Volume one

ORAL REHABILITATION PROBLEM CASES

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Treatment and evaluation

JEROME M. SCHWEITZER, B.S., D.D.S.

Clinical Professor of Denture Prosthetics, New York University College of Dentistry Graduate School, New York, N. Y.; Guest Lecturer in Prosthodontics, University of Pennsylvania Graduate School of Medicine, Philadelphia, Pa.; Fellow, American College of Dentistry; Fellow, International College of Dentistry; Fellow, American Academy of Denture Prosthetics; Fellow and Past President, Greater New York Academy of Prosthodontics; Associate Fellow, New York Academy of Medicine; Member, American Prosthodontic Society; Member, American Equilibration Society; Honorary Member, Swedish Dental Society; Past Chairman, Prosthetic Section, First District Dental Society, New York, N. Y.; Author of *Restorative Dentistry* and of *Oral Rehabilitation*

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PREFACE

It is the duty of man to remember and to communicate. Every effort has been made to do this in my two previous prosthetic textbooks, *Restorative Dentistry* and *Oral Rehabilitation*. It is well to keep in mind that there can be an appreciable difference between the proclamation of a concept and its practical application at the clinical level. During nearly half a century of dental practice, I have tried to observe, compare, reflect, and document. I am now recording my conclusions. No two patients and no two methods of treatment are similar, and while I have enjoyed a fair proportion of success in treatment planning and execution, I have also been confronted by failure. This has been due to a lack of knowledge on my part of the cause and effect relationships, or to the insufficiency of the available knowledge.

This will probably be my last textbook. The actual organization of the contents and arrangement of this material have taken the better part of four years. To collect the material has taken thirty-five years. While the will to do is still present, the body grows weary. There are too many distractions and too many curricular and extracurricular activities. As one ages, responsibilities increase, honors multiply, and professional and civic administrative duties occupy more and more of one's time. This is as it should be, but with these events it becomes impossible to continue to contribute in all areas, regardless of one's ability or desires. Most of us must finally be content with the faithful performance of these many and varied chores which gradually take the place of the more burning ambitions of our youth in the realm of research and clinical investigation.

My sincere thanks to my friend, Kenneth Carroad, Esq., for his help in dealing with the legal aspects of this book; to my son and associate, Dr. Jerome Schweitzer, for reproducing the roentgenograms in black and white prints; to my son and associate, Dr. Robert D. Schweitzer, for reviewing the text in general and making the index; to my daughter-in-law, Patricia de Waele Schweitzer, for her help; to my secretary, Delores Eisenberg, for her help; and above all to my wife, Dorothy, not alone for retouching the photographs and assisting in the organization of the manuscript, but for her patience, understanding, encouragement, and counsel in all matters.

Finally, I am grateful for the privilege of practicing in association with my sons, Jerome and Robert. What greater reward is there for a father!

Jerome M. Schweitzer

To those patients all over the world, whose trust in our integrity and ability makes it imperative that we continue to study throughout our professional lives in order to be able to successfully cope with, in a sympathetic and understanding manner, the many dental problems they present.

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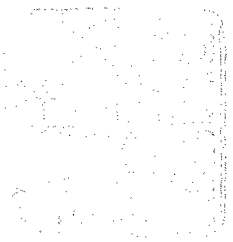
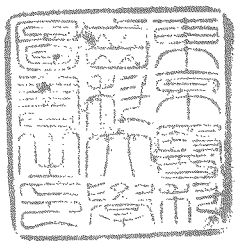




Chapter 1

THE GOAL WE STRIVE TO ATTAIN

Let us state our goal in reconstructing an occlusion. The ideal result is one in which the processes of breakdown are stopped, and a flawlessly functioning stomatological system is created. Excellent esthetics would be patterned to the phenotype and yet obey all biomechanical principles.

We accept the fact that because of human frailties of body and mind, this ideal result is not usually attained. In order to be realistic we must modify our aims. We should strive to halt the known degenerative processes, such as caries and periodontal disease, and to replace the missing teeth with fixed and removable prostheses. We will fully realize that any treatment is dictated by man-made mechanical and physiological concepts. The success of our method of intercuspating teeth for good function and longevity depends on our particular skill to achieve our mental picture of what the finished product should resemble. Such a result, while not being perfection, will permit us to attain successes having reasonable longevity, function, esthetics, and comfort. Those among us who are serious and conscientious in our endeavors attain these results in most cases, but there are certain factors over which we have little control that may become obstacles to satisfactory results. The most important of these is the systemic factor. Under this broad heading would come heredity, neuromuscular control, psychic factors, and immunity to caries. Undoubtedly one can add many more conditions.

While, then, we are aware of the ideal result, we generally have to settle for considerably less because of the hard fact that our reconstructed cases, once completed, are exposed to the same wear and tear to which all other human organs are subjected.

DOCUMENTATION

By analysis of careful documentations, those dentists who have completed more than two hundred cases of complete oral rehabilitation realize that the useful life of their work is likely to be only between ten and fifteen years. Whereas unusual cases that have lasted fifteen years or more can be adduced, they are rare indeed without considerable maintenance or redoing.

HOW ARE OUR FINAL RESULTS APPRAISED?

Even in appraising our final results in terms of longevity and in comparing them with the work of others, it is all too easy to misinterpret the evidence because of the lack of standardization in the original premise. To what extent was the stomatological system broken down when its reconstruction was undertaken? There is a great difference between rehabilitating the mouth of a person who presents poor hygiene, periodontal involvement, numerous caries, devitalizations, missing teeth, and systemic involvement and in restoring the mouth of an individual who presents rampant caries that has led to missing teeth and malocclusion but whose periodontal and bony structures are strong and healthy.

I have restored the mouths of people whose teeth have been eroded because of drinking lemon juice. The longevity of the results in these cases has far exceeded that attained in cases of severe dietary deficiency on top of weak osseous and periodontal structures. For a fair comparison of the life expectancy of our results after our therapy has been completed, only cases of similar nature should be considered. To date I have not seen published records of such comparative data. As a consequence, there are little means of evaluating the results of individual operators, based upon their own chosen techniques and carried out by them with instruments of their own preferences. Up to now we have relied upon the subjective opinions of practitioners whose conjectures and individual claims were based either upon their own mental impressions of their successes and failures or upon some random cases which they documented and kept over the necessary spread of years.

Careful documentation is a difficult and laborious task. It entails a combination of closely related factors:

1. Records must be kept early in the career of the dentist. This entails curiosity and enthusiasm as well as industry.
2. Records must be taken at least every two years.
3. The dentist must retain his patient for enough years to make the study meaningful. For various reasons this in itself is often difficult.
4. The techniques should be various, and sufficient cases must be completed in order to make valid comparisons.
5. The dentist needs to remain in practice for a considerable length of time and to be in reasonably good physical and mental health so that he can evaluate his documented records objectively.
6. The patients under investigation must be cooperative and in addition must attain an age that will provide the necessary evidence.
7. A sufficient number of investigators must undertake the same study in order to compare results if subjectivity is to be eliminated.

In any form of research it is desirable to have a reference line in order to draw valid comparisons. There should be a "control" in the experiment. In our own experimentation the control or reference line is the individual operator. The same operator, with the same skill and knowledge, completes a given number of cases.

METHODS OF DOCUMENTATION

Records have been made of all the patients whom I have treated since the early 1920's. In addition, records were made of cases presented for an evaluation even though no treatment was given. Many of these documentations seemed unimportant then, but when given the extra dimension of time, they proved of inestimable value. Photographs were taken in black and white and color transparencies. Roentgenograms and history reports were taken. These amount to over 25,000 color transparencies, several thousand black and white 4 by 5 prints, and, in addition, the roentgenograms of these patients. They span a period of forty-two years.

DIVISIONS OF PROBLEM CASES

In order to present these problem cases in an orderly manner, they have been arranged in three large divisions, namely:

1. Those over which the dentist has very little control
2. Those over which the dentist has limited control
3. Those over which the dentist has great control

These three broad areas have been further subdivided into many categories which overlap each other in several instances and which cross over the boundaries of the three large divisions at times so as to clarify some special topics and to effect some semblance of order in the presentation. The following thirty-five categories are therefore presented:

1. Importance of the systemic factor
2. Periodontal disease of suspected systemic origin
3. Retention of problematic teeth
4. Postinsertion care of extensive prosthetic restorations
5. Splinting from the point of view of the prosthodontist
6. Gold copings for problematic teeth
7. Patients who find it difficult to wear removable appliances
8. Retention of infected teeth
9. Insertion and cementation of extensive prosthetic restorations
10. Problems associated with deep overbite
11. Difficulty of mandibular repositioning
12. Failures encountered in orthodontic treatment
13. Injuries of the temporomandibular joints
14. Postural changes induced by aging and disease that may alter the position of the mandible
15. Violation of the free-way space
16. False prognathism
17. Principles of gnathology
18. Principles of Transographics

19. Tongue and false swallowing habits that create problems
20. Insertion of a small filling that may change the entire occlusion
21. Problems created as a result of the open bite
22. Problems created as a result of growth anomalies
23. Problems with an emotional background
24. Periodontal disease with an emotional background
25. Problems created by poor judgment and/or lack of knowledge on the part of the dentist
26. Problems created by a lack of knowledge as to the properties of the various materials used in extensive prosthetic restorations
27. Problems created by systemic disease
28. Problems created by aging
29. Problems created by faulty habits
30. Fallacy of depending upon any specific theory or concept of occlusion
31. Problems caused by caries
32. Generally unsatisfactory cases
33. Problems met with in attempting to duplicate fixed and removable partial dentures
34. Problems associated with the dual bite
35. Problems created by neglect on the part of the patient

Chapter 2

SUCCESSFUL RESULTS— IMPORTANCE OF GOOD SYSTEMIC FACTORS

There are several criteria to measure the success of the completed oral rehabilitations. Among them are an extended life, the ability of the patient to function well, reasonably good comfort, the lack of deterioration of the tissues, and good esthetics. The presence of all of these favorable indicia marks the ideal result.

A SUCCESSFUL RESULT

Case 1

In 1926 a 44-year-old woman presented herself for treatment.* There were twenty-two remaining teeth. Of these, six were nonvital. This was the era in which nonvital teeth were usually condemned because of the possibility of their causing focal infection. In the following years the pulpless teeth were removed. Only sixteen teeth remained in 1937 when her mouth was rehabilitated. She was then 55 years old. A Hanau Model H articulator was used. At the time of writing the patient was 81 years old. The upper and lower removable partial dentures that were inserted in 1937 were still in position. No other teeth were removed after the extraction of the nonvital teeth in the late twenties. Her function was excellent. The teeth were firm, and the periodontal tissues were healthy. The maintenance cost of the reconstruction was very small. This is presented as an ideal result. It will be in marked contrast to some of the other cases presented. (Figs. 1 to 24.)

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., p. 249.

Text continued on p. 24.

Fig. 1. Clinical photograph at the start of treatment in 1937. (Figs. 1 to 24 are of the same case.)

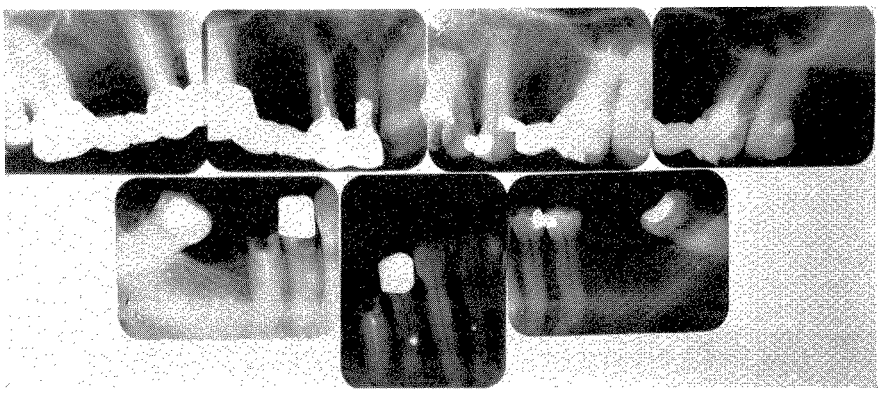


Fig. 2. Roentgenograms taken in 1926 at the age of 44 years.

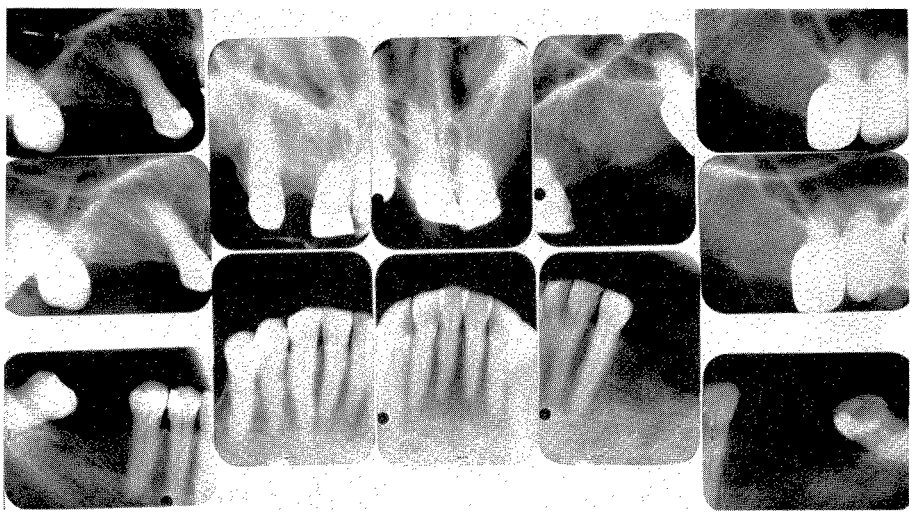


Fig. 3. Roentgenograms taken in 1937 at the age of 55 years. All the nonvital teeth were removed. This was the era during which nonvital teeth were condemned for their role in systemic infection.

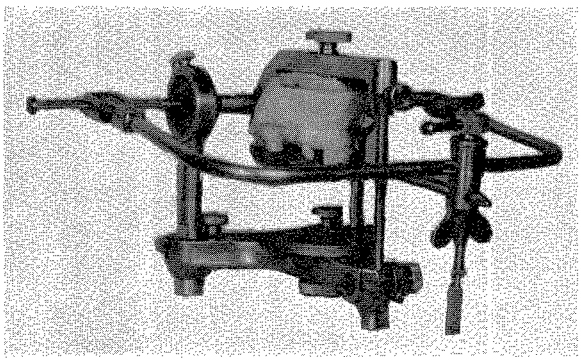


Fig. 4. October, 1937. The upper study cast being mounted on the Hanau Model H articulator by means of the Snow face-bow.

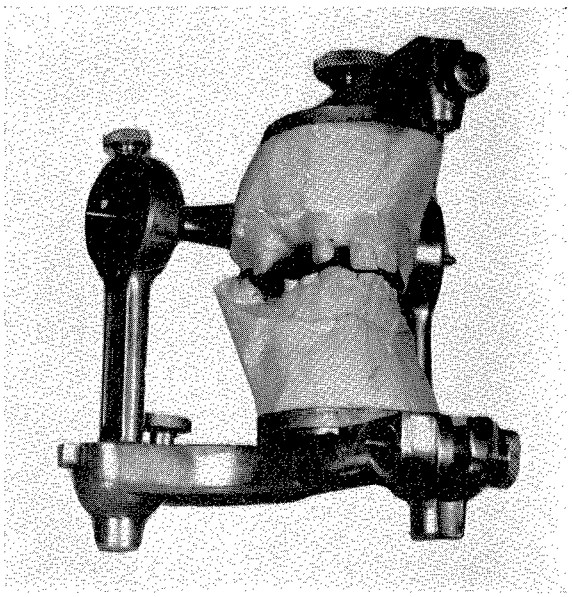


Fig. 5. This is the approximate opening to which the bite was finally raised. The modeling compound bite shown here between the teeth was taken directly in the mouth and then transferred to the articulator in order to relate the casts.

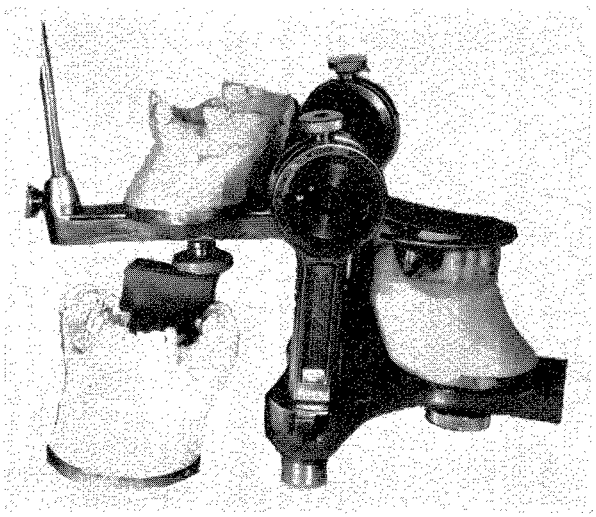


Fig. 6. In the preliminary coordination of the occlusion, the lower posterior teeth were restored by means of gold crowns which conformed to the undersurface of a four-inch disk. The study cast in the left foreground was retained as an original record.

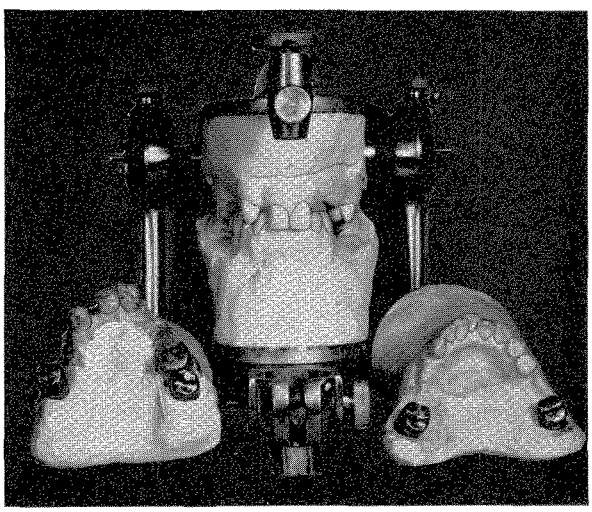


Fig. 7. After the lower crowns were completed, the upper crowns were constructed to articulate with them at the predetermined increase in the vertical dimension. The original casts are on the articulator. The work casts with the five cast gold crowns are interchangeable with them.

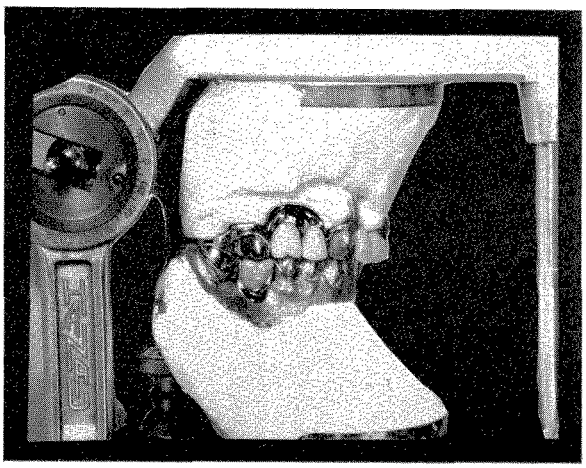


Fig. 8. Right-side view of the completed work.

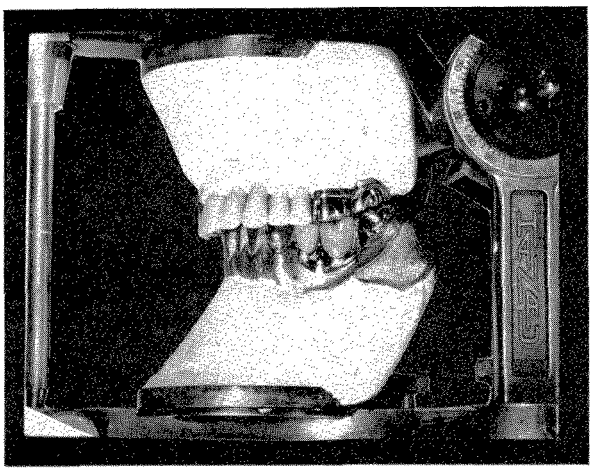


Fig. 9. Left-side view of the completed work. Observe the horizontal overjet.

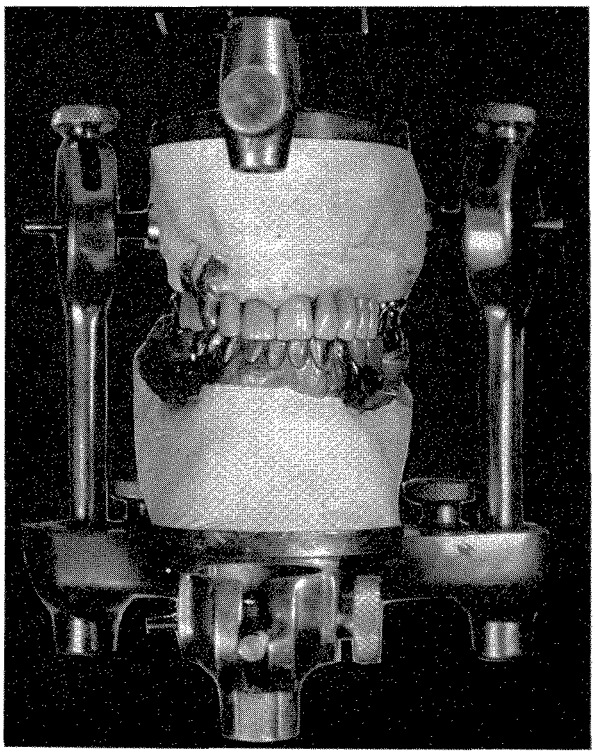


Fig. 10. Anterior view of the completed work. There is very little vertical overbite.

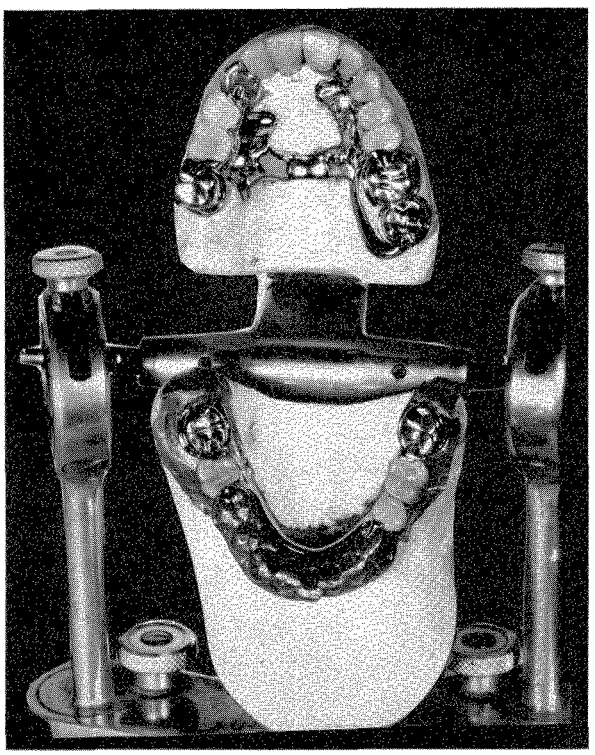


Fig. 11. Occlusal view. Upper and lower fixed and removable partial dentures and porcelain jacket crowns. A lug runs from the left upper third molar into a lug seat in the distal portion of the second molar. The more modern method is to solder both crowns together for greatest strength.

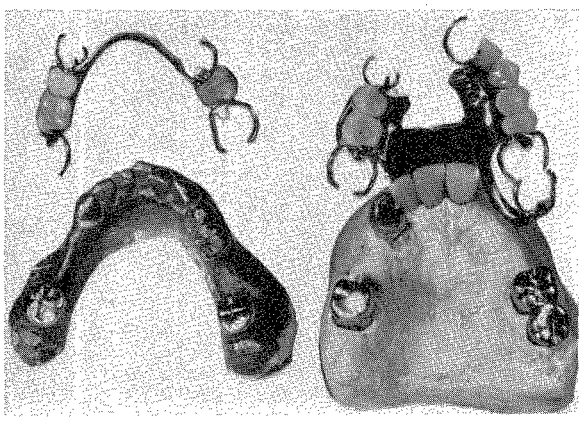


Fig. 12. The removable partial dentures are shown off the casts. The porcelain bridge runs from the right central incisor to the cuspid. It is a broken stress bridge. The more modern method would be to solder both abutments together for greater rigidity. The double clasps on the left side of the upper denture were constructed in order to dispense with the labial clasp on the left central porcelain jacket crown.

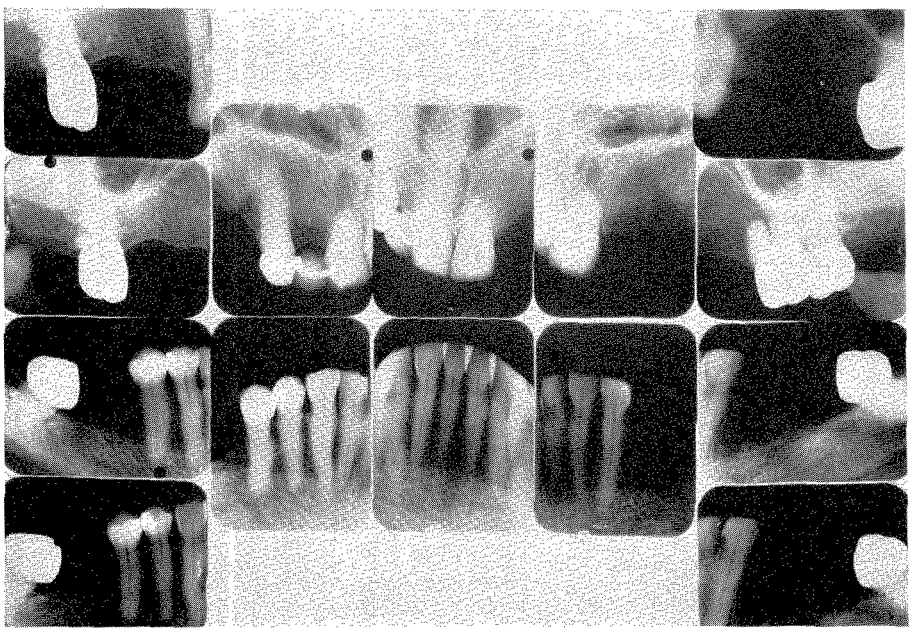


Fig. 13. Roentgenograms of the completed work taken in November, 1937.

Fig. 14

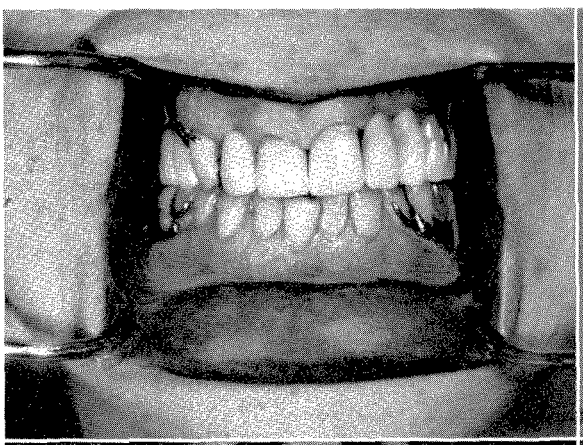
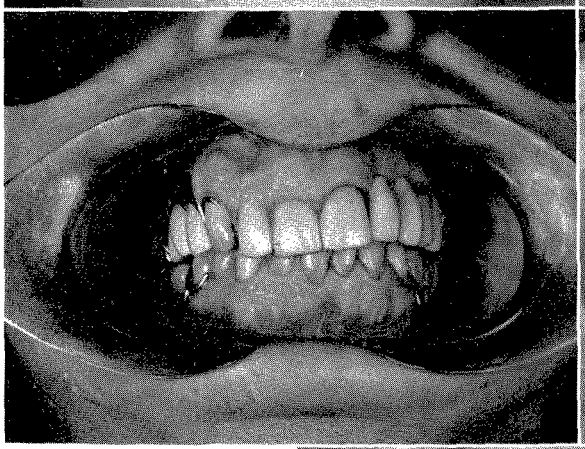


Fig. 15

Fig. 16



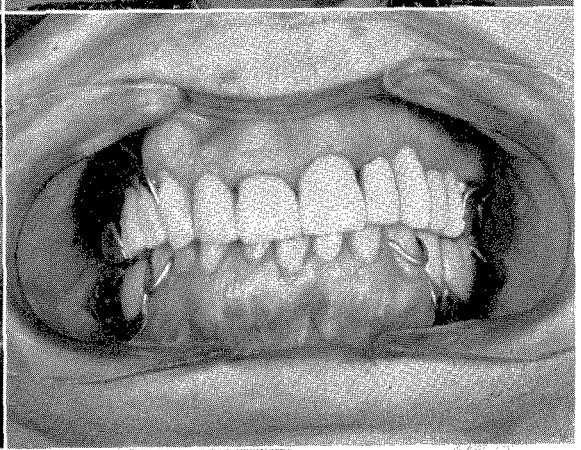


Fig. 17

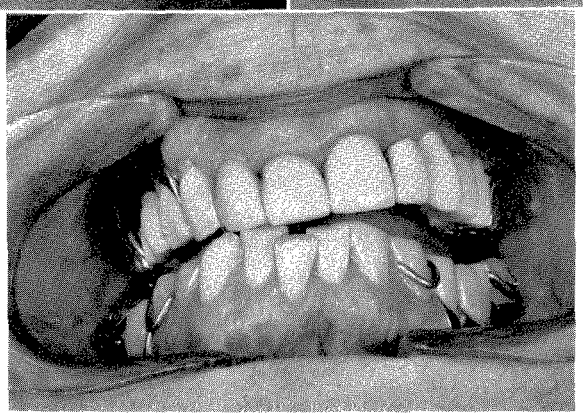


Fig. 18

Fig. 14. The final work in the mouth. Observe the increased vertical dimension.
Fig. 15. Compare the facial appearance with the face at the start of treatment.
Fig. 16. By 1942, five years after completion, the bite had closed in the anterior region. This may have been due partly to an excessive opening and partly because the anterior teeth, which originally contacted, were taken out of contact in the final work. This often permits the over-eruption of the involved teeth even if the vertical dimension was normal.
Fig. 17. Sixteen years after completion (1953). The bite was stable. The patient was approaching 70 years of age.
Fig. 18. Although the completed work presented a coordinated occlusion, the bite in 1953 was in complete imbalance if the patient was asked to move her teeth in any direction on the horizontal plane. However, her functional chewing had to be performed in the transverse and vertical planes rather than in the horizontal plane; otherwise the oral structures would have deteriorated.

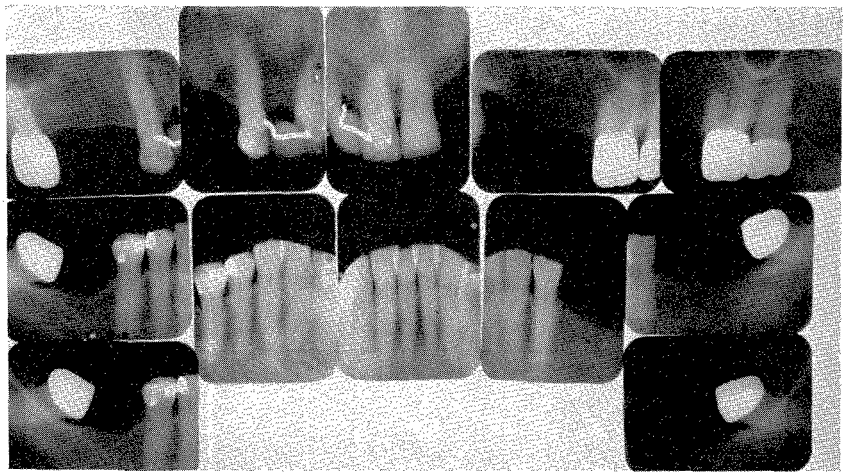
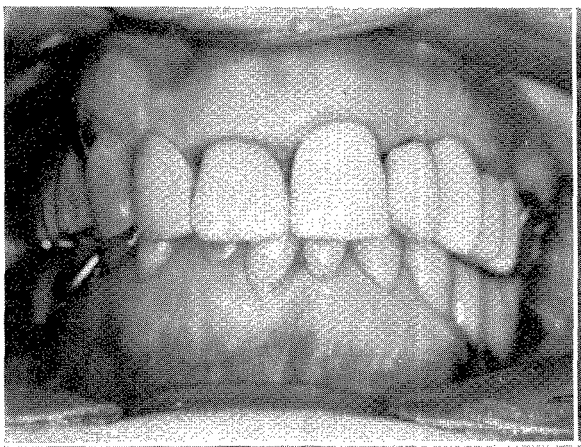


Fig. 19. The 1953 roentgenograms disclosed normal, healthy structures. There had been no deterioration in the sixteen years following the reconstruction.

Fig. 20



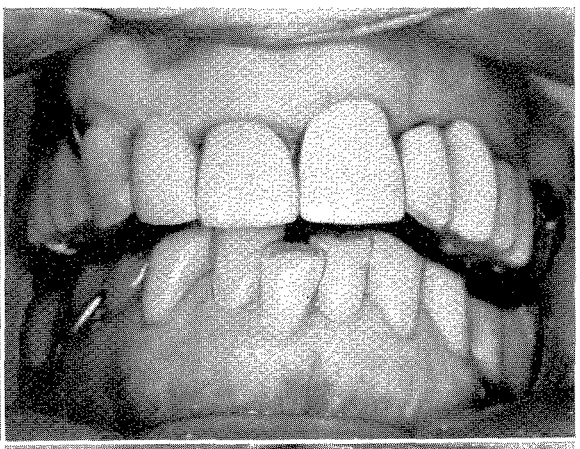
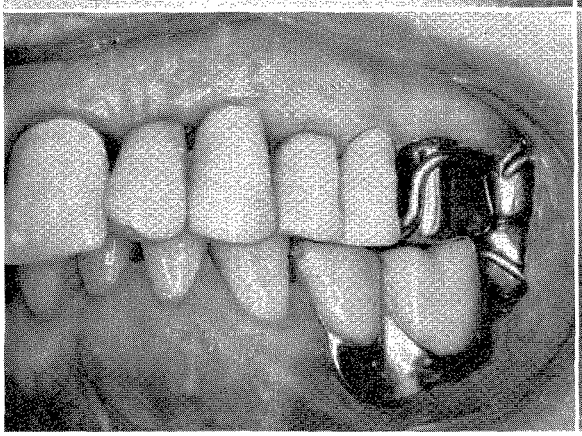


Fig. 21

Fig. 22



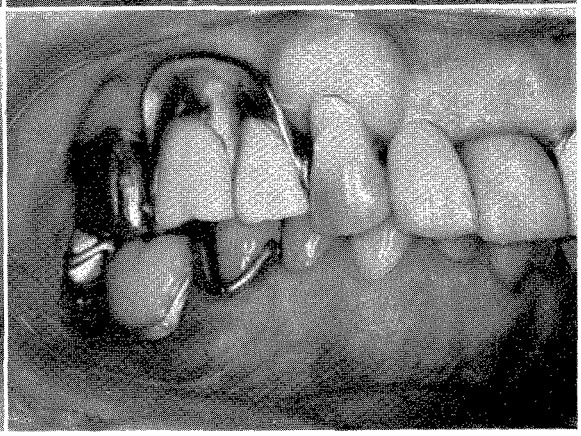


Fig. 23

Figs. 20 to 23. Four views of the teeth as they appeared in 1962. This was twenty-five years after the completion of the work.

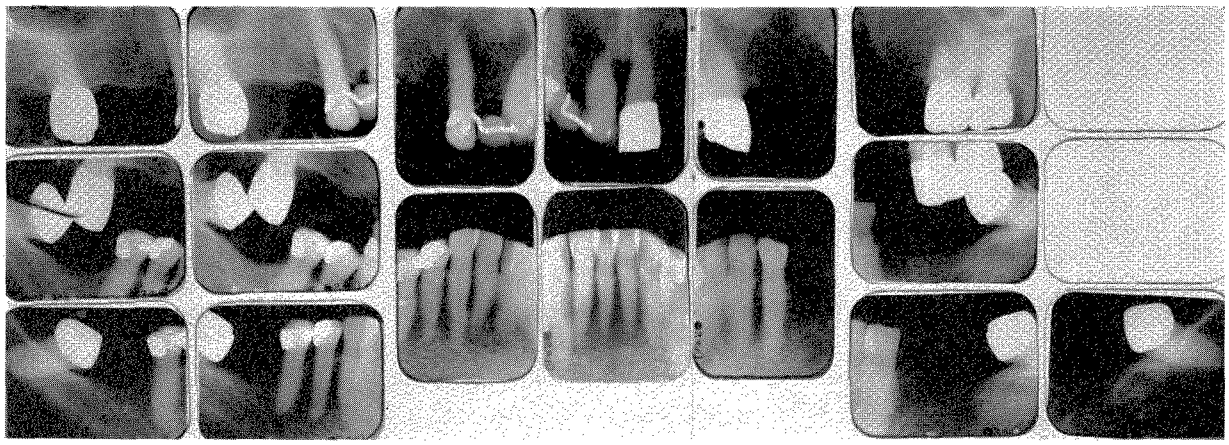


Fig. 24. Roentgenograms taken twenty-five years after work was completed (1962).

Discussion

There are several important considerations in studying the results of a case of this nature. In 1926, at the age of 44, the patient had lost ten teeth. These, it can be assumed from the condition of the teeth, were lost because of caries and pulp infections, not because of weak periodontal tissues. She presented a deep overbite which was opened considerably in the restorative work. Subsequently, the bite closed in the anterior region. It took several years before it stabilized. It also closed in the posterior region. This is evident because the original lower occlusal curve had been made with a template. By 1958 it was impossible to place a template upon her lower cast without observing its nonconformity.

During the reconstruction procedure we exerted considerable effort to obtain the traditional working and balancing bites. The photographs taken several years later indicate that there was no longer any evidence of a balanced occlusion. It must, therefore, be assumed that this patient's functional chewing pattern is predominantly vertical and not on the horizontal plane as we are taught to believe.

Starting with only six upper teeth one would judge they would have deteriorated and would have had to be removed in the course of time. This did not take place. Undoubtedly, centric contact was in harmony with centric relation in her important terminal functional orbit. There was no clash between the patient's muscles, nerves, teeth, and temporomandibular joints.

THE SYSTEMIC FACTOR

But even all of this would not account for the successful outcome. What must be considered is the patient's excellent "systemic factor." In spite of a deep overbite and a departure from our traditional concepts of a balanced occlusion, although only a few teeth were left, the structures remained healthy. In addition, the patient paid very little attention to her teeth and rarely made an appointment of her own accord unless there was something in need of repair. Otherwise she was constantly receiving office reminders to take reasonable care of her teeth. Cases such as these teach us that of all the factors concerned with preservation of teeth, the "systemic factor" is the most important.

A category headed "a good systemic factor" would include many patients. For such people, unless the minimum requirements of good physiological and mechanical concepts are flagrantly violated, operative and prosthetic procedures are successful. During the age of adolescence some of these patients may have suffered from rampant caries and may have had many teeth removed. This might have been caused by poor analysis and inadequate treatment. Even such cases could have been carried through this period if careful operative dentistry had been performed. (Refer to Figs. 2023 to 2029, 2035, and 2036.)

Some of these patients lose teeth because of severe neglect or inadequate finances or both. This does not negate the premise that in a patient with a good systemic factor the oral structures have their best chance for survival.

We are told that in the normal healthy and young adult dentition, centric occlusion and centric relation are harmonious. However, we see patients in this age group and older, with occlusions defying all of our principles, still having sound periodontal and bony structures.

Even the staunchest advocate of local environment deterioration will classify some patients as systemically predisposed to oral disease. Diabetes, hyperparathyroidism, and leukemia are only a few examples of this. Other types of oral change with known manifestations but unknown causes are called idiopathic.

With these facts glaring at us, should we not question the diagnosis of the cause of oral disintegration? Is it not plausible that oral breakdown is one effect of multicausal systemic deterioration that is undetectable by presently known methods? Is not the normal 50-year-old person in reality a good deal less healthy than the normal young adult? Should we not, therefore, in considering occlusal breakdown, give at least equal importance to systemic and local factors?*

The following cases were selected to demonstrate the validity of this claim. In these case histories all the patients had a good systemic factor. The documentation covers a minimum of twenty-two years to a maximum of forty years. At the time of writing the patients ranged in age from 60 to 80 years.

PATIENTS WITH GOOD SYSTEMIC FACTORS

Case 2

The subject to be presented is a woman who came for dental treatment in 1922. At that time, twenty-nine teeth were present. The lower right first molar was nonvital and infected. It was removed in 1937 and replaced with a fixed bridge. The upper left second bicuspid was removed and replaced in 1942. Its removal can be attributed to a devitalization due to caries. Pulp treatment was refused by the patient. In 1944 porcelain jacket crowns were inserted on the upper incisors because of an etching of the enamel due to lemon juice erosion. The following two sets of roentgenograms cover a forty-year period from 1922 to 1962. There has been very little structural change. The patient at the time of writing was 60 years of age. (Figs. 25 to 29.)

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*Schweitzer, J M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 679-725.

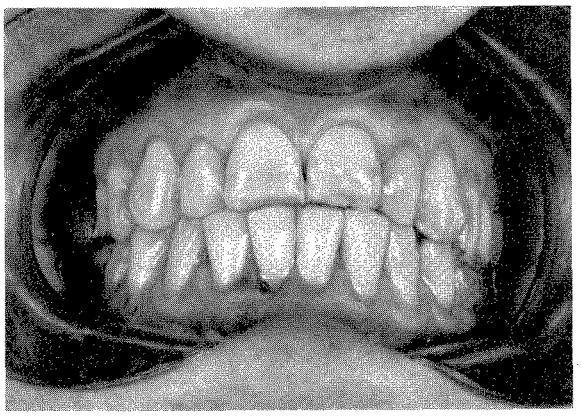
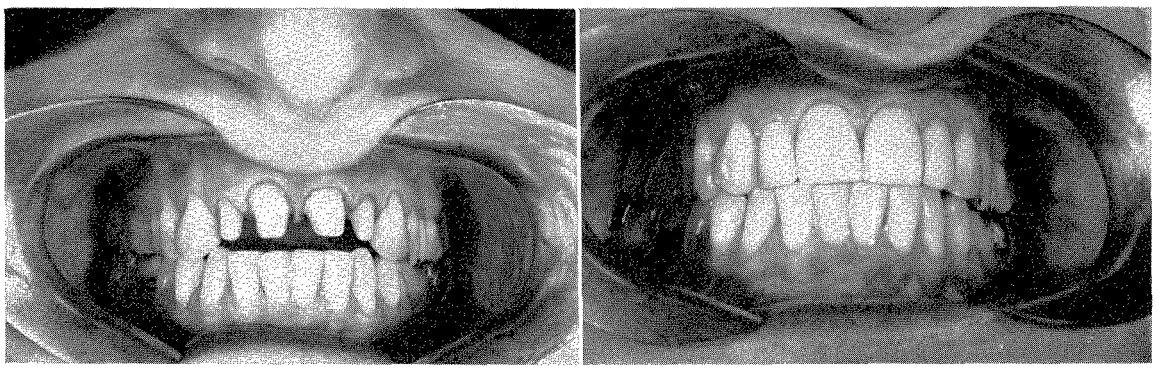


Fig. 25. November 2, 1940, at the age of 38, showing lemon juice erosion of the upper incisors. (Figs. 25 to 29 are of the same case.)

A



B

Fig. 26. A, March, 1944. The central and lateral incisors were prepared for porcelain jacket crowns. **B,** The porcelain jacket crowns were inserted.

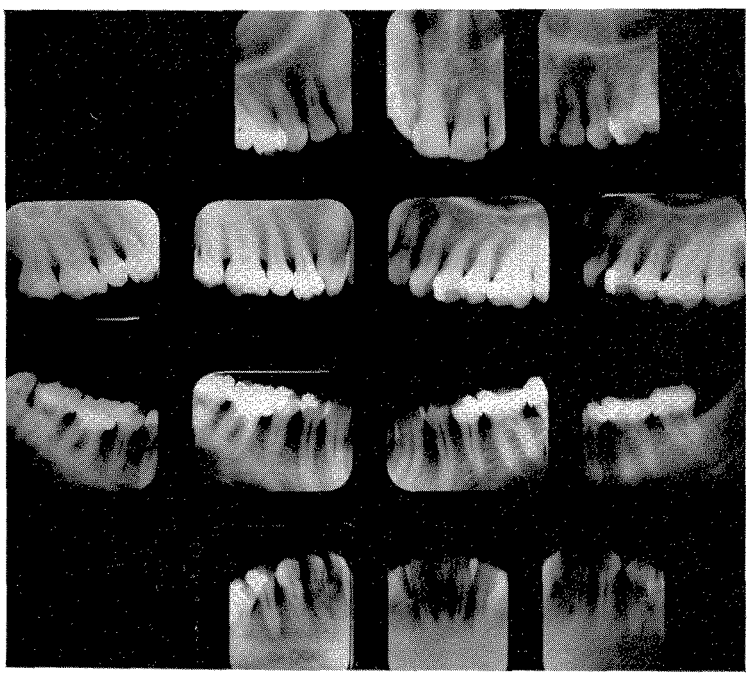


Fig. 27. 1922 roentgenograms. The patient was 20 years of age.

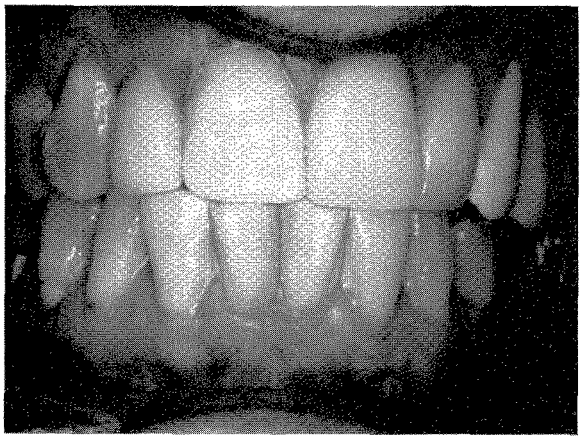


Fig. 28. Anterior view of the teeth taken in July, 1962, when the patient was 60 years old.

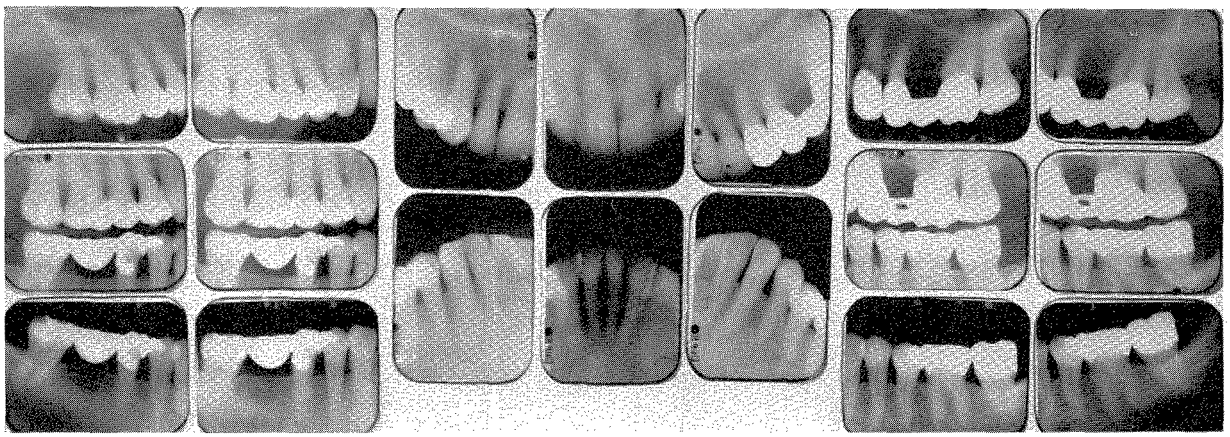


Fig. 29. November, 1961, roentgenograms.

Case 3

This patient, also female, came for dental treatment in 1919. Unfortunately the early roentgenograms were damaged, but the 1933 and 1962 series covering nearly thirty years are presented. Her oral structures were excellent. (Figs. 30 to 32.)

Discussion

The interesting feature of this case is that when the patient was examined initially the lower first molars were absent. Nature attempted to compensate for this loss by tipping forward the second and third molars to close the space. In spite of this her oral structures were in excellent condition at the time of writing when she was 60 years of age. Another factor ordinarily to be considered is that the patient was obese and that in 1957 she suffered a coronary attack. However, these conditions apparently had no ill effect upon her oral structures.

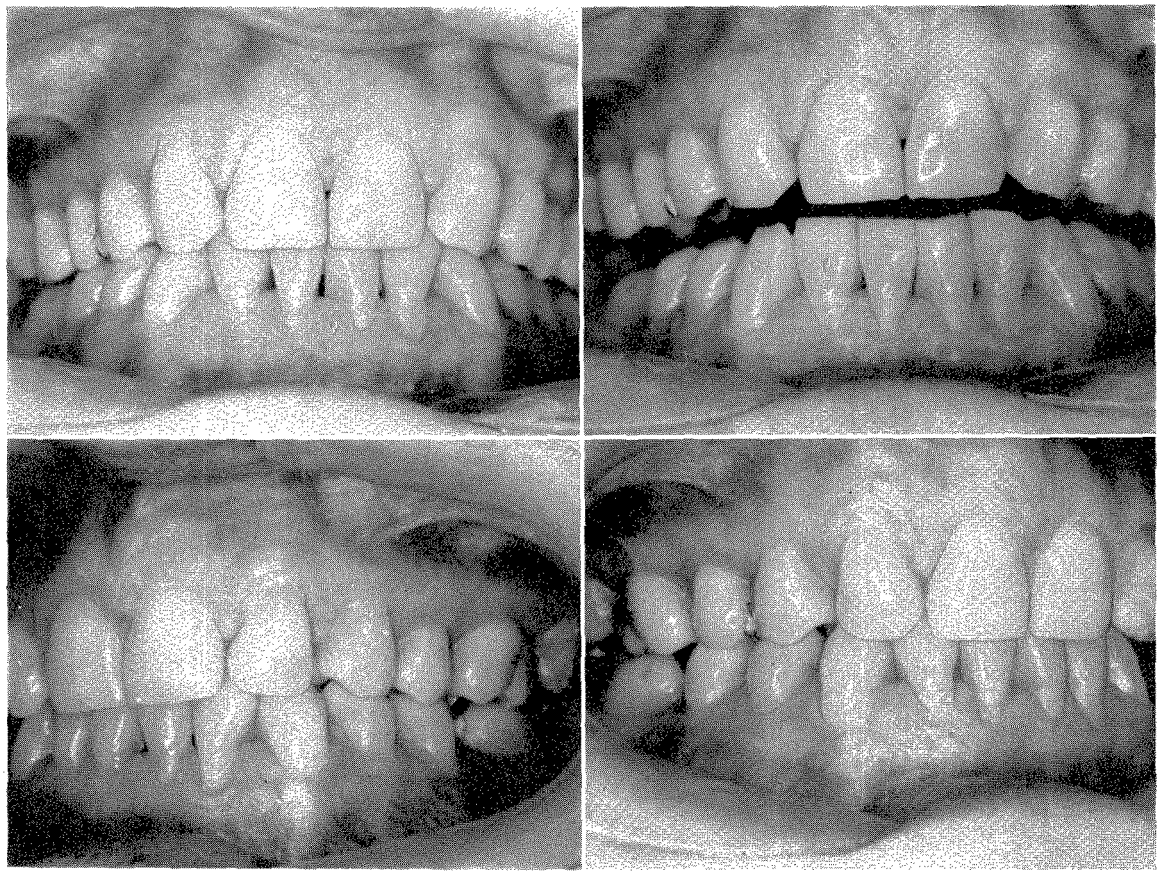


Fig. 30. 1961 photographs, anterior and lateral views, of the patient at the age of 60. Excellent oral structures. (Figs. 30 to 32 are of the same case.)

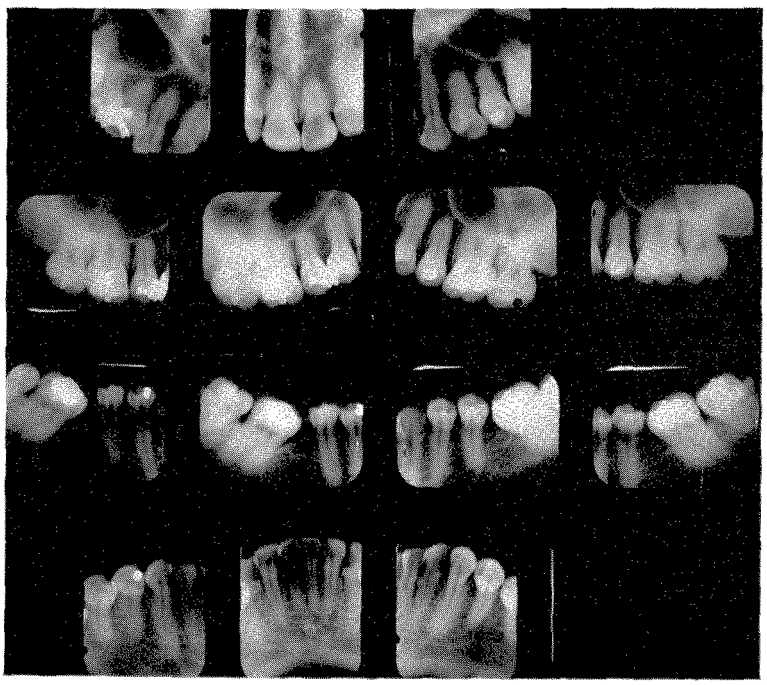


Fig. 31. 1933 roentgenograms of the patient whose mouth is shown in Fig. 30.

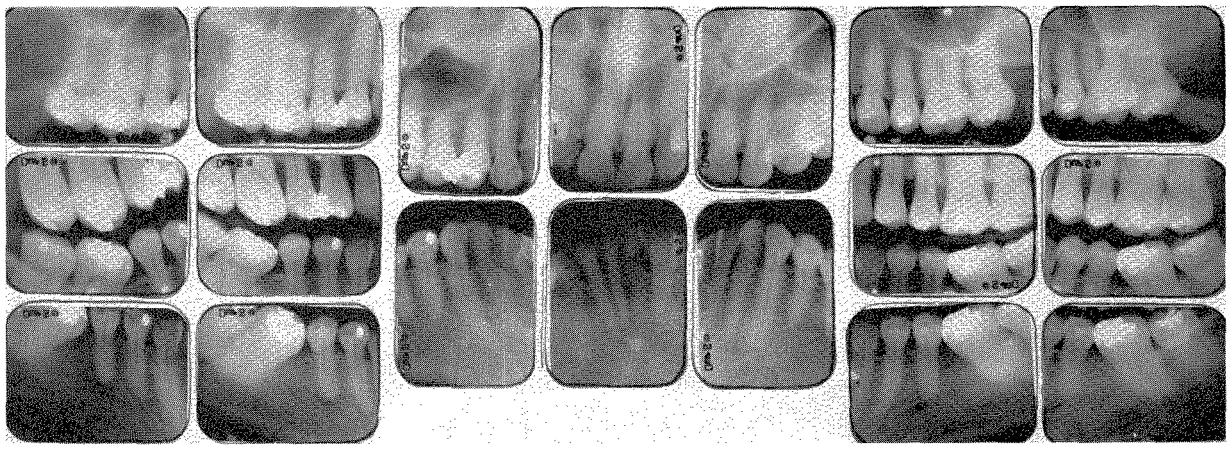


Fig. 32. May, 1961, roentgenograms of the patient shown in Figs. 30 and 31.

Case 4

This female patient came for dental treatment in the 1920's. The early roentgenograms were damaged in a flood. However, those covering nearly thirty years from 1933 to 1962 are shown. The patient had a cross-bite in the left bicuspid region. This was corrected many years previously. She was subject to recurrent caries around the margins of her fillings, and in 1952 the pulp of the lower left first molar was lost. The patient at the time of writing was 60 years old. Her dental structures were excellent. (Figs. 33 to 35.)

Case 5

This was a male patient whose roentgenograms are shown from 1932 to 1959. covering a span of nearly thirty years. The patient died in 1959 at the age of 78, He came for dental treatment for the first time in the early twenties. Both lower first molars were missing. They were never replaced. A deep anterior vertical overbite was present. In 1951 his upper and lower incisors were shortened and crowned, thus reducing the vertical overbite. This patient had a peculiar lip habit. He compressed his lips so that no vermilion border was visible. Other than the regular care and maintenance, his dental structures were in excellent condition when he died in 1959. (Figs. 36 to 41.)

Case 6

This was a female patient who at the time of writing was 83 years old. Her 1929 roentgenograms revealed that eight teeth were missing. These included seven molars and one bicuspid. These teeth were never replaced. Fillings were inserted, and general dental care was performed. Her 1929 and 1962 roentgenograms are presented. The oral tissues were healthy. There was no loss of teeth. Her continued excellent oral health took place in spite of all the missing teeth and no replacements. The case is remarkable in retrospect. Among the reasons for the very successful outcome are undoubtedly the systemic factor. Her method of chewing may also have had a favorable effect. (Figs. 42 to 44.)

Text continued on p. 34.

Fig. 33. Anterior and lateral views of a 60-year-old female patient with excellent oral structures. (Figs. 33 to 35 are of the same case.)

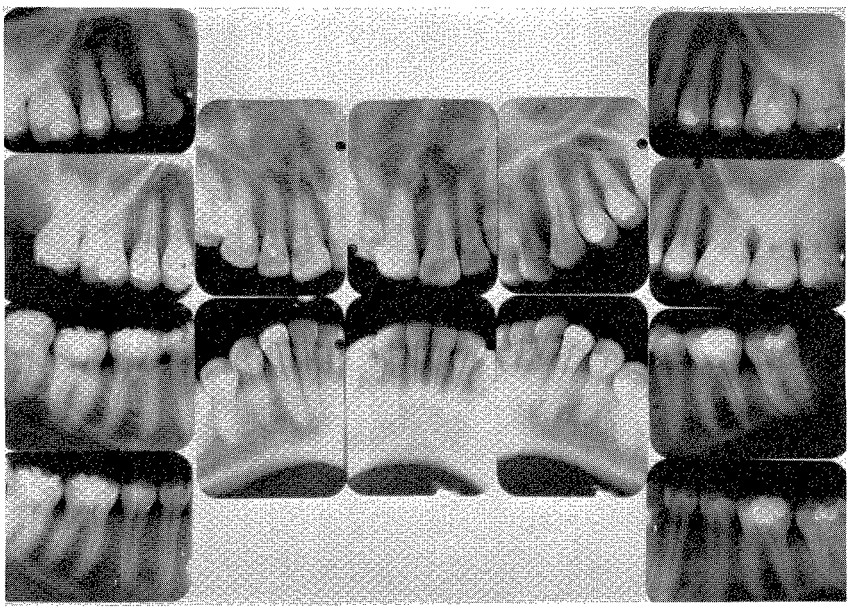


Fig. 34. Roentgenograms of the patient shown in Fig. 33 taken in 1933 when she was in her early thirties.

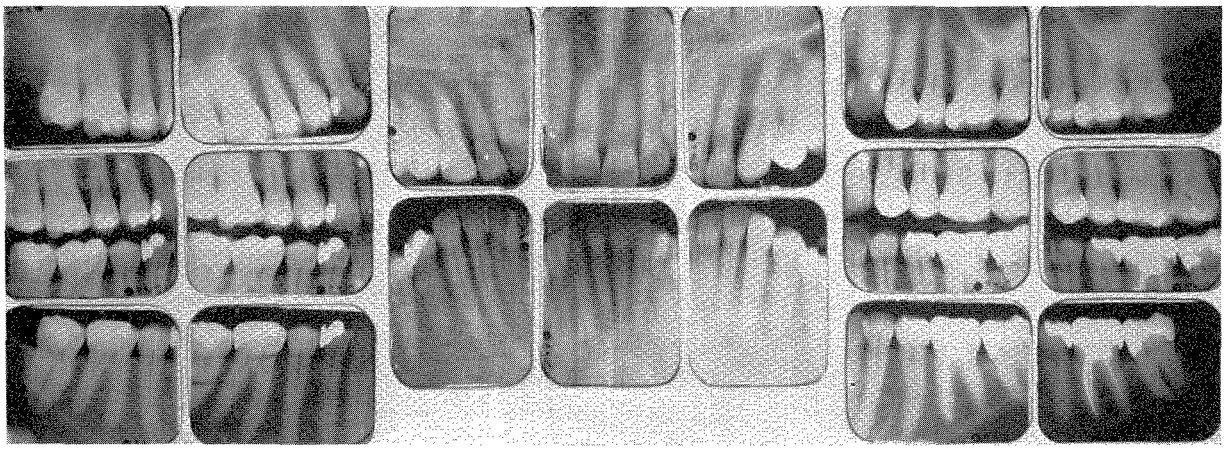
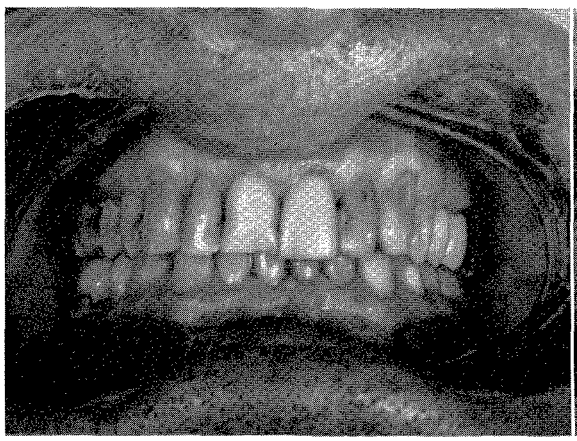


Fig. 35. 1962 roentgenograms. The patient shown in Figs. 33 and 34. She is now 60 years of age. Excellent oral structures.

Fig. 36



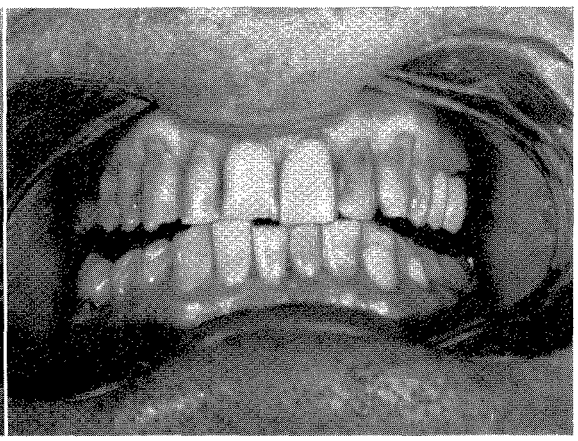


Fig. 37

Fig. 36. Anterior view taken in June, 1949, at the age of 68. Deep vertical overbite. Excellent oral structures. (Figs. 36 to 41 are of the same case.)
Fig. 37. Teeth parted to show extent of vertical overlap.

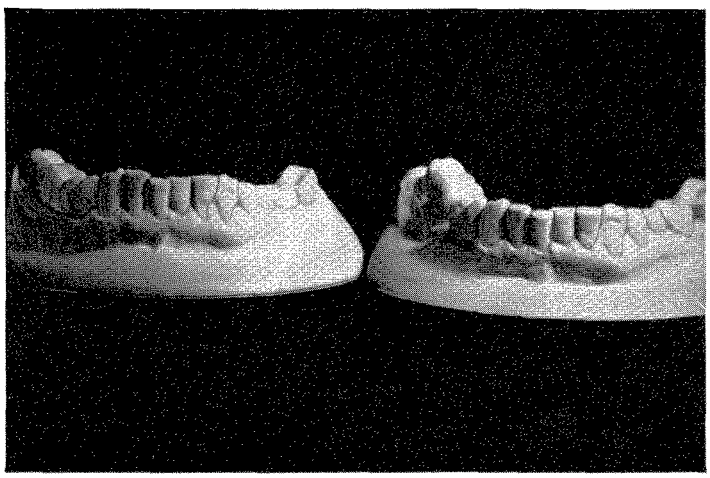
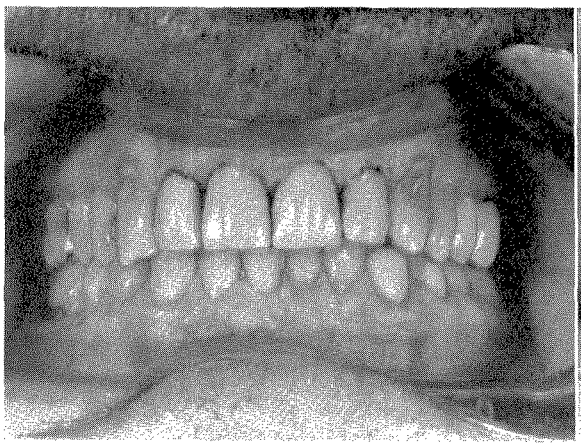


Fig. 38. In 1951 the lower incisors were shortened (right cast) to aid in the reduction of the vertical overbite. Stone cast on the left was made before the incisors were reduced.



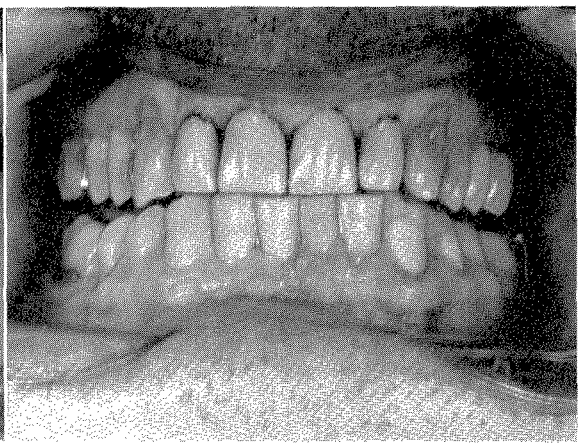
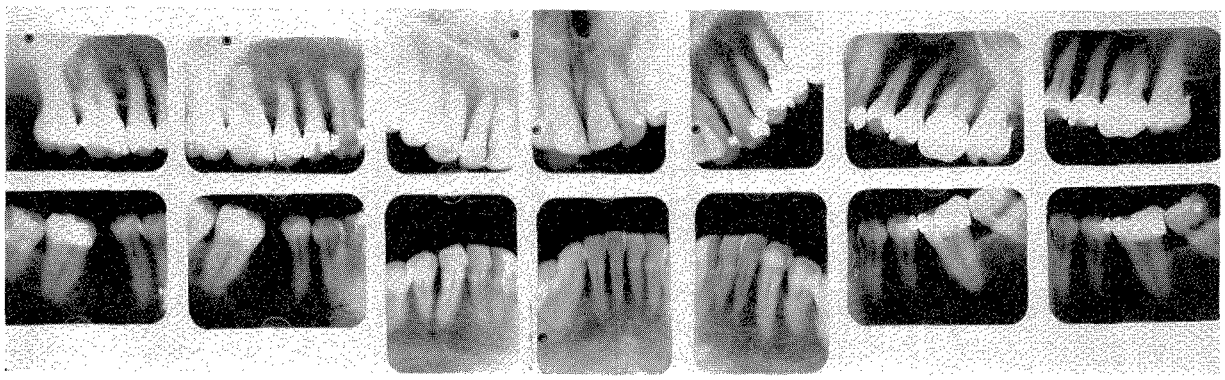


Fig. 39

Fig. 40

Fig. 39. Photograph of the patient taken in 1951 at the age of 70. The upper central and lateral incisors were covered with plastic veneer crowns. The vertical overbite was reduced.
Fig. 40. The teeth were separated. The lower incisors were rebeveled. Compare these with Fig. 36.

A



B

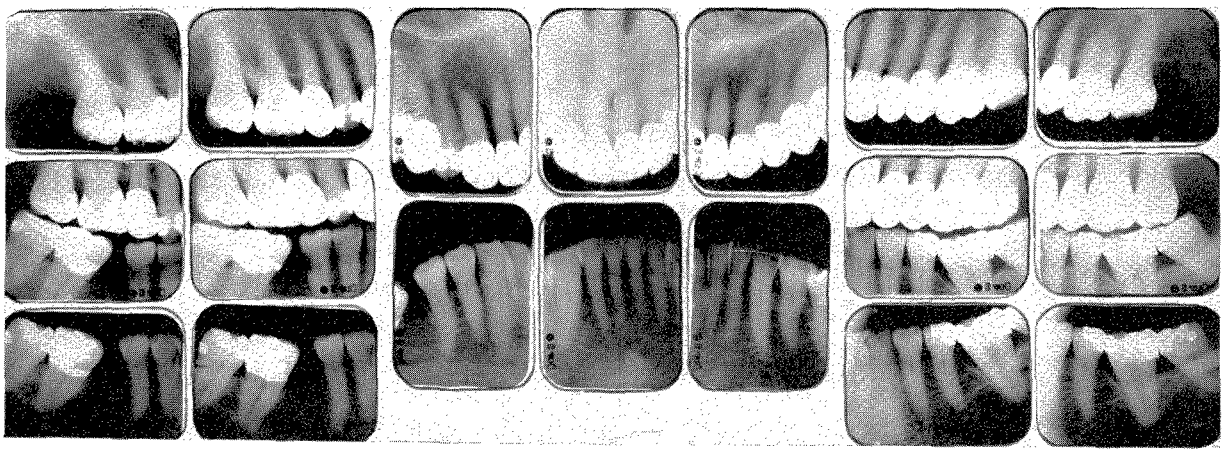


Fig. 41. A, 1934 roentgenograms. The patient was 53 years of age. **B,** 1959 roentgenograms. The oral structures were in excellent condition. The patient's age was 78.

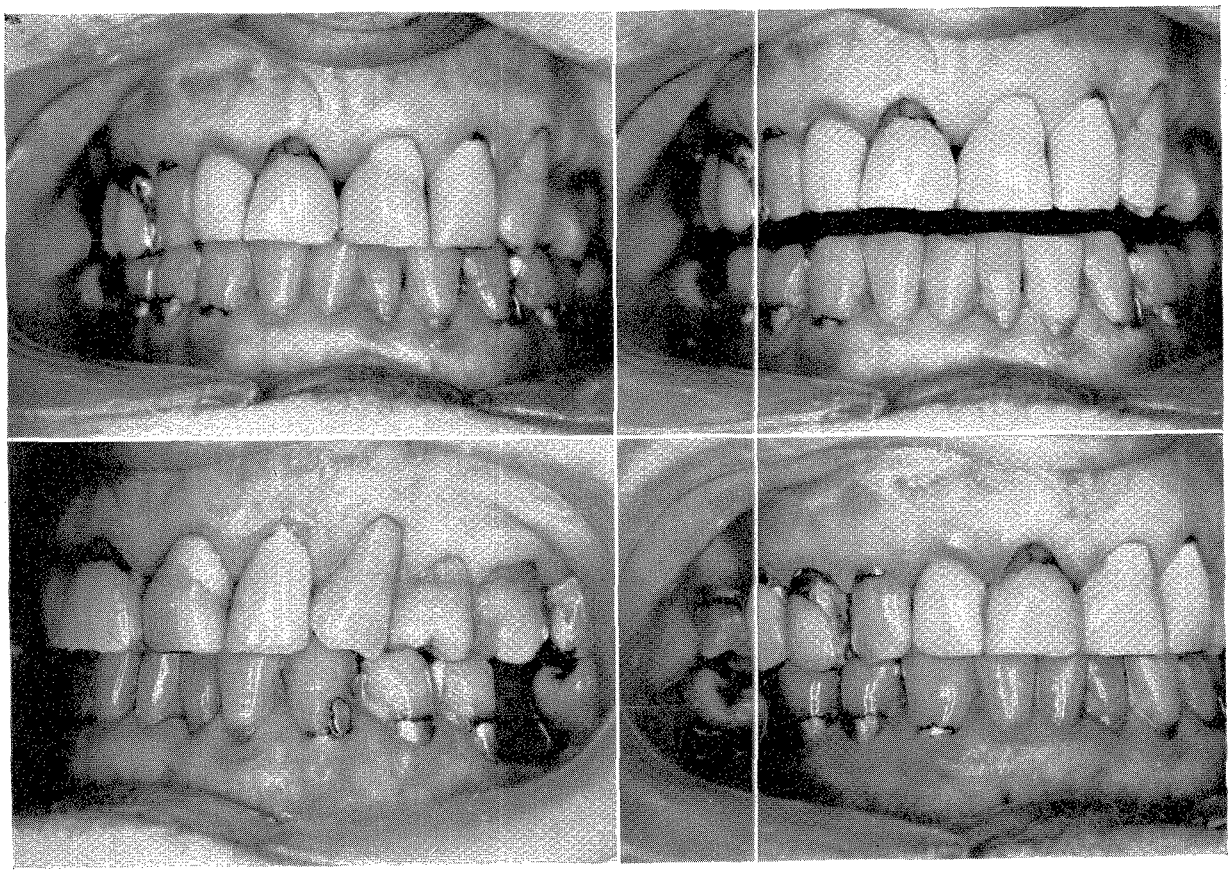


Fig. 42. Anterior and side views of the teeth. The oral structures were in excellent condition. These photographs were taken in May, 1961, of this female patient at the age of 82 years. (Figs. 42 to 44 are of the same case.)

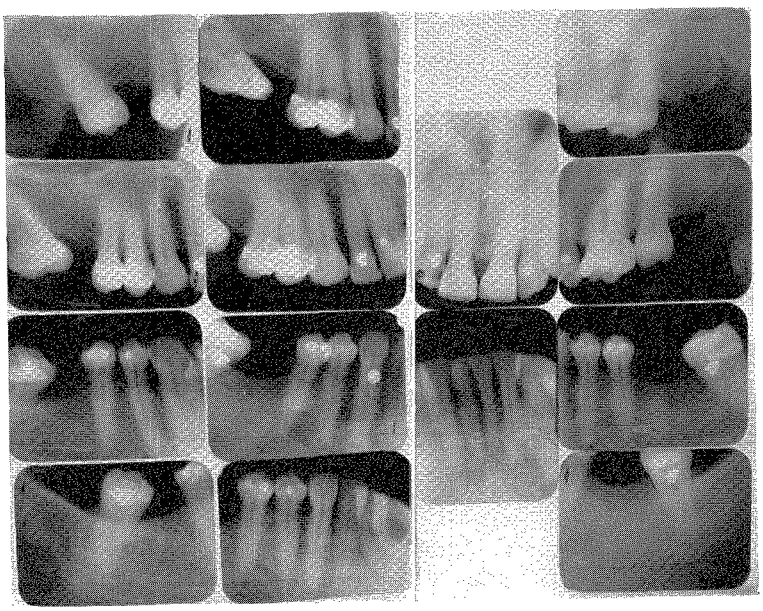


Fig. 43. 1929 roentgenograms of the patient at the age of 50.

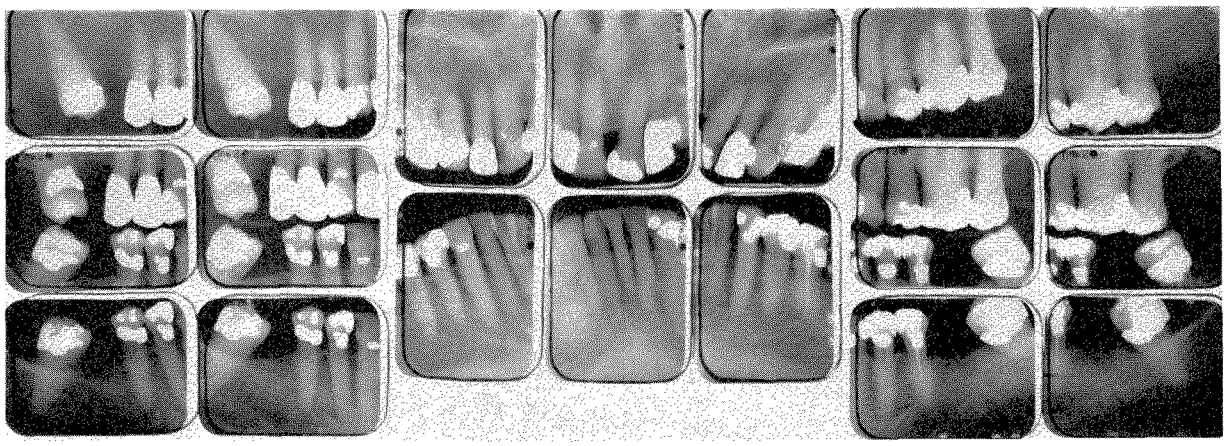


Fig. 44. Roentgenograms taken of the patient in November, 1961, at the age of 83.

Case 7

This patient was 83 years old. Only two third molars were missing. Her oral structures were in excellent condition upon examination in 1960. She had not been to a dentist in many years. As a result of this neglect, caries had finally attacked the upper left first molar. Her cusps were relatively unworn, preserving the original tooth anatomy. This gave evidence of her pattern of chewing which must have been predominantly vertical because of the preservation of the cuspal anatomical detail. (Figs. 45 to 47.)

Case 8

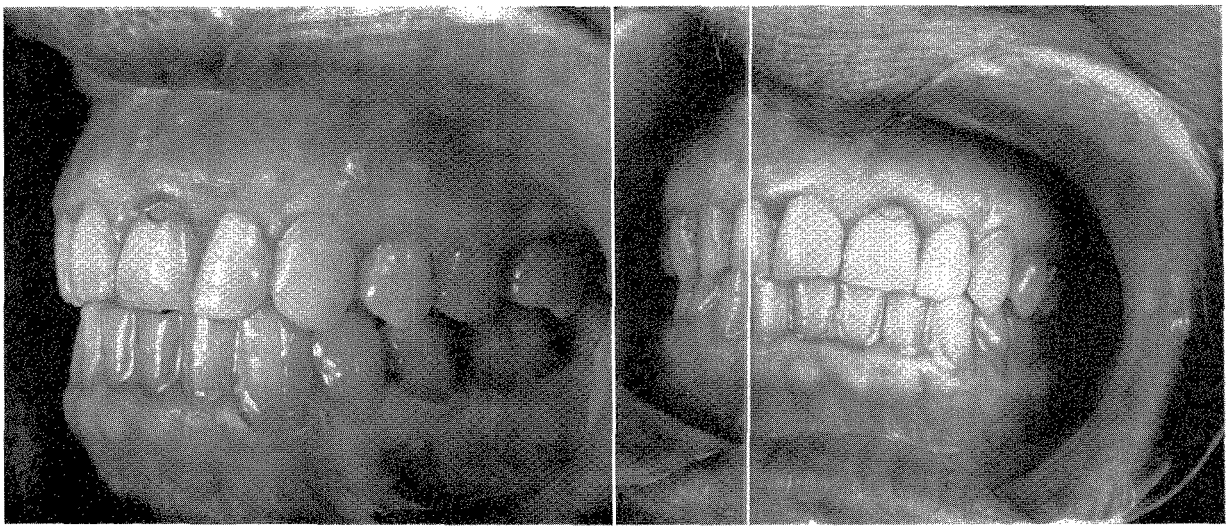
This female patient, who at the time of writing was in her mid-sixties, had an extremely deep anterior vertical overbite. This case was reported in 1951.* She had had a childhood operation for harelip and cleft palate. Her roentgenograms for the years of 1934 and 1962 showed comparatively little structural change in twenty-eight years. Only recently (in 1959) was the anterior upper fixed bridge replaced. It had been worn for over forty years. This case is also unusual because even with the deep vertical overbite the oral structures remained in excellent health. (Figs. 48 to 51.)

Case 9

Patients who have had stable dental structures for twenty years or more are numerous. The following one is reported for several reasons. In 1940 a 50-year-old man came for dental treatment. Although a large-boned individual, his teeth were small.

He presented a deep anterior vertical overbite. At that time an infected lower left second bicuspid was removed, and two lower posterior fixed bridges were inserted. His oral structures were healthy in 1940 and remained in excellent condition. He was over 70 years of age at the time of writing. The records indicate

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 940-942.



A B

Fig. 45. A, Left-side view of the patient's teeth, taken in 1960, at the age of 83. **B,** Anterior view of the patient's teeth. (Figs. 45 to 47 are of the same case.)

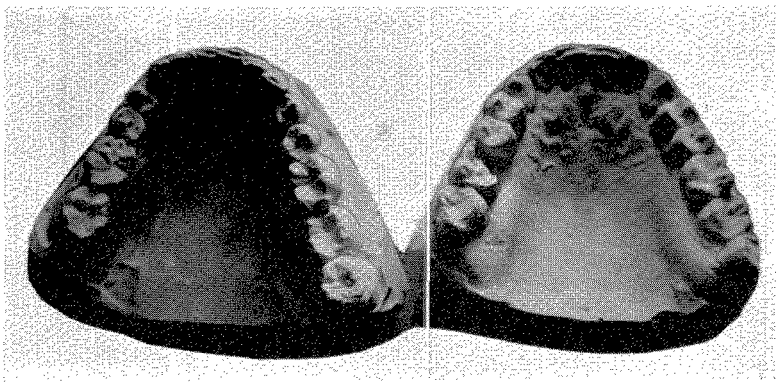


Fig. 46. Occlusal view of the stone casts of the teeth of the patient shown in Fig. 45. Only two third molars were missing.

Fig. 47. Roentgenograms of the patient shown in Figs. 45 and 46. The oral structures were in excellent condition. The patient was 85 years of age. These were taken in 1960.

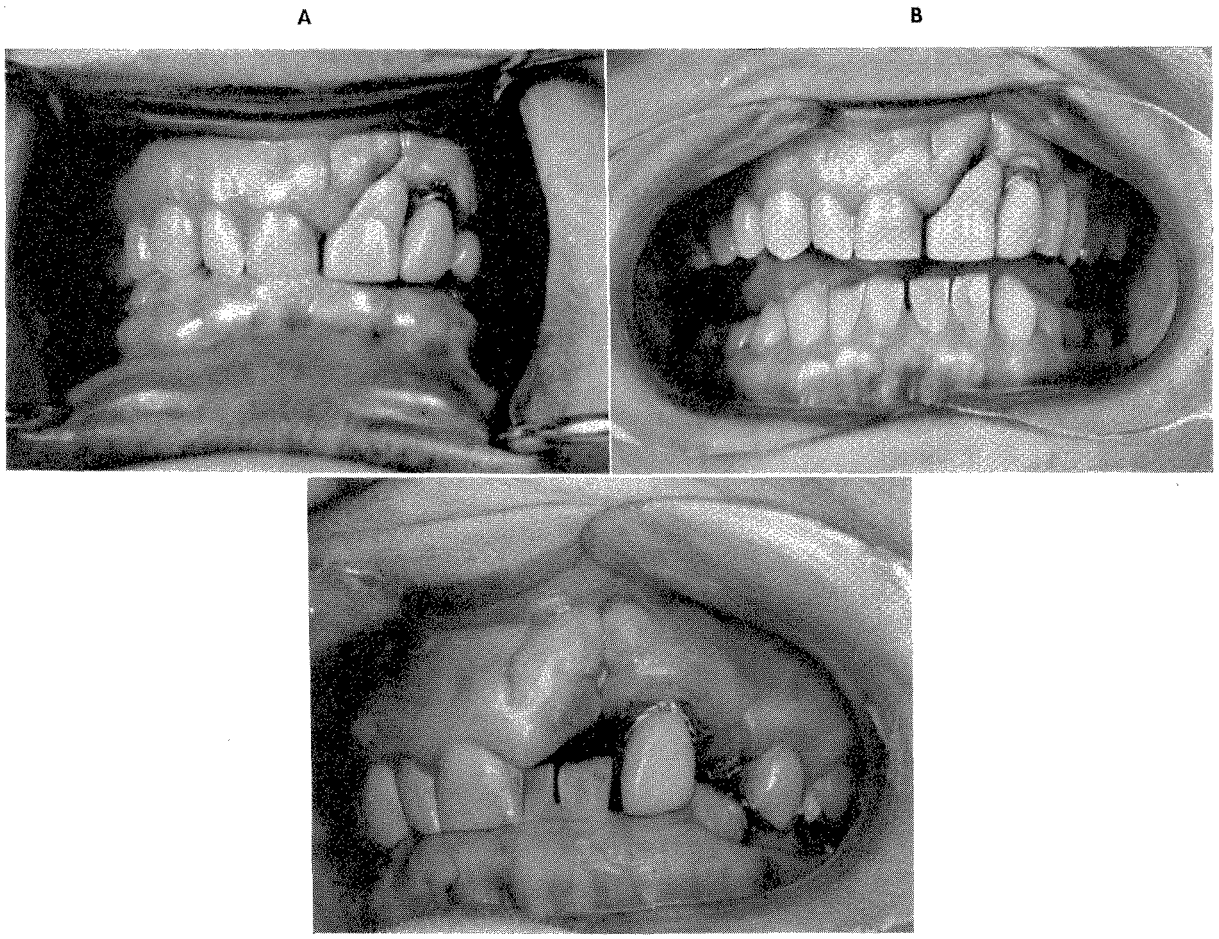


Fig. 48. A, Photograph taken in 1940, showing deep vertical overbite. This patient was operated upon as a child for harelip and cleft palate. **B,** This photograph was taken in 1954. The cleft was clearly visible. The extent of the vertical overbite could be seen. **C,** In 1959 the anterior and left upper fixed bridges were removed and replaced. The cleft can be seen clearly in this photograph. (Figs. 48 to 51 are of the same case.)

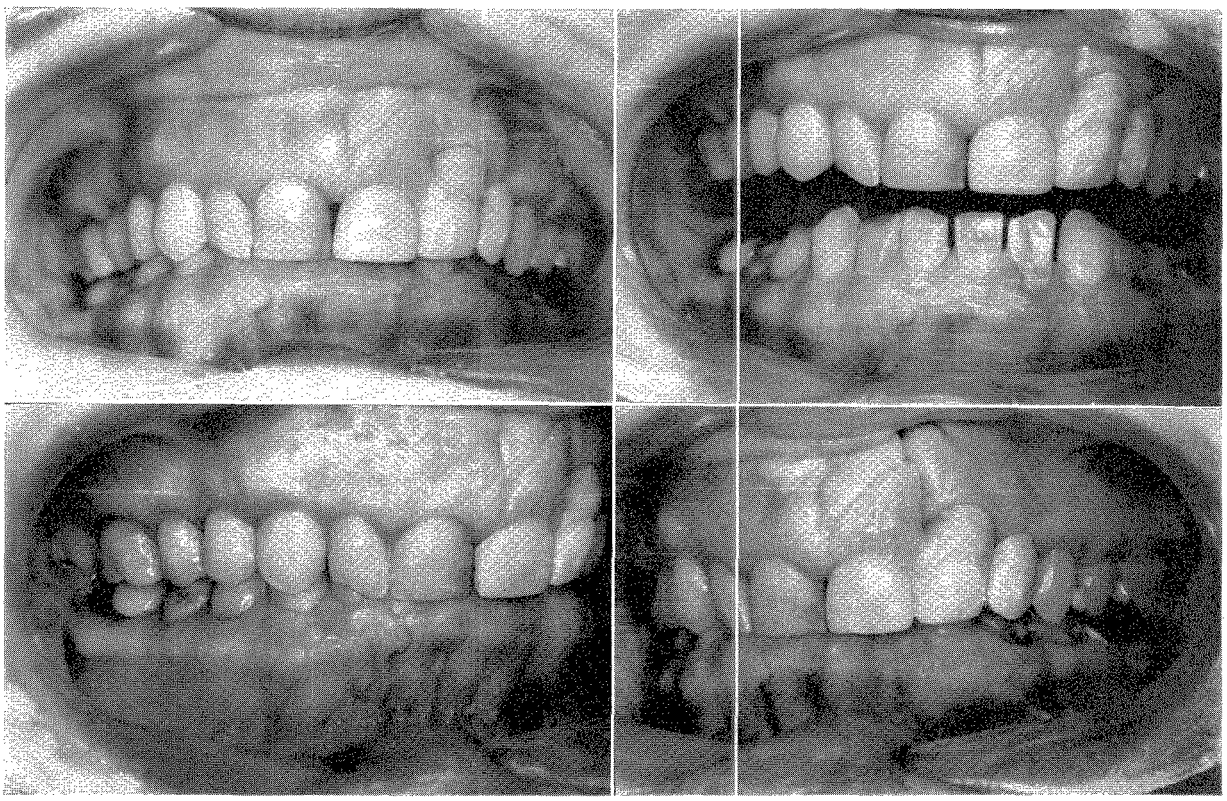


Fig. 49. 1961 photographs of the same subject shown in Fig. 48. A new bridge was inserted on the upper left side. The patient was 65 years of age. The structures were excellent in spite of the deep overbite.

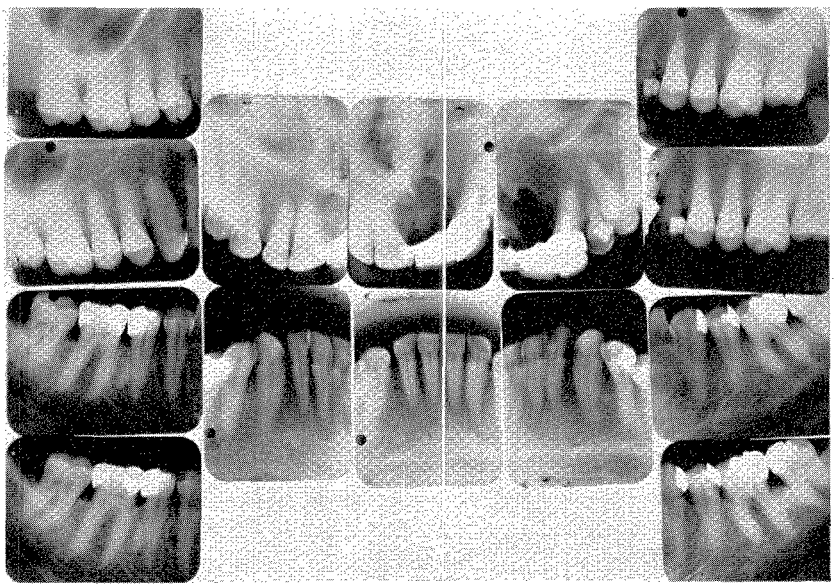


Fig. 50. 1934 roentgenograms. The anterior bridge stayed in place for over forty years. The anterior cleft may be seen.

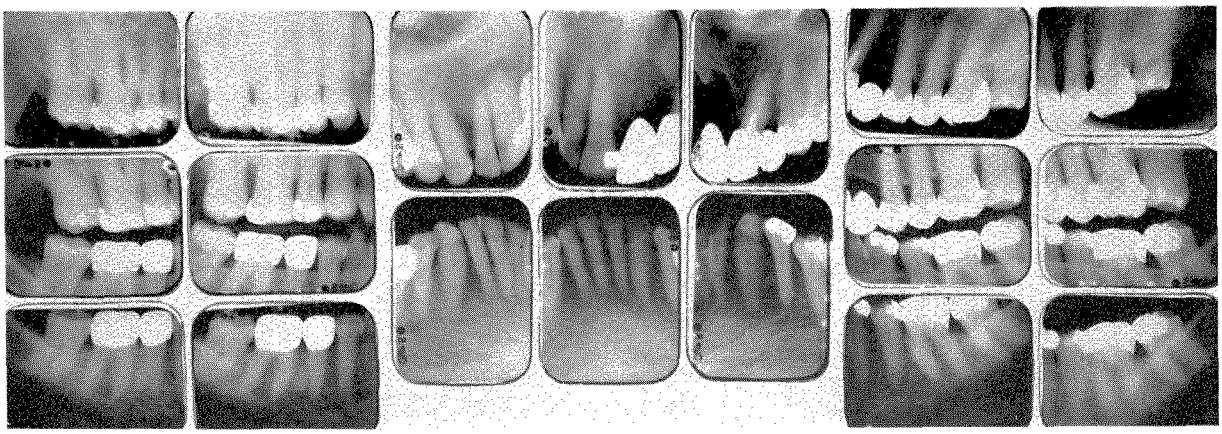


Fig. 51. September, 1962, roentgenograms of the patient whose photographs are shown in Figs. 48 to 50 at the age of 66. The oral structures were in excellent condition.

Fig. 52. This individual was 71 years old when this photograph was taken (1961). He was over 6 feet tall and had a large head but small anterior teeth. (Figs. 52 to 55 are of the same case.)

that by 1955 his anterior teeth showed the effects of the continued abrasion to which they had been subjected. If these teeth were to be crowned, it would probably be necessary to consider an increase of his vertical dimension. At the time this seemed to be a drastic step. He undoubtedly was subject to bruxism. His anterior teeth remained untreated.

The judgment to continue observation of these teeth rather than to operate on them seemed justified. It is possible that at some future time lingual gold inlays will be inserted in the upper incisors. Caries was rare in this mouth. Two similar cases of large-boned persons with small teeth were reported in 1951.* (Figs. 52 to 55.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 544-547.

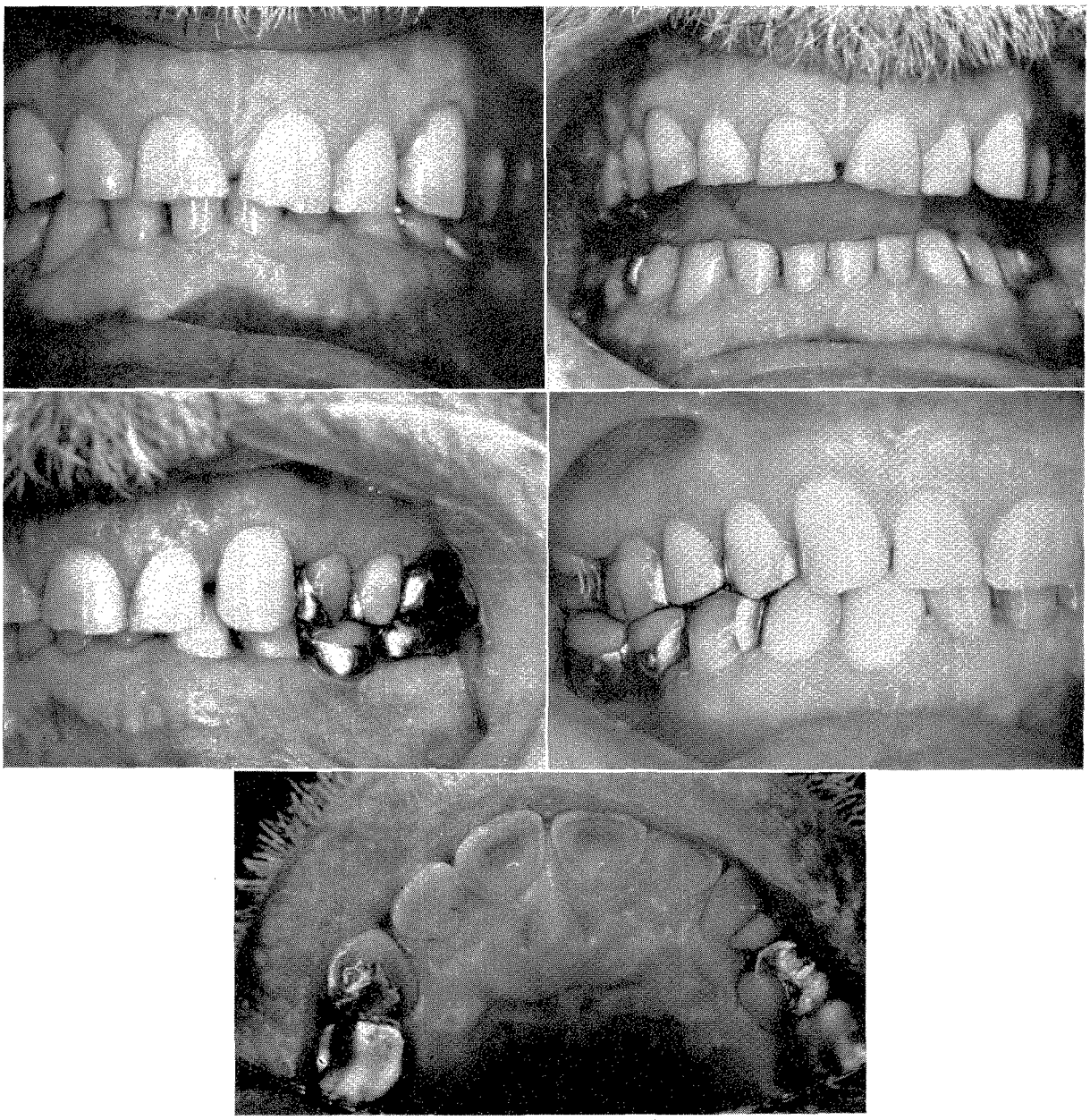


Fig. 53. Anterior view with the teeth apart as well as right and left lateral views of the teeth of the patient shown in Fig. 52. The vertical overbite was pronounced. The anterior teeth were severely abraded.

Fig. 54. Roentgenograms of the patient shown in Figs. 52 and 53. These were taken in 1949 when I first undertook this patient's dental treatment. He was then 59 years old.

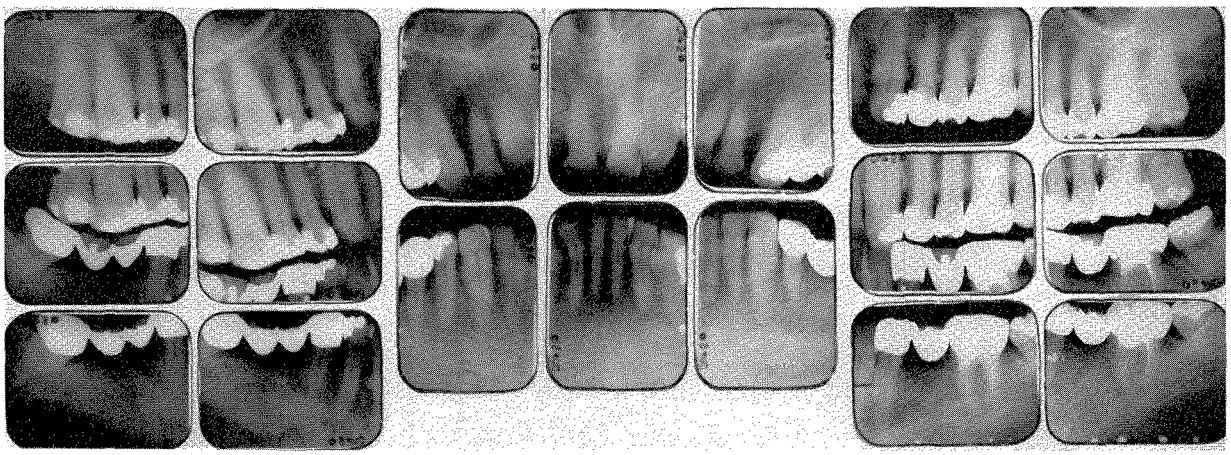


Fig. 55. Roentgenograms of the patient taken in 1962, at the age of 72. The structures were in excellent condition.

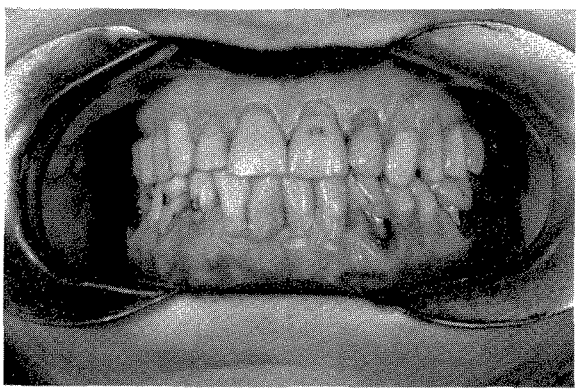


Fig. 56. Photograph of the patient taken in 1952. The gum recession was very marked even then. (Figs. 56 to 59 are of the same case.)

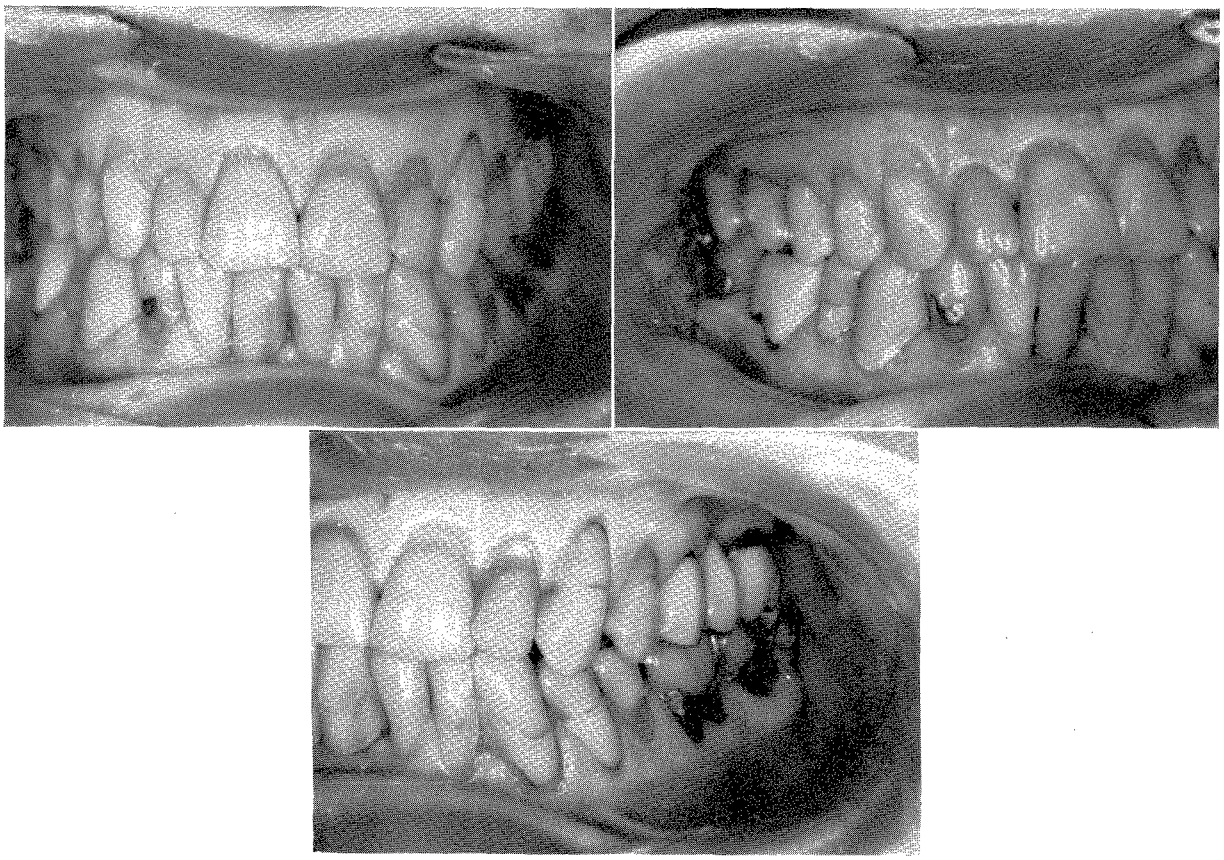


Fig. 57. Photographs of the patient showing anterior, right, and left views taken in September, 1961. Observe the gum recession.

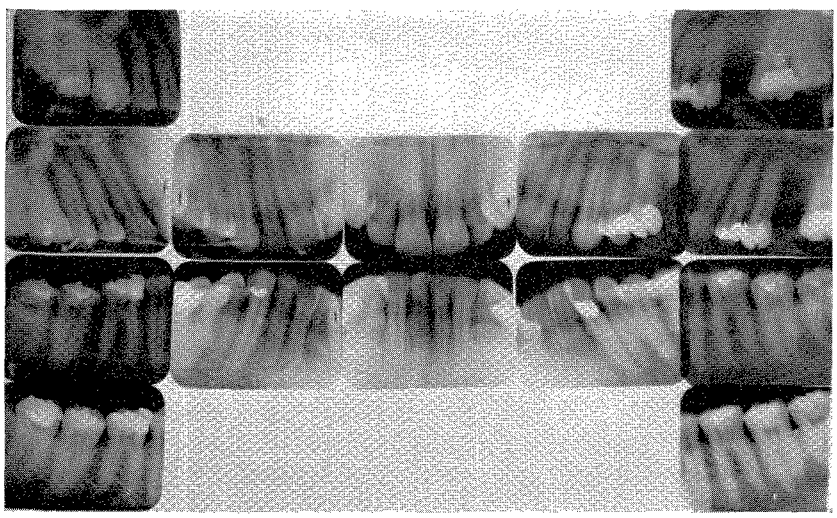


Fig. 58. Roentgenograms taken in 1928 when the patient was in her twenties.

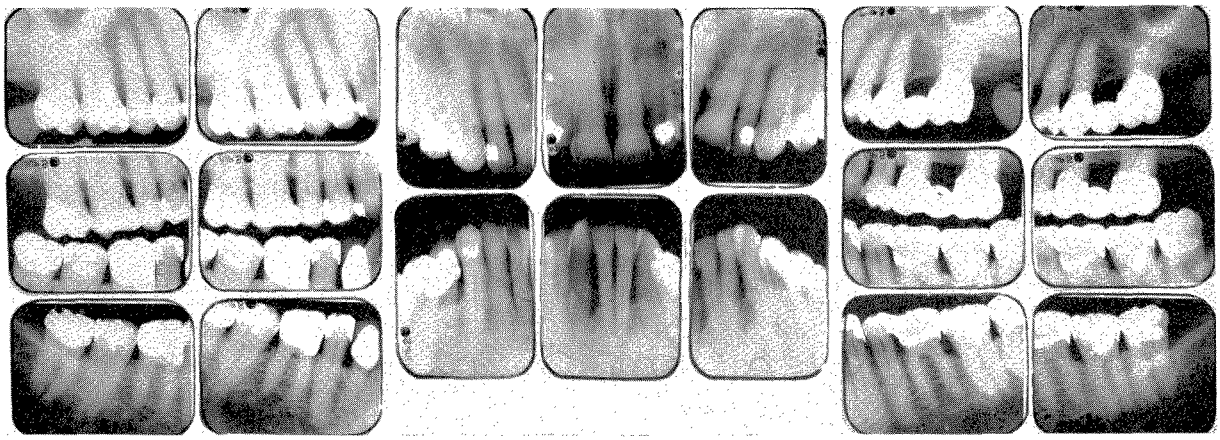


Fig. 59. Roentgenograms taken in September, 1961. Although extensive gum recession was evident, the bone structure was in excellent condition. This patient had always been subject to an unusual amount of recession as seen in Fig. 59.

Case 10

This patient was a middle-aged woman whose 1928 and 1962 roentgenograms are shown during the time in which she was under dental supervision. Her gums had receded to the extent of being unsightly, yet the oral structures remained in good condition. In 1958 the patient underwent a serious operation for carcinoma. Looking at this mouth with its poor esthetics, one might have been tempted to recommend reconstruction. In fact, reconstruction was suggested ten years previously. Its necessity is doubted seriously. I believe this patient was served better by limiting the remedy to good effective operative dentistry.

This conservative policy served her well for over three decades. An interesting sidelight in this case is to find the cause of her severe gum recession without pocket formation. Perhaps it might have been her technique of brushing her teeth, but this does not seem to be the case. We have postulated that some forms of gingival recession are physiological and are not attended by periodontal disease. They may be considered as a sign of aging, yet in many instances the recession starts at a comparatively early age as it did in this case. (Figs. 56 to 59.)

Case 11

This female patient, also reported in 1951,* died in 1959 at the age of 85. Her sister was reported in Case 6 (p. 29, Figs. 42 to 44). In 1951 this patient's age was incorrectly printed as 72 instead of 77. The 1939 and 1959 roentgenograms are shown. There are several interesting aspects in this history. In 1939, at the age of 65, the lower first molars were missing. They were never replaced. An infected upper right third molar was removed at that time. In 1952 the lower right third molar was removed. Twenty-eight teeth were present in 1959. Both arches were narrow and the teeth crowded. The left upper lateral incisor was in linguoversion, and the left lower cuspid was in a cross-bite relationship. In spite of this the dental

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 681-685.

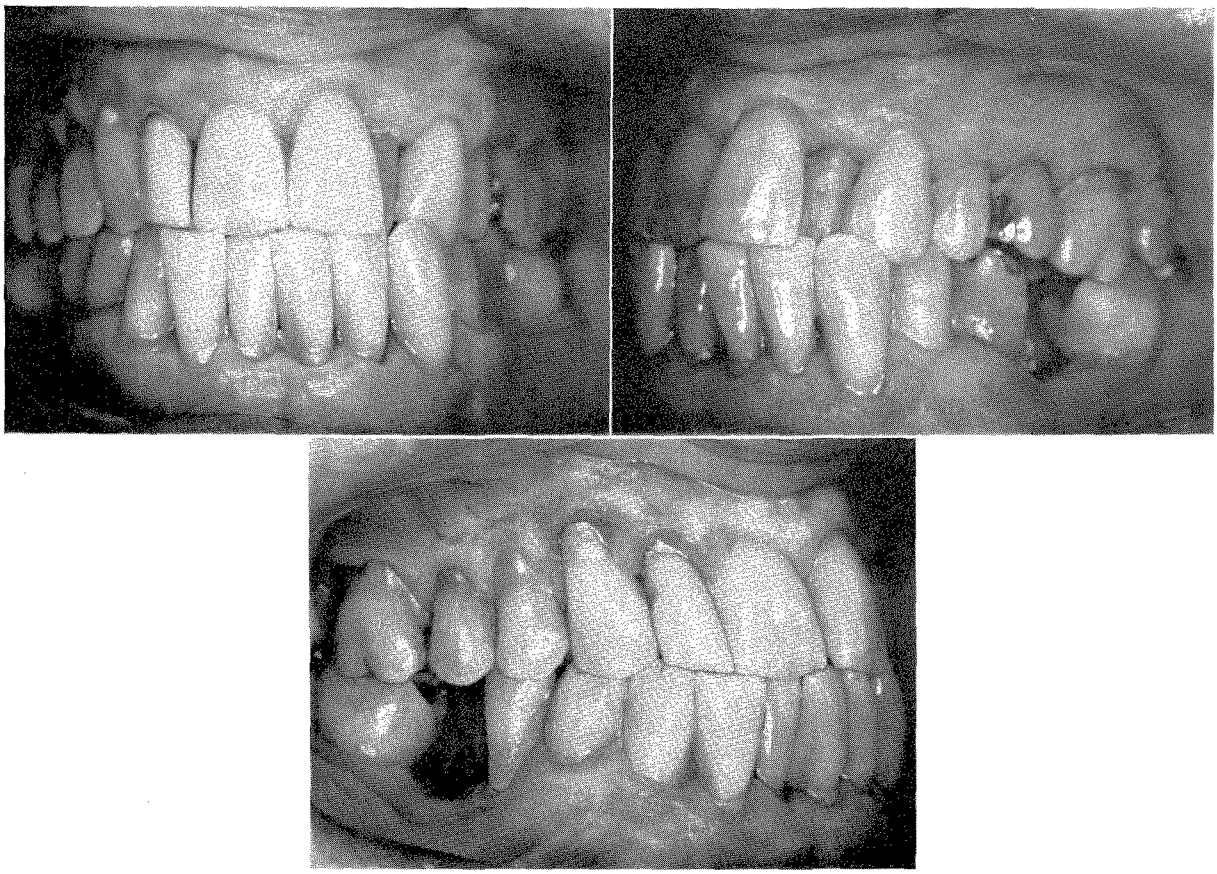


Fig. 60. Anterior, left, and right views of the teeth of an 83-year-old female patient. The occlusion was irregular. The lower first molars were removed at an early age and were never replaced. In spite of this, the structures were in excellent condition. (Figs. 60 to 62 are of the same case.)

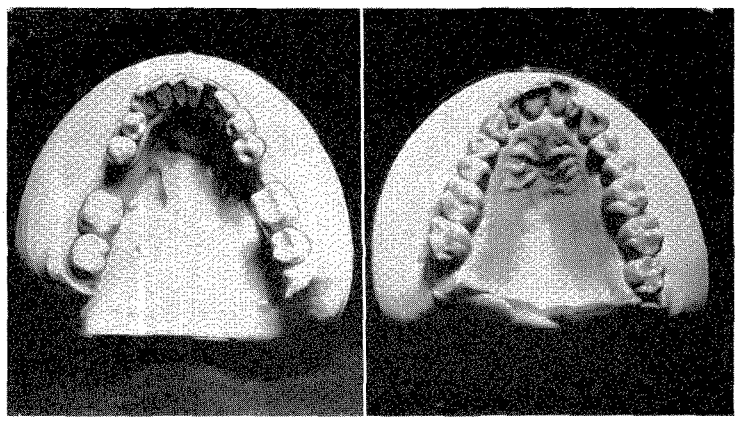


Fig. 61. Occlusal view of casts of the teeth of the patient. Observe the irregularity of the arch form as well as the missing lower first molars.

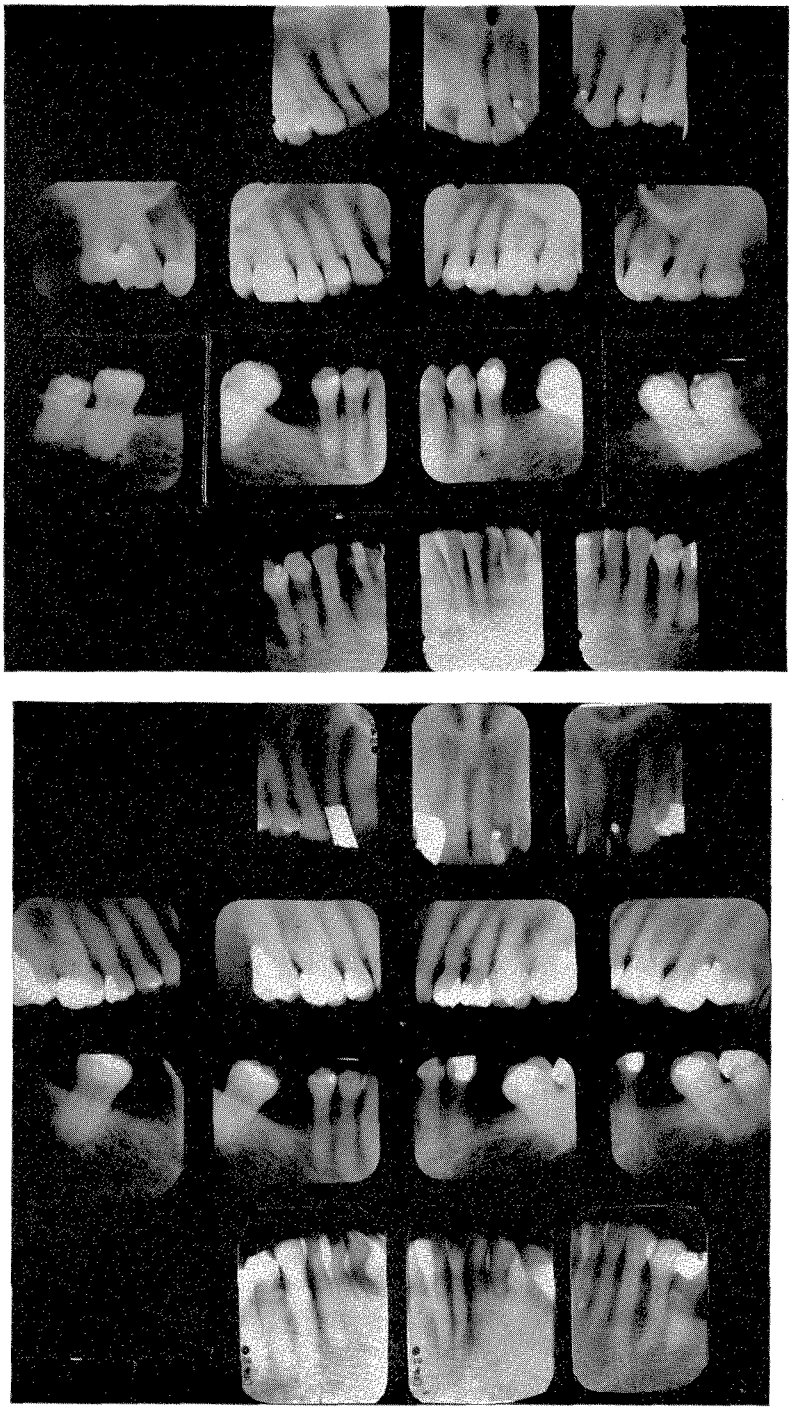


Fig. 62. A, Roentgenograms of the patient taken in June, 1939. She was 63 years old at this time. **B,** Roentgenograms of the patient taken in 1959 at the age of 83. Only the right third molars were removed in the twenty-year period between the two series. The structures had deteriorated very little.

structures were in excellent condition. One can infer that inheritance plays its role in many of these cases. (Figs. 60 to 62.)

SUMMARY

The reports of the ten patients presented cover many types of interocclusal relationships. Several of these patients had missing teeth and various forms of malocclusions. Others had deep overbites. The systemic factor of all contained something favorable to their oral structures. The following chapters will include more reports of this type, but the emphasis will be upon the presentation, evaluation, and, in many instances, the treatment of problem cases.

Chapter 3

PERIODONTAL DISEASE OF SUSPECTED SYSTEMIC ORIGIN

The first large division will contain those cases over which the dentist has very little control. Under this main heading will now be considered periodontal disease of suspected systemic origin. This has caused problems and failures in numerous cases.

Case 1

This patient was examined by me in July, 1962. He was a 67-year-old man who presented an advanced condition of periodontal disease. His 1944 dental roentgenograms were secured from his periodontist. At that time he was 49 years old. Eight teeth were already missing. Of those that remained, the inroads made by chronic periodontal disease were clearly discernible. There were bifurcation and trifurcation involvements, as well as single-rooted teeth with evident alveolar bone loss.

The intervening thirteen years between 1944 and 1957 were undoubtedly marked by further deterioration of the supporting bone. By February, 1957, not only were there only twenty-four teeth remaining, but advanced periodontal disease had also made extensive inroads upon the bony scaffolding. By this time the patient was well aware of his oral condition. It appears, however, that he stubbornly resisted the extraction of any of his teeth regardless of their diseased condition. This can be deduced from the method of treatment which was given in 1957. Although the lower anterior teeth were hopelessly involved in disease and should have been removed, three of them were devitalized and retained by means of a

splint which extended from cuspid to cuspid. Metal pins were placed in the root canals of these teeth.

At that time, which was five years prior to the time of writing, specialized periodontal treatment was instituted. The roentgenograms which were taken in April, 1962, again demonstrated vividly the continued advance of the periodontal disease in spite of this specialized treatment. Most of the teeth were hopelessly involved. The lower incisors were held in place only because they had been splinted

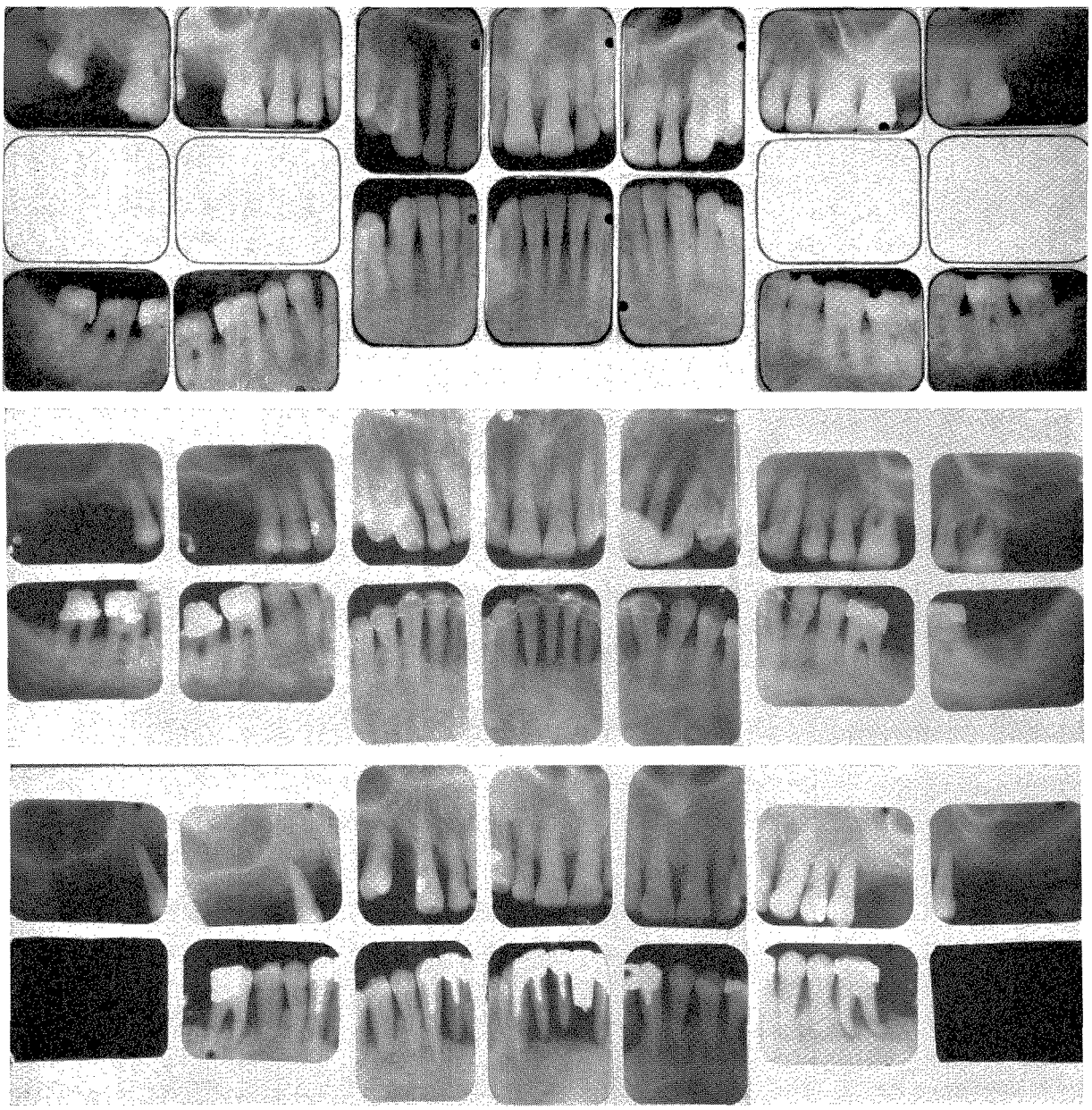


Fig. 63. A, Roentgenograms taken in September, 1944, of a male patient 47 years old. **B,** Roentgenograms taken in February, 1957. Severe periodontal involvement. **C,** Roentgenograms taken in April, 1962. The periodontal disease continued unchecked in spite of specialized treatment.

to the cuspids. Otherwise they would have fallen out from lack of any supporting bone.

The patient was still reluctant not only to have all his teeth removed but even to have the more seriously infected ones removed. Although he realized what had been taking place over the previous years, he was still unwilling to face the problem squarely. Under these circumstances I believe that a dentist should refuse to undertake the treatment. Otherwise he compromises his principles by retaining a good portion of these problematic teeth.

The treatment finally decided upon was gingivectomy and mucogingival extension procedures, and the following teeth were to be retained and splinted: the maxillary right canine and maxillary right lateral incisor, the maxillary left canine and maxillary left central incisor, the mandibular right first premolar and mandibular right canine, and the mandibular left canine and second premolar. I am only reporting this case and did not do the work. In December, 1962, the patient suffered from an aneurysm and was hospitalized.

Cases of this sort are not too infrequent. Although most of these patients are intelligent, either they are not alarmed by what they are told or they consider the evil of losing their teeth as a greater one than the focal infection which such tooth retention might cause. It seems difficult for any competent dentist to justify any elaborate means of retaining and restoring even the healthiest of those teeth which remained in the above case. However, if adequate measures were not resorted to, the longevity of the few teeth which would be retained would be considerably abridged. The above history and the successive radiographic studies should make any dentist apprehensive even if he extended fully his personal sympathy and understanding to the patient.

Once again one may conjecture as to the cause of this type of periodontal disease. Can it be caused by lack of correct interocclusal coordination, or perhaps by inability to control the neuromuscular mechanism, thus permitting the pernicious habit of clenching and idle grinding? Are we dealing with a drainage by the blood and lymph of the vital components which are necessary to maintain good supporting bony structures around the teeth? Have these patients had some debilitating disease which continues to cause the disintegration that is found in their mouths? This patient's medical history revealed that his gallbladder was removed eight years previously. Is it possible that malabsorption of essential nutrients may have been a factor? This is highly conjectural.

If a definition of periodontal disease requires that a suppuration accompany the pocket, then these cases are still more puzzling because very often pus is not present. Many of these pockets are vertical and defy the most modern methods of treatment. (Fig. 63.)

Case 2

In 1947 the case of a 21-year-old woman was presented.* She began treatment in 1943. At that time nine posterior teeth were missing. The majority of the remaining teeth had deep periodontal pockets. The upper anterior teeth flared. An open bite was present. The treatment consisted of rebuilding the lower pos-

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 449-468.

terior occlusion and inserting a full upper denture. Utmost care was taken using a conventional technique. The work was completed in 1943.

The periodontal disease continued unchecked until by 1952 only four bicuspids remained. At that time the patient was 30 years of age. She was not seen after 1952. In 1951 this case was again reported.* It can be assumed that in a relatively short period after she was last treated, the bicuspids would have to be removed and a full lower denture inserted.

In comparing Figs. 64 and 67 with Fig. 68, the extent to which the vertical dimension was increased may be measured by the upper cuspids. In Figs. 64 and 67 they contact the lower teeth. In Fig. 68 there is a comparatively large space between them and the same lower teeth. It may also be seen in Fig. 81, by comparing the distance between the upper left ridge and the lower teeth of the articulated casts with the same distance in the original study casts which are shown to the left of the figure, that the increase of the vertical dimension plus the amount of alveolar absorption which took place was considerable. The articulated casts were made in 1947, four years after the insertion of the upper full denture. Therefore, the fact must not be overlooked that the large original increase of the vertical dimension may have contributed in no small extent to the alveolar destruction of the lower teeth and the upper ridge. With the poor periodontal background which this patient presented, any added insult would accelerate the disintegration.

In the light of our present knowledge, if this case were undertaken today, the lower teeth would be splinted instead of simply being restored with gold inlays as was done in 1943. This may have prolonged the life of these teeth. The fact remains that cases of this type are difficult to evaluate, and treatment is unsatisfactory. Very little is known even today regarding the etiology of the periodontal disease in these cases. (Figs. 64 to 81.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., p. 753.

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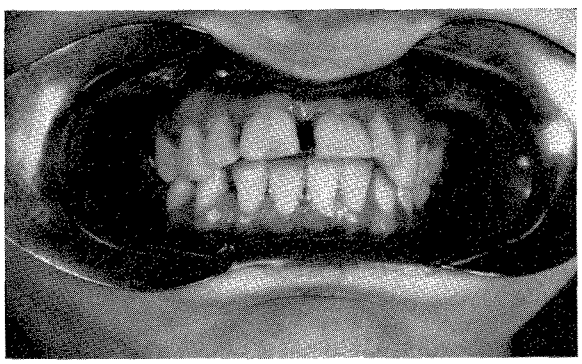
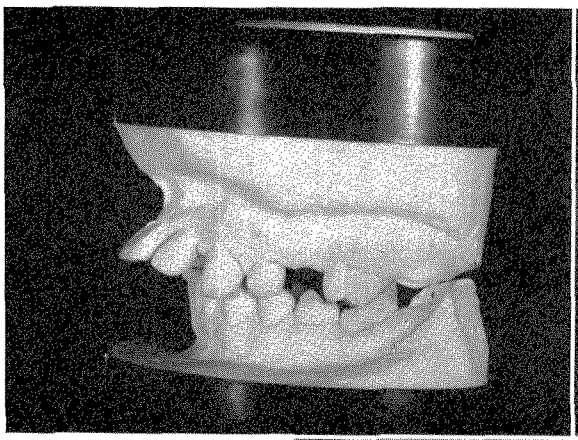


Fig. 64. Photograph, anterior view, of a female patient 21 years of age. The step-by-step sequence of the entire procedure was published in 1947.* Only a few steps taken from the detailed report are published here. (Figs. 64 to 81 are of the same case.)

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 449-468.

Fig. 65. Roentgenograms at the start of treatment (1943).

Fig. 66



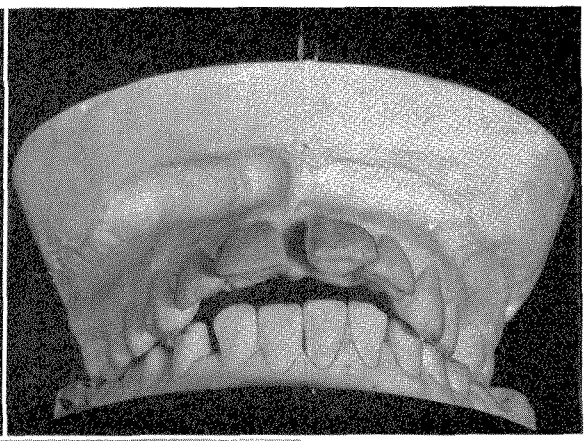


Fig. 67

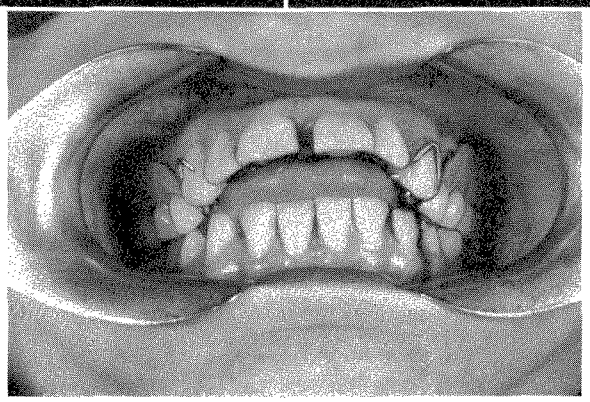


Fig. 68

Fig. 66. Dental casts at the start of treatment.
Fig. 67. Large horizontal and vertical overbite.
Fig. 68. The upper posterior teeth were removed, and an immediate removable partial denture was inserted.

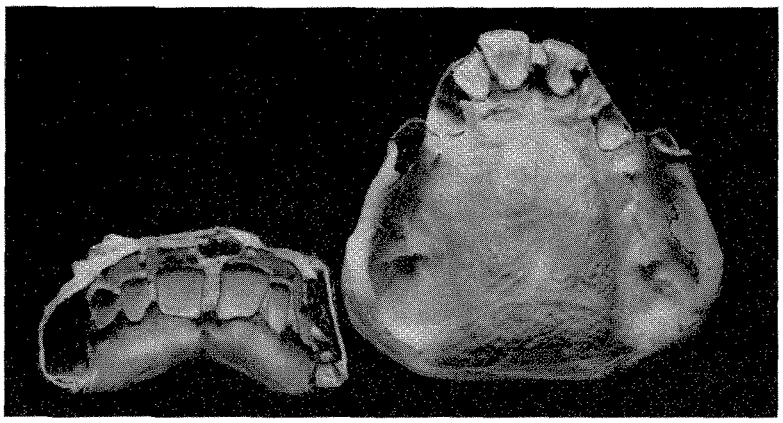


Fig. 69. Upper sectional impression. Modeling compound with Plastogum wash.

Fig. 70

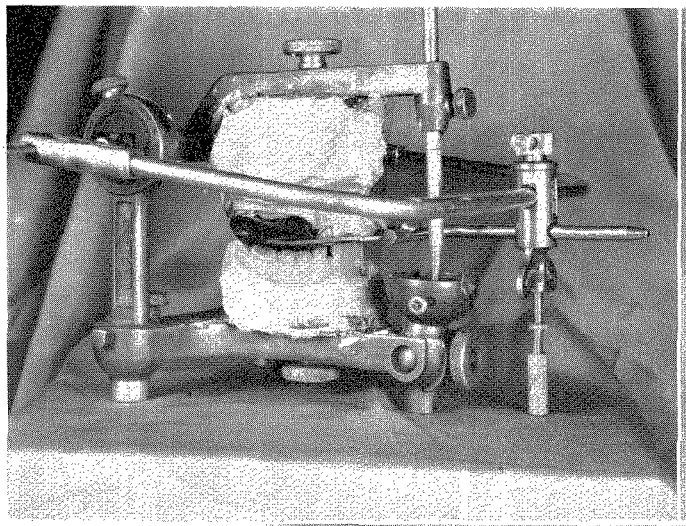
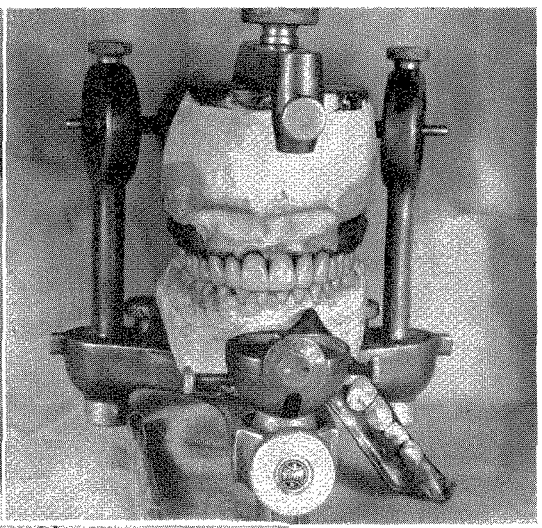


Fig. 71



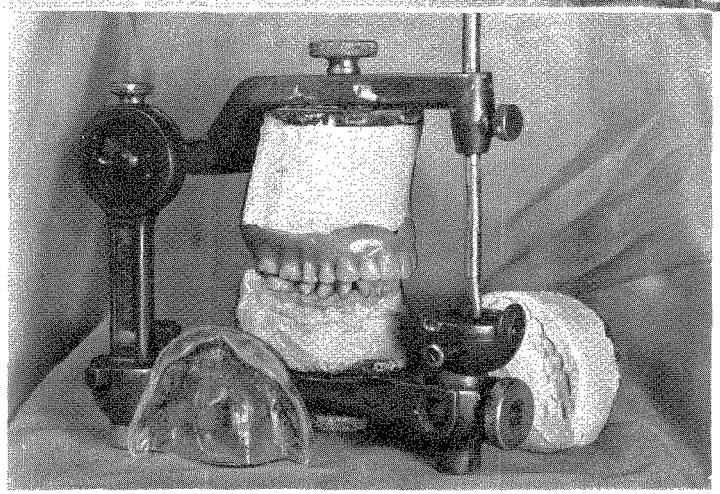


Fig. 72

Fig. 70. Upper and lower casts mounted on articulator by face-bow and centric relation records. Angulation of condylar inclination slot is set by means of a protrusive wax record.
Fig. 71. Upper set of teeth. The stone teeth which were removed may be seen in the right foreground. The protrusion was corrected. The anterior labial flange was added just before flasking.
Fig. 72. The completed upper immediate denture. The stone index for the correction of flasking errors may be seen on the right. The clear celluloid operating mask is shown in the left foreground.

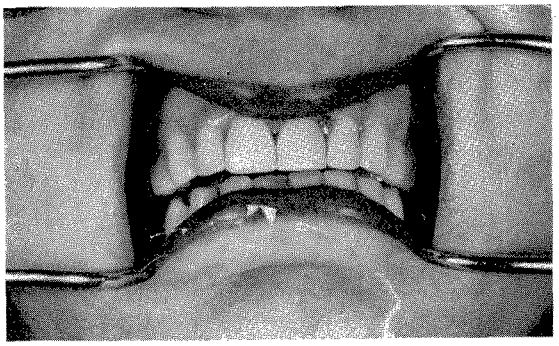


Fig. 73. The immediate denture was inserted just after the upper anterior teeth were removed.

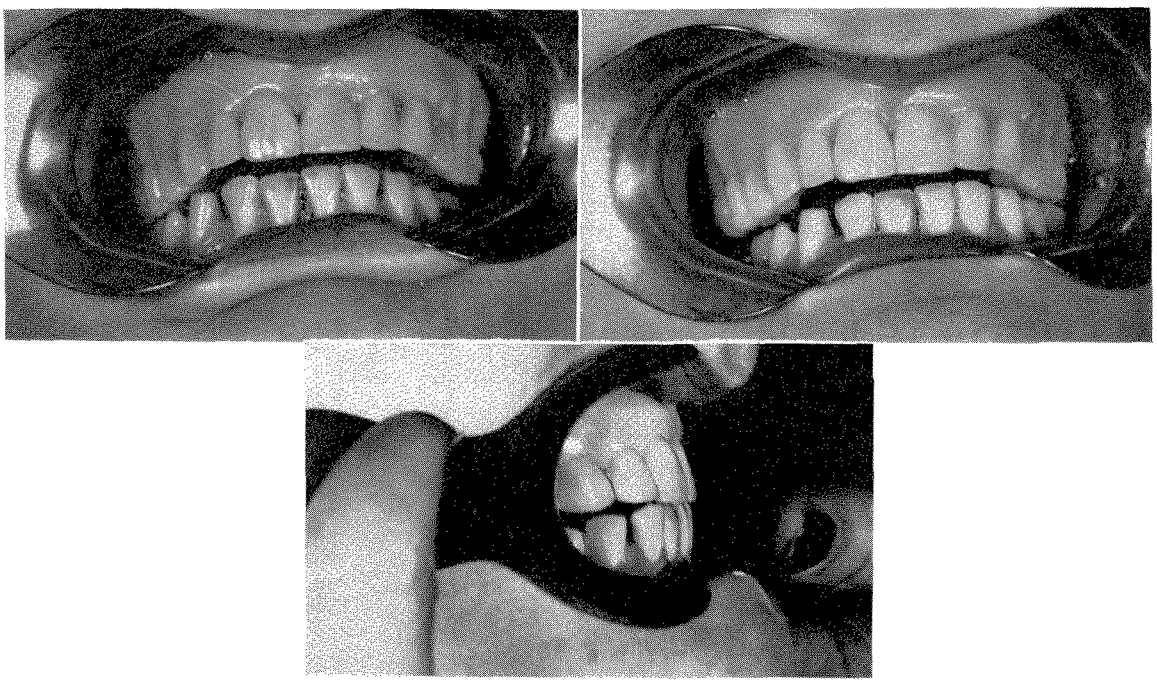


Fig. 74. Right and left lateral bites and the protrusive bite.

Fig. 75. Profile view of the completed work. This immediate denture was worn for six months, at which time a new upper denture was made.

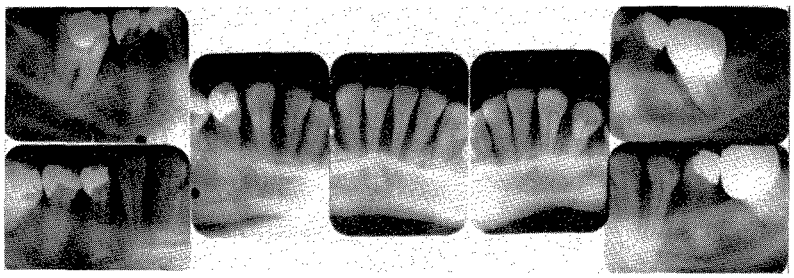


Fig. 76. Roentgenograms taken in 1949. The patient was 27 years old. Alveolar bone destruction had progressed.

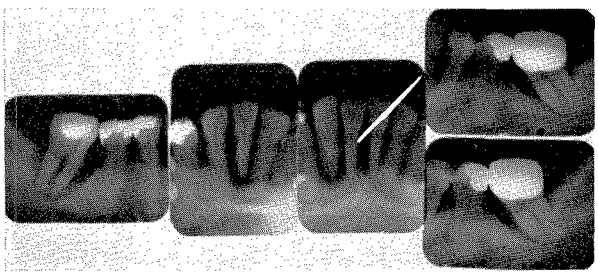


Fig. 77. Roentgenograms taken in November, 1951. All the teeth but the bicuspids were removed.

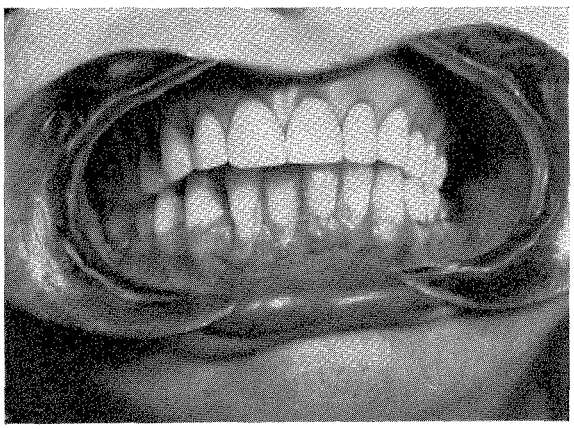


Fig. 78. Condition of the mouth in November, 1951. I had not seen the patient for two years.

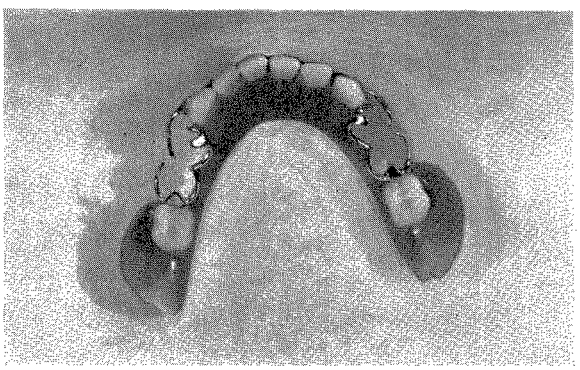


Fig. 79. A lower clasp removable immediate partial denture was inserted in March, 1952. The patient was not seen after this.

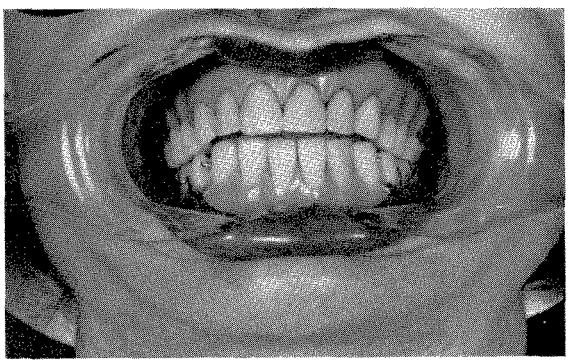


Fig. 80. The temporary lower removable partial denture in position. This was inserted in March, 1952.

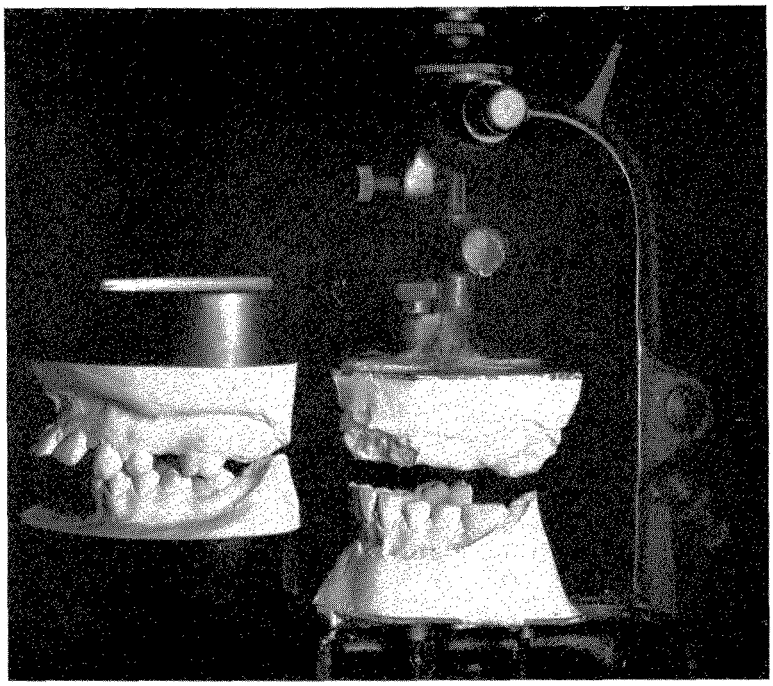


Fig. 81. A comparison of the distance of the posterior alveolar ridge to the lower posterior teeth of the articulated casts shown on the right with the same distance in the original casts shown on the left reveals the large amount of increase in the vertical dimension when this case was constructed in 1943. The articulated casts were made in 1947 when the upper denture was repaired.

Discussion

When comparatively young people who give normal good care to their teeth present themselves for treatment with several missing teeth and periodontal involvement, the systemic factor may be suspected. These cases usually terminate in the patient's wearing full dentures at an early age. The best that can be expected is some postponement of the insertion date of the full dentures. It is inadvisable to promise miracles. The odds are heavily against fulfilling such promises. The medical advisors of such patients should be consulted, and any necessary tests should be performed, including those to determine the advisability of revision and correction of dietary habits.

In some of these cases, it would be much more satisfactory to give a careful evaluation based upon the subjective and objective conditions presented by the patient and then follow up this evaluation with a step-by-step procedure for corrective treatment. Those with long experience are only too well aware that this procedure frequently cannot be followed because so often the reason for the breakdown is unknown. The treatment may or may not be orthodox, but the chance for success, based upon the suggested technique to arrest the breakdown and restore adequate function, is at best only a hope. Why are individual teeth in the same mouths sometimes spared from being attacked by the disease? Why does the disease sometimes arrest itself? Why does great bone loss sometimes take place without pocket formation or without the presence of suppuration? Why are some teeth firm in spite of great alveolar destruction? Only after greater knowledge is

attained in elementary body processes will we be able to determine the causes of breakdown in various individual organs and tissues.

Case 3

This patient, a man, was referred for treatment in the 1920's. He was then just past 30. Three molars were missing. Signs of periodontal disease were already present. The trifurcation of the upper right second molar was involved, and the lower incisors had already lost some alveolar bone. The lower right molar had a periapical infection, and the upper left second bicuspid had an incomplete root canal filling. The upper right and lower left first molars were missing.

Seven years later, in 1936, there was increased evidence of periodontal disease. The pocket formation had progressed. This patient took reasonably good care of his health and received periodical checkups. He was then 42 years old. He appeared underweight and emaciated. His demeanor was serious and anxious. The missing teeth were replaced by individual bridges. Specialized periodontal treatment was advised, but the patient refused it.

The 1942 roentgenograms gave further evidence of alveolar bone destruction in almost all his teeth. At this time the six lower anterior teeth were splinted. His medical doctor was consulted with respect to various phases of his health. One can only surmise that there was a systemic factor present resulting in the breakdown of his oral structures. In spite of his outward appearance, there was nothing in his medical history that revealed any serious ailment. By this time the patient had become reconciled and hardened to the poor condition of his mouth.

In 1944 the upper left second bicuspid and first molar were removed and another fixed bridge inserted. A full upper denture had been recommended previously, together with multiple lower extractions and a lower removable partial denture. However, the patient was unwilling to have this work undertaken, and his medical advisor did not stress the importance of this therapy. In 1948 it became necessary to remove the four upper and two lower right incisors. An upper removable partial denture was inserted. Interestingly, the lower left and right third molars were unaffected by the periodontal disease.

By 1956 only fifteen teeth remained. The patient finally consented to the full upper denture. A partial lower denture still appeared to be indicated. The third molars, the left two bicuspids, and the right first bicuspid were retained.

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Fig. 82. Roentgenograms taken in 1929 when the patient was in his early thirties. (Figs. 82 to 95 are of the same case.)

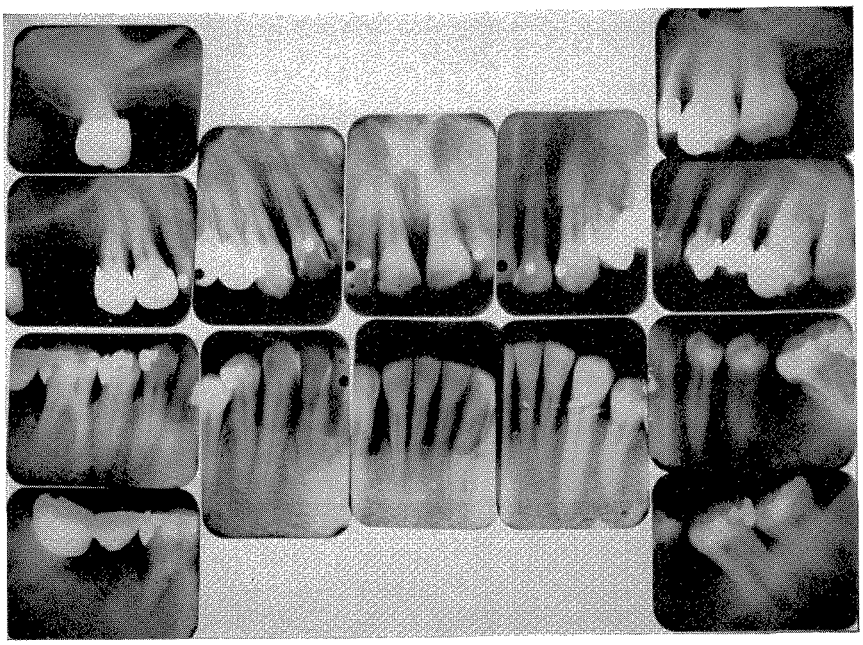

Fig. 83. Roentgenograms taken in 1938. Observe extent of periodontal pathology since the 1929 series shown in Fig. 82.

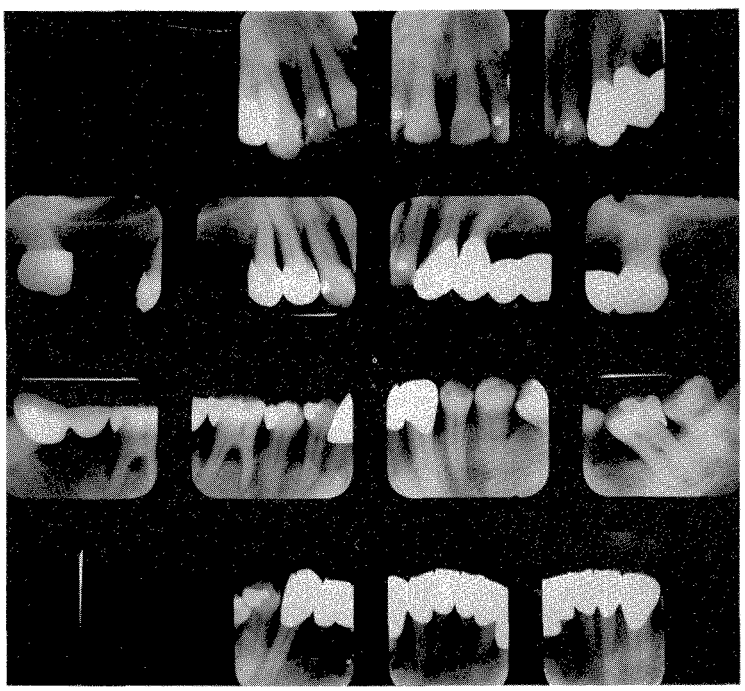

Fig. 84. Roentgenograms taken in 1946. The bone destruction was progressive.

Fig. 85. Roentgenograms taken in 1952. The patient was in his early fifties. The periodontal involvement was severe.

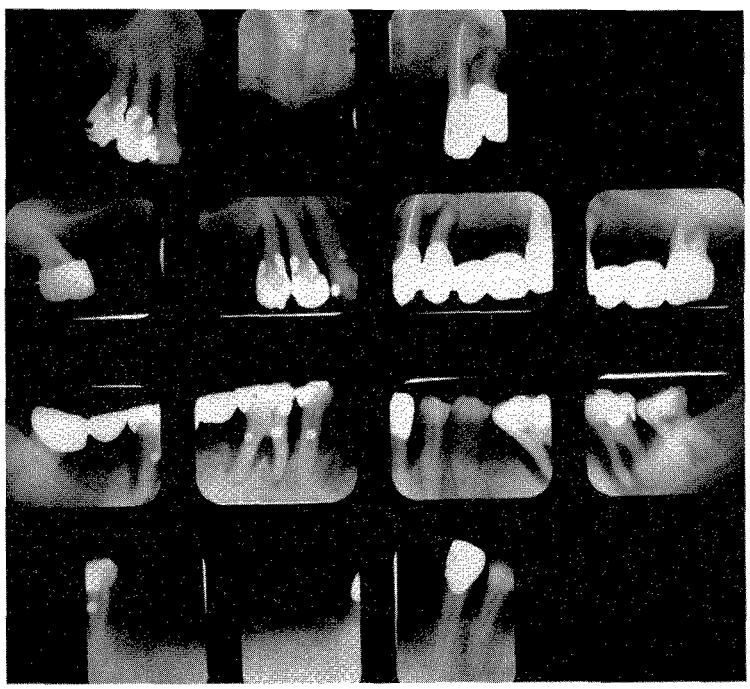

Fig. 86. Roentgenograms taken in 1956. Shortly after these were taken, all the upper and lower teeth which were hopelessly involved were removed.

Fig. 87. Gum resections were performed in both right and left bicuspid areas. The pack is shown in place.

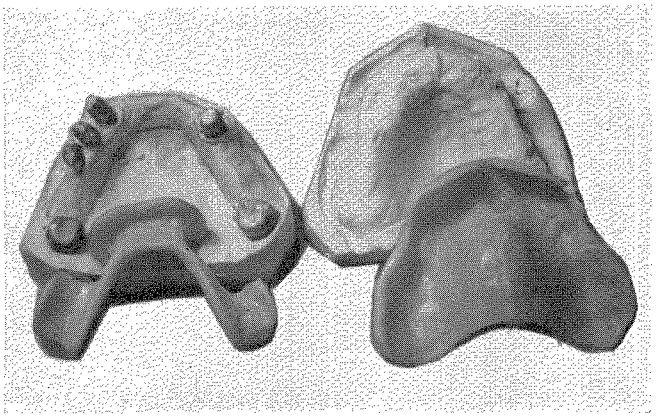

Fig. 88. Photograph taken in March, 1957. Six lower teeth were retained. Copper-plated dies are shown in the lower cast. Acrylic upper and lower trays were made for the final impressions.

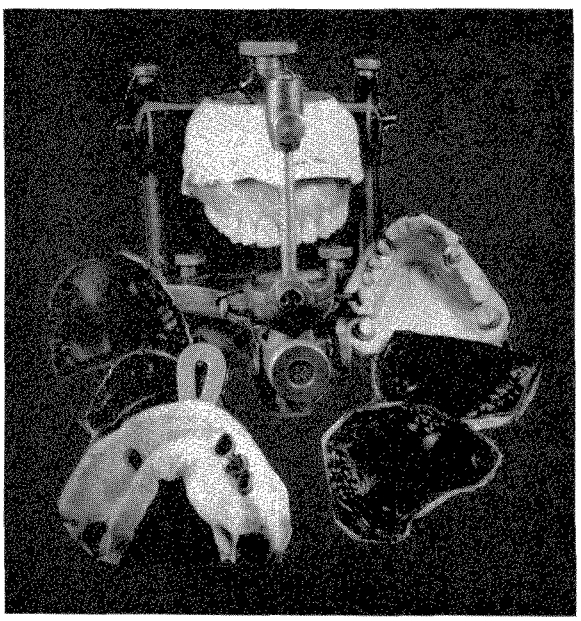

Fig. 89. The Hanau Model H articulator was used in the reconstruction. Wax records were taken in order to mount the working casts on the articulator.

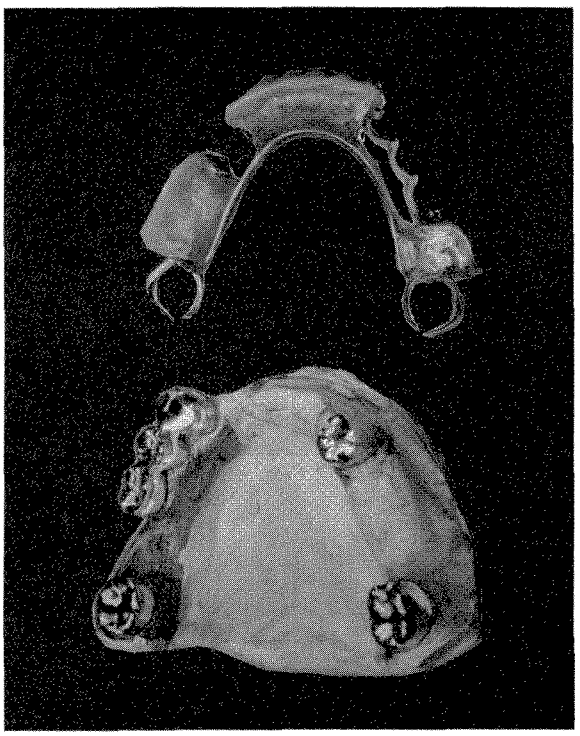

Fig. 90. The lower removable partial denture is shown here. The abutment castings contain precision lug rests. A cast lingual continuous clasp fits into its precision cut shelf on the lingual surface of the lower left cuspid and bicuspids.

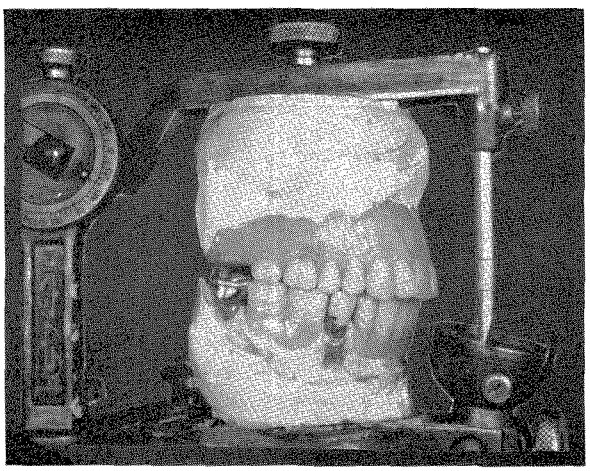

Fig. 91. Right view of the completed prosthesis just prior to insertion.

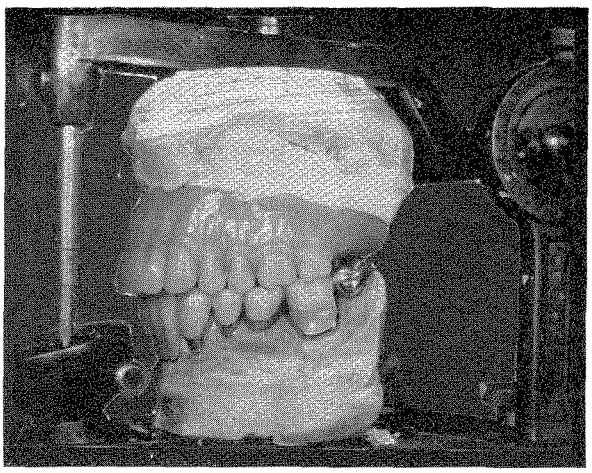

Fig. 92. Left view of the completed prosthesis just prior to insertion.

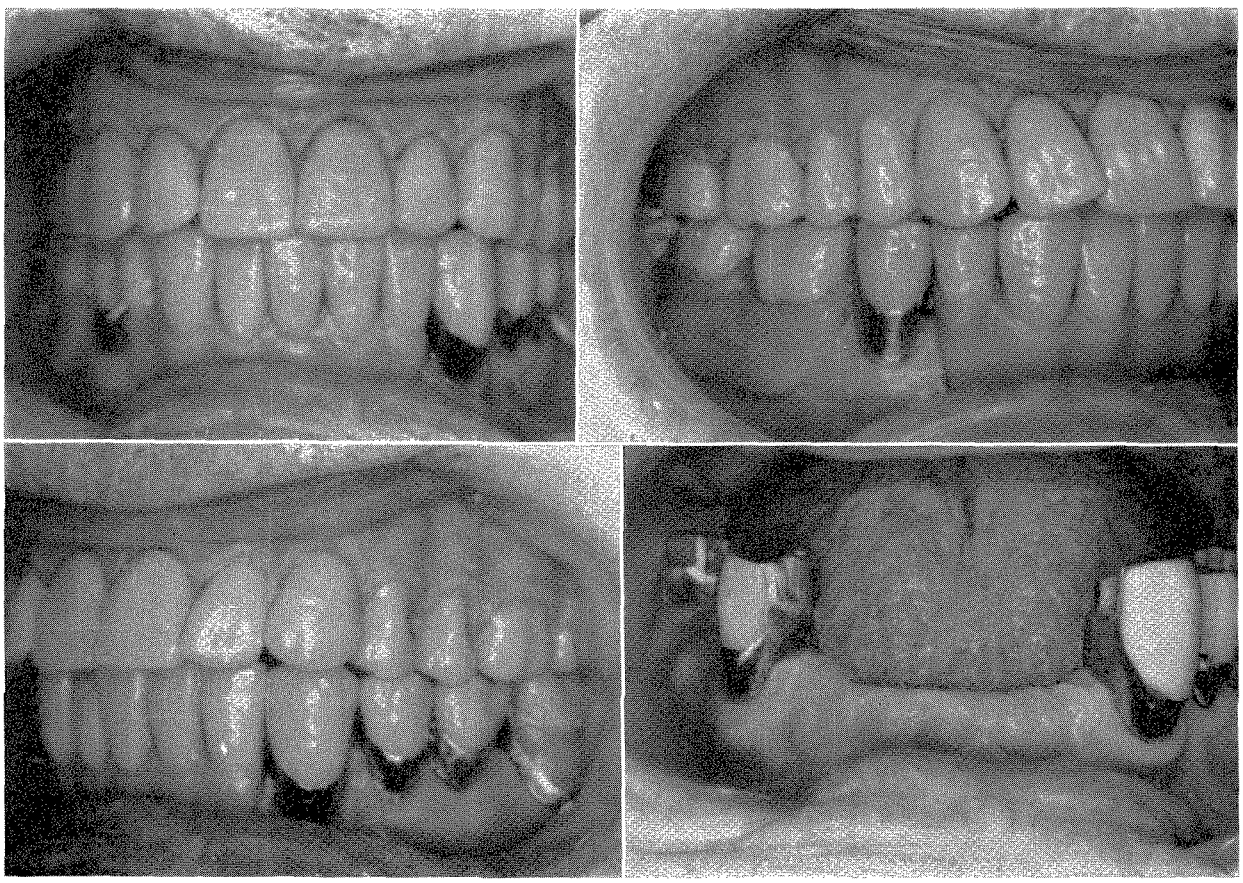

Fig. 93. The completed case showing right, left, and front views. In the lower right illustration the removable partial denture has been removed.

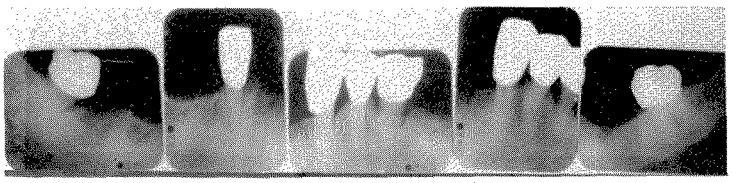

Fig. 94. Roentgenograms taken in March, 1958.

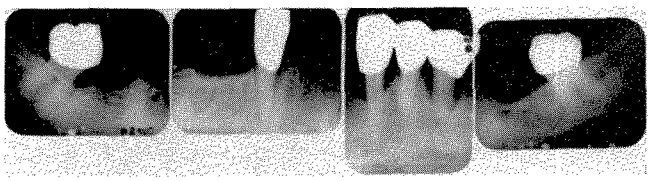

Fig. 95. Roentgenograms taken in 1962. The left second bicuspid was becoming deeply involved in periodontal pathology.

The roentgenograms gave the tragic evidence of the severe alveolar bone destruction. There were bifurcation and trifurcation involvements and vertical pockets that engulfed entire roots. The patient was 62 years old at this time.

The reconstruction was completed in May, 1957. It consisted first of gum resections, followed by transitional procedures, and then the final work. Upon examination five years after completion, the periodontal pockets in the lower left bicuspids had become deeper. The lower right molar had developed a mesial pocket. In spite of this the mouth was cleaner and healthier than it had been in many years. Why the lower left molar was not involved periodontally is an enigma. How long the remaining lower teeth would hold up was also problematic. With our present state of knowledge, the obstacles presented by a case of this nature are insurmountable. The patient at the time of writing was 69 years old. (Figs. 82 to 95.)

Case 4

The reason some teeth are not affected by periodontal disease whereas others are is difficult to explain. In 1934 this patient, a young man in his mid-thirties, came for treatment. The 1934 roentgenograms revealed the extensive bone destruction. Similar to the preceding patient, the periodontal pockets were vertical, and even at this young age many root apices were completely surrounded by areas of alveolar resorption. Although only three teeth had been extracted previously, it was necessary to remove nine additional teeth that were hopelessly involved. The majority of the twenty remaining teeth had lost much of their bony support.

The patient was reluctant to have any teeth removed. His 1936 roentgenograms showed the compromise treatment which he received. A lower right fixed partial denture and a lower left removable partial denture were inserted. The upper missing teeth were restored by a removable partial denture.

In 1940 he suffered a coronary attack and was hospitalized for four weeks. His recovery was rapid—in fact, so much so that he remarked that his medical advisors had probably made a mistake in diagnosis.

The 1941 roentgenograms showed the progressive loss of alveolar bone in spite

of continual physical and dental checkups. In 1943 it became necessary to reconstruct his mouth. Four lower molars and five lower anterior teeth were retained. The lower incisors had lost a great deal of the alveolar bone. A full upper denture and a lower lingual bar were used. The work was completed in May, 1944.

The 1946 roentgenograms showed no change in bone structure. This case was reported in 1947.* In 1956 the roentgenograms showed a further deterioration in the left second molar. No other significant changes had taken place by 1956. It was not discovered until 1960 that this patient had been drinking lemon juice in warm water every day for about forty years. The inlays in the lower molars were observed to be much higher than the surrounding natural tooth structure. What effect this had upon the over-all picture is difficult to appraise, but it is astonishing that this habit could have remained undiscovered for so long. His 1961 roentgenograms showed further infection in the lower left second molar. Only when this infection became acute and the tissues swollen and painful would the patient submit to its removal. The remaining eight teeth were still in the same relative condition as in 1944, when the lower removable partial denture was inserted. The infected tooth was removed, and another tooth was added to the partial denture. The left third molar was clasped. The patient at this time was in his mid-sixties. In August, 1962, he suffered a stroke which paralyzed his left side. At the time of writing he was still hospitalized.

Discussion

From the amount of alveolar bone lost in 1934 when the patient was in his thirties and from the type of bone loss, it was a foregone conclusion that he would wear full upper and lower dentures at an early age. Yet, insofar as the retained lower nine teeth are concerned, the past twenty-eight years demonstrated very little deterioration. This could have been due to an improvement in the patient's health. It also could have resulted from the removal of all the upper natural teeth and the insertion of an upper full denture. A full denture is less traumatic to the remaining natural lower teeth because it cannot exert great pressure.

This patient was neglectful of his oral hygiene and did not come regularly for examination and prophylaxis. He seemed to be philosophic and serious in his attitude toward life in general and fatalistic in his attitude concerning his teeth. He knew that his case had been a problem marked by several unknown factors. He suggested more and deeper research along the lines of his periodontal problem.

Relative to the restorative procedures which were employed then, now more extensive splinting would be used. Twenty years ago splinting was not utilized as frequently as today. The lower left second molar should have been supported by the third molar as one unit. It already had a distal root involvement in 1934. The fact remains that the insidious and rapid alveolar bone loss was checked. Could it have been because the occlusion was balanced in 1944? Multitudinous simultaneous contacts in lateral and protrusive excursions were provided. A correct centric relation was attained. However, these answers are but conjectures based solely upon hindsight. The most probable answer is that known mechanical and unknown systemic factors were at work. (Figs. 96 to 116.)

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 427-429.

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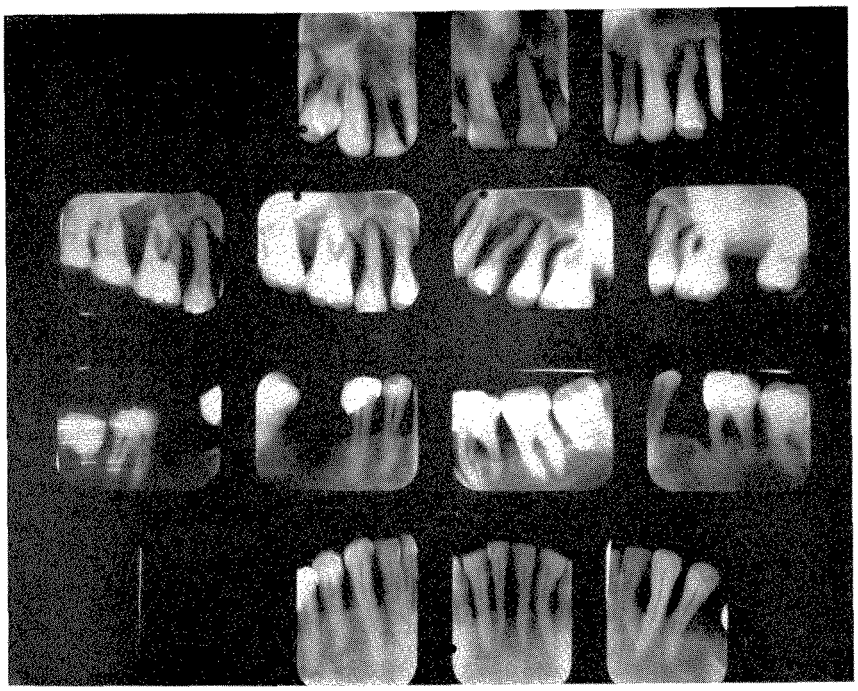


Fig. 96. Roentgenograms taken in 1934 at the age of 35. Observe the extensive alveolar bone destruction. (Figs. 96 to 116 are of the same case.)

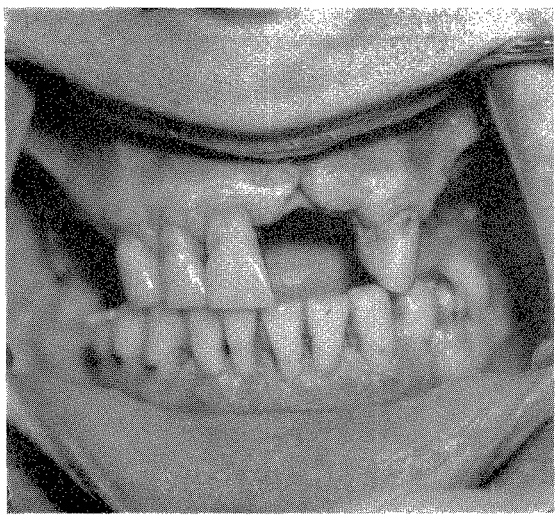


Fig. 97. The infected teeth shown in Fig. 96 were removed. The mouth is shown just prior to the insertion of the upper removable partial denture.

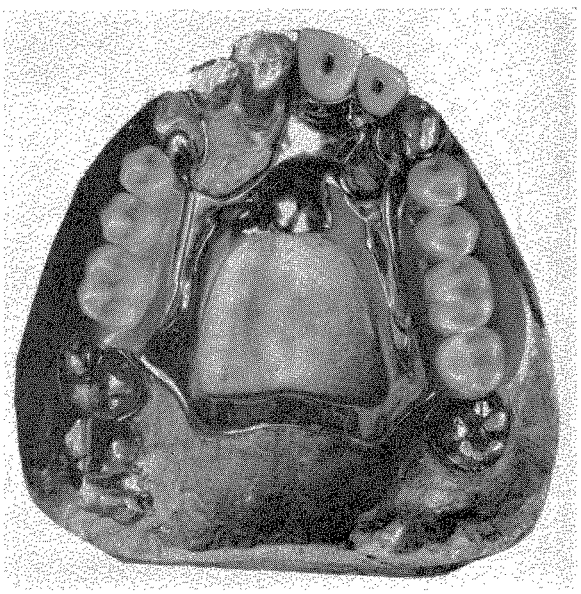


Fig. 98. This is the removable partial denture that was inserted in 1935. It had two clasps on the cuspids which were soldered posteriorly in the area of the first molars to provide a breakstress. Today's concepts would eliminate such procedures.

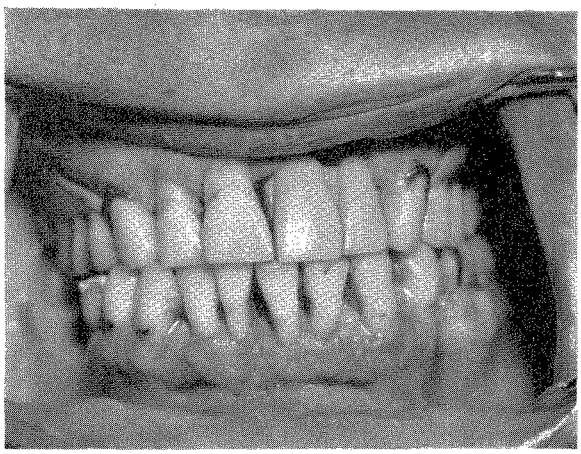


Fig. 99. The removable partial denture shown in Fig. 98 is in position in the mouth. This was taken in 1935.

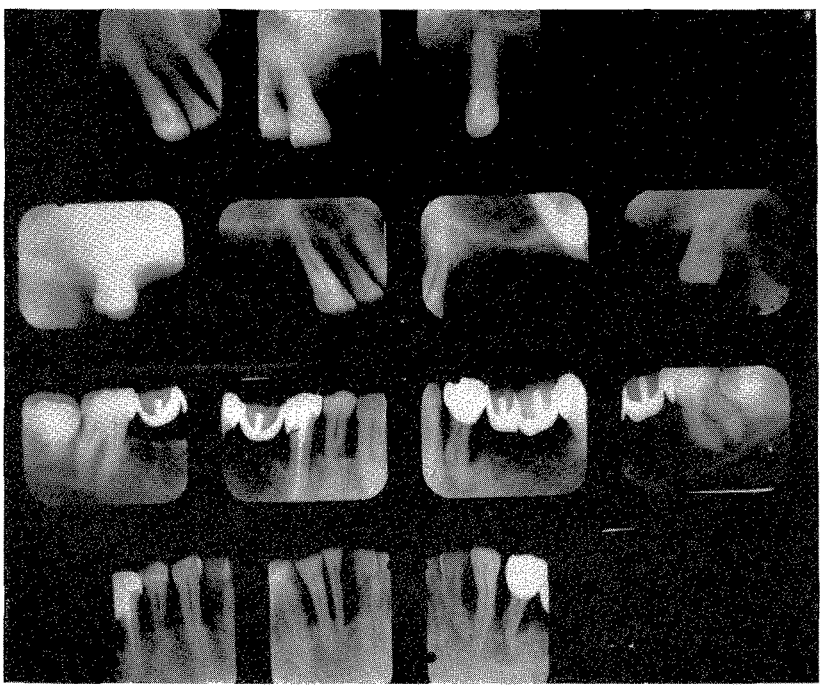


Fig. 100. Roentgenograms taken in 1939. The advance of the periodontal pathology had not been checked.

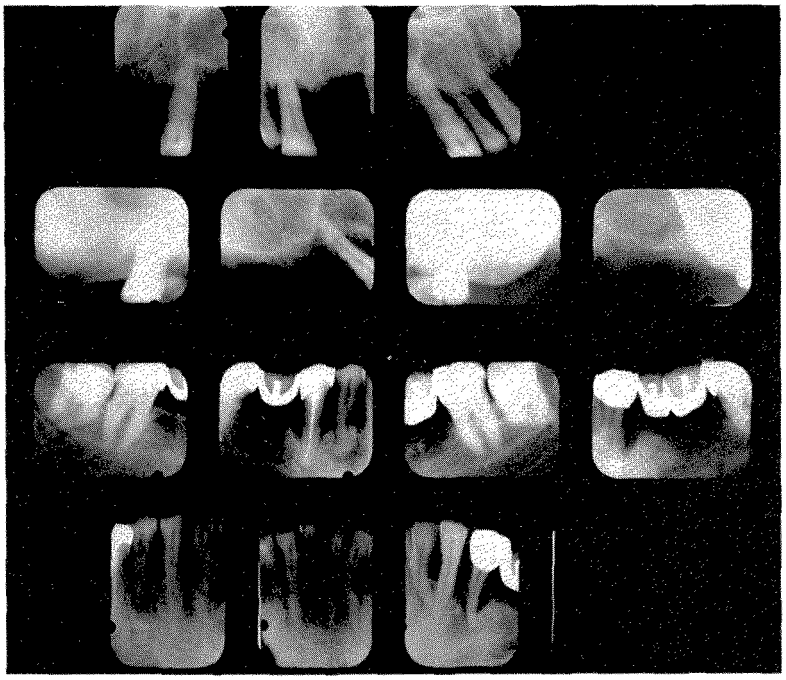


Fig. 101. Roentgenograms taken in 1943 just before the removal of the infected teeth and the rehabilitation of the mouth.

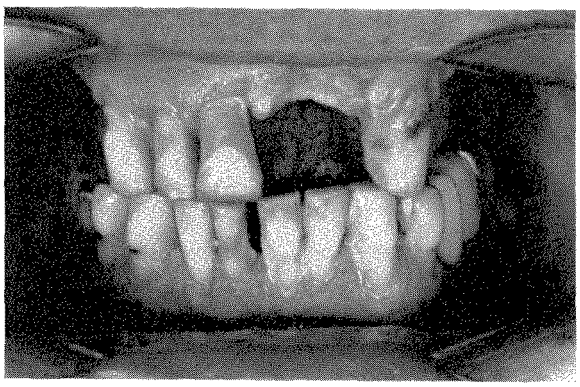


Fig. 102. Photograph of the mouth taken in 1943 at the start of treatment.

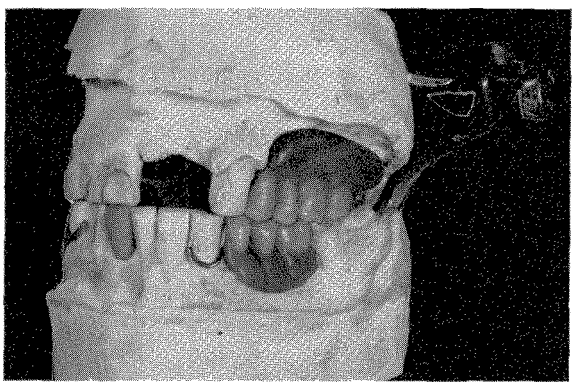


Fig. 103. The construction of the immediate upper and lower removable dentures.

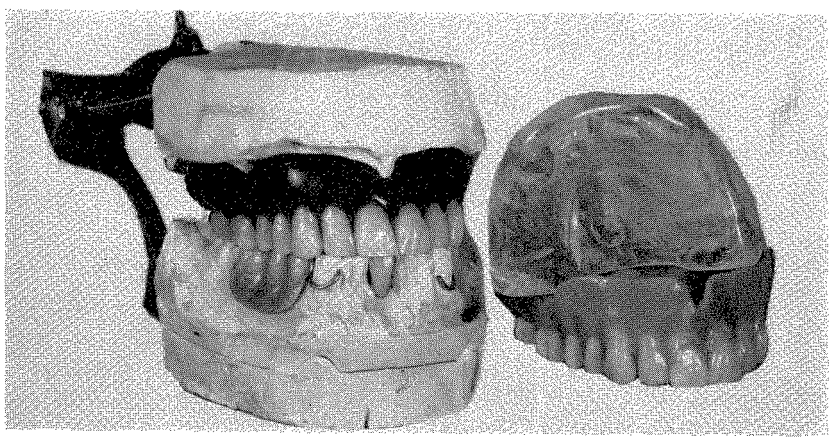


Fig. 104. The upper immediate denture completed. The clear acrylic operating mask is seen above it. The lower immediate partial denture is on the articulator. The upper duplicate setup is also on the articulator. This was used later on to construct the final upper denture.

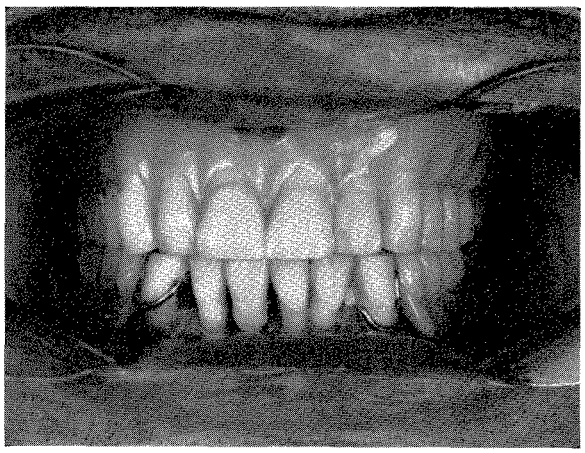


Fig. 105. The teeth were removed, and the immediate upper and lower prostheses were inserted. This was done on Jan. 3, 1944.

Fig. 106. As the healing took place the immediate upper denture was relined.

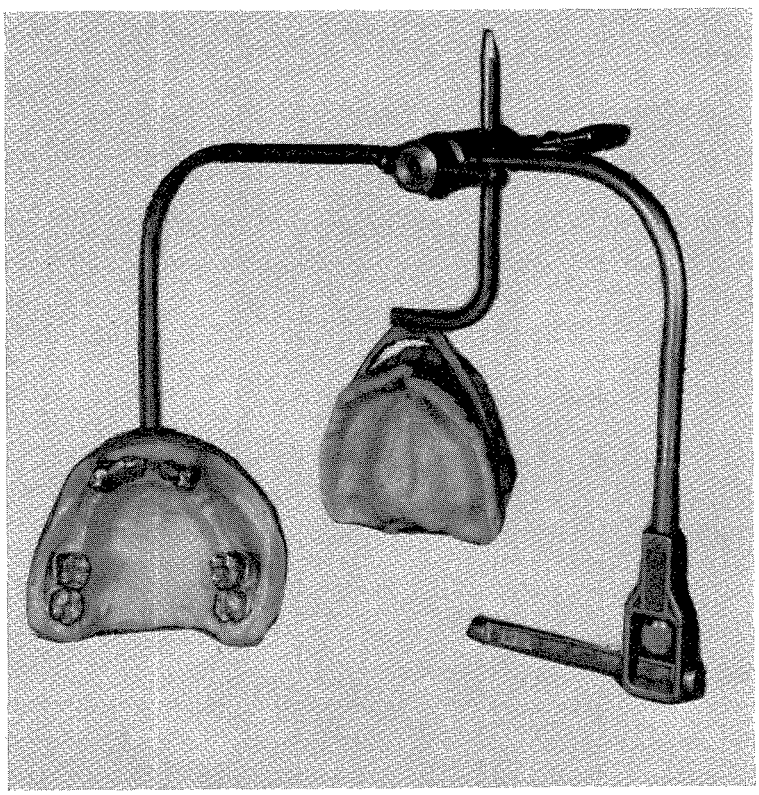
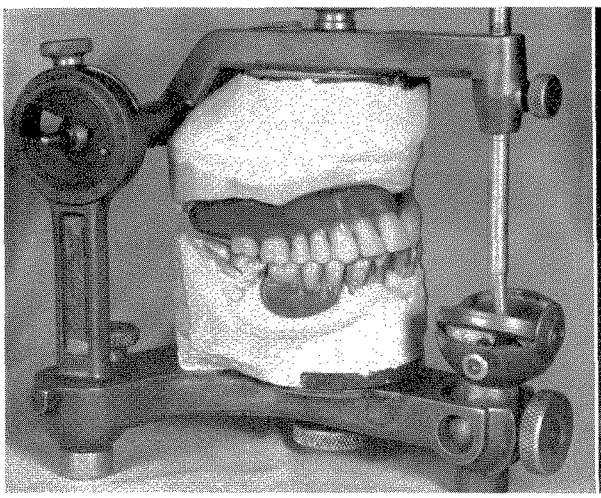


Fig. 107. In March, 1944, the duplicate denture was used as a tray, and an impression was taken with Plastogum. The lower teeth had been prepared previously for castings which would hold the female slots for precision attachments. The face-bow record is also shown.

Fig. 108



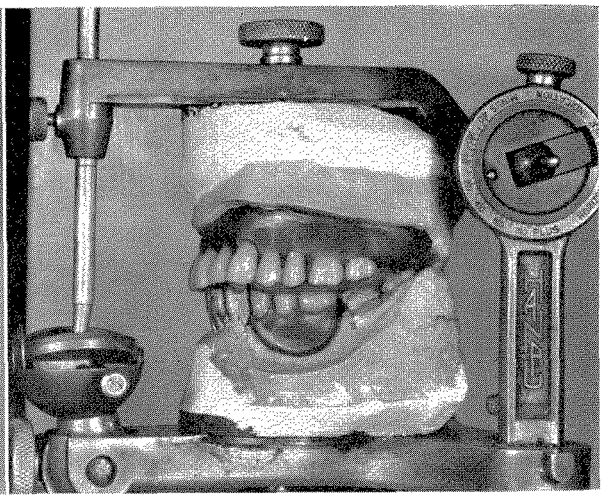


Fig. 109

Fig. 108. The upper and lower setup on the articulator. The bases are still in pink wax.
Fig. 109. Checkbites were taken with wax to coordinate the occlusion.

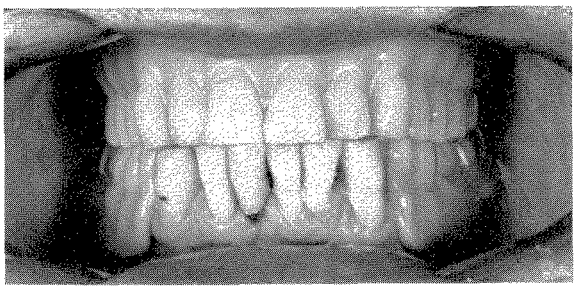


Fig. 110. Anterior view of completed work in the mouth (May, 1944).

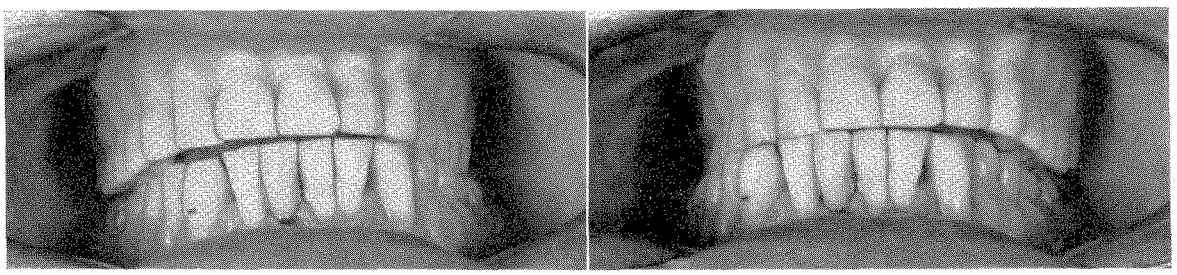


Fig. 111. Right and left working and balancing bites of final prosthesis.

Fig. 112. The temporary immediate prosthesis is shown on the left. The two duplicate sets of final work are shown in the center and on the right side. They are interchangeable with one another.

Fig. 113. Roentgenograms taken in 1953. There was little or no deterioration during the previous ten years.

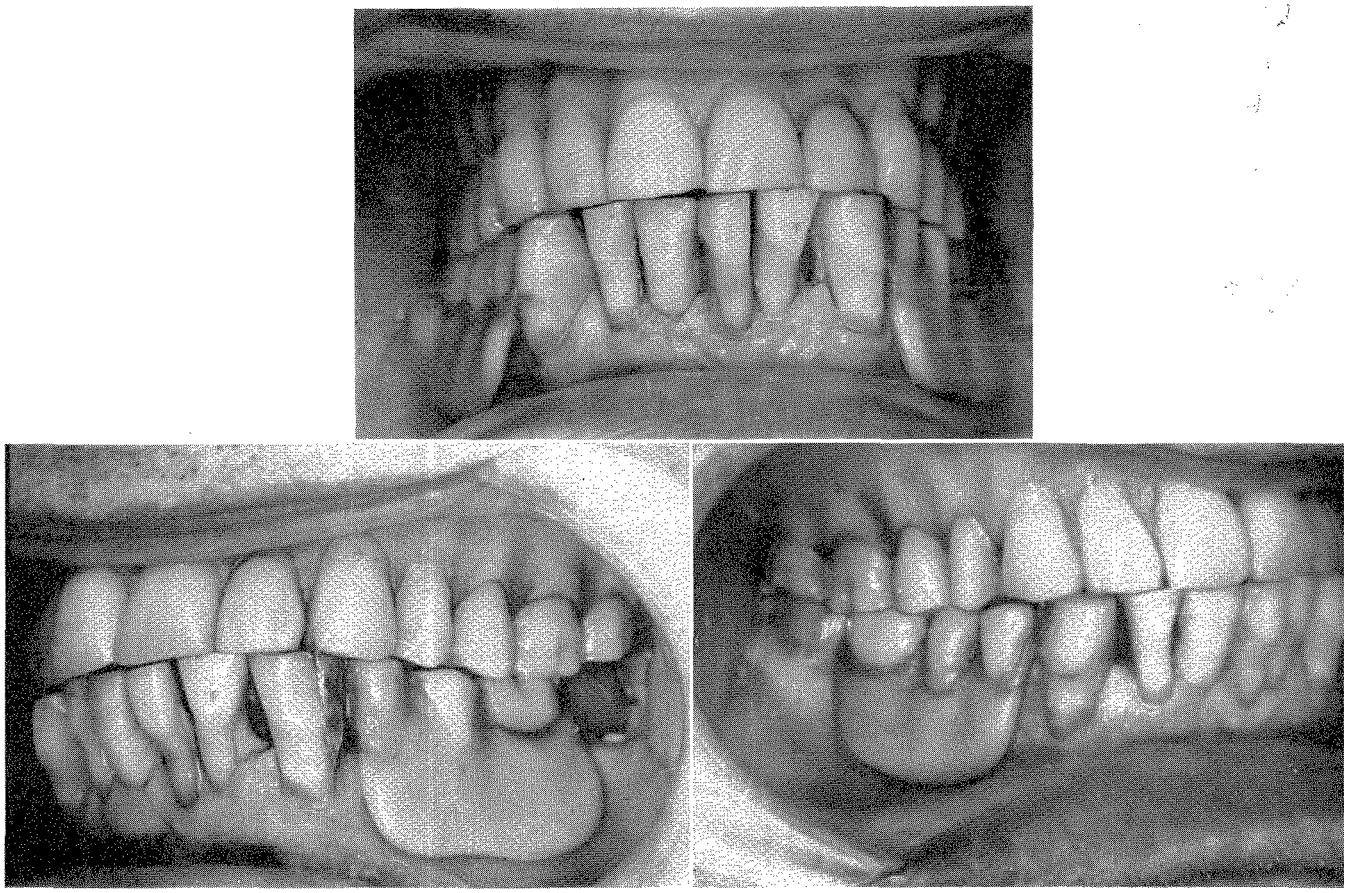


Fig. 114. Anterior, left, and right views. These were taken in 1961. The lower left second molar was removed recently.

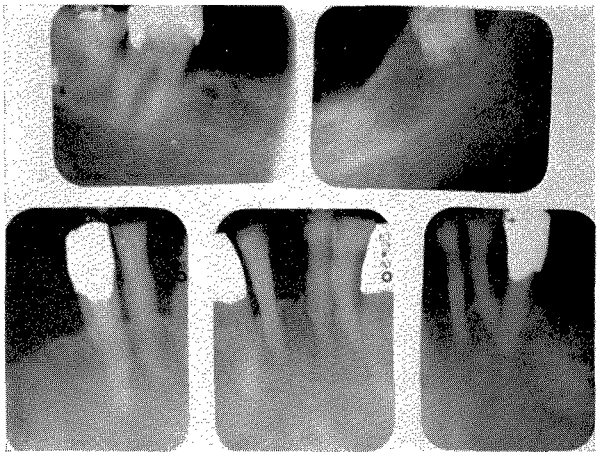


Fig. 115. Roentgenograms taken in 1963. The left second molar became infected and had to be removed. Its replacement was added to the present lower removable partial denture as is shown in Fig. 116.

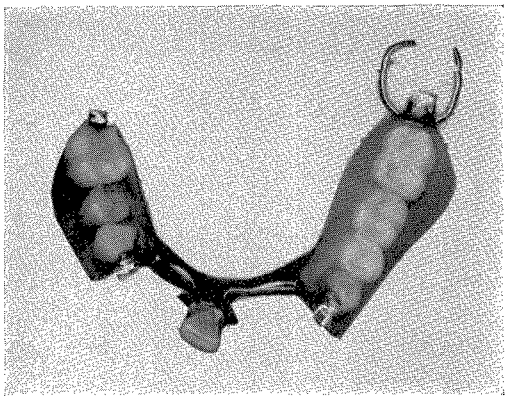


Fig. 116. Repair of the lower removable partial denture which is still being worn. It was inserted in 1944.

REGARDING RETENTION OF PROBLEMATIC TEETH

Teeth which present questionable prognosis are being retained, to a greater or lesser degree, by the great majority of dentists. Some are needed for the retention of extensive restorative procedures, and others are needed because of the unwillingness of the patient to have them removed even with the realization that retention involves gambling with the future longevity of their restorative work. The question comes up continually whether or not the dentist should refuse to undertake a case in which the prognosis is uncertain. Such an inquiry produces a complex and involved reply.

From the financial point of view, only people of means can afford to retain problematic teeth. They must be able to afford to have their extensive restorative work replaced if these teeth require removal. The pros and cons of the effect of possible infections upon the patient's general health should be discussed thoroughly. The responsibility in these decisions should be shared openly by both dentist and patient. The advice of the patient's medical doctor should also be obtained wherever possible. When the responsibility for the decision rests entirely and only upon the dentist, it is recommended that most of the teeth with questionable futures should be removed. There are always some patients, however, who are willing to make many sacrifices to retain their natural teeth. Although these cases may barely meet the minimum requirements for tooth retention, the wishes of such patients are entitled to every consideration.

When the dentist is aware that a financial and a physical hardship will be inflicted upon a patient by the retention of problematic teeth, the patient should be emphatically discouraged. In the average lifetime of a dentist, many problem cases must be undertaken and many teeth with questionable prognosis retained. All of us who are willing to be intellectually honest will admit to having had a fair percentage of failures with this group of patients. However, the number of people who have been benefited physically and emotionally by our willingness to cooperate, even if only on a compromise basis, usually far outnumber the failures—

and the majority of such patients are enduringly grateful. Although many eventually have to have their teeth removed and full dentures inserted, over a span of many years they become emotionally better adjusted to their dental problem, and then they are better prepared mentally to accept full dentures.

Case 5

The preceding remarks are a background for this case. In 1929 a young man first came for dental treatment. He was in his early thirties and was a lawyer by profession. Eight teeth had already been removed. The 1929 roentgenograms indicated deep periodontal involvement. His history revealed specialized periodontal treatment. He was wearing three fixed partial dentures. He gave every evidence of good health and a relaxed state of mind. His dental problems were carefully evaluated for him. He had previously undergone specialized periodontal therapy and had been advised to have all his remaining teeth removed. Although he was aware of their weakness, he wished to retain them.

His 1936 roentgenograms reveal further periodontal deterioration. At that time a number of teeth were removed, and upper and lower removable partial dentures were inserted. His 1942 roentgenograms revealed continued severe alveolar bone destruction. There were fourteen teeth missing. Of those remaining, the majority were deeply involved in periodontal pathology. Although, several times during treatment, a full upper denture was suggested, the patient was content with the removable partial dentures and was unwilling to comply. The 1949 roentgenograms revealed that of the fifteen remaining teeth, half were hopelessly involved. By 1958 only nine teeth remained, of which several had periodontal infections. The patient was finally reconciled to a full upper denture. This was completed in 1960. The lower cuspids and lateral incisors, as well as the right second molar, were retained, and a lower removable partial denture was inserted.

The patient at this time was in his early seventies and in good health. He appreciated the cooperation he received during the previous thirty-two years. An intelligent individual, he was fully cognizant of what was taking place, and he selected the treatment he received. He felt strongly that he made the correct choice. (Figs. 117 to 139.)

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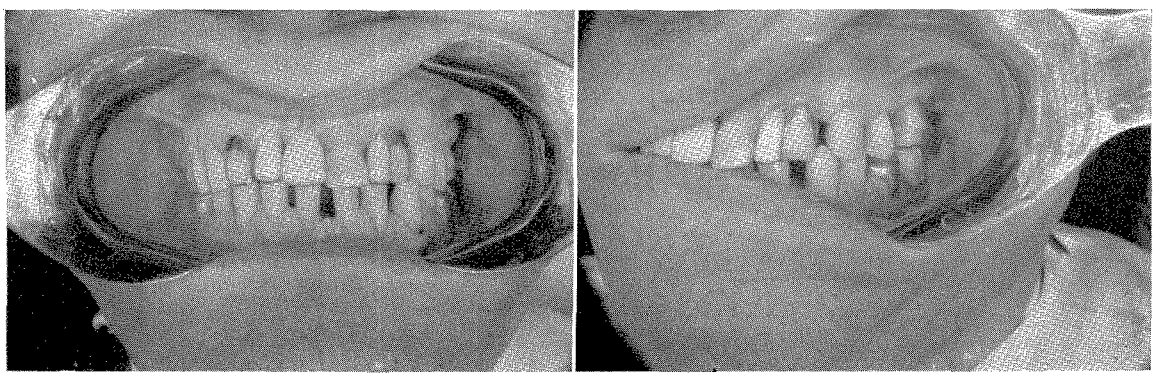

Fig. 117. Anterior and left-side views taken in 1936 when the patient was 46 years old. (Figs. 117 to 139 are of the same case.)

Fig. 118. Roentgenograms taken in 1929 when the patient was 39 years old.

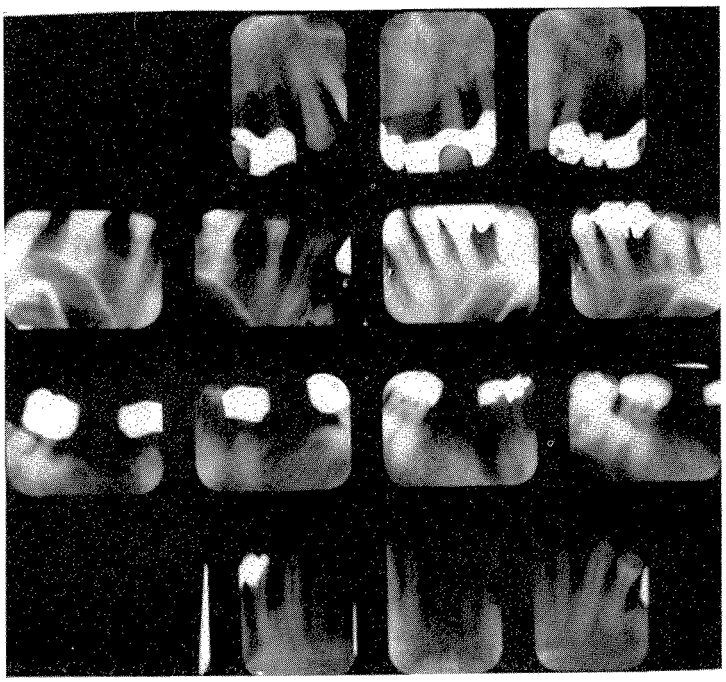

Fig. 119. Roentgenograms taken in February, 1936, just prior to the rehabilitation of the mouth.

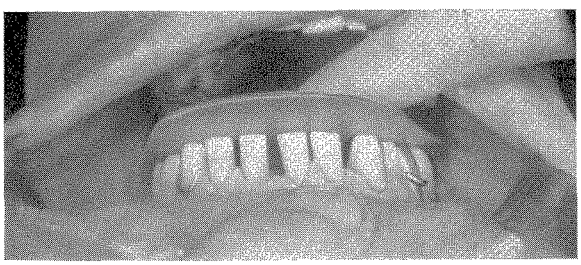

Fig. 120. In the reconstruction the lower teeth were made to conform to a disk which formed a segment of a circle whose radius was four inches.

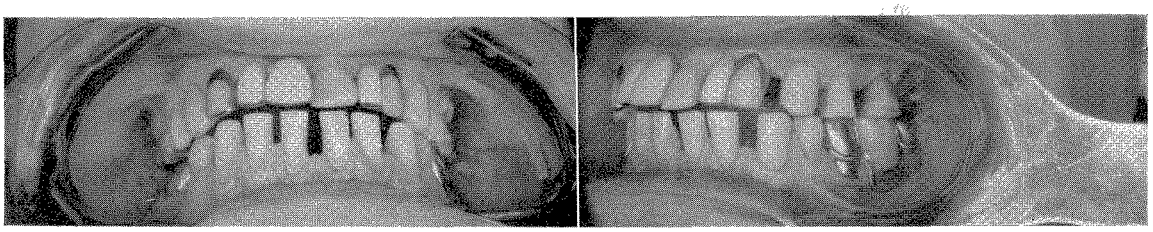

Fig. 121. Anterior and left-side views of the completed lower prosthesis after insertion in the mouth. The increase in the vertical dimension may be seen by comparing this illustration with Fig. 117.

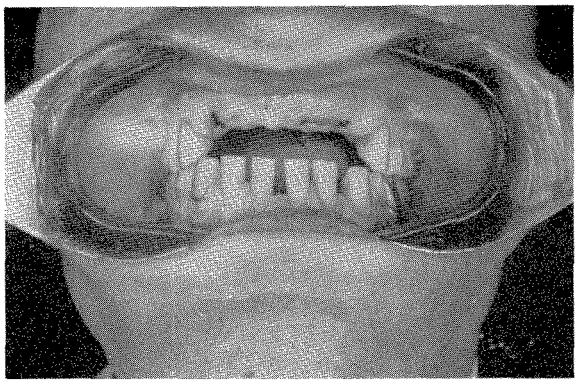

Fig. 122. The reconstruction of the upper teeth was started. The central and lateral incisors were removed.

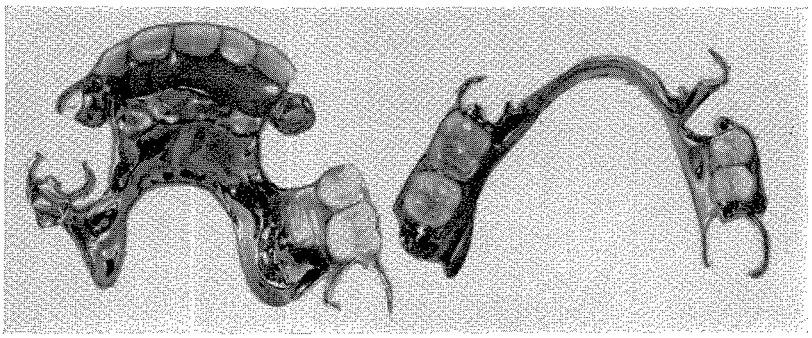

Fig. 123. The upper and lower removable partial dentures which were used.

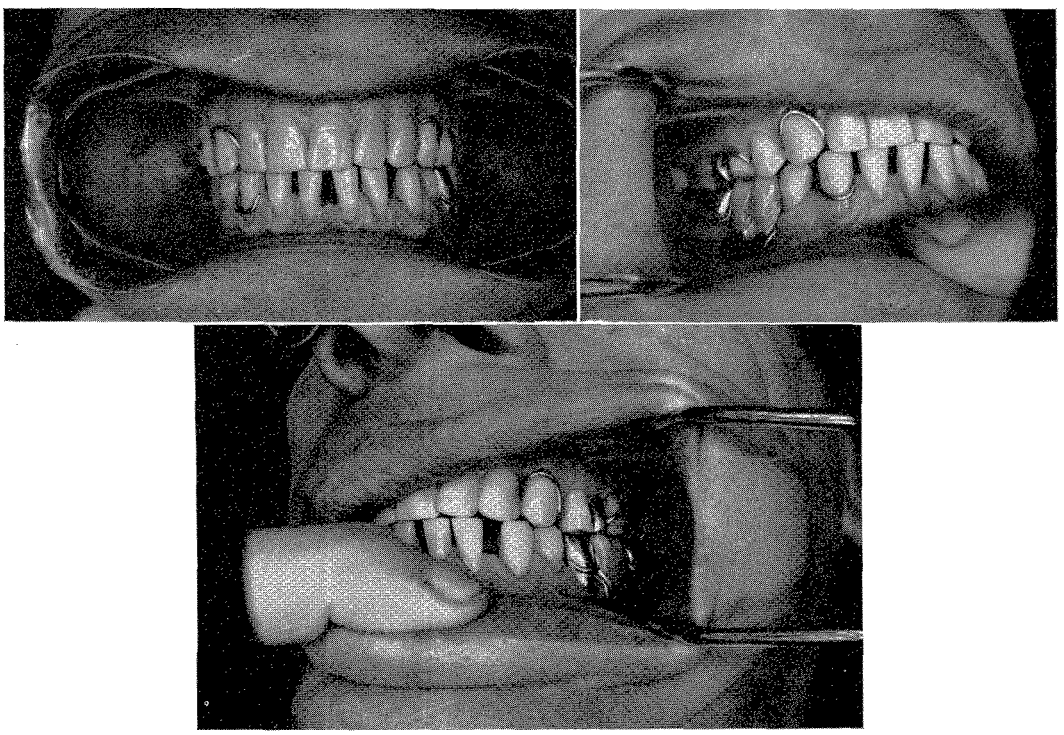

Fig. 124. Anterior, right, and left views of the completed work. The patient was 46 years old at this time, in 1936.

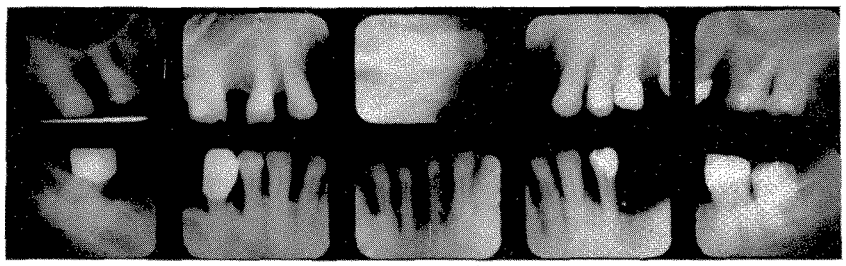

Fig. 125. Roentgenograms taken in 1936 at the completion of the rehabilitation.

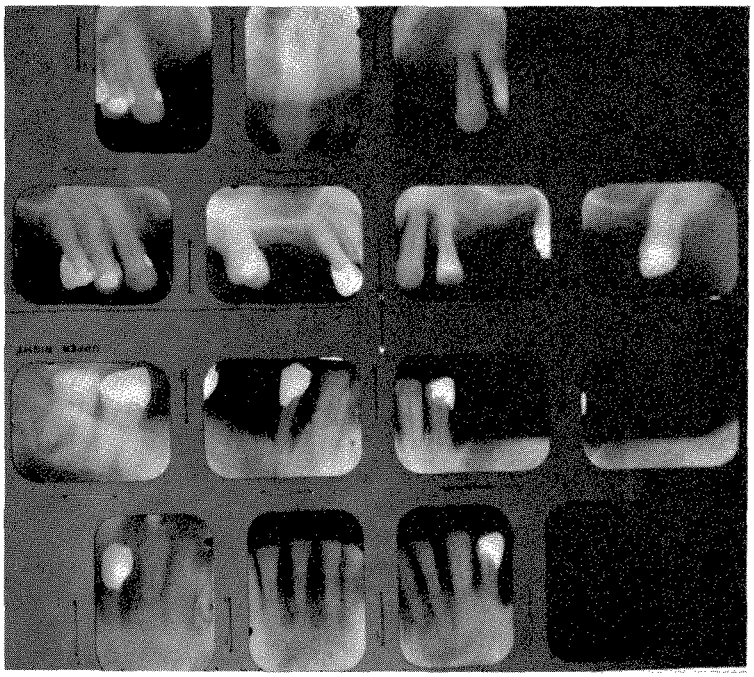

Fig. 126. Roentgenograms taken in October, 1945.

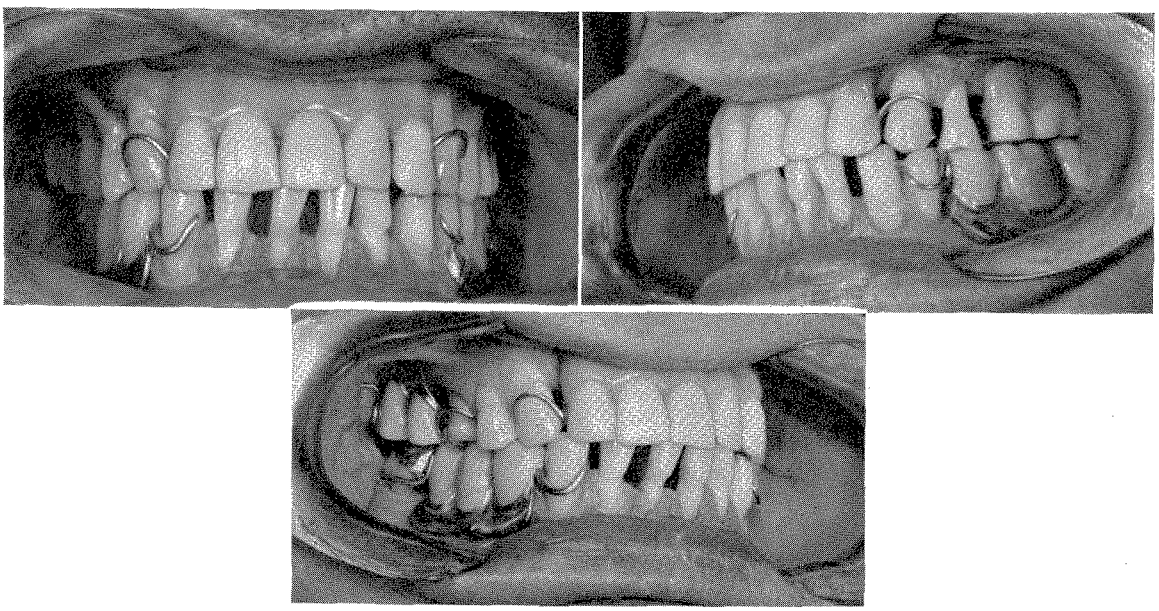

Fig. 127. Anterior, left, and right views of the mouth taken in 1953. The patient was then 63 years old.

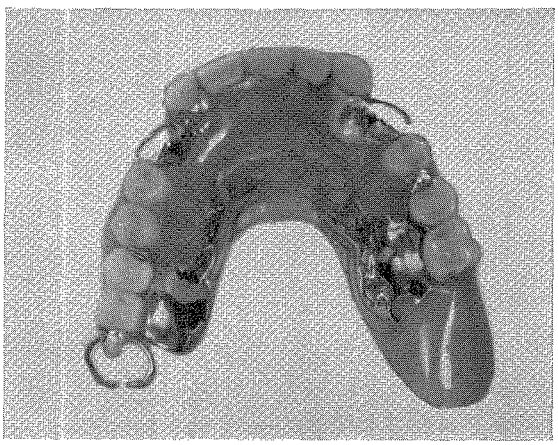

Fig. 128. The old upper removable partial denture was rebased and added to several times. This is how it looked in 1953.

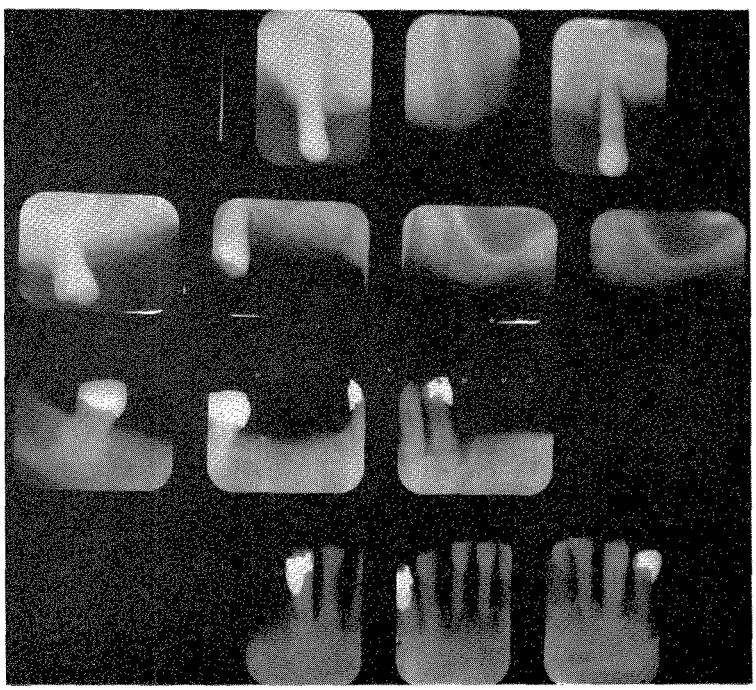

Fig. 129. Roentgenograms taken in 1955.

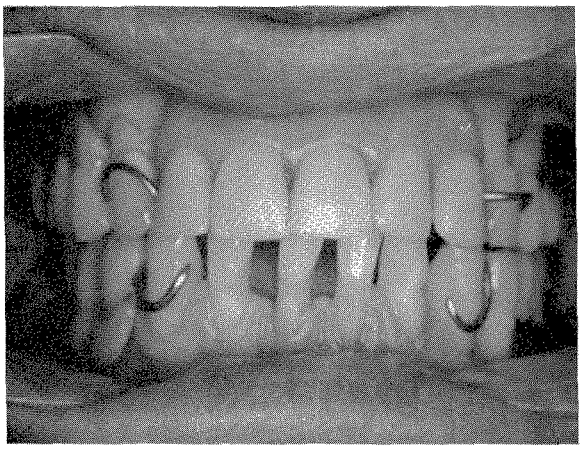

Fig. 130. The appearance of the mouth in May, 1959. Shortly after this photograph was made, the two lower central incisors and the three remaining maxillary teeth were removed.

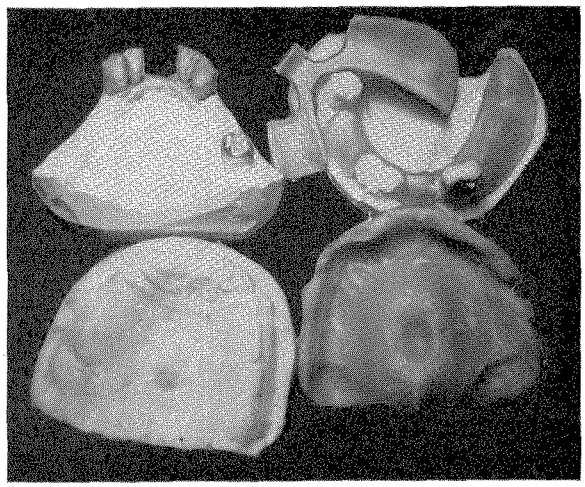

Fig. 131. The lower anterior castings were splinted in pairs. A lower plastic tray was made in which to take the final impression. An upper acrylic base was made with which to register the bite.

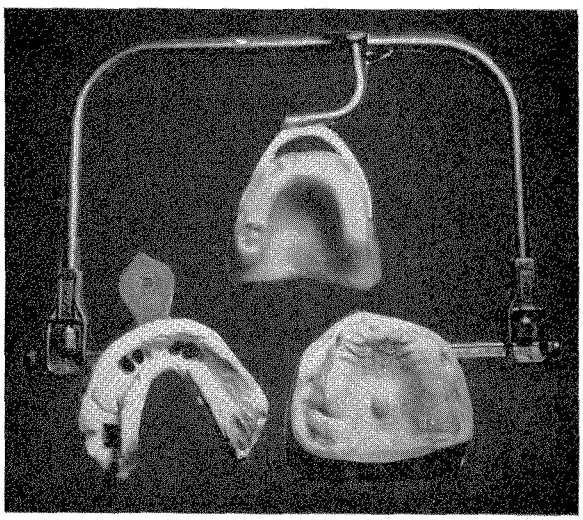

Fig. 132. The lower impression was taken in two parts as shown here. The face-bow and centric relation bite are also shown. The master upper cast is in the right foreground.

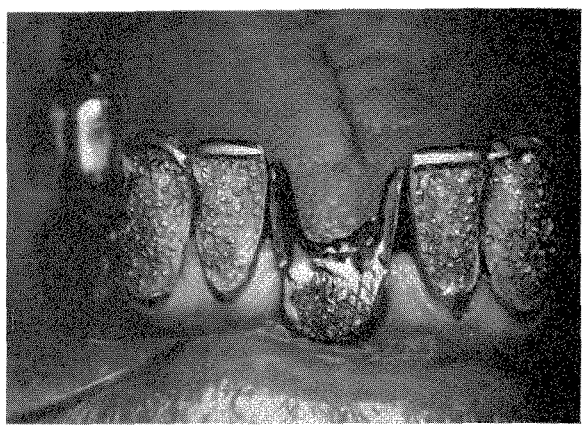

Fig. 133. The lower abutment castings were inserted. Then the removable partial denture base was inserted. The removable and fixed parts were not yet related to each other by means of the precision attachments.

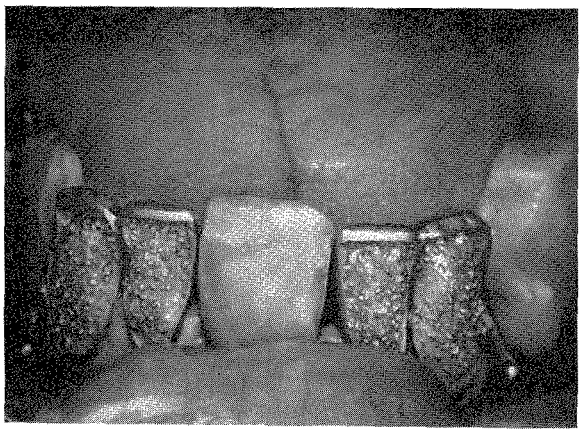

Fig. 134. Wax vertical stops were added to the saddles to contact the metal impression tray in order to create slight functional pressure when the over-all relational plaster impression is taken.

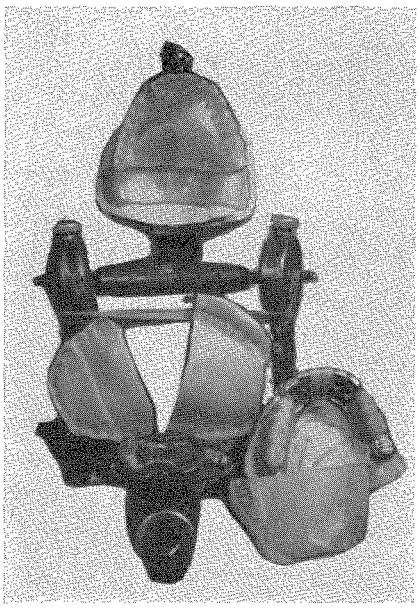

Fig. 135. After the try-in, in order to check for centric occlusion, vertical dimension, and esthetics, right and left lateral, protrusive, and new centric relation wax records were taken for remounting and further co-ordination of the occlusion before completion.

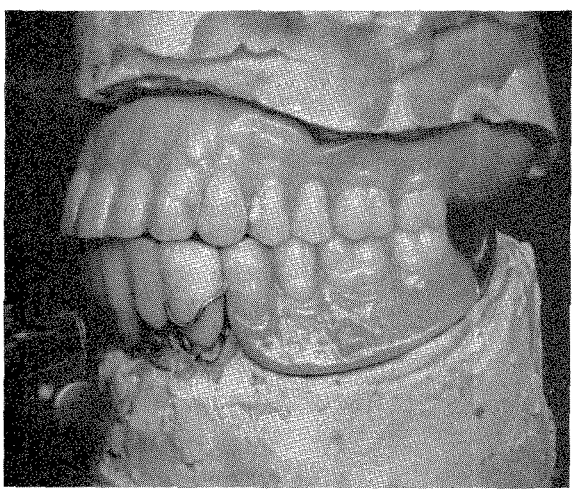

Fig. 136. The final prosthesis on the articulator.

Fig. 137. The final lower prosthesis just before its insertion into the mouth.

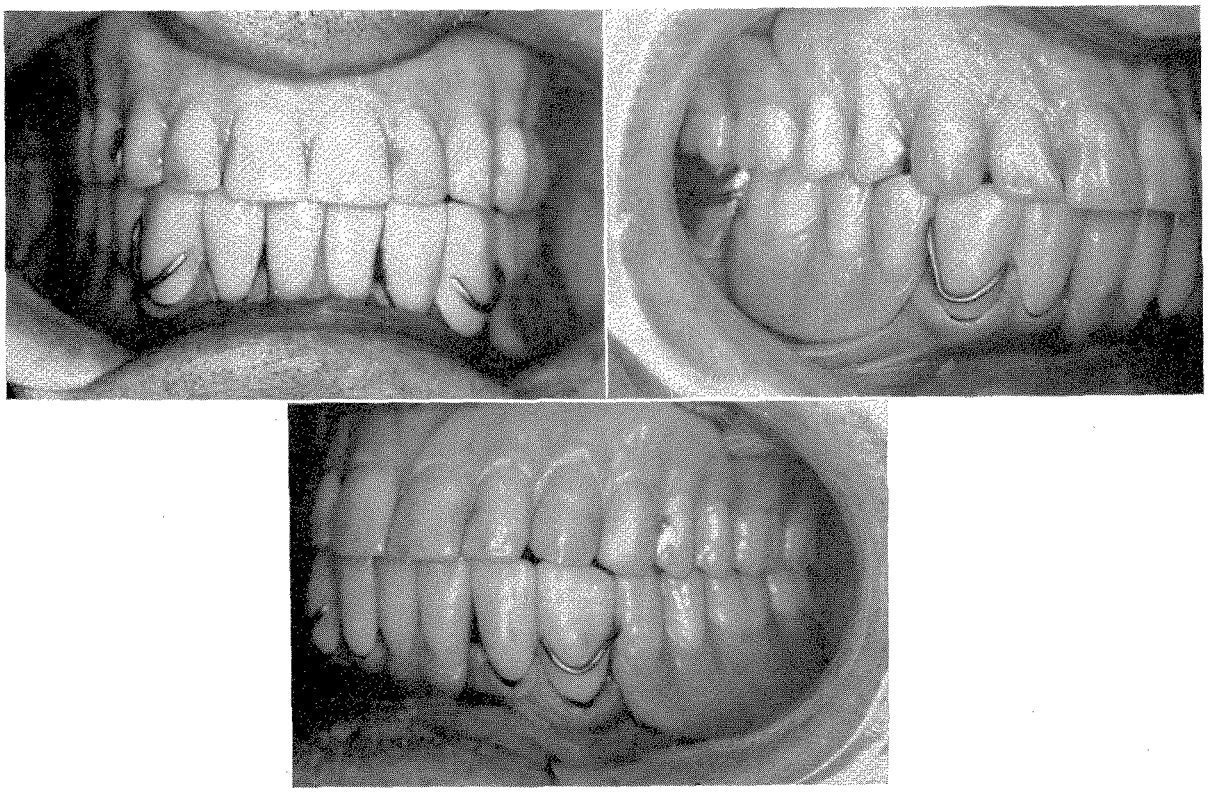

Fig. 138. The completed work in the mouth. Anterior, right, and left views taken in 1960.

Fig. 139. Roentgenograms taken in 1963. The patient was 73 years of age.

Case 6

This patient was a man whose roentgenograms, taken in 1932, indicated deep periodontal pockets associated with his upper second molars. He was then 40 years old and had already lost six molars due to periodontal pathology. Two more teeth were removed in 1932, and four fixed partial dentures were inserted. The 1945 roentgenograms indicated that three of the remaining four molars were again deeply involved, in addition to several other teeth. In a short time these were removed. The lower bicuspids were splinted together for better support, and upper and lower removable partial dentures were inserted between 1947 and

1948. The occlusal load was divided over many teeth, and the occlusion was balanced. By 1954 the periodontal pockets were extensive around the upper left bicuspid and right lateral incisor as well as the lower right central incisor, the right first bicuspid, and the left second bicuspid. The right second bicuspid had been removed.

During this time periodontal treatment was instituted, diet checked, and medical background evaluated. This involved numerous tests. In 1956 to 1957 the lower teeth were more extensively splinted, his gums resected, and a new removable partial denture supported by precision attachments was inserted. In 1958 the upper right vertical periodontal pocket was eliminated by bone planing, and the left upper molar and right lateral incisor were removed. The upper teeth were splinted in two sections. These were joined by a precision lug and a removable partial denture, retained by precision attachments inserted. This was completed in August, 1958.

In 1961 this patient died at the age of 70. Although his mouth was under constant care since 1932, the results were unsatisfactory. The construction of the fixed and removable partial dentures followed accepted conventional methods. The bridges that were inserted long ago could have been supported by more abutments in order to divide the masticatory pressures better. In the later prosthesis more extensive splinting was employed. (Figs. 140 to 156.)

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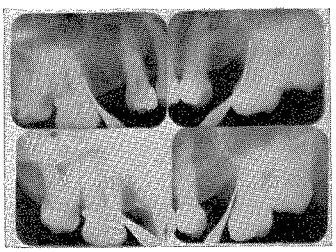


Fig. 140. Roentgenograms taken in 1932. Deep periodontal pockets are shown associated with the upper second molars. (Figs. 140 to 156 are of the same case.)

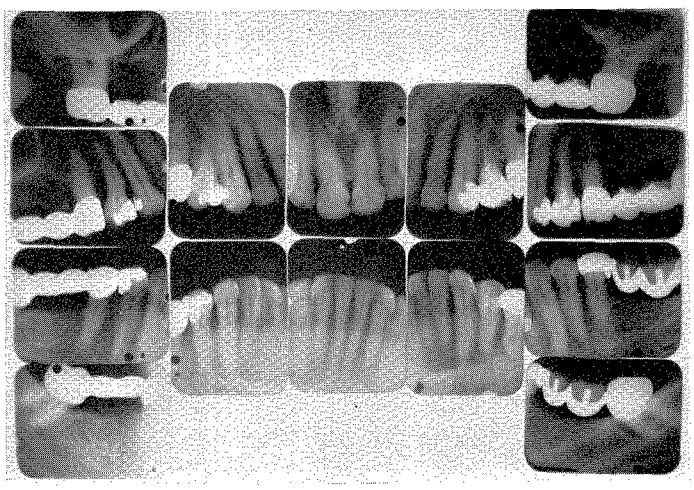


Fig. 141. Roentgenograms taken in 1938. Four fixed partial dentures had been inserted in the fall of 1934.

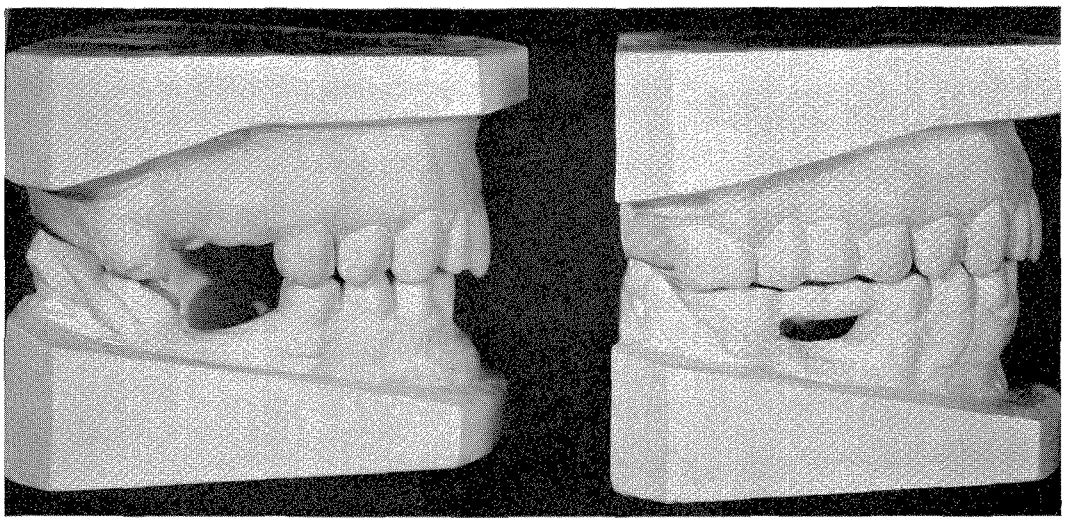


Fig. 142. Right side of the casts taken in 1934 showing the teeth before and after the insertion of the four fixed partial dentures. The left side is similar.

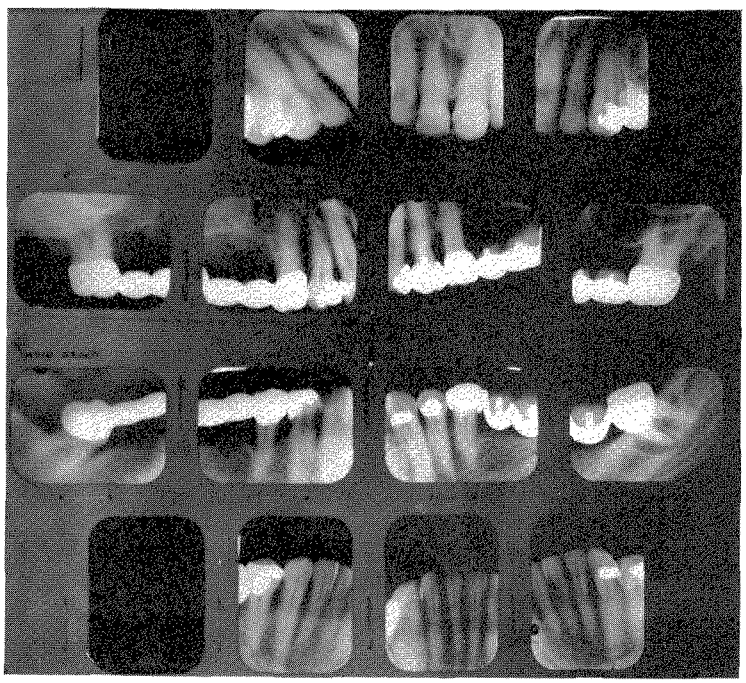


Fig. 143. Roentgenograms taken in 1945. The patient was 51 years old. The lower left and the upper right molars were deeply involved in periodontal disease as were several other teeth.

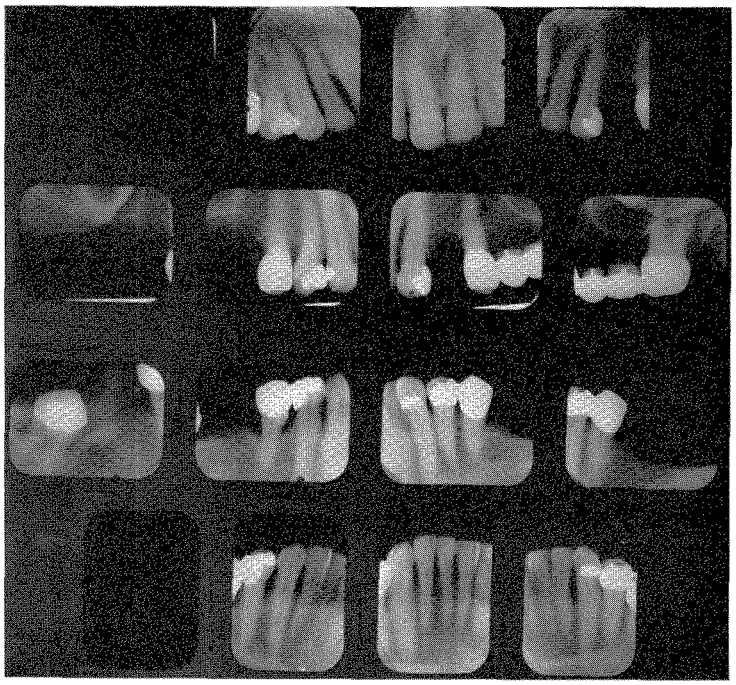


Fig. 144. Roentgenograms taken in 1947. This was the year in which upper and lower removable partial dentures were inserted.

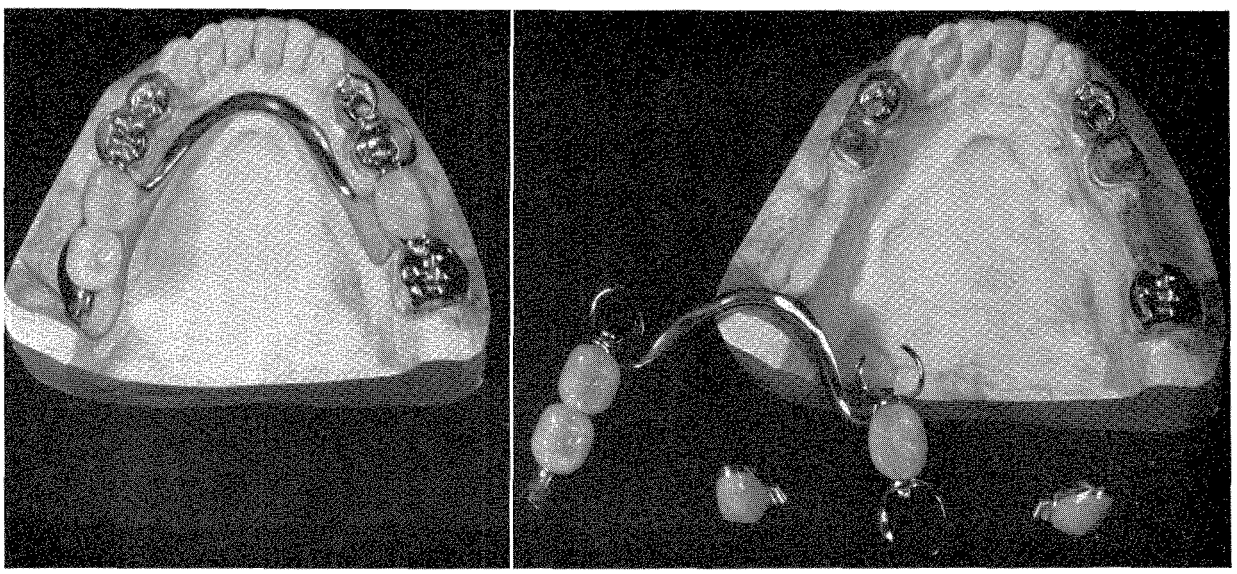


Fig. 145. The lower removable partial denture inserted in March, 1947. The bicuspids were joined by lugs. The lingual arms of the clasps were cast and rigid. They were countersunk in the abutment castings.

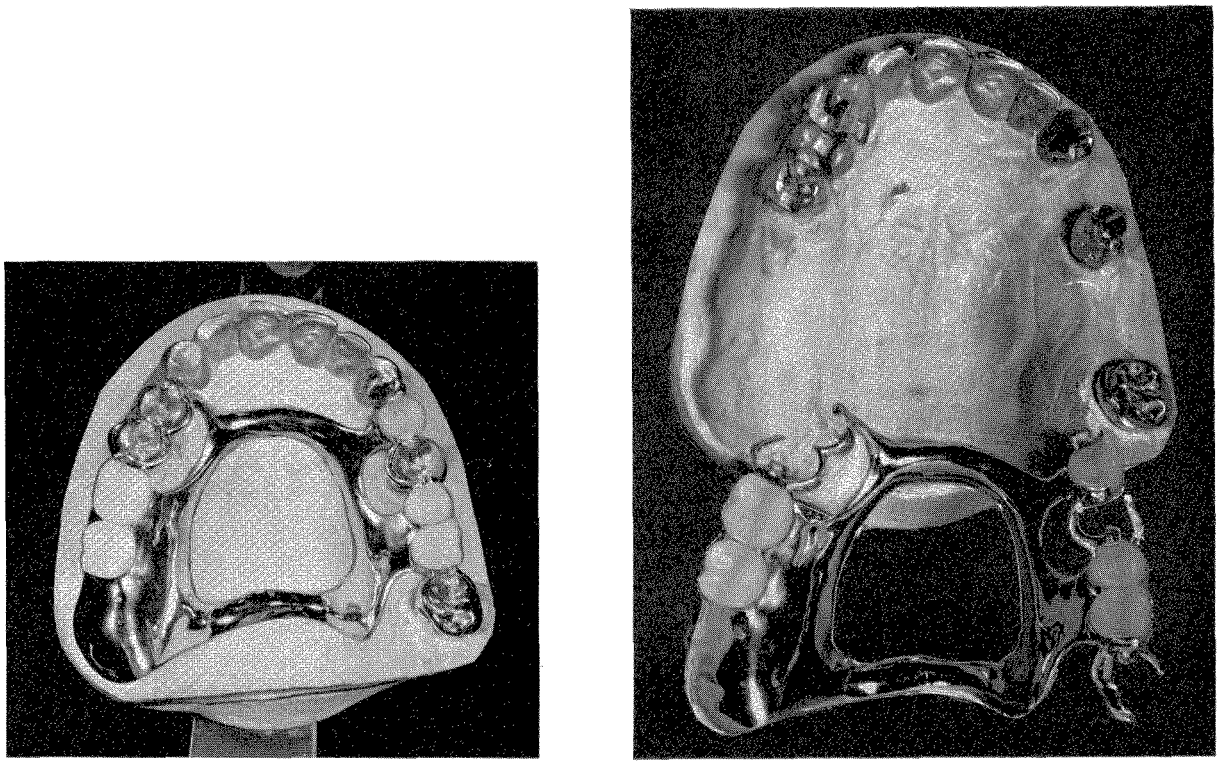


Fig. 146. The upper removable partial denture inserted in January, 1948. There were six lugs which rested in five natural teeth. In addition, the right bicuspids were united by an additional lug. The Hanau Model H articulator was used in its construction.

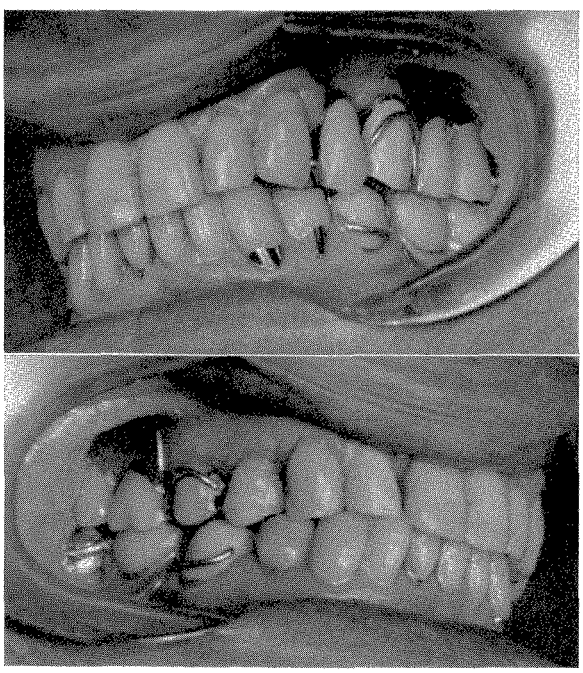


Fig. 147. Left and right views of the upper and lower removable partial dentures. These photographs were taken in January, 1948.

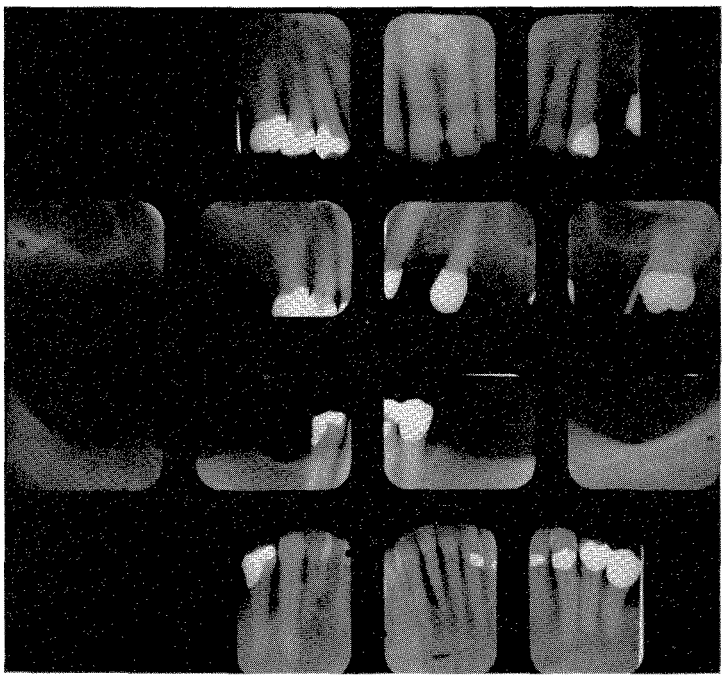
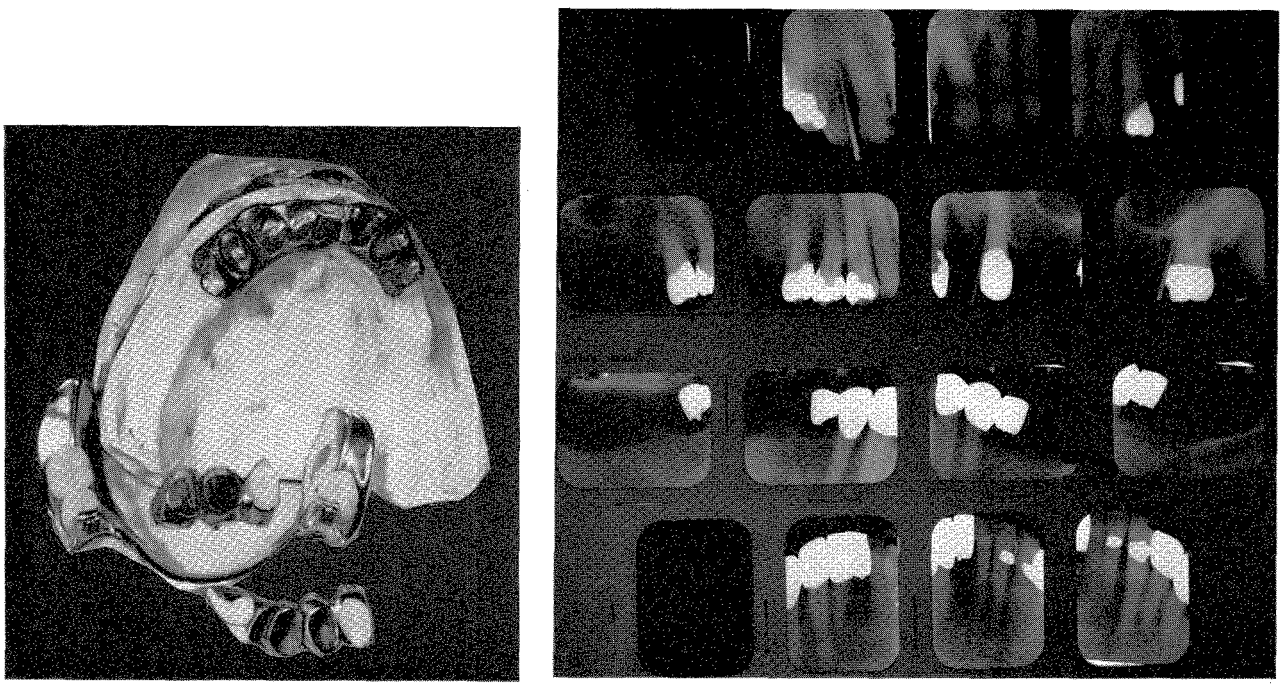


Fig. 148. Roentgenograms taken in 1955. The lower right molar was removed. Several of the remaining teeth were deeply involved periodontally.



A **B**

Fig. 149. A, In May, 1957, a new lower precision removable partial denture was inserted. Splinting was resorted to. The removable and fixed assemblages are shown in the photograph. **B,** Roentgenograms taken in October, 1957. Three upper teeth had deep vertical periodontal pockets.

Fig. 150

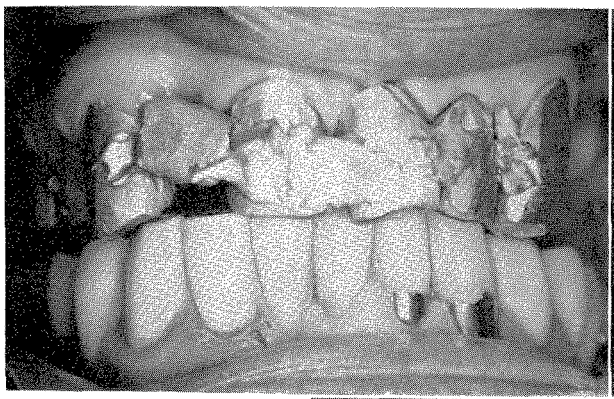


Fig. 151

Fig. 152

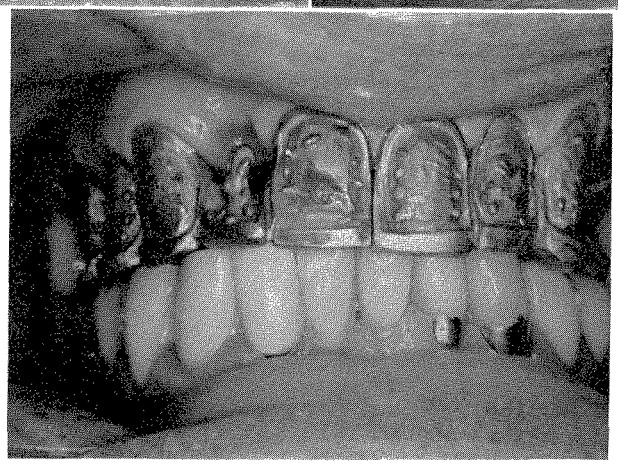


Fig. 150. In 1958 a new upper precision removable partial denture was inserted. Full coverage was resorted to. This photograph shows the low-fusing metal transfers being tried in to check centric relation and vertical dimension.

Fig. 151. The abutment castings are being tried in individually to check centric relation and vertical dimension.

Fig. 152. The upper castings were soldered together and are being tried in as two splints of four and five units, respectively. Once again centric relation is checked.

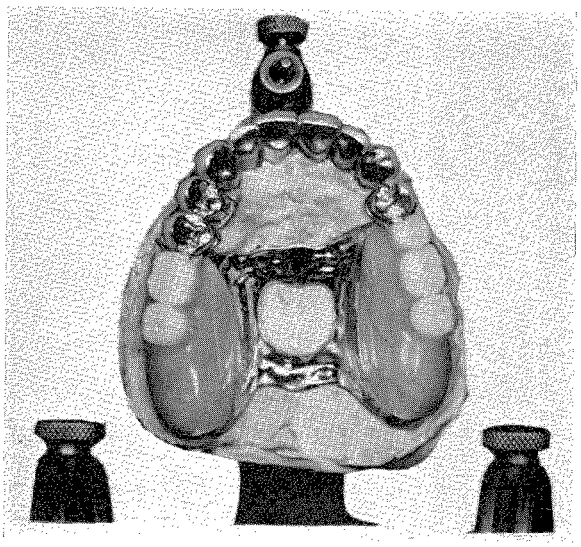


Fig. 153. The completed prosthesis on the articulator. A Hanau Model H articulator was used in the construction.

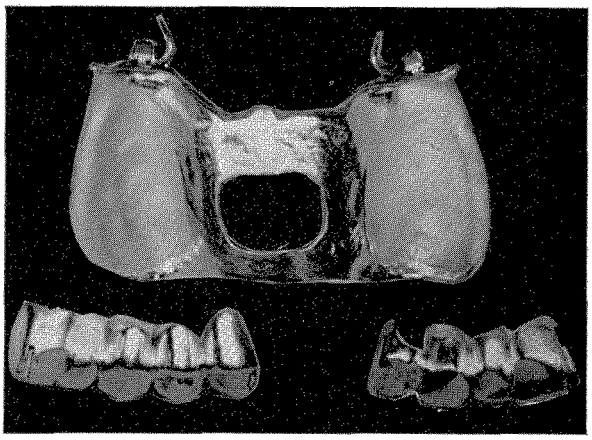


Fig. 154. The removable partial denture showing the lingual surface. The lingual arm provides the means for maintaining good retention. The buccal gold vertical projections provide the patient with the ability to remove the denture. The two splints in the foreground have been joined by a lug and a lug rest.

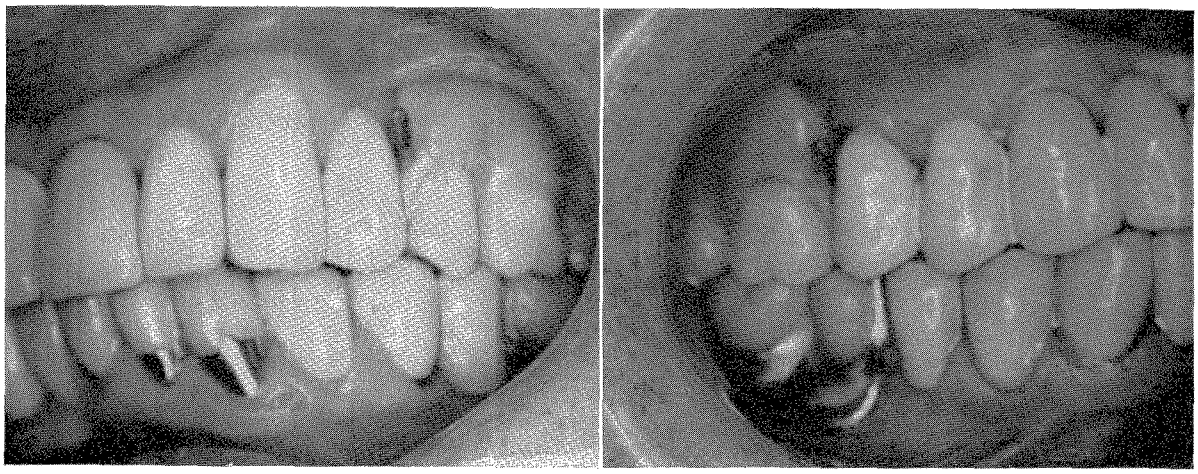


Fig. 155. Right and left views of the completed work in the mouth. These photographs were taken in August, 1958.

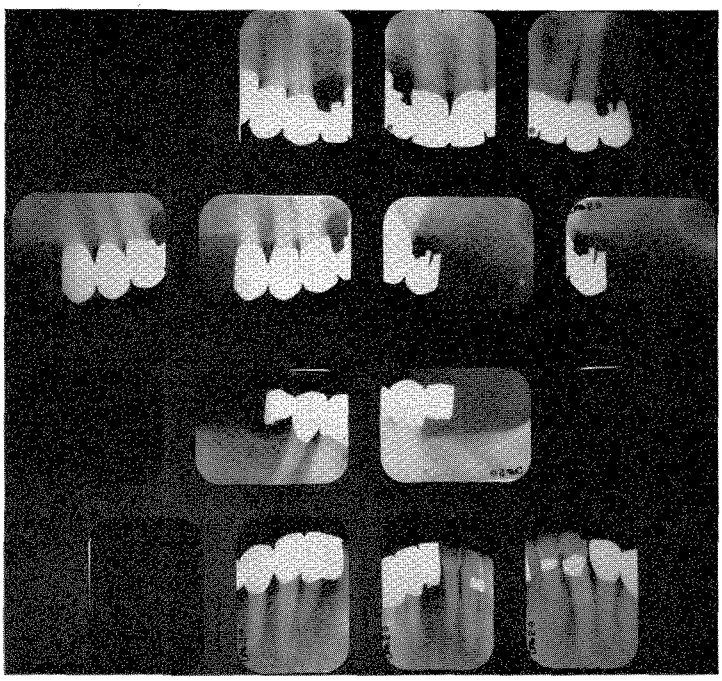


Fig. 156. Roentgenograms taken in January, 1961. The patient was 70 years old.

Case 7

This patient, another with deeply involved periodontal pathology of systemic origin, was the wife of the preceding patient. She was first examined in 1933 at the age of 35. Ten posterior teeth were missing. Two others had to be removed. She was referred to a periodontist who treated her for several years. The 1948 roentgenograms revealed that only thirteen teeth remained. Of the eight maxillary teeth, the right bicuspid was involved seriously. Her dental condition continued to deteriorate in spite of constant care both by the dentist and by the medical doctor.

In 1949 she decided to have all her remaining upper teeth removed. Seven of

these teeth could have been retained. She was persuaded to retain the five remaining mandibular teeth. Her mouth was reconstructed. A full upper and a partial lower removable denture were inserted. The free-way space was extremely small. By the use of gold inlays and three-quarter crowns, the occlusal pressures were divided among the five teeth and the tissue-bearing areas. The teeth were not splinted together.

Based upon her past history, it would have been difficult to predict the longevity of these lower teeth, yet in June, 1959, ten years after their reconstruction, they were in healthy condition. At this time the mouth was again reconstructed, using the same procedure as in 1949.

Discussion

This case evokes some interesting questions. Why did the upper left second bicuspid remain healthy from 1933 until the time of its removal in 1949? This was in spite of the fact that it was used as an abutment for all the removable bridges from the very start of reconstruction. Why did the lower five teeth remain healthy although they supported a lower lingual bar with free-end saddles? Serious consideration was always given to the interocclusal relationship in the present as well as in the previous work. Is it possible that by the introduction of a full upper denture the pressures exerted against the lower teeth were considerably less and, therefore, not as traumatic? Was the arrest in the periodontal pathology due to some structural change in the over-all systemic mechanism? Could the original periodontal breakdown have been aggravated by clenching and bruxing habits because of the very small free-way space and the short vertical dimension?

At the time of writing the patient was 66 years old and in good health. The lower five natural teeth were still strong and healthy. It is regrettable that in

Text continued on p. 92.

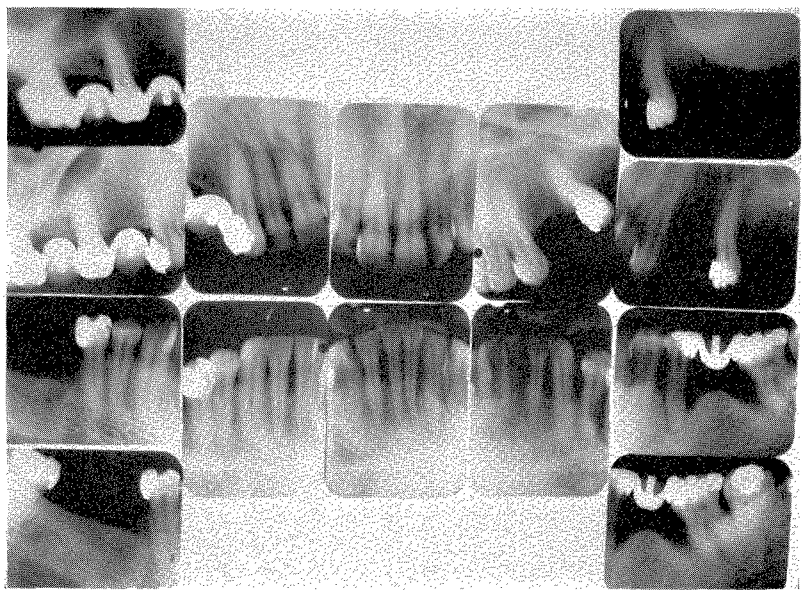


Fig. 157. Roentgenograms taken in 1933. The patient was 35 years old. The periodontal pathology is very evident. (Figs. 157 to 180 are of the same case.)

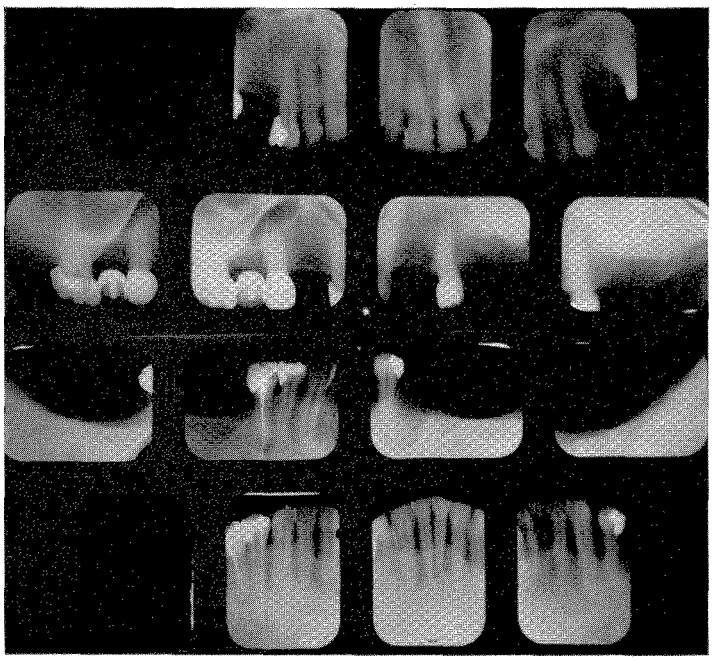


Fig. 158. Roentgenograms taken in 1941.

Fig. 159. Roentgenograms taken in January, 1949, just before the rehabilitation.

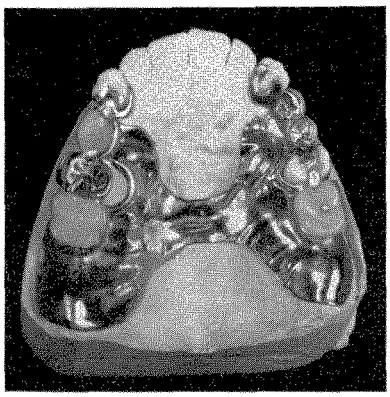
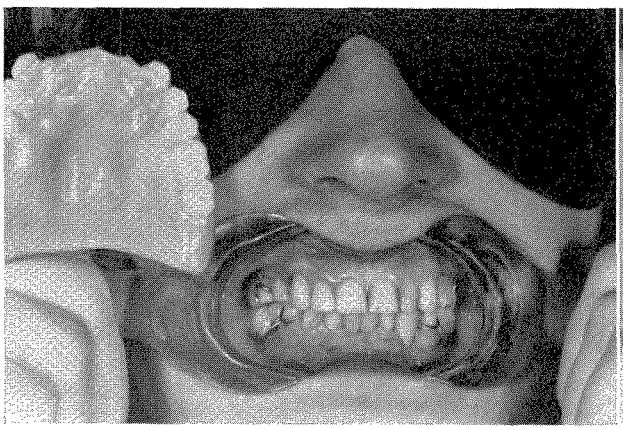


Fig. 160. The removable partial denture which was used prior to the removal of the upper remaining teeth.

Fig. 161



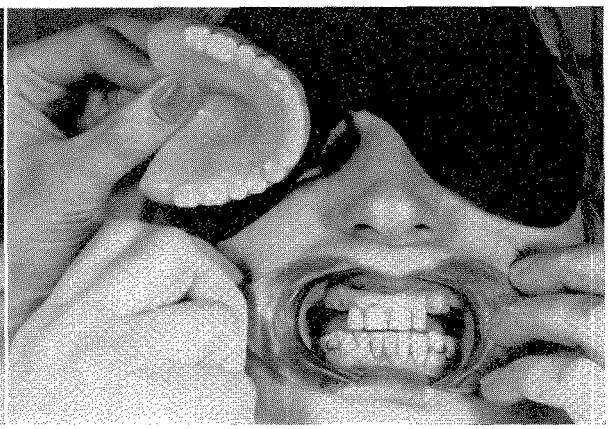
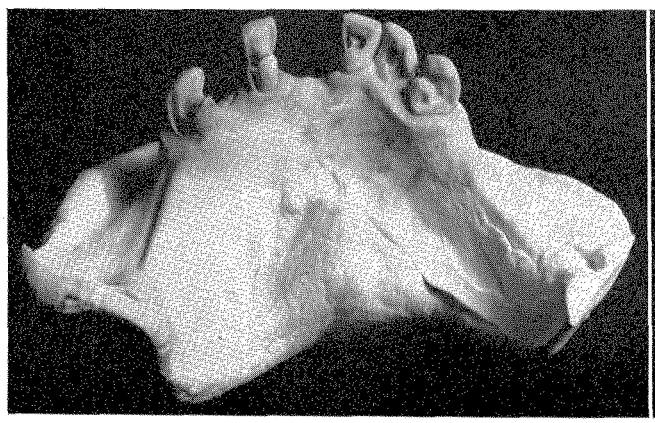


Fig. 16

Fig. 161. The try-in of the upper immediate denture before the removal of the anterior teeth. The denture is shown to the right of the face.

Fig. 162. The remaining four incisors were removed, and the immediate denture was inserted in February, 1949.

Fig. 163



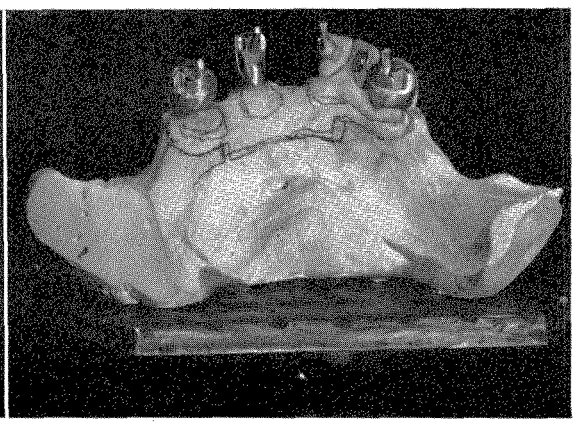


Fig. 16

Fig. 163. Lower stone cast made from a hydrocolloid impression. Silver temporary inlays were made on this.

Fig. 164. Gold inlays and three-quarter crowns which receive lug rests from lower lingual bar were cast and are shown on the model. The lug rests were paralleled on the parallelometer.

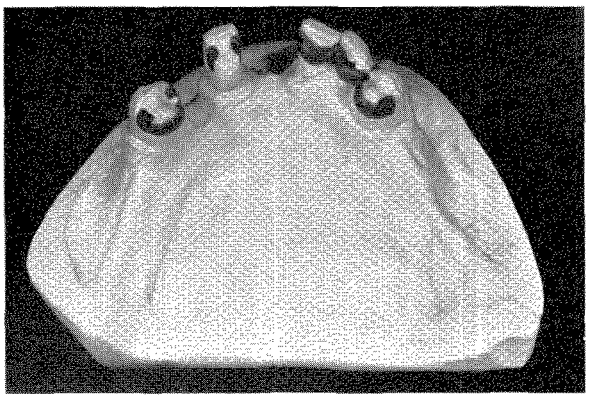


Fig. 165. Wax-up for continuous clasp which will be part of the lower lingual bar.

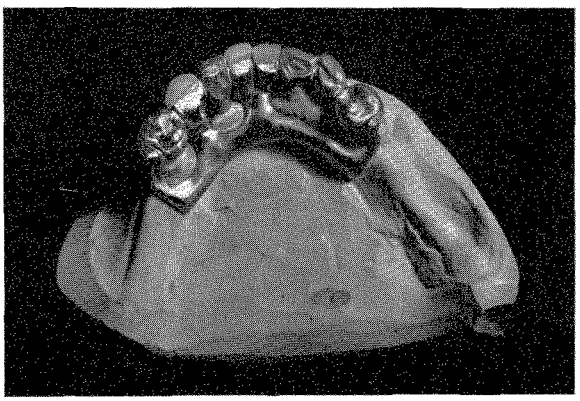


Fig. 166. The anterior section of the lower lingual bar. It will be shown in more detail later. The saddles were cast separately and joined with the anterior bar so as to provide slight movement.

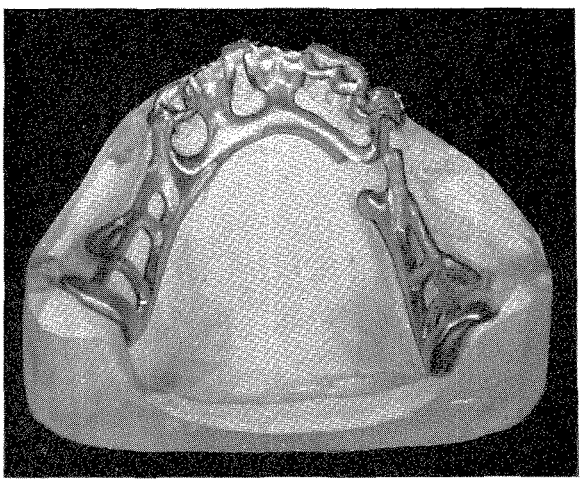


Fig. 167. The cast individual saddles. The left one is in place. It will be soldered only at its medial butt. The remaining open joint will provide a slight break-stress. The right saddle is placed posteriorly to enable he observer actually to visualize the joint.

Fig. 168. The upper final impression. A modeling compound Plastogum wash.

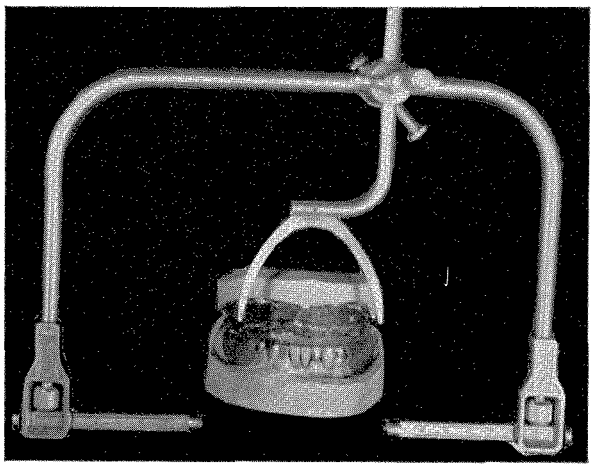


Fig. 169. Records prior to first setup. Face-bow, vertical dimension, and centric relation.

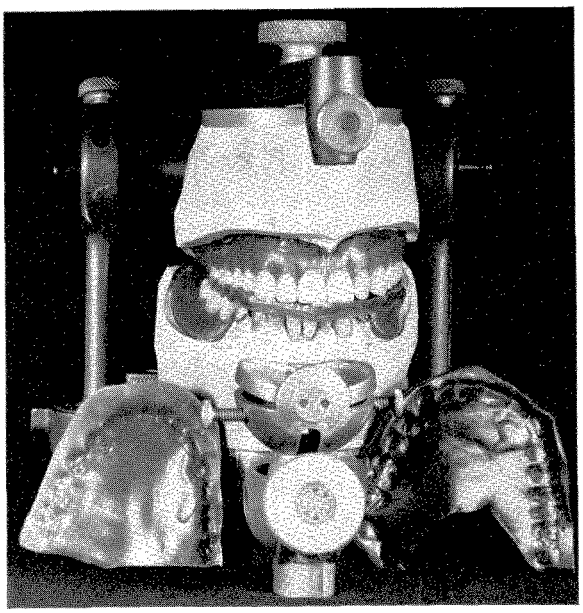


Fig. 170. First setup and wax records with which to adjust the articulator. Protrusive and right and left lateral wax records are shown.

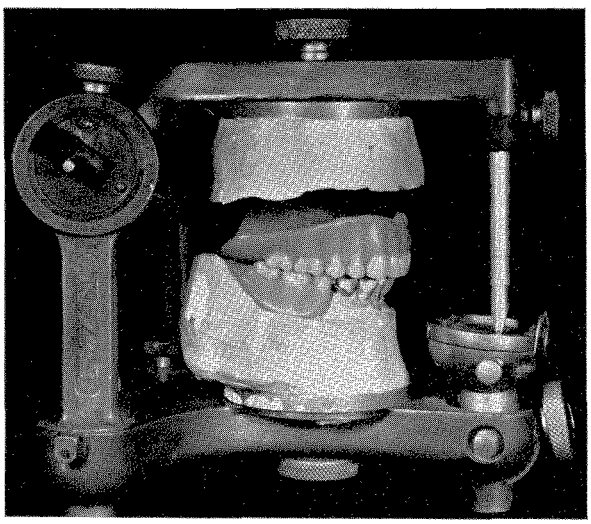


Fig. 171. Completed prosthesis on the articulator.

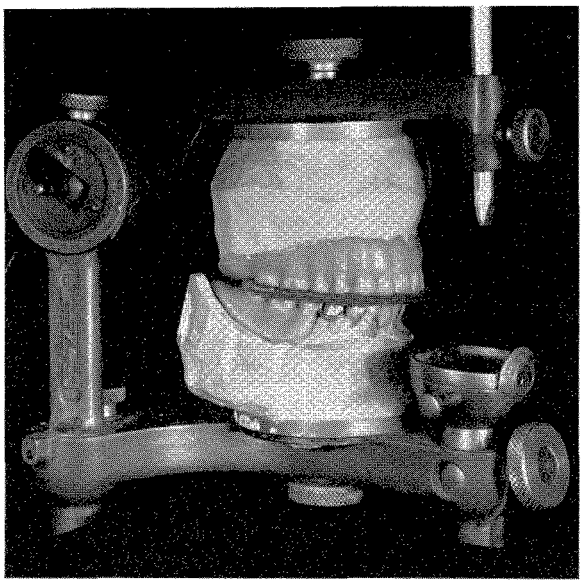


Fig. 172. Checkbite taken with all the work inserted. The prosthesis was remounted, and the occlusion was corrected.

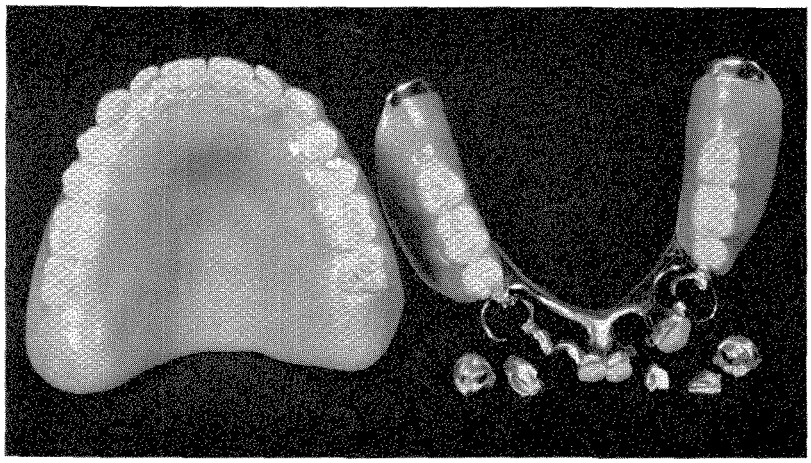


Fig. 173. The completed work. The lower anterior teeth are steel facings. The upper acrylic denture has an anterior lingual acrylic platform to engage the lower teeth because of the very close bite and the large horizontal overjet.

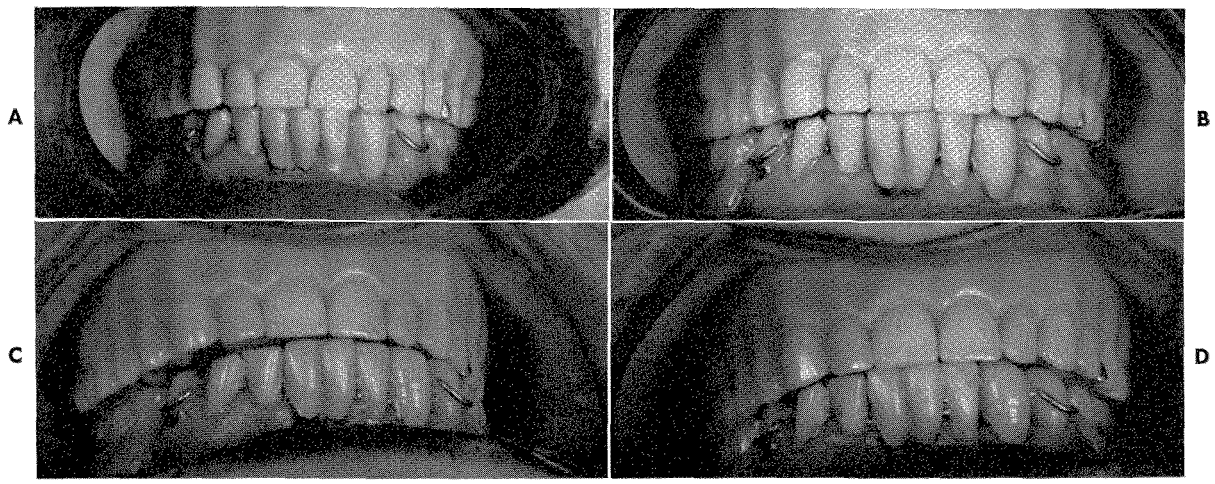


Fig. 174. Completed work. **A,** Anterior view, centric occlusion taken in March, 1949. **B,** Protrusive bite. **C,** Left working, right balancing bites. **D,** Left balancing, right working bites.

Fig. 175. The rest position. Observe that the tissues are relaxed. The vertical dimension was extremely short, and the occlusal coordination was difficult.

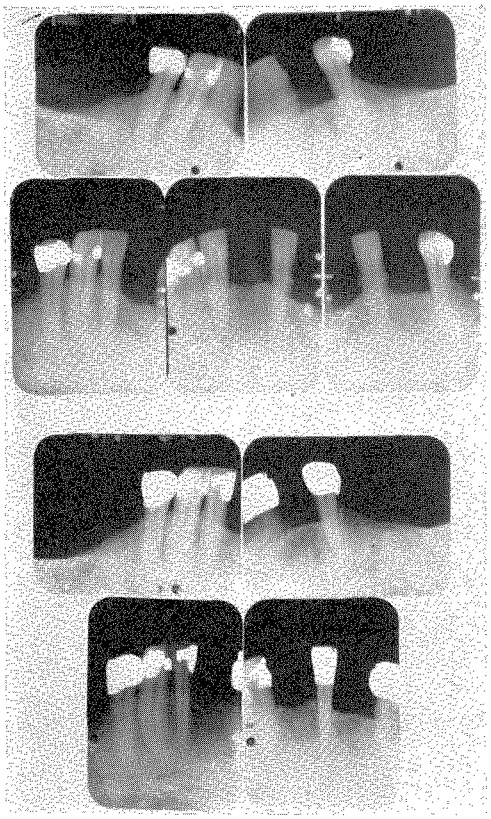


Fig. 176. A comparison of the radiographs taken in 1940 (above) and 1950 (below). The bone structure was stable over this ten-year period.

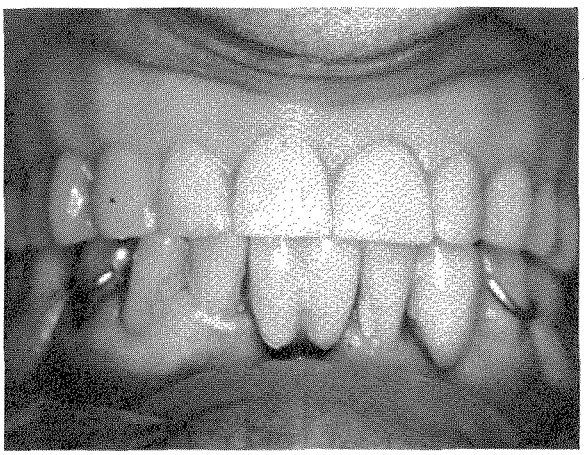


Fig. 177. The mouth as of August, 1959. This was ten years after the insertion of the prosthesis.

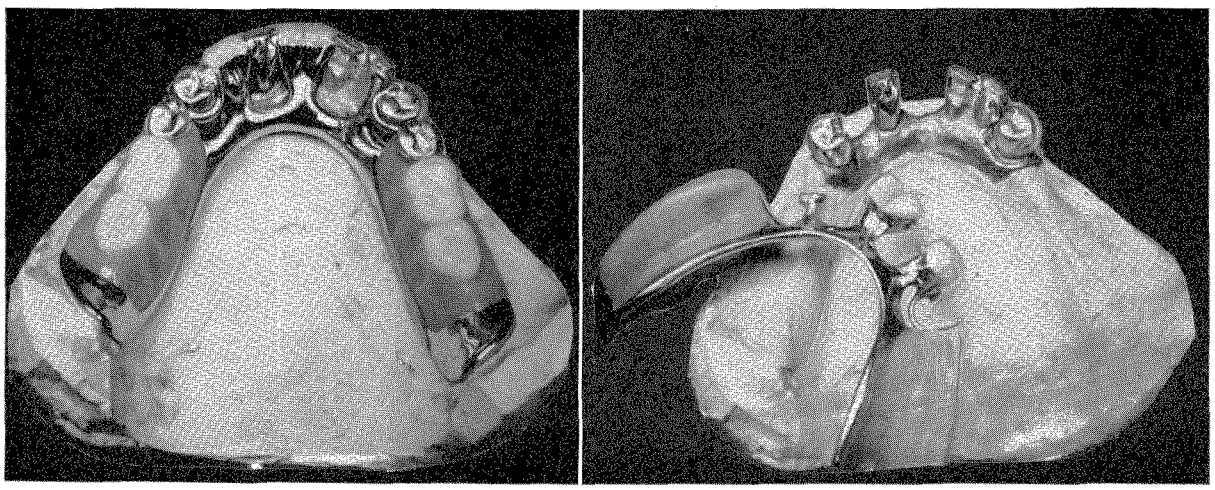


Fig. 178. In 1959 the mouth was again rehabilitated using the exact procedure that was resorted to in 1949. The one exception was that the lower lingual bar was made rigid with no split bar. The original split bar had to be closed because of its frequent breakage at the joint. For this reason it was not resorted to again. The new lower lingual bar is shown on and off the cast. The individual abutment castings are shown on the model.

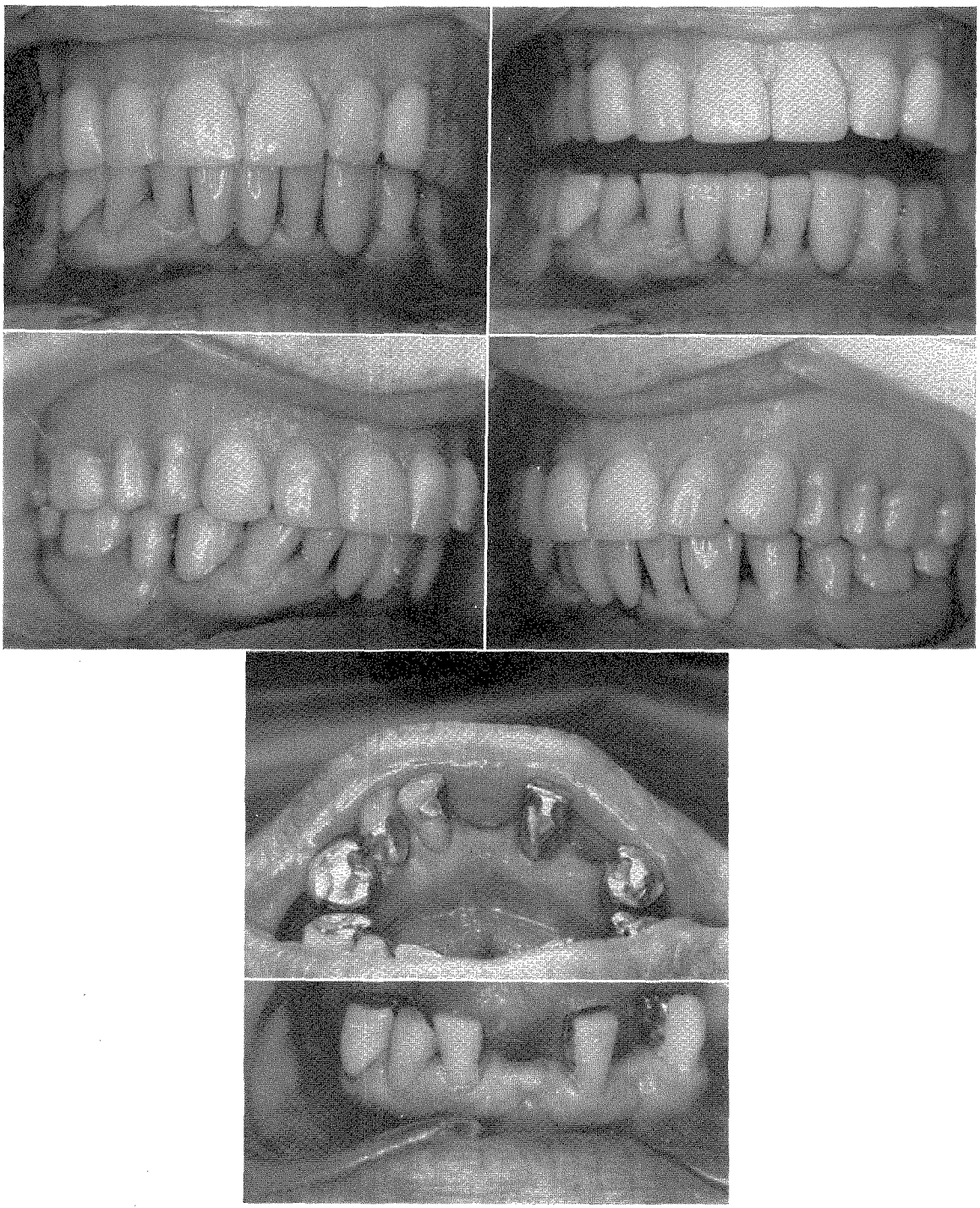


Fig. 179. Six views of the completed work in the mouth. These were taken in 1961, two years after the insertion. The patient was then 64 years old. Observe the excellent tone of the lingual soft tissues.

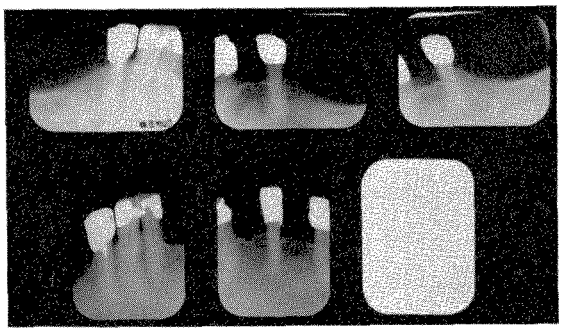


Fig. 180. Roentgenograms of the lower teeth taken in 1962. The bone structure was still in excellent condition.

1949 she insisted upon the removal of all her upper teeth. Without a doubt the seven which remained healthy would have served well at least for several years. However, had the upper natural teeth been retained, it is debatable whether the lower teeth would have maintained their health and given such excellent support to the lower removable partial denture. The difficulties encountered in wearing a full lower denture are usually much greater than those which accompany the wearing of a full upper denture. Therefore, given a choice, the lower teeth should be retained in preference to the upper teeth. (Figs. 157 to 180.)

Case 8

This patient presented the dental history of the type of patient just discussed. When first seen in 1936 she was 33 years old, and her mouth had already been reconstructed. Only fourteen natural teeth remained. Of these, only three were posterior teeth. One was nonvital. Upper and lower clasp removable partial dentures were being worn. The patient was unusually attractive, and good esthetics was of vital concern.

For this type of case no future promises of life expectancy should be given. Barring accidents or extreme neglect, if a patient in his early thirties has already had eighteen teeth removed, there usually is something in the systemic background which makes hazardous any predictions as to the future longevity of any new dental work. Ordinary neglect would not cause so many teeth to be lost in such a young person. Equipped with knowledge of this sort, it is imperative that no rash promises be made as to the future life of dental restorations.

Her mouth was reconstructed in 1936 to 1937. This case was reported in 1939.* For the replacement of the mandibular teeth a lingual bar was used. As she refused to have her lower incisors included, only three teeth were used as abutments. This was poor judgment. These teeth were not strong. They had already been used to support her previous lingual bar. In the reconstruction the lower teeth were made to conform to the segment of a four-inch disk. Then, using the lower teeth as a pattern, the upper teeth were restored. A Hanau Model H articulator was used. The vertical dimension was increased 2.5 mm. A palatal bar removable partial denture restored the missing upper teeth. Porcelain jacket crowns

*Schweitzer, J. M.: Extensive prosthetic restorations, D. Digest **45**:432-436, 1939.

covered the upper anterior teeth. More extensive splinting should have been resorted to, but twenty-five years ago these techniques were not fully appreciated, and hence they were not used as they are today.

The 1940 roentgenograms disclosed no significant changes when compared with those taken when the reconstruction was completed in 1937. During World War II the patient moved to Washington, D. C. She was not seen for over five years. She returned in 1948, and her roentgenograms revealed deep periodontal involvements around each abutment tooth except the two molars.

The obvious prescription at that time was for a full upper denture and a lower lingual bar. The previous anterior abutment teeth would be removed, and all the lower incisors would be splinted together. The proposed reconstruction was rejected. A periodontal consultation was advised. This was also refused. Realizing the severe compromise nature of this case, a letter disclaimer was written clearing the dentist of all future responsibility. The upper prosthesis was then made, and the old lower lingual bar was repaired. A stressbreaker was added to the right saddle, and a continuous clasp was added to engage the lower incisors. In this manner the masticatory pressures were distributed more favorably. This also provided additional strength to the seven remaining natural teeth.

By 1955 the periodontal pathology involved all the upper teeth except the right molar. The lower cuspids were also deeply involved. Once again a full upper denture and a lower lingual bar were prescribed. The lower cuspids would have to be removed and the four incisors splinted together. This advice was again rejected by both the patient and her husband. This time three upper teeth had to be removed. The four that remained were splinted after gum resections had been performed. This work was done reluctantly. The patient was informed of my attitude both by letter and verbally. Complete lower splinting was resorted to in a desperate effort to retain the few lower teeth. The work was completed in 1956. The documentation following this report will testify to the care and effort which were exercised in this case.

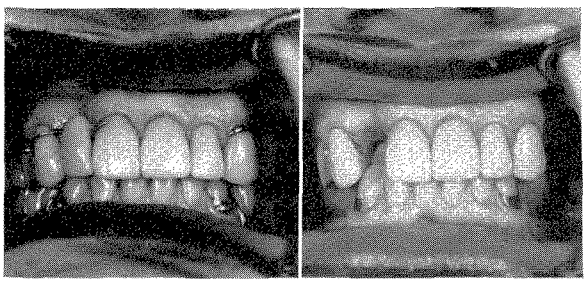
The patient was not seen again for nearly three years in spite of persistent efforts which were made to have her report for a checkup. In June, 1959, she finally came for examination. This time all but three lower incisors were hopelessly involved. Full upper and lower dentures were prescribed. The final compromise was to retain three lower incisors and to build a removable partial denture around them. The full upper denture could no longer be avoided. The new upper and lower prosthesis was inserted in December, 1959. At the time of writing, just twenty-seven years after the first examination of this patient's mouth was made, she was 60 years old.

Discussion

Now that the facts can be reviewed with the data built up over a long stretch of years, many interesting deductions can be made. First, there are the systemic factors to consider. The loss of eighteen teeth in a young woman who gave reasonably good attention to her mouth suggests that causes other than local were at work initiating dental deterioration. She stated in her history report that her mother lost all of her teeth at an early age. She cannot recall having poor

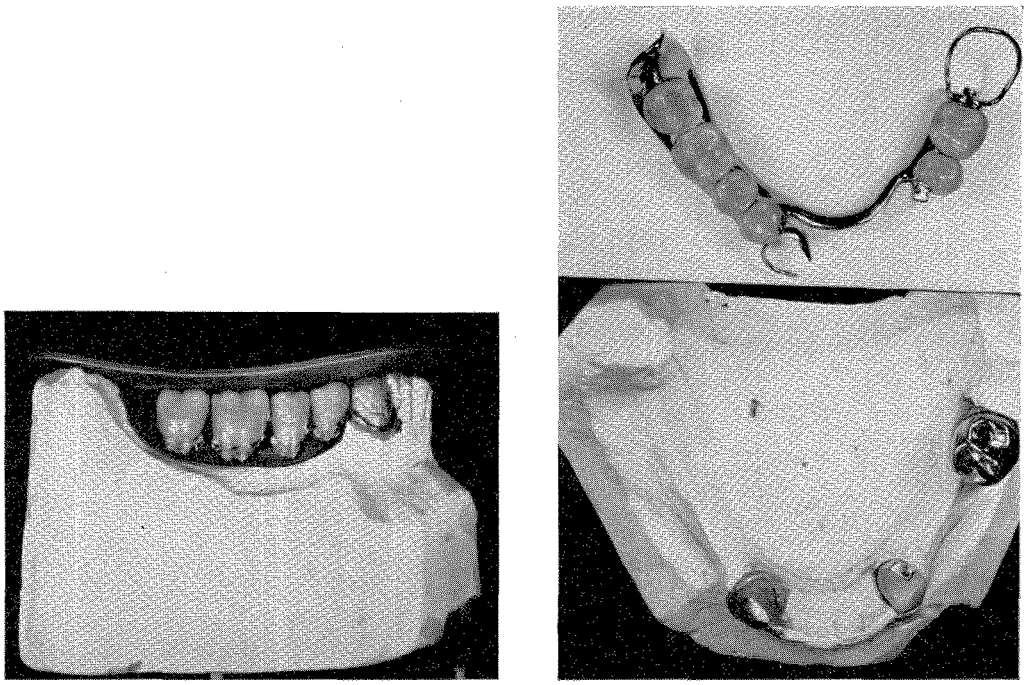
Text continued on p. 105.

Fig. 181. Roentgenograms taken in 1936 at the start of treatment. (Figs. 181 to 211 are of the same case.)



A **B**

Fig. 182. **A,** Anterior view of the mouth taken in 1936 at the age of 33 years with the upper and lower removable partial dentures in place. **B,** Same as A except that the partial dentures were removed.



A B

Fig. 183. A, The lower removable partial denture on the cast. This was constructed using the four-inch disk as the reference plane. **B,** A combination of clasps and precision attachments was resorted to.

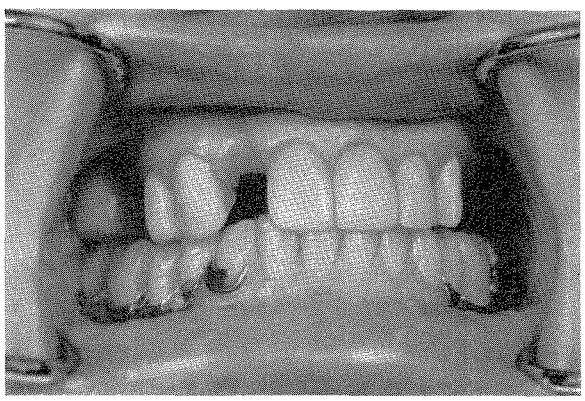


Fig. 184. The upper work was started with the lower prosthesis inserted.

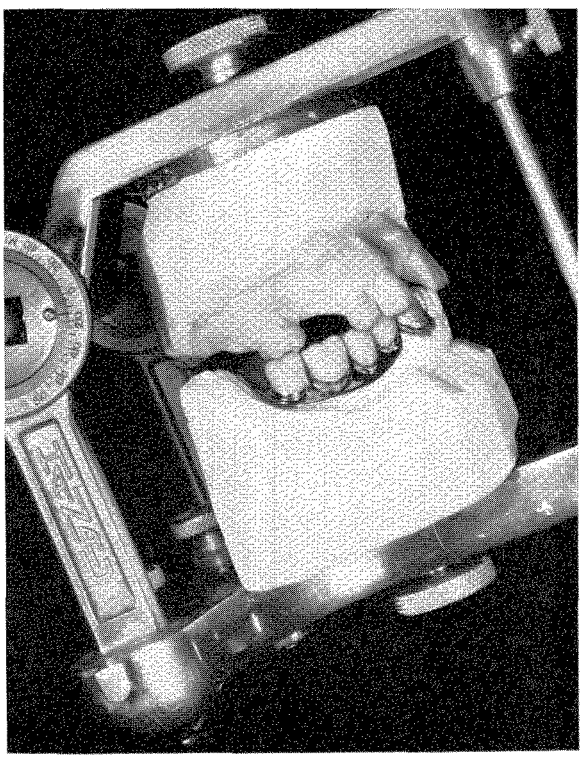
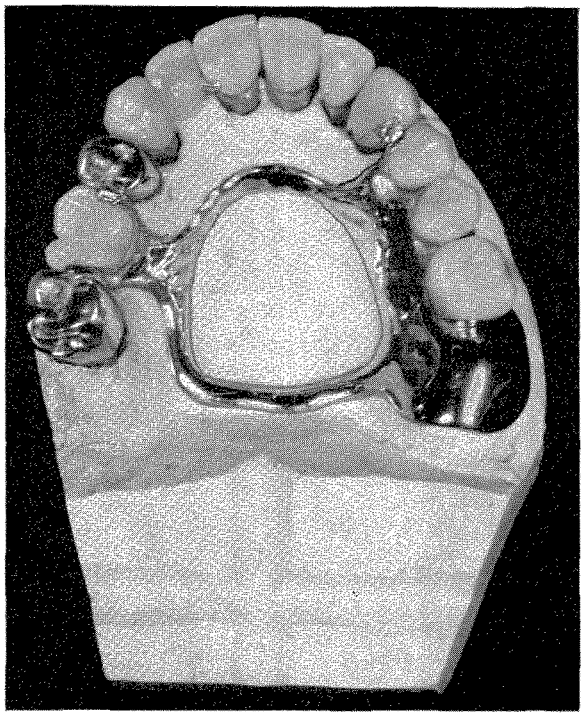


Fig. 185. It was constructed on a Hanau Model H articulator.



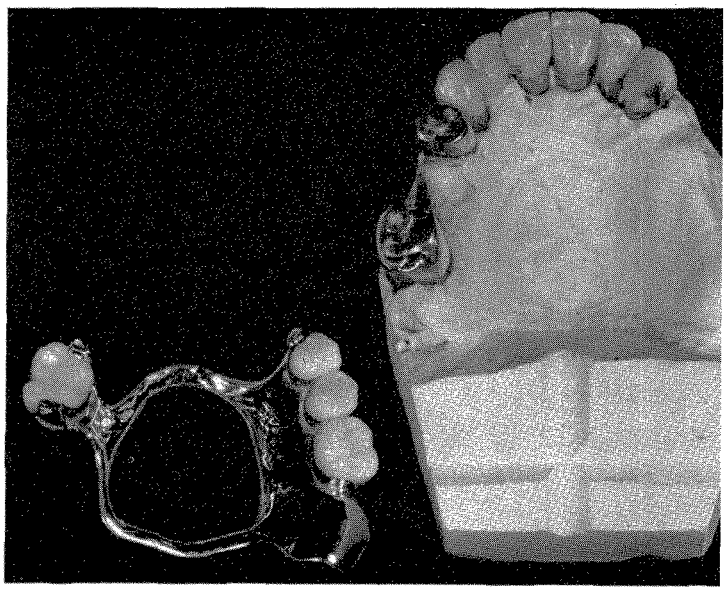


Fig. 186. The final upper work consisted of an upper palatal bar precision removable partial denture. The abutments were covered with porcelain jacket crowns cemented over metal copings plus gold crowns with porcelain inserts. Acrylic was not yet known to be applicable for this type of work. This was in 1936.

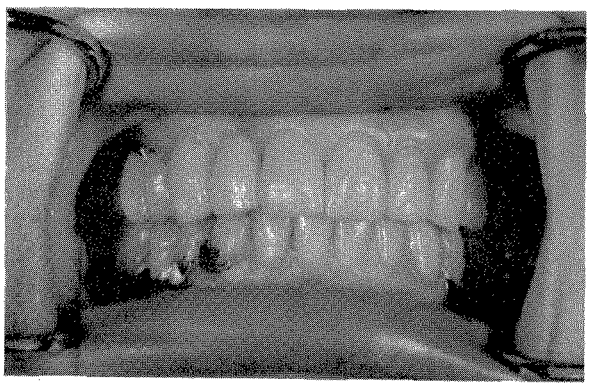


Fig. 187. The final work as it looked after its insertion.

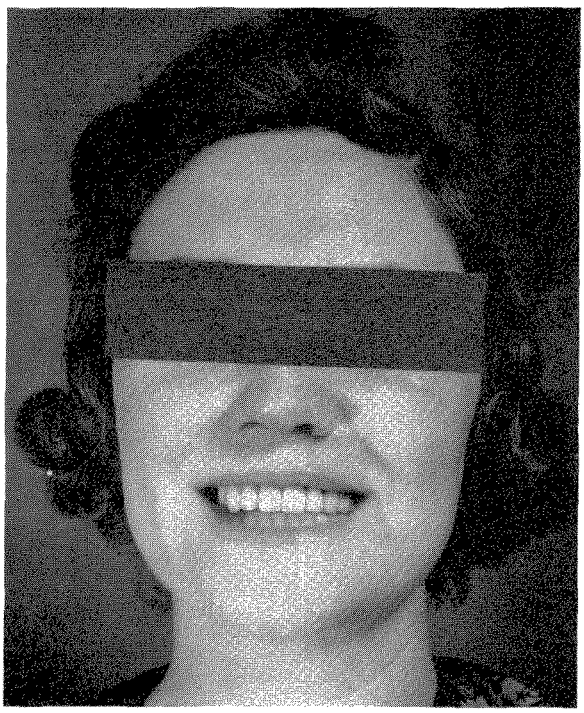


Fig. 188. A full-face view (1936).

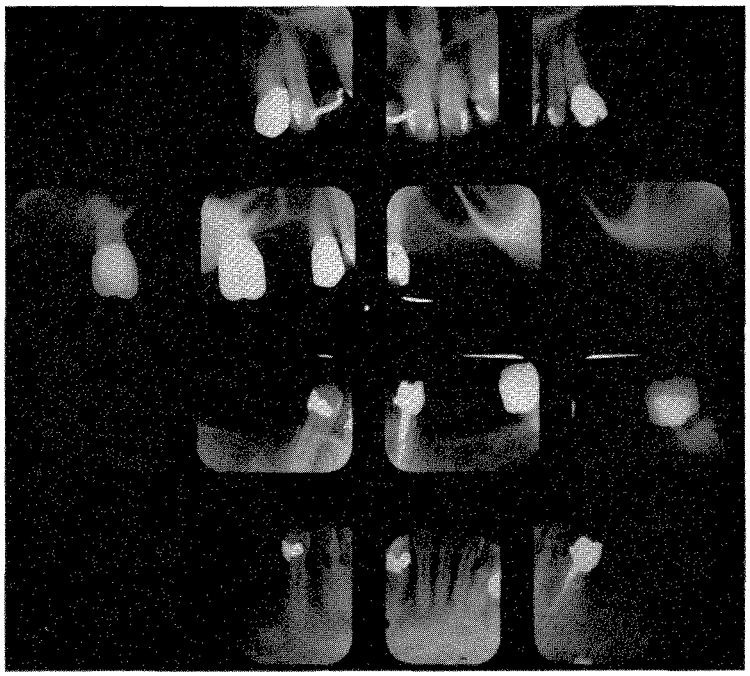


Fig. 189. Roentgenograms taken in September, 1940, four years after completion.

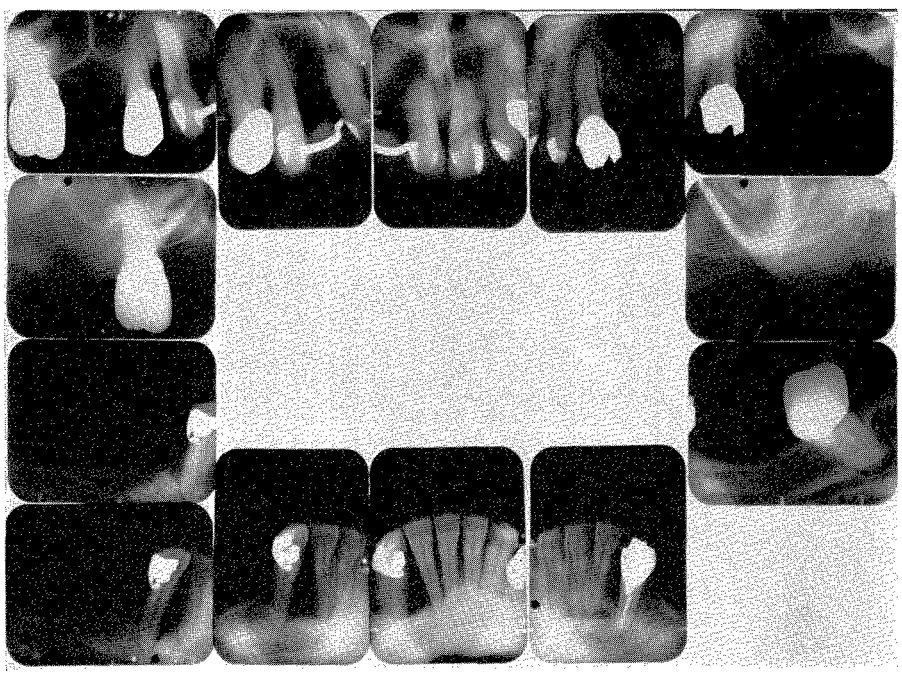


Fig. 190. Roentgenograms taken in December, 1948, reveal the advanced periodontal disease associated with several teeth. The patient was then 45 years old.

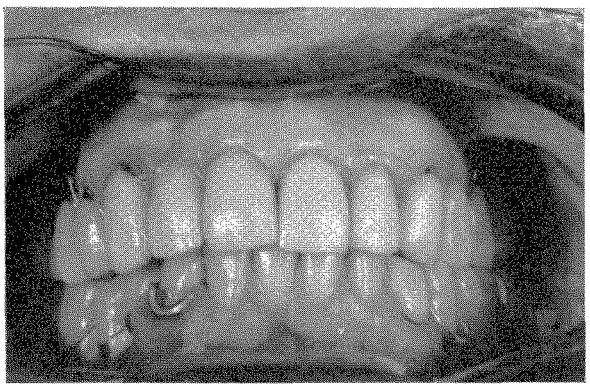


Fig. 191. The mouth as it looked in December, 1948. This was twelve years after the reconstruction.

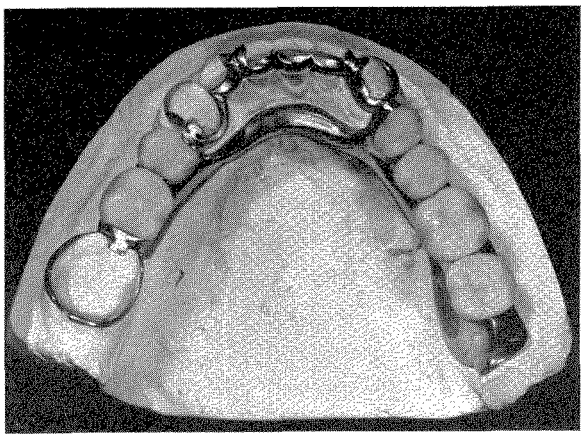


Fig. 192. An attempt was made to relieve the weak right cuspid by the addition of a continuous clasp which engaged the four lower incisors. A split bar was also constructed for the right saddle to relieve the stress. The patient refused to permit the four incisors to be cut for splinting.

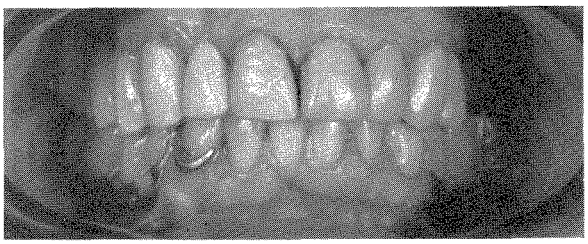
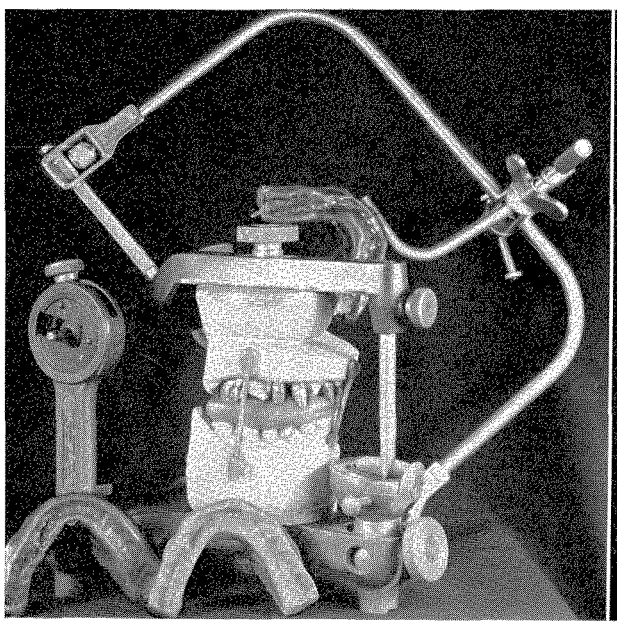
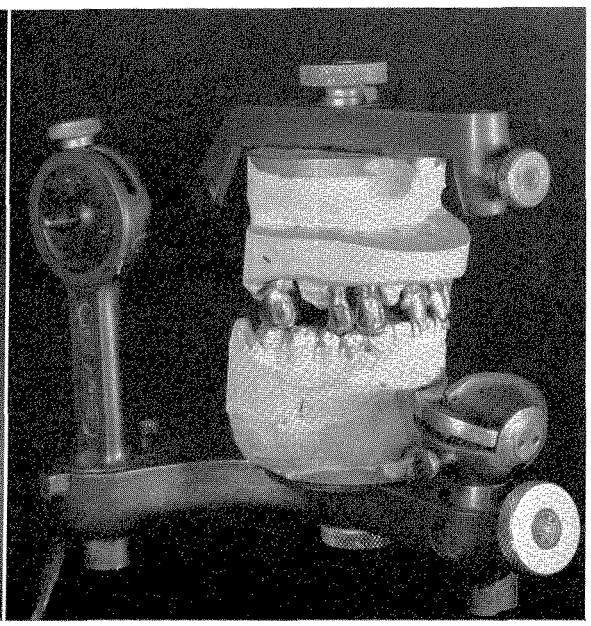


Fig. 193. Two slow-cured acrylic transitional splints were constructed for the upper teeth. They are shown in position. This was done in March, 1949.

A





B

Fig. 194. A, Copper-plated dies were constructed for the upper teeth. Wax records and a face-bow record were taken. The work casts were mounted upon a Hanau Model H articulator. The lower cast was made from an alginate impression of the completed lower prosthesis. **B,** The completed upper castings in place on the model.

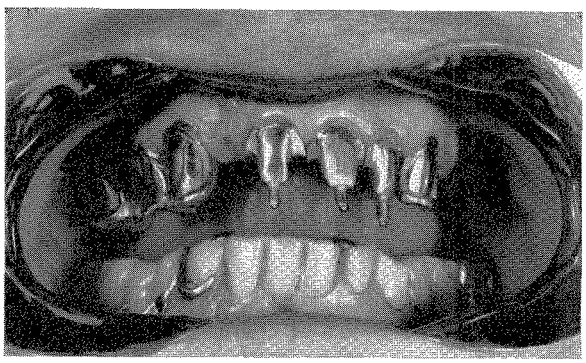


Fig. 195. The upper castings were tried in the mouth. Centric and vertical dimension were checked.

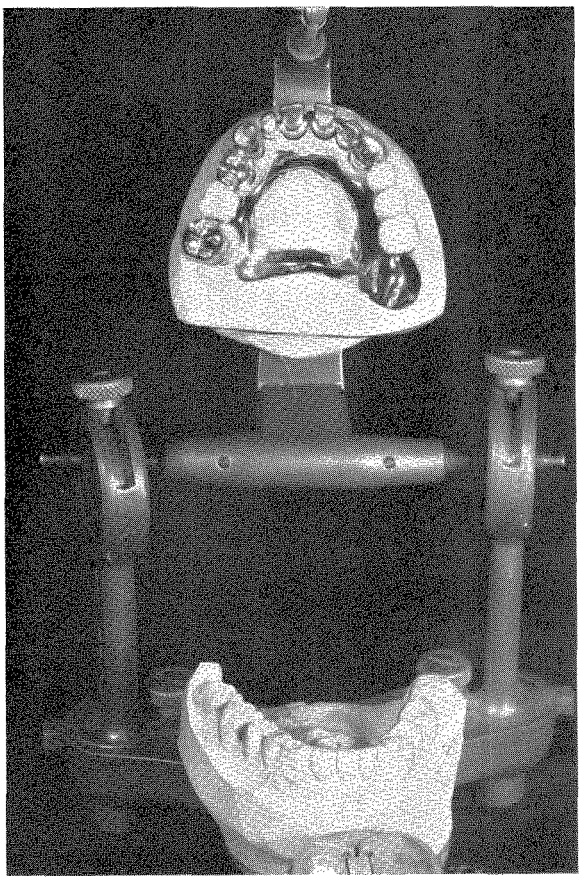


Fig. 196. The upper work was completed. The anterior teeth, which were splinted in two sections, will be covered with porcelain jacket crowns.

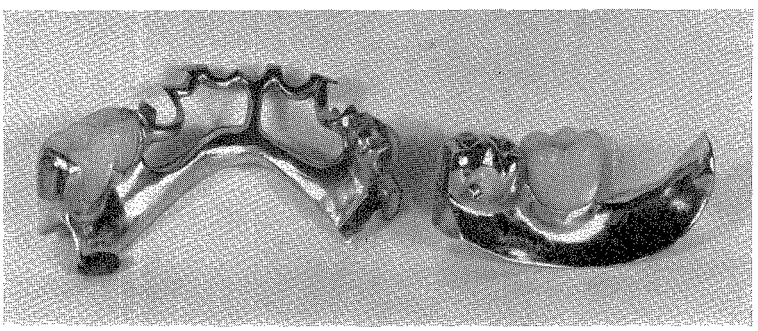


Fig. 197. The lower breakstress to relieve the cuspid.

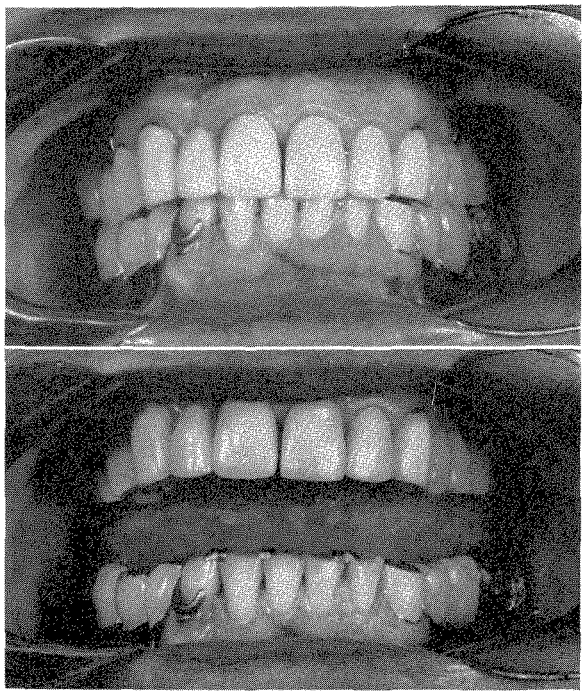


Fig. 198. The completed work assembled in the mouth in June, 1949.

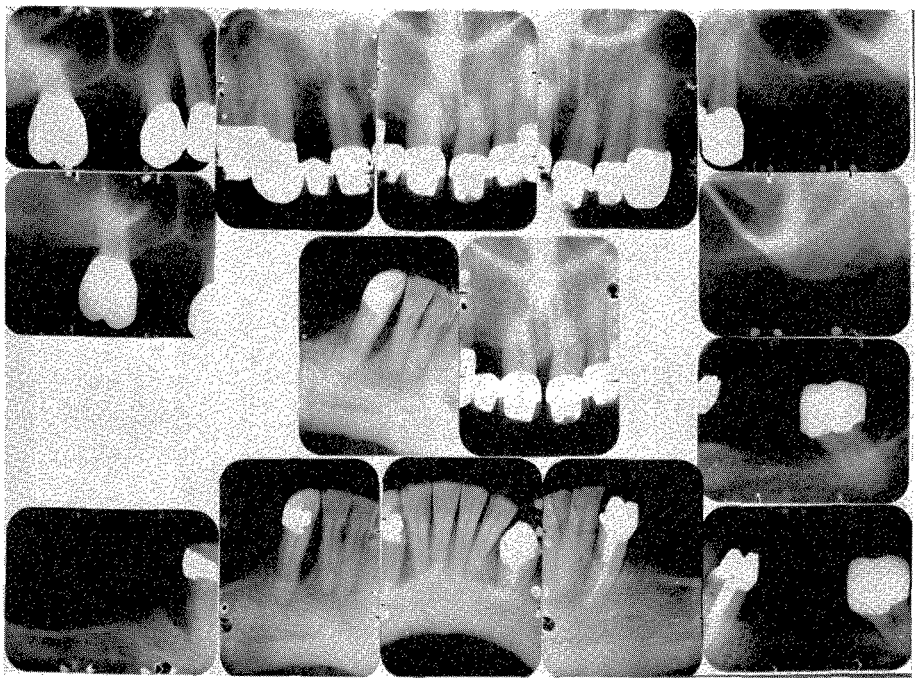


Fig. 199. Roentgenograms taken in December, 1949, of the final work.

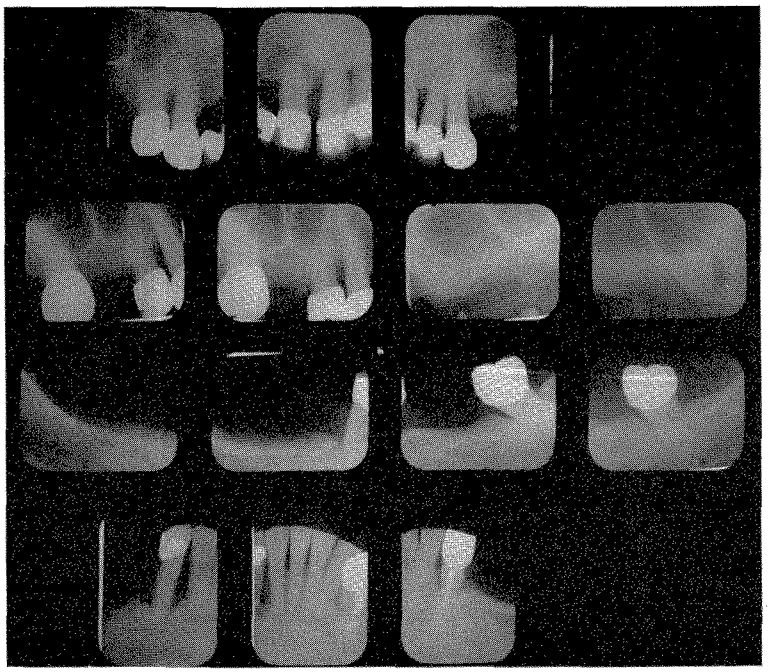


Fig. 200. Roentgenograms taken in November, 1955.

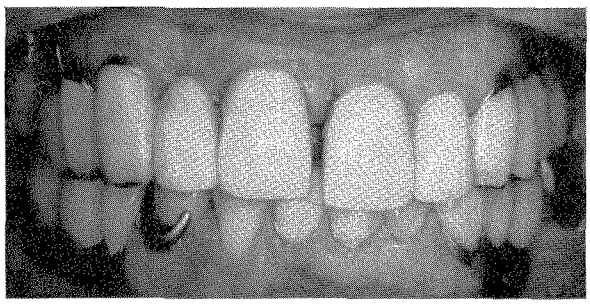


Fig. 201. The mouth in November, 1955.

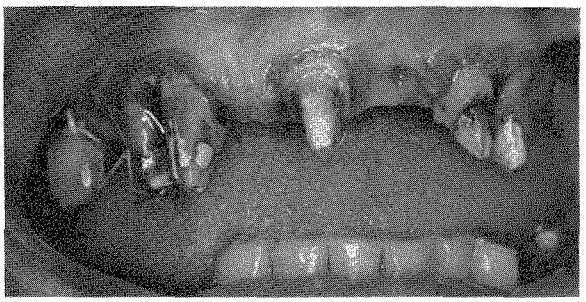


Fig. 202. In February, 1956, the gums were resected. Of these six upper teeth, only four were retained.

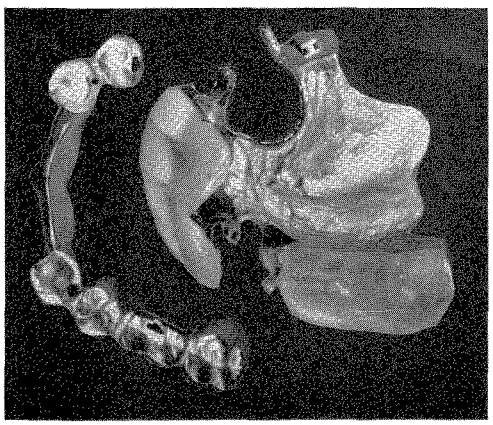
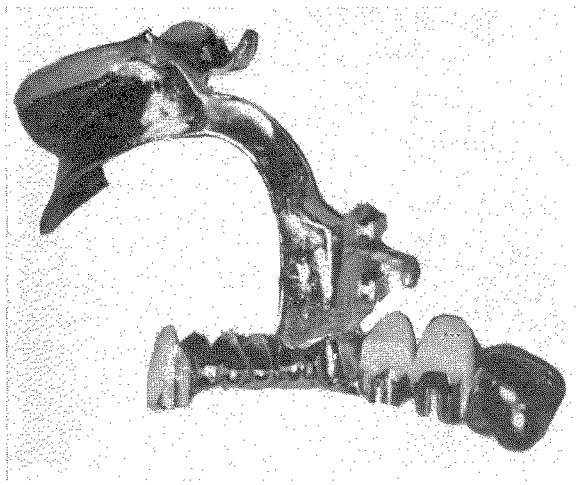
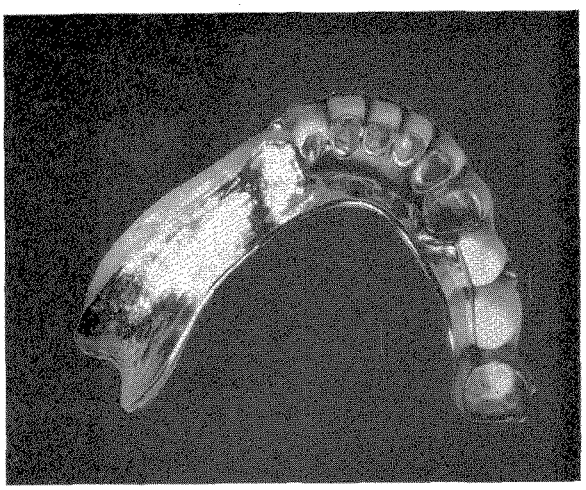


Fig. 203. The new upper prosthesis. The fixed splint is shown on the left side. The removable partial denture is on the right side. The V-shaped anterior casting fits into a countersunk similar groove in the removable part.

A

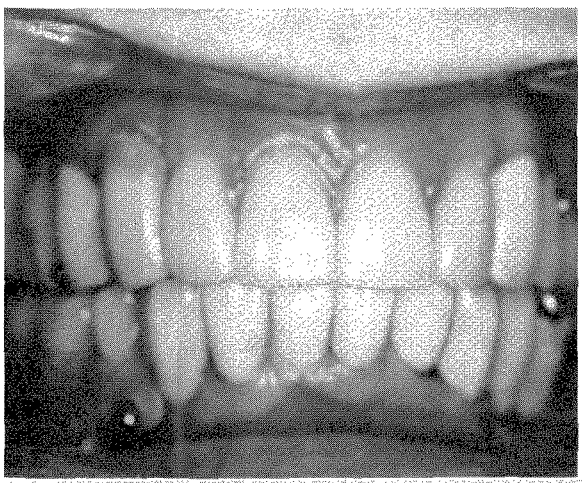




B

Fig. 204. A, The lower prosthesis. The fixed splint is shown below. Six lower teeth were retained. The removable partial denture had three precision attachments. **B,** The undersurface of both parts assembled.

A



B

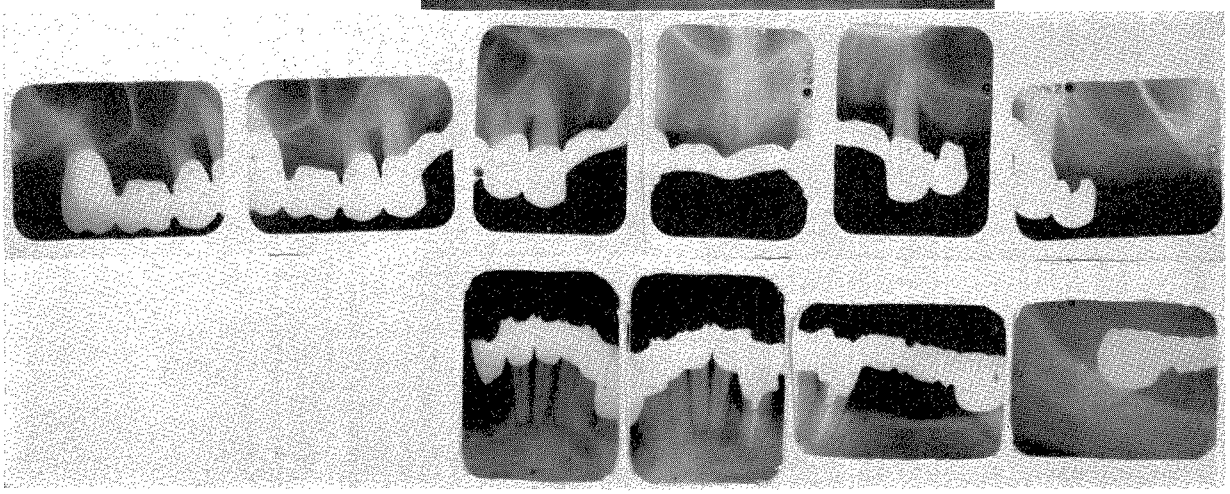


Fig. 205. A, The completed prosthesis in the mouth. This was inserted in October, 1956. **B,** Roentgenograms taken in December, 1956. The periodontal tissues are very weak.

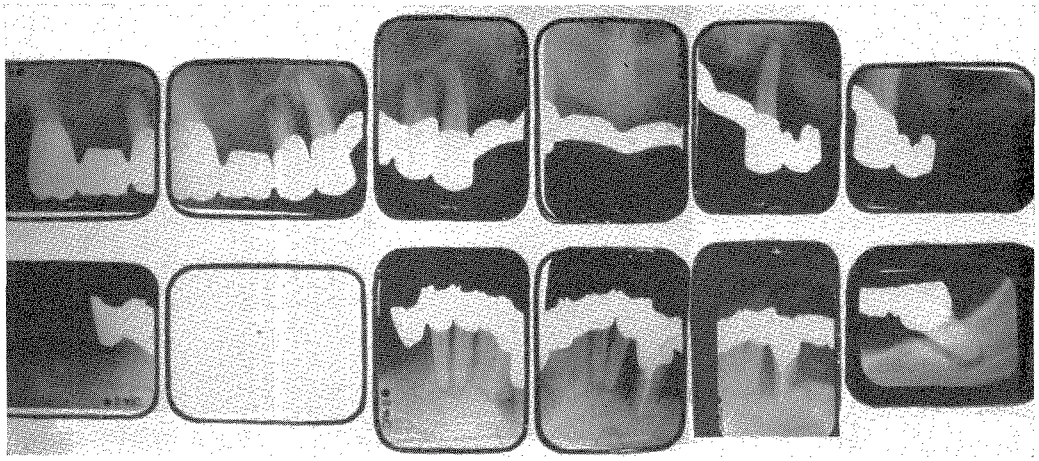


Fig. 206. The roentgenograms which were taken in 1959. Finally the patient consented to a full upper denture but insisted upon the retention of three lower incisors.

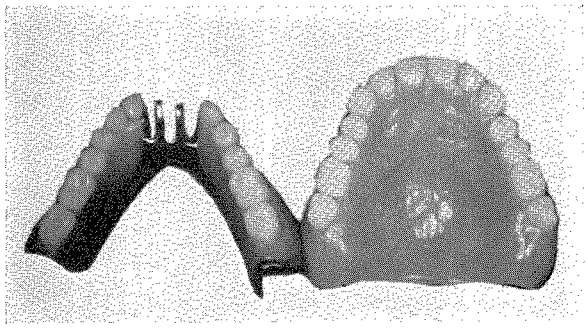


Fig. 207. The completed full upper denture and removable lower partial denture. These were inserted in December, 1959.

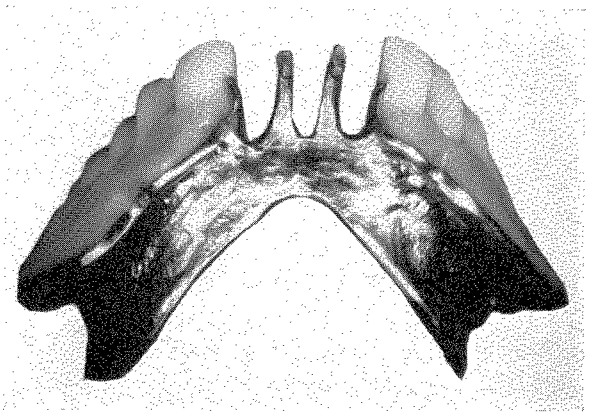


Fig. 208. Close-up of the anterior section of the lower prosthesis. The wires on the mesial surface of the porcelain teeth permit slight tightening for better retention. The tapered lugs rest in lingual lug seats and help stabilization while at the same time permitting limited movement.

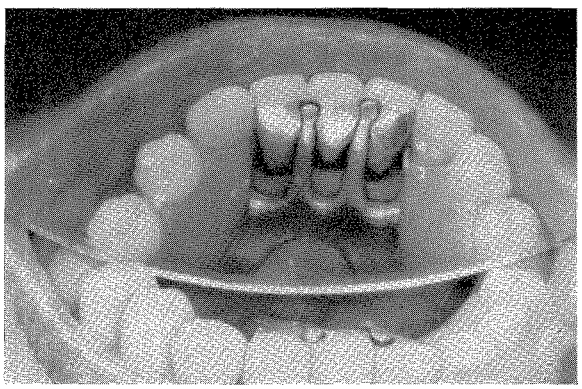


Fig. 209. A lingual view of the anterior section of the lower assemblage.

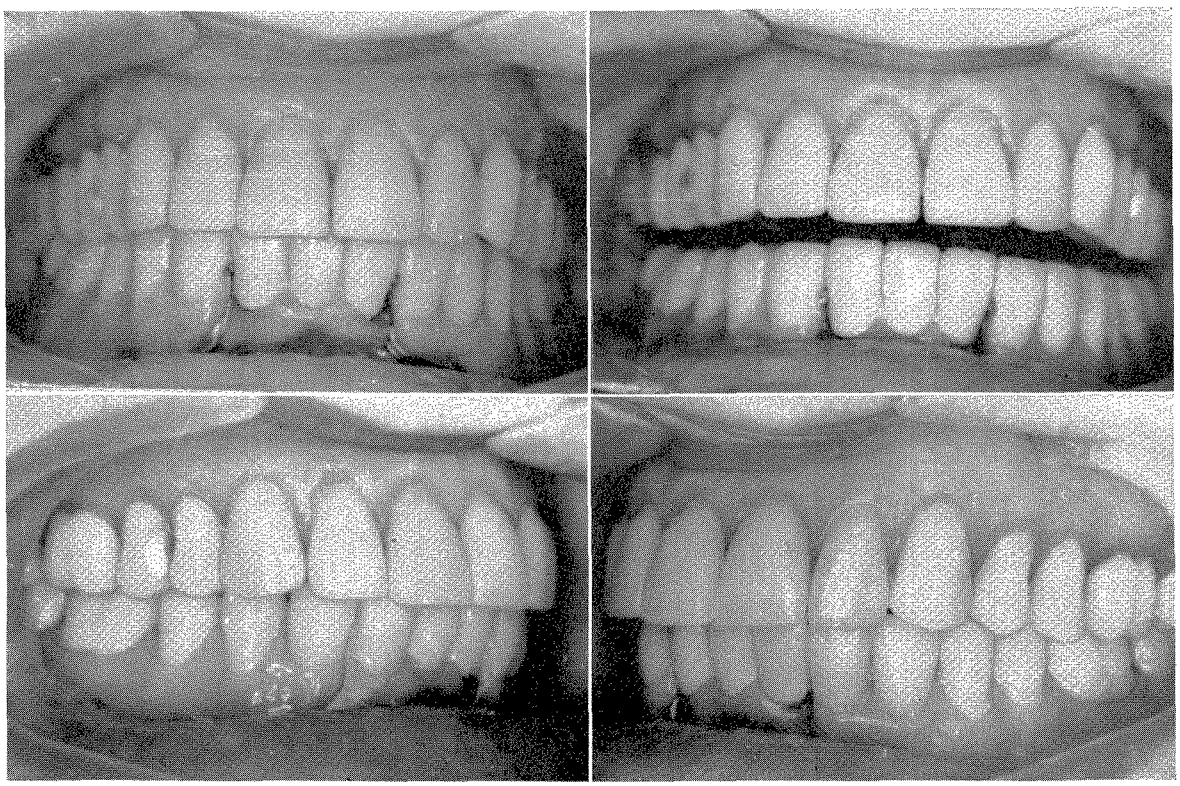


Fig. 210. Four views of the completed work. These were taken in 1961. The patient was then 58 years old.

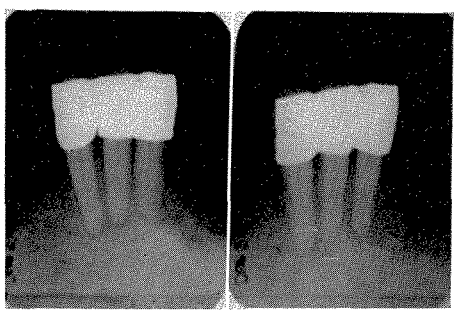


Fig. 211. Roentgenograms of the lower incisors taken in 1960. There had been no change up to the time the roentgenograms were taken.

periodontal structures but does remember caries as the cause of the loss of many of her teeth.

Specialized periodontal treatment would have undoubtedly helped the periodontal condition. Teeth which were hopelessly involved should have been removed. Her general health had always appeared good. Would I have been justified in refusing to treat this patient because of her unwillingness to follow my prescription? Her husband also always encouraged the retention of the teeth regardless of their condition and their problematic future. Full responsibility for any outcome was always assumed by the patient.

With regard to her present lower prosthesis, less rigid retention, which permits a small degree of movement, should favor the health of the three remaining incisors. The free-end saddles are long, and if rigid retention is employed, the lever arms are likely to cause unfavorable stresses upon the abutment teeth. In this case a mucostatic technique was employed in taking the lower impression. A separate impression was taken to relate the fixed and removable parts. In reviewing the longevity of the finished results, successes have been obtained both in the cases in which rigid retention was employed and also in which limited motion was permitted between the fixed and removable parts. This may be due to the fact that even with precision attachments, some amount of movement takes place which seems to be most desirable. This was used in the final lower removable partial denture for this case. The insertion of a full upper denture also served to reduce the vertical and lateral masticatory pressures to which the lower teeth were subjected. (Figs. 181 to 211.)

Case 9

This patient, a woman, came for dental treatment in 1943 at the age of 47. Her case was reported in 1947.* There were thirteen teeth missing. Of those remaining, it was possible to retain only eight lower teeth. A full upper denture was constructed. The lower teeth were splinted by means of interlocking gold inlays and lug seats in crowns. These supported a lower lingual bar which was retained by means of precision attachments. The work was accomplished with great care and by acceptable dental techniques. It was completed in 1943.

In 1945 the lower left cuspid had to be removed. In a relatively short time the remaining teeth, with the exception of the left bicuspid, had to be removed because of deep-seated periodontal infection. In 1958 the entire prosthesis was remade. The single left bicuspid was retained in an attempt to obtain additional stabilization and retention.

The upper and lower prosthesis was so constructed that when the time came to extract this single tooth, it could be added to the lower partial denture without having to make a new lower denture. The retainer had limited vertical and lateral motion. In 1962 this single bicuspid was still present. The lower denture had settled, and the bicuspid extruded slightly. This can be seen by the position of the retainer in its groove. The patient was in her mid-sixties.

There is very little doubt that this is another case of severe periodontal involvement with a systemic background. When she presented herself for treatment, there

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 430-448.

Text continued on p. 112.

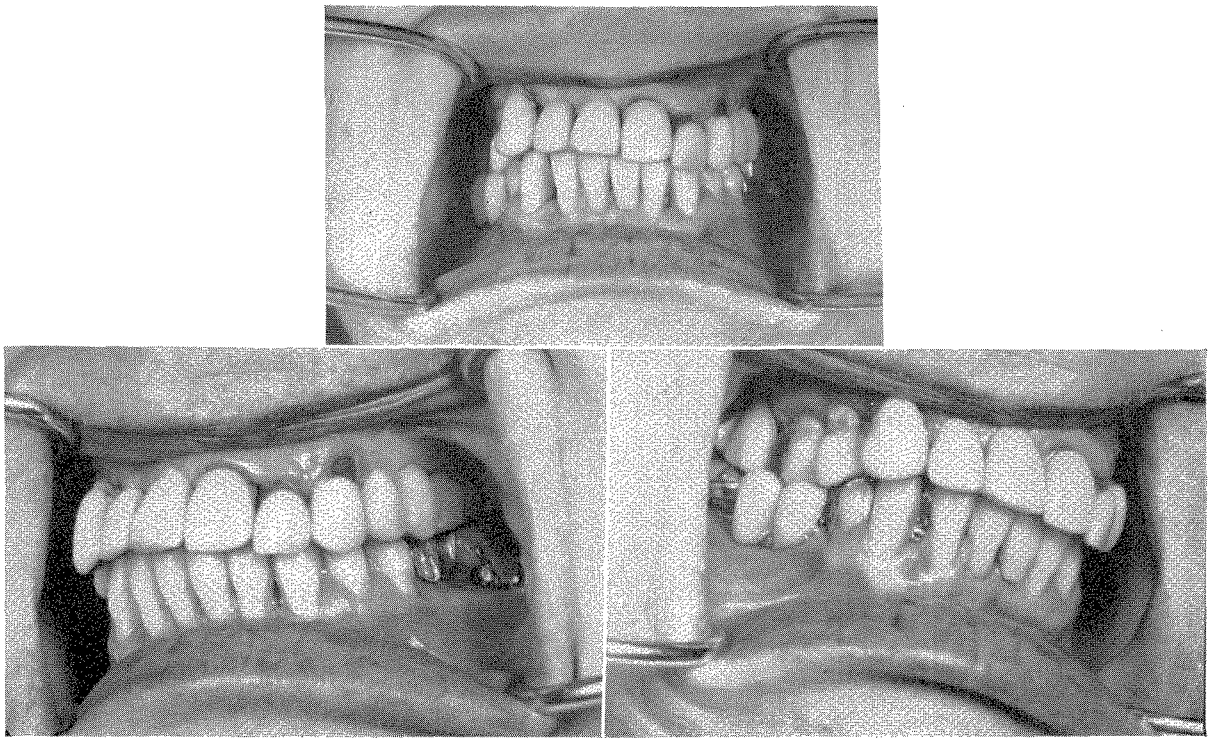


Fig. 212. Front, left, and right views of the mouth before work was started. These were taken in 1943. (Figs. 212 to 229 are of the same case.)

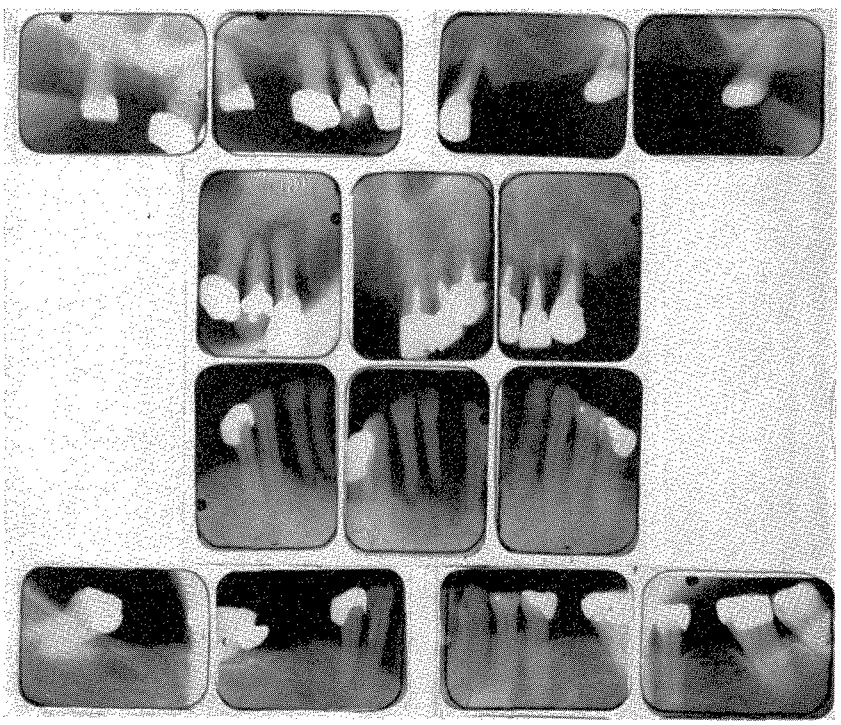


Fig. 213. Roentgenograms of the teeth at the start of treatment (1943).

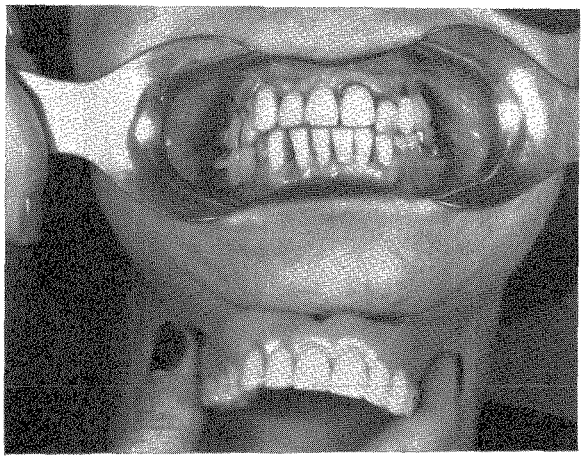


Fig. 214. The transitional denture before the extraction of all the upper remaining teeth. It was inserted immediately. No alveolar bone was removed.

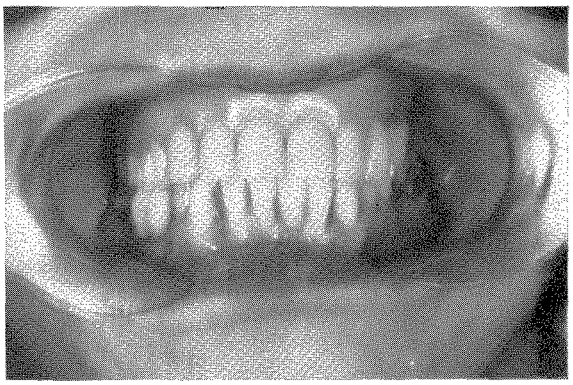


Fig. 215. The immediate denture was inserted. No balance of the occlusion was attempted at this time.

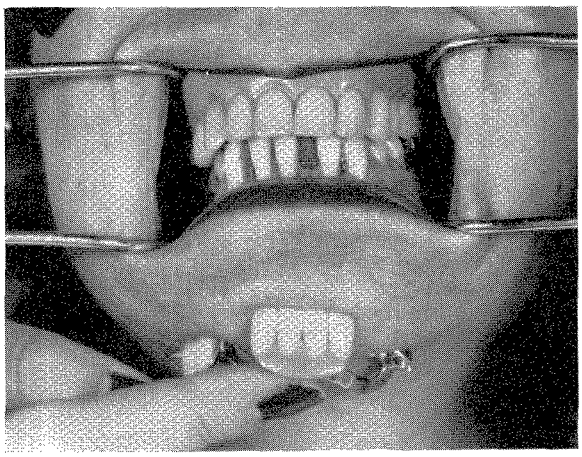
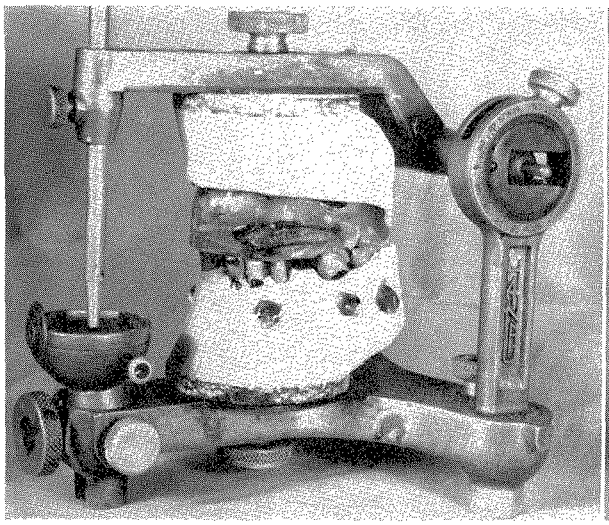


Fig. 216. The completed lower immediate removable partial denture is shown here just prior to extracting the three lower incisors.

Fig. 217



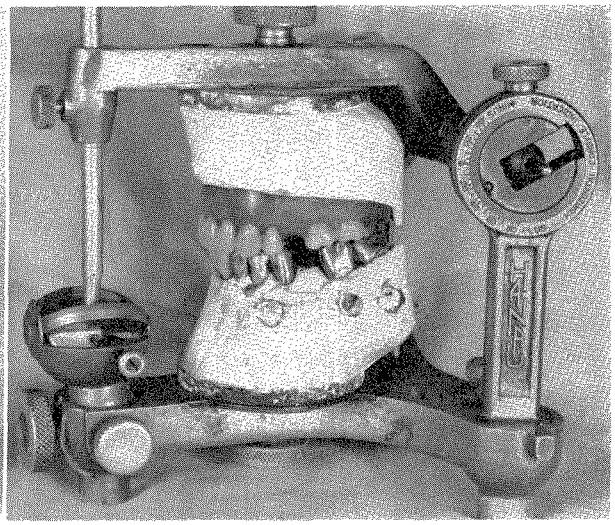


Fig. 218

Fig. 217. The lower working cast was related to the upper cast by means of a wax centric relational record.
Fig. 218. The lower castings were made to coordinate with the upper setup. Balance was obtained in lateral and protrusive movements.

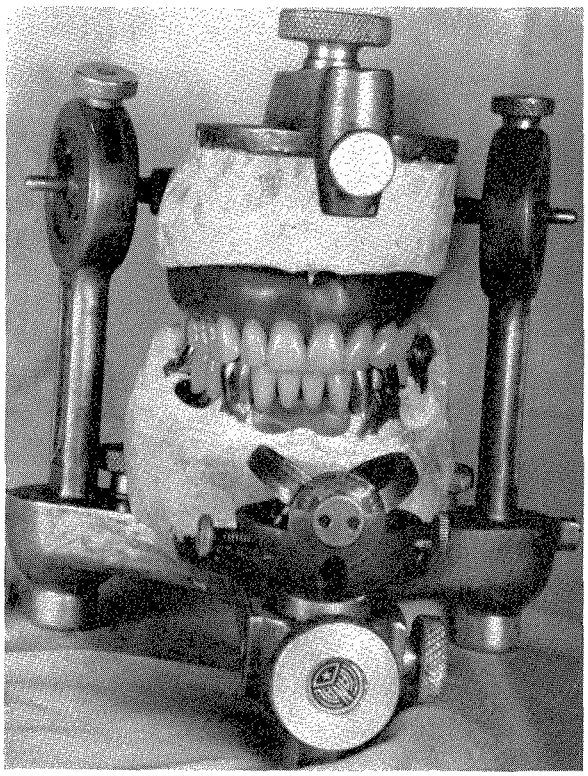


Fig. 219. The new lower working model as placed upon the articulator to replace the old one. It was related by means of a new wax record.

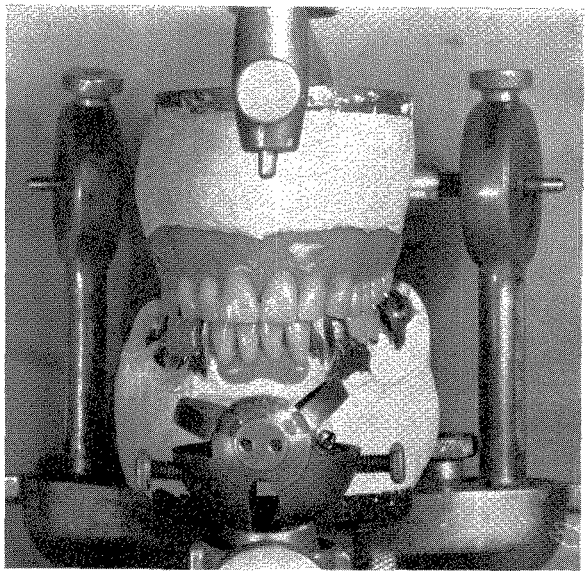


Fig. 220. Anterior view of the completed work.

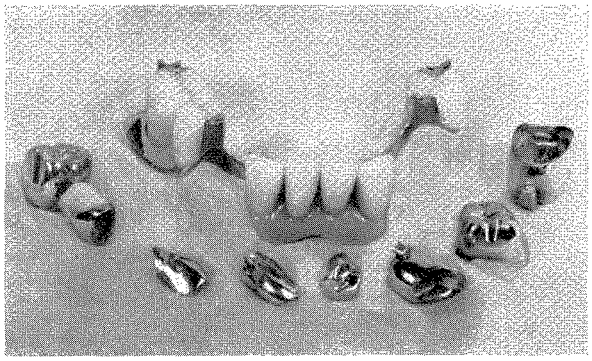


Fig. 221. The lower lingual bar and the supporting abutment castings disassembled just prior to their cementation in the mouth. In addition to the four posterior precision attachments, the cuspid castings have mesial lug seats supporting lugs. The posterior castings have interlocking lugs. In light of our more recent knowledge, if the work were done today, these castings would be soldered together for greater rigidity.

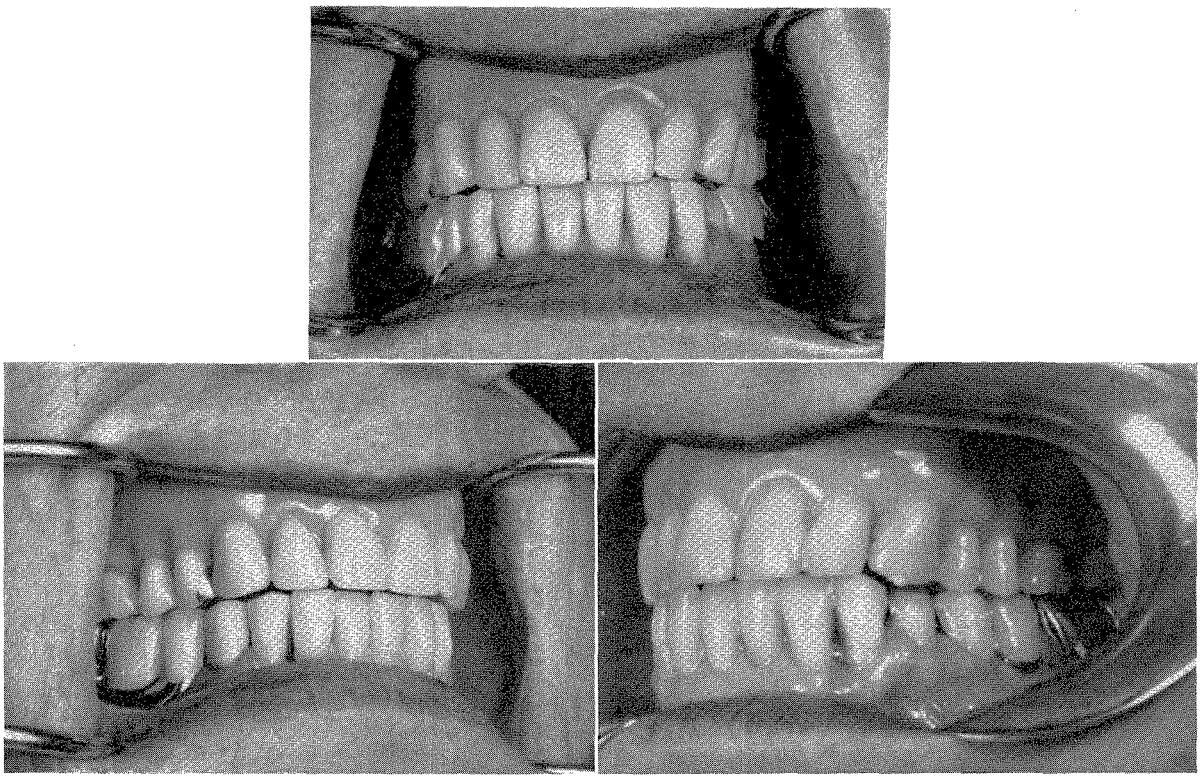


Fig. 222. Anterior, right, and left views of the completed work. This was inserted in 1943.

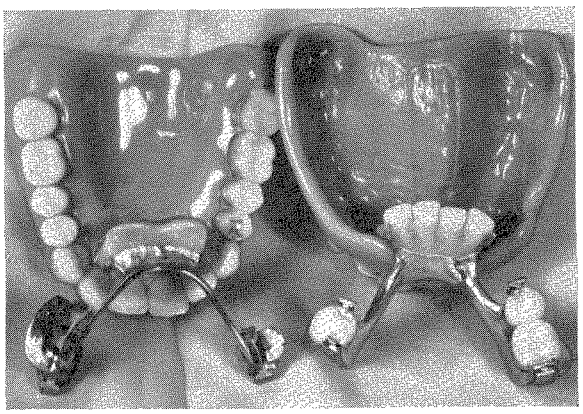


Fig. 223. Duplicate interchangeable replacements were made.

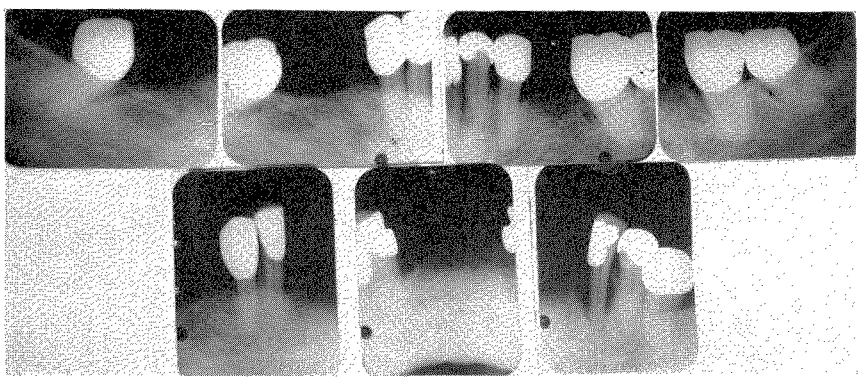


Fig. 224. Roentgenograms taken in 1945. This was two years after completion. The alveolar bone structure already showed signs of periodontal involvement.

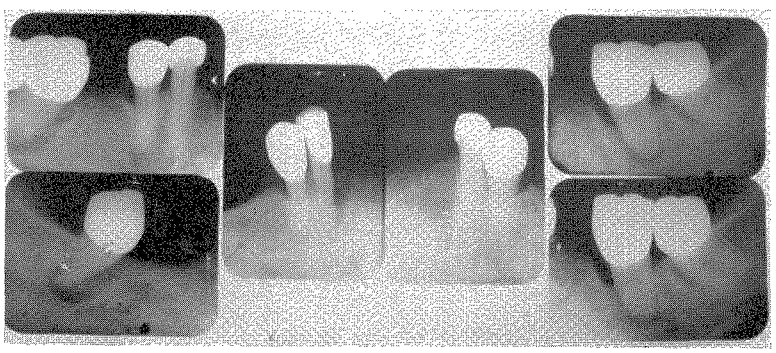


Fig. 225. Roentgenograms taken in 1948. This was five years after completion. The molars were removed shortly after, and the lower prosthesis was added to.

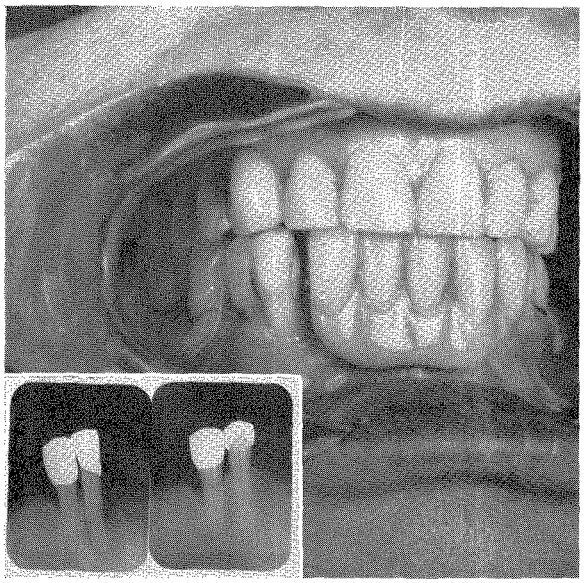


Fig. 226. The mouth as it looked in October, 1950. In the insert are roentgenograms taken in October, 1950.

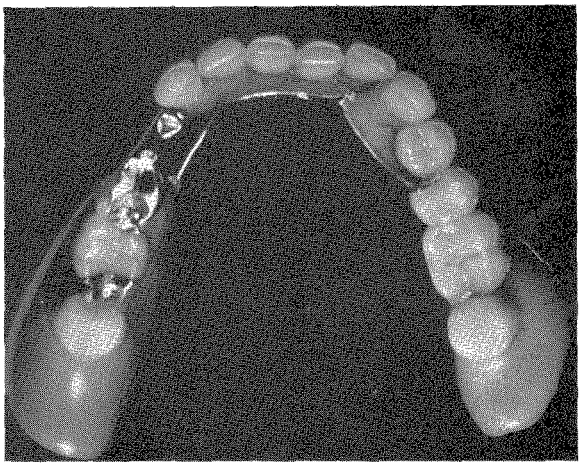


Fig. 227. By 1954 only the left bicuspid remained in place.

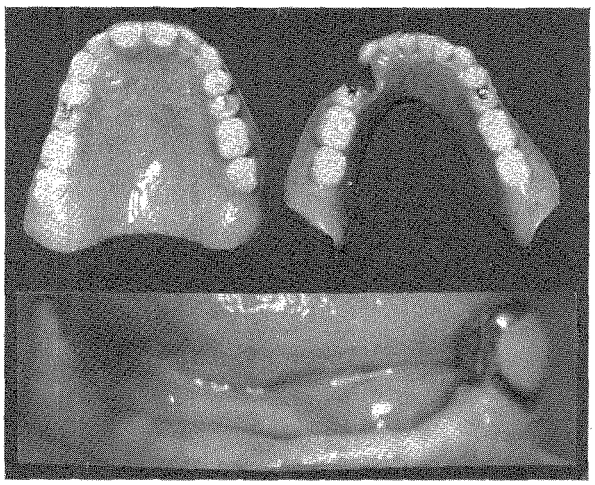


Fig. 228. In August, 1958, new prostheses were constructed. These were in the form of full upper and lower dentures with the sole exception of the left bicuspid which was retained for its stabilizing and retaining effect. The bicuspid was crowned. The crown contained mesial and distal tapered slots which supported vertical wires on the removable partial denture. This permitted motion and at the same time lent support.

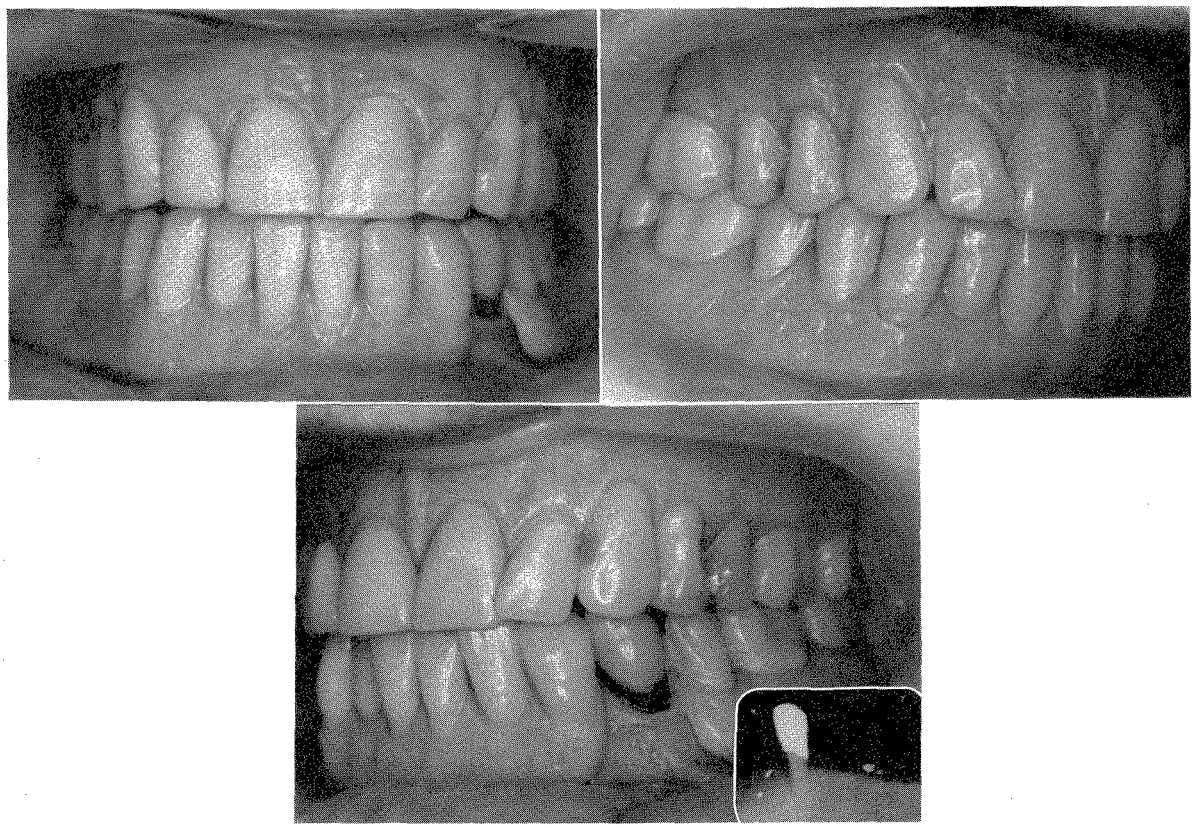


Fig. 229. Front, right, and left views of the prosthesis in the mouth. The patient was 66 years old at this time. The radiograph of the left bicuspid taken in 1962 is shown in the inset of the left lateral view.

were old precision bridges in position. This would indicate that care had always been taken of her teeth. In spite of all these precautions, she continued to lose her teeth systematically until when last seen she was practically endentulous. (Figs. 212 to 229.)

Case 10

This patient, a woman in her early thirties, came for dental treatment in 1945. At that time seven teeth were missing. Her soft tissues were unhealthy. Vertical periodontal pockets were present. This case was reported in 1947* and in 1951.†

A large percentage of patients who present missing teeth and poor periodontal structures need good conformative dentistry. If these patients are under 40 years of age, predictions as to the future longevity of their oral structures should be very guarded. Whereas sympathy and encouragement should be given to these patients, it is unwise to make promises relative to the longevity of the restorations or of their remaining teeth. Young people with poor periodontal tissues who have already lost a number of teeth do not always lose them from neglect or from poor

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 148-149.
†Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 960-964.

dentistry. The causes are often more profound and difficult to understand. They are also exceedingly difficult to treat.

A CONSERVATIVE APPROACH TO ORAL REINTEGRATION

The following quotations are taken from an article published in 1961:

"Oral rehabilitation by means of occlusal reconstruction is a difficult and arduous task. Dentists have always engaged in this procedure, but until twenty-five years ago it was undertaken by a select few who approached their objective with timidity and diffidence. Now dentists everywhere are completely reconstructing mouths.

"Oral reconstruction has its effect both upon the dentist and the patient. It is time consuming, tiresome and expensive for the patient and for the dentist it is exhausting and also time consuming."*

The following letter is from a patient whose mouth was rehabilitated seventeen years ago. The result was very successful by all modern standards. The teeth and periodontal tissues stood up remarkably well. No teeth were removed. The plastics had deteriorated to some extent, and the interocclusal relationship had shifted. The patient was advised to have the teeth again reintegrated.

November, 1962

Dear Jerry:

You have suggested that in my best interests—dentally—I agree to a second "reconstruction job" at this time.

My resounding "No!"—although emphatic—was neither too thoughtful nor polite—herewith the explanation for said "No!"

I am well aware of the tremendous comfort I have had for the past 17 years—since the completion of the 1944-45 reconstruction. I am also still too aware of the traumatic experience I underwent at that time—the fear—the pain—the loss of 23 pounds and the unhappy effects on my family are all too vivid.

At age 51 I'm loathe to face the six months upheavel connected with all this....for those of you who have had only "normal" dental experiences I know this is hard to understand—but each of us has his own particular "Achilles' heel"—and mine is in my mouth.

This, then, is the why of my "No!"

My love—and my deep gratitude for all your patience—

(Signed) _____

Further quotations from my article follow:

"When a patient seeks oral repair, be sure complete rehabilitation is needed before engaging in that perilous procedure. If there is a simpler way to proceed, study this simpler method. With great advances in operative techniques and armamentarium, especially with the high-speed machines, extensive prosthetic

*Schweitzer, J. M.: A conservative approach to oral rehabilitation, J. Pros. Dent. **11**:119-123, 1961.

procedures have become a great temptation to general practitioners. As a result of this widespread practice of complete oral reconstruction, there are an increasing number of patients who are unable to adjust to this changed oral environment. Incorrect changes in the occlusal pattern can cause psychologic disturbances which can pose a more serious problem than the original occlusal defect.

• • •

"If a patient is not conscious of his oral organ, if he eats well, has no trouble with hearing, and has a moderately presentable occlusion, and if roentgenograms of the mouth are favorable for his age, be careful before undertaking complete oral reconstruction. A dentition may be in malocclusion, but it still may be in equilibrium, and to change it to our concept of occlusion may do the patient an extreme disservice. The best service that can be rendered to some of these patients is to leave them alone.

• • •

"Some patients cannot be treated simply. In these instances the occlusion is badly broken down and the teeth have rotated and migrated. Teeth are missing, and the patient is a dental cripple. This type of patient is not met as often as the patient who needs good conformative dental reconstruction built up to the type of occlusion he presents and to his present vertical dimension. It may not be possible to build up the ideal occlusion, but the dentist can construct compromise restorations with the honest conviction that not only is he doing the patient a great service but also that he is treading on safer ground. For this type of situation, conformative dentistry will provide for better function, enhance the chances of longevity, provide for lower costs, do the work in less time, and take less energy from both the dentist and the patient.

• • •

"Our best assets are knowledge and personal skill. Progress means a search to make dental treatment easier to perform, while making it more successful and available to more people.

• • •

"Those situations which are impossible to treat by conformative dentistry will have to be corrected by more difficult methods. Not only must the dentist be specially trained in order to treat these complicated situations by means of complete occlusal reconstruction, but specially trained technicians must be available in order to execute the complex details. Where the work is left to commercial dental laboratories, the results only aggravate an already difficult situation. The commercial dental laboratories are not at fault, but the dentist is unable to carefully prescribe and then watch the procedure being executed. The result is often far from satisfactory.

• • •

"The longer one practices, the greater respect he has for the infinite variations which manifest themselves in the forms and in the functioning of the masticatory apparatus of the patients who present themselves for treatment. The greater

their confidence, the larger our responsibility. Long experience dictates that many of the mouths which were rehabilitated would have been much better treated by simple good dental procedures. The test of time will remain the most eloquent testimonial to the effectiveness of any treatment procedure. Careful documentation over a period of more than twenty-five years gives one a hindsight that is much more intelligent than his foresight. This hindsight encourages those who will listen to continue to perform more and more good dental procedures with sound mechanical and physiologic principles, and to avoid wherever possible, intricate and dramatic techniques. There is a tremendous difference between philosophy and clinical practice. Let us, therefore, adhere to sound principles, involve little risk, and do our work within safe bounds. In other words—be conservative."*

Case 10—cont'd

This patient was referred to a periodontist for specialized gum treatment. By June, 1946, her restorative work was completed. This involved the removal of three additional teeth and the insertion of four fixed partial dentures. In two of these bridges, the use of more than two abutments was resorted to. Although sound mechanical and physiological principles were employed, no unusual procedures were used. The bridges were inserted seperately.

In 1948 the lower teeth needed additional bilateral support, and to provide this a partial lower lingual bar was inserted. This appliance served to connect the lower right fixed partial denture with the lower left bicuspids and molars. It did not restore any teeth. The patient's hygiene was always good. However, she had gone through several emotional crises since dental treatment was rendered which probably contributed to a general physiological change.

In 1953 the gums became inflamed around the upper anterior bridge. In a short time, after careful home treatment, the inflammation disappeared. As time elapsed several small caries developed and were filled. Between 1957 and 1959 the upper left second bicuspid lost alveolar bone, and the pin ledge in the lower right lateral incisor became loose. The lateral incisor was separated from the bridge, and the pin ledge was cemented separately. An arm of the lower removable partial denture was made to engage this tooth. As finance was a problem, it was feasible to do only the imperative. Additional responsibility is always placed upon the dentist who wishes to protect the teeth in spite of the inability of the patient to make adequate compensation. In such cases it is necessary for the dentist to adopt a liberal attitude with every possible concession until such time as the patient can again resume the financial responsibility.

In retrospect

At the time of writing it was sixteen years since the original work was completed. The patient was 43 years old. The 1961 roentgenograms showed little significant bony changes as compared with those of 1945. Without well-planned

*Schweitzer, J. M.: A conservative approach to oral rehabilitation, J. Pros. Dent. **11**:119-123, 1961.

Text continued on p. 121.

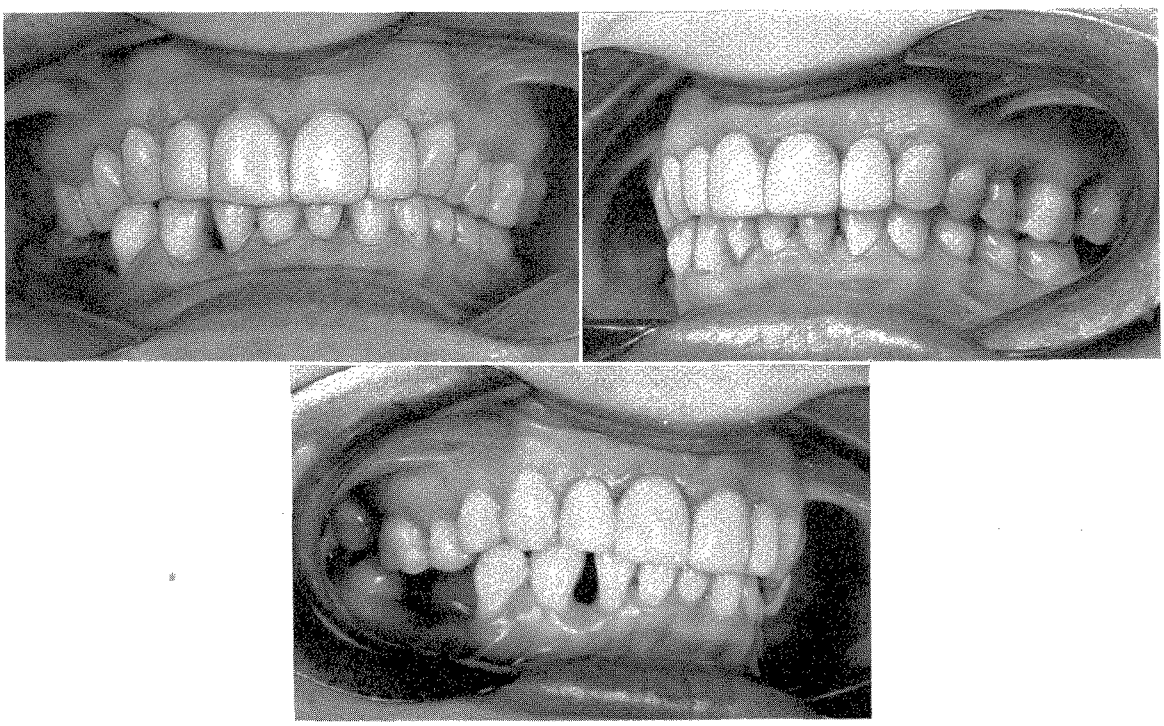


Fig. 230. Front, left, and right views at the start of treatment in 1945. The patient was then in her early thirties. Specialized periodontal treatment had just been completed. (Figs. 230 to 243 are of the same case.)

Fig. 231. Roentgenograms taken in January, 1945, at the start of treatment.

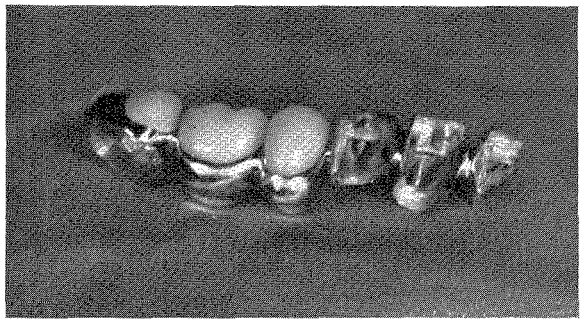


Fig. 232. The lower right six-unit fixed partial denture utilizing three pin ledges and one full crown.

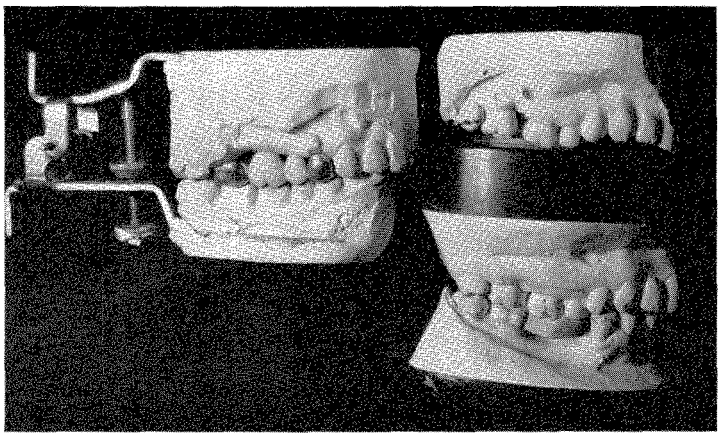
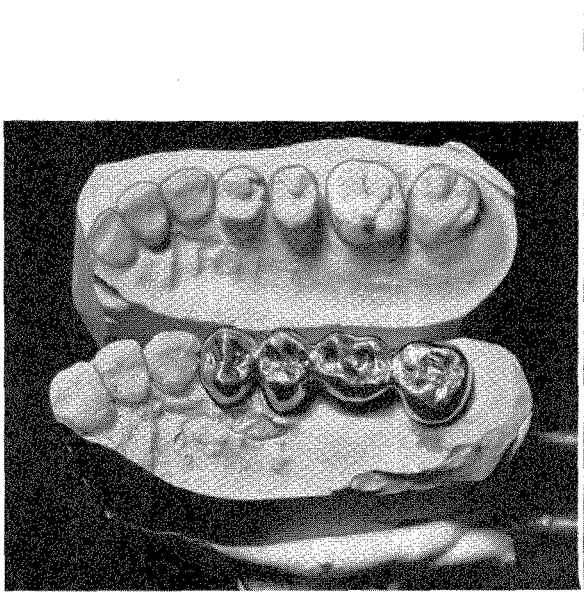
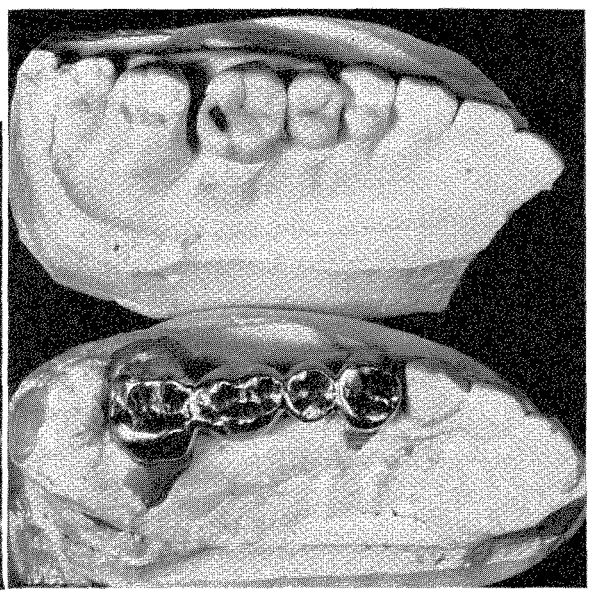


Fig. 233. The right side of the casts in this case before the work was started. Two teeth were extracted, and the occlusal plane straightened out. On the left side is the new reconstructed work with the more favorable occlusal plane.

A





B

Fig. 234. A, The upper left first molar was removed and replaced by the bridge shown here. Observe the narrow molar dummy to lessen the lateral occlusal stress. **B,** The upper right replacement also has the narrow buccolingual widths in the dummies.

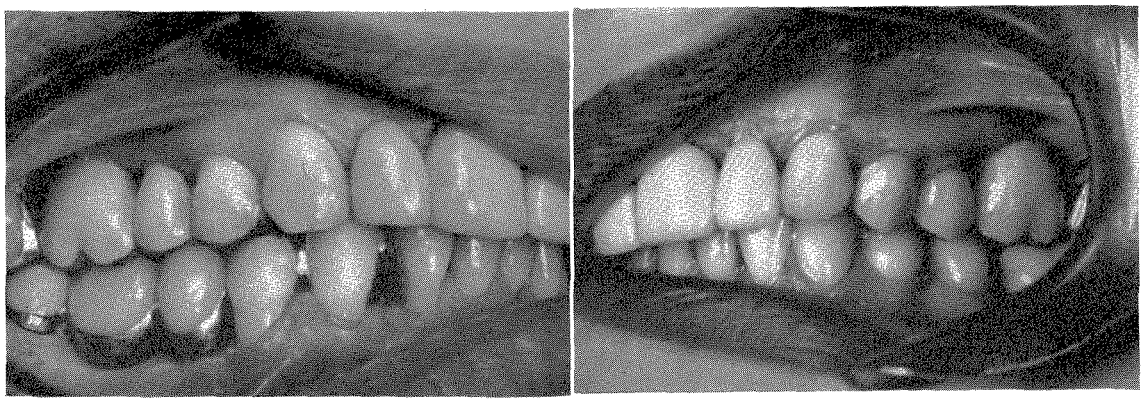


Fig. 235. The completed posterior work. Right and left sides.

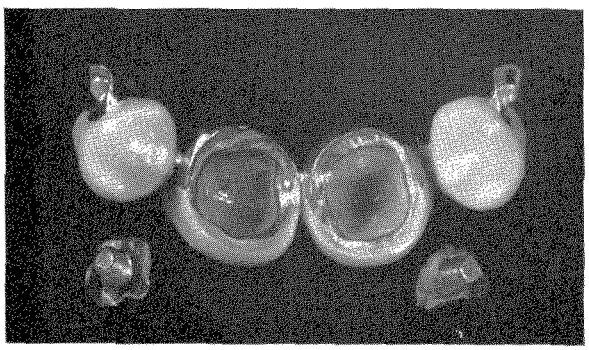


Fig. 236. The completed upper anterior bridge. The lugs fit into gold inlays placed in the mesial surfaces of both upper cuspids. The entire circumference of the central incisors is encircled with gold.

Fig. 237. The completed work. The mandible is in slight protrusion in this photograph. It was taken in June, 1946.

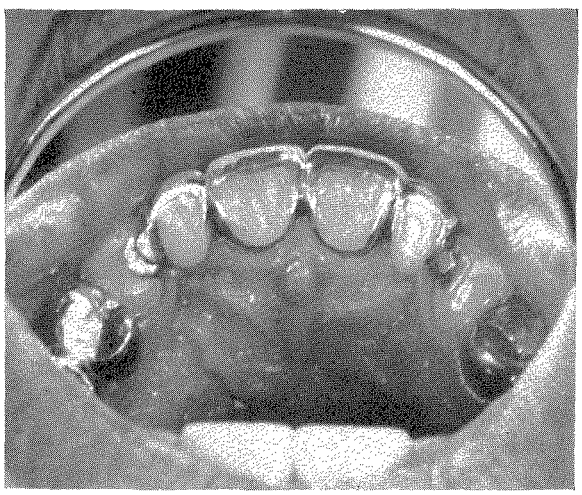


Fig. 238. Lingual view of the upper anterior bridge.

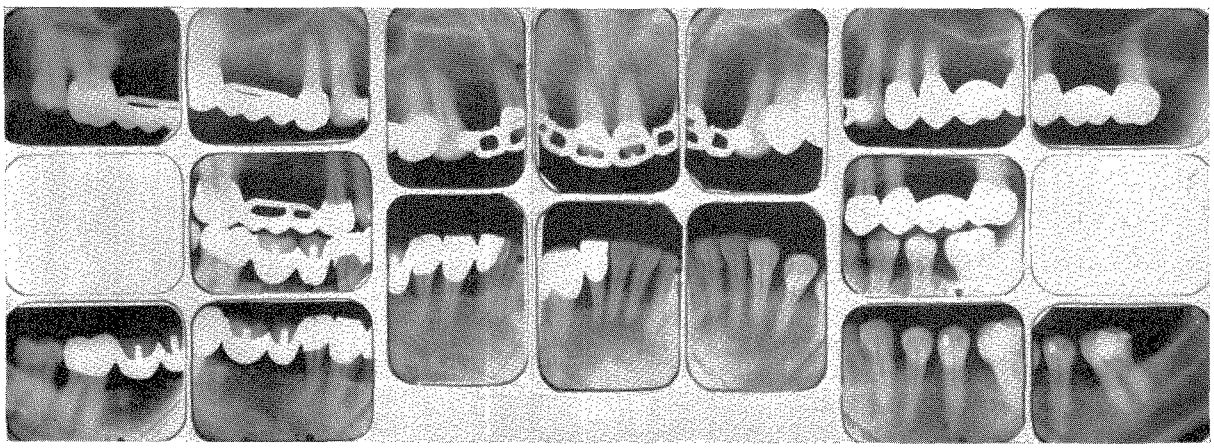


Fig. 239. Roentgenograms taken in February, 1947.

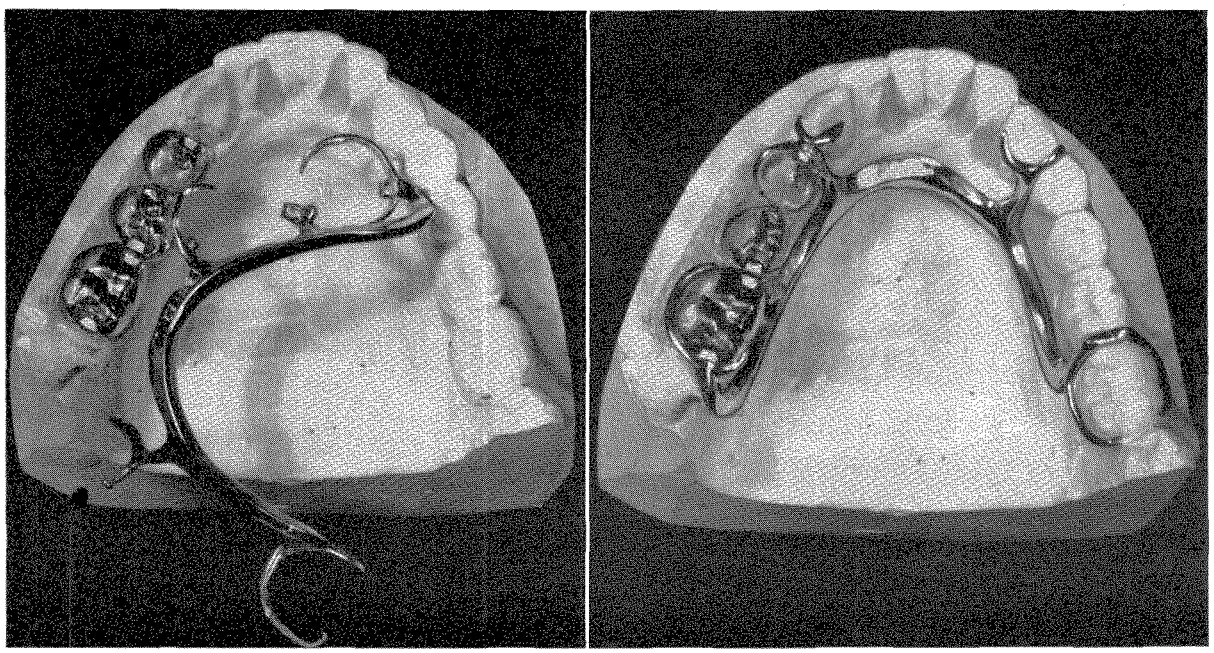


Fig. 240. In 1948 the left first and second bicuspids and first molar were prepared for gold inlays. Precision lug seats were constructed with platinum foil. A splint was made which united the right and left sides of the mouth together for mutual support. This splint is shown in the illustrations.

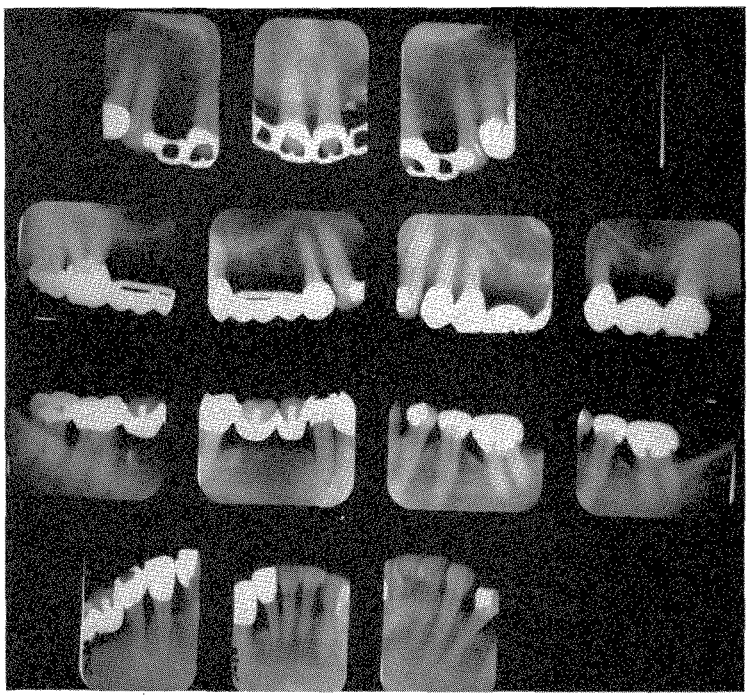


Fig. 241. Roentgenograms taken in 1955. The work was inserted nine years previously.

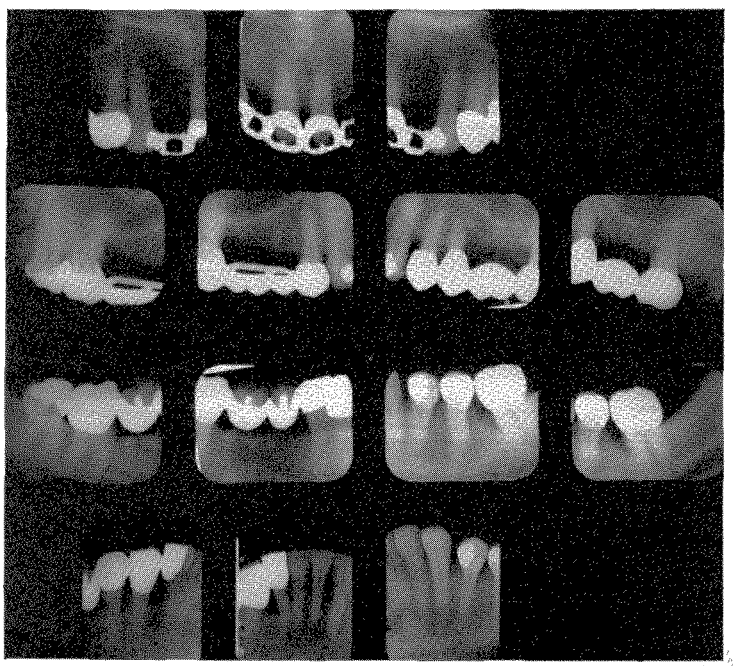


Fig. 242. Roentgenograms taken in 1962, sixteen years after the completion of treatment. The upper left second bicuspid had a deep distal pocket and was problematic.

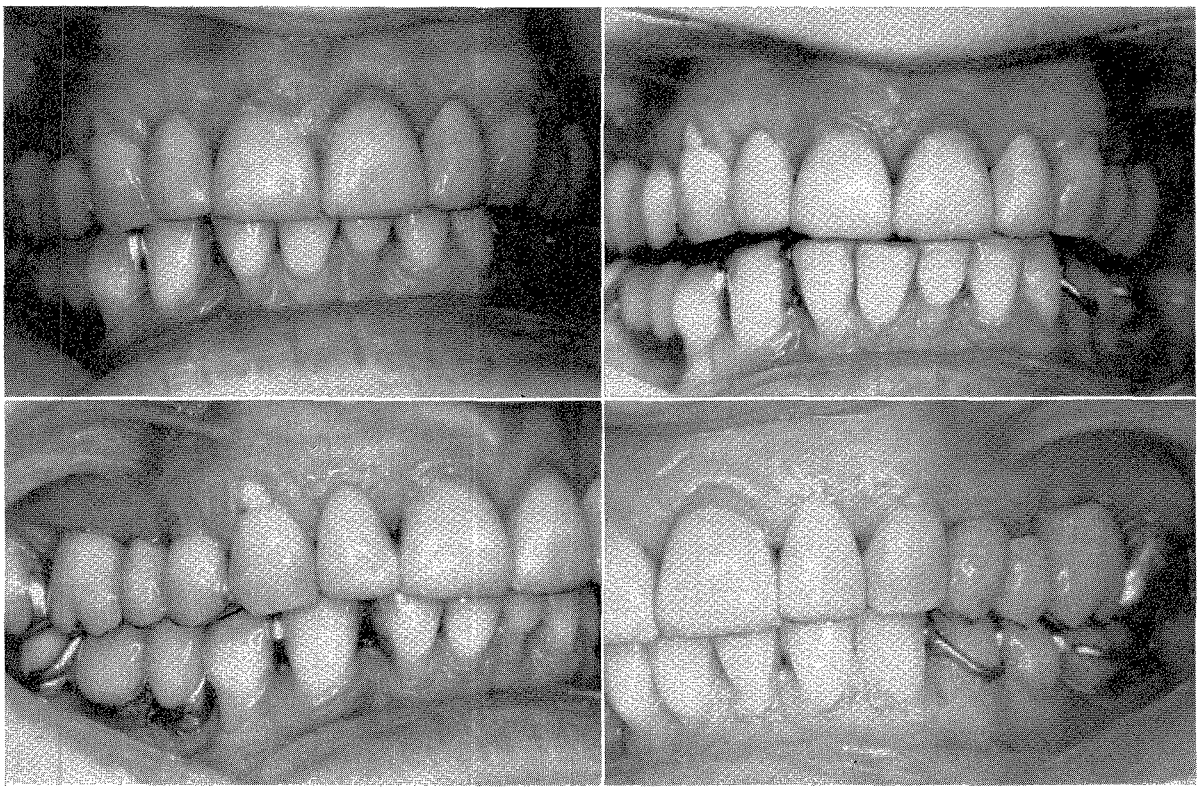


Fig. 243. Front, right, and left views of the teeth. These were taken in 1961. The patient was 43 years old.

dental restorations, in addition to specialized and continuous gum treatment, plus postinsertion checkups, this dental organ would long ago have disintegrated. This demonstrates that while some of these problem cases with a suspected systemic background cannot be treated successfully, others respond to present-day methods. In these, the forces of destruction can be arrested or at least delayed. (Figs. 230 to 243.)

There are many factors which may be responsible for the slowing down or complete arresting of the forces deteriorating the oral structures. It is possible that the predominating local causes may be removed. There may also be a change in the metabolism of the system as a whole. Usually the determinant is a combination of both factors. Only after treatment and an interval of time can the disease be specified as arrested.

Case 11

This was a male patient whose treatment was instituted in 1942 at the age of 44. His roentgenograms disclosed advanced periodontal pathology. Although at that time only two upper third molars were missing, it was necessary to remove seven additional teeth. This patient then received specialized periodontal care. Two removable partial dentures were inserted, using simple conventional methods. The reconstruction was completed in June, 1943. In 1948 the saddles of the removable partial dentures were rebased.

Arrested deterioration

This patient reported regularly for examination. His home hygiene was good. He was 64 years old at the time of writing. Not only had deterioration been checked, but also his teeth and periodontal structures were in better health than at his first treatment twenty years previously. This is an excellent example of arrested deterioration due to local treatment. It would be possible but difficult to prove that additional aid was provided by altered systemic factors. (Figs. 244 to 248.) Another case of arrested periodontal disease is shown in Figs. 343 and 344.

ROLE OF THE SPECIALIST

All specialists are likely to be subjective relative to the importance of their own specialty. The importance of any one of them should not be overemphasized to the detriment of any other specialty. Prosthodontics, periodontics, pedodontics, orthodontics, operative dentistry, oral surgery, endodontics, and other specialties have all played a significant role in the treatment and the reintegration of the stomatological system. Each specialty individually would be severely handicapped without the cooperation of the others. It is this mutual cooperation and understanding that will serve the patient best, and, after all, the patient should be the first consideration. When it becomes necessary for a patient to undergo extensive prosthetic restorations in order to reintegrate the stomatological system, the prescription should be written before the reconstruction is undertaken. In writing these directives, it is often necessary to consult one or more of the specialists for their valued opinions. However, inasmuch as the prosthodontist or the general

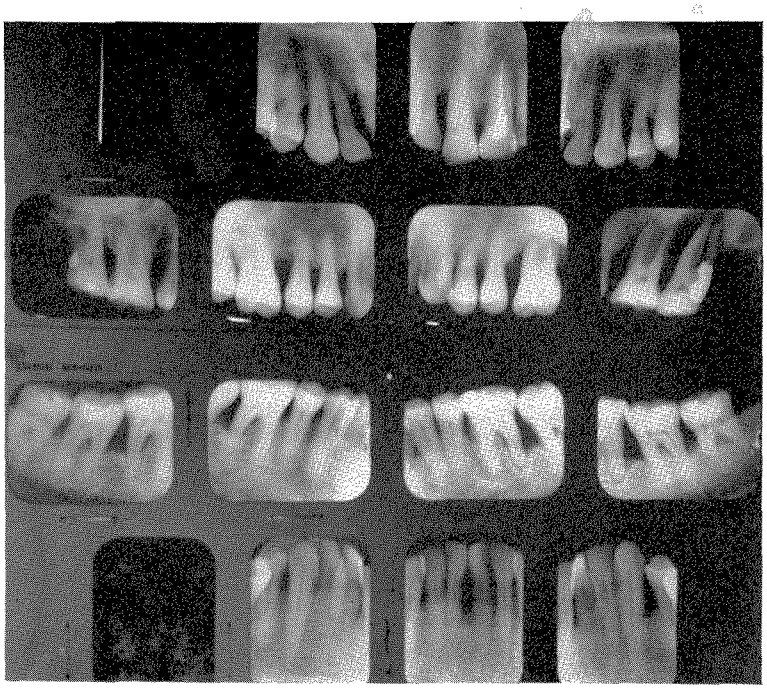


Fig. 244. Roentgenograms taken in 1942 at the age of 44 years. Advanced periodontal disease is evident. (Figs. 244 to 248 are of the same case.)

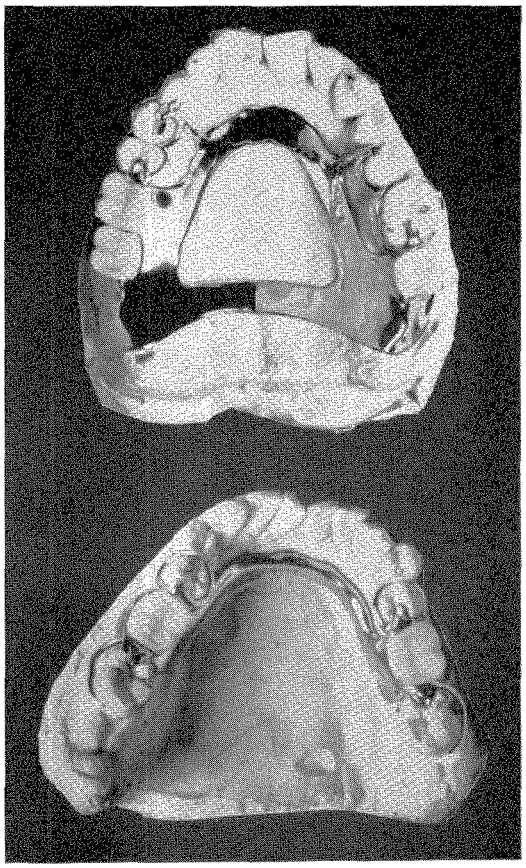


Fig. 245. Upper and lower removable partial dentures retained by clasps and stabilized by lugs were inserted in June, 1943.

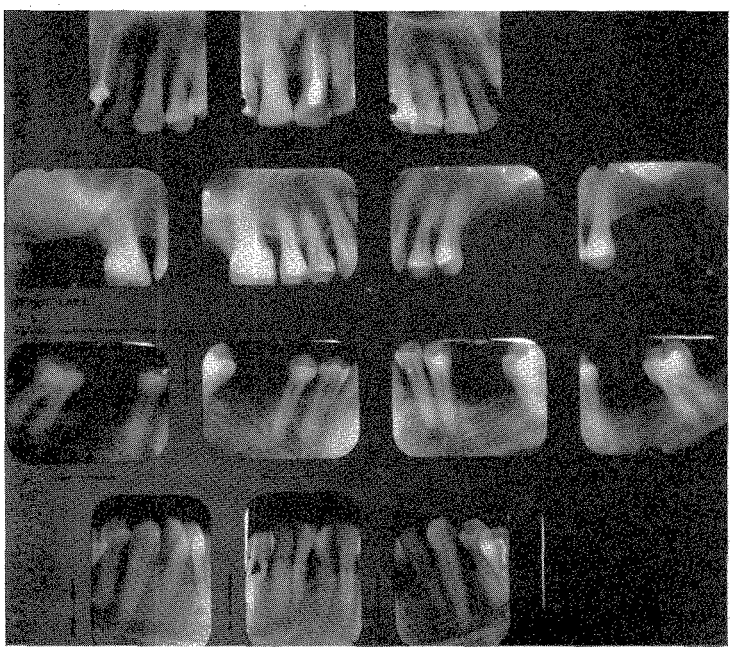


Fig. 246. Roentgenograms taken in September, 1946.

Fig. 247. Anterior view of the mouth taken in 1951.

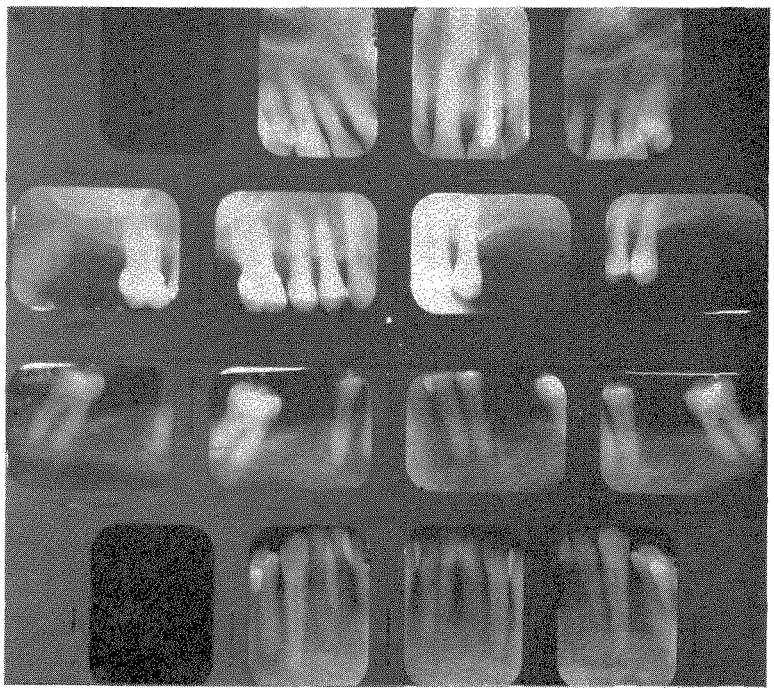


Fig. 248. Roentgenograms of the patient taken in 1962 at the age of 64. In comparing these with those taken in 1946, little or no change could be detected.

dentist is to do the restorative work, it is best for the patient that he has the final word in writing this important prescription.

After the reintegration has been accomplished, it seems to me that the patient will be served best if only one dentist takes charge. Whoever did the actual reconstruction seems likely to be the candidate for this role inasmuch as it is he who will have to service the extensive prosthesis. This does not mean that the other specialties will be omitted from serving the patient in their various capacities. The dentist in charge, whether it be the original general dentist or the prosthodontist, will refer to his various colleagues whenever he deems it to be to the patient's advantage. In this way the patient will not be the unhappy victim of clashes between the specialties. Recall notices should come from only one source

to avoid confusion and sometimes neglect. The patient's well-being should be the first consideration.

With regard to the role of the specialist in the treatment of the patient who requires restorative procedures, Smith stated:

"It might be well to point out here an important responsibility of the restorative specialist or general practitioner who undertakes the placement of a fixed or removable partial denture for a patient. This responsibility is his relationship with dental specialists who might be called upon to serve this patient and, in a sense, become a part of the team. The direction of treatment is his responsibility and his referral of the patient to an oral surgeon, periodontist, endodontist or other specialist does not constitute a transferral of total care to any of them. These specialists are responsible for their specialized component of the cooperative treatment and upon completion of their component it is their responsibility to refer the patient back to the referring dentist. Too many patients get on a merry-go-round of specialists where each one performs his service and passes them on to another without anyone assuming responsibility for the total dental care. Without a comprehensive diagnosis and treatment plan the patient may have teeth saved by the periodontist that for various reasons are a hazard or are useless in the restorative program, other teeth may be saved by the endodontist which compromise the success of the restoration, or surgical preparation of the mouth by the oral surgeon may be incomplete. Each of these operations individually may be a success but collectively they do not add up to an acceptable program. This results in needless treatment, duplication, unnecessary physical and mental trauma to the patient, often excessive financial cost and is a serious reflection upon the dental profession. It is the responsibility of the profession to meet this problem of the proper placement of the coordinative function within its framework of general and specialty practice. The general practitioner or the restorative specialist, who in most cases instigate treatment and render continuous service to the patient, are the logical coordinators of dental service."*

REASONS FOR LOSS OF PERMANENT TEETH

In a recent study of the reasons for the loss of permanent teeth, Andrews and Krogh stated, "In all age groups combined 38.3 per cent of all the teeth lost were due to caries, 36 per cent to periodontal disease, 3.5 per cent for prosthetic reasons, 6.8 per cent at the patients' own request (in spite of careful explanations of the importance of retaining sound teeth), and 15.4 per cent for all other reasons. Thus caries accounted for removal of 55 or 6.3 per cent more teeth than did periodontal disease."†

In another study made by Coxhead,‡ which was reported in 1960, records were made of the reason for extraction of teeth in four separate general dental practices. Two hundred ninety-seven patients were involved, and 1,159 teeth were extracted. Periodontal disease accounted for 20%, whereas caries was responsible for 67%. Orthodontics, prosthetics, and various other reasons accounted for the removal

*Smith, Gilbert P.: The responsibility of the dentist toward laboratory procedures in fixed and removable partial denture prosthesis, J. Pros. Dent. **13**:295-301, 1963.

†Andrews, George, and Krogh, Harold W.: Permanent tooth mortality, D. Prog. **1**:130-134, 1961; copyright 1961 by The University of Chicago Press.

‡Coxhead, L. J.: Reasons for extraction in general practice, New Zealand D. J. **56**:182-183, 1960.

of eighty teeth out of the total. This report also disclosed that dental caries was the main cause for tooth removal in New Zealanders of all ages and that loss of teeth due to periodontal disease is about one third that due to caries.

The major causes for extracting 3,388 teeth from 2,652 persons in the Armed Forces of India at twelve dental centers were analyzed. The subjects were men ranging in age from 15 to 50 years.

Of the 3,388 teeth, 1,438 (42.4%) were lost because of periodontal disease, 1,415 (41.7%) because of caries, 42 (1.3%) because of impaction, and 504 (14.6%) for miscellaneous reasons.

The chief cause of tooth loss in subjects up to 30 years of age was dental caries. After the age of 30 more teeth were lost because of periodontal disease than because of caries. After the age of 40 periodontal disease was overwhelmingly the chief cause of tooth loss.*

Untreated dental conditions are among the most common of all diseases afflicting the American people. It is estimated that the 180 million residents of the United States in 1960 had at least 700 million unfilled cavities, an average of four per person.

Nearly 250,000 records of dental examinations given to beneficiaries of the United States Public Health Service during the five fiscal years from 1948 to 1952 were studied.

In the group aged 15 years and older the number of missing teeth per person averaged 4.4% at ages 15 to 24 years. It rose steadily to 23.8 per person at 65 years of age and over. The number of teeth for which extraction was indicated rose from 0.7% at ages 15 to 24 years, to 2.2% at ages 55 to 64 years, then declined to 2.0% at 65 years and over.

Dental caries was the chief reason for tooth loss in about one third of these teeth. Among the remainder periodontal disease or some other factor was reported as the most immediate cause for extraction. Caries was the main reason for extraction under 35 years of age, but in older ages periodontal disease was the main cause. Studies of periodontal disease among adults show a steadily rising prevalence with age.†

Caries not only causes the loss of teeth directly, but indirectly it furthers the disintegration of the entire dental organ. Carious teeth that have been extracted and not replaced cause the remaining teeth to rotate and migrate. The interproximal contacts become abnormal, with resulting food impaction. Periodontal pockets and the future loss of teeth often have their initial beginning in these cases. It is also possible that some prosthetic cases in which teeth have been lost through periodontal pathology have had caries rather than abnormal gum and bone structures as the initial cause.

Assuming that some of the carious teeth have been removed and replaced, still these restorations, unless properly constructed, impose additional stresses upon the abutment teeth and may later become responsible for the many periodontal breakdowns which occur. Periodontal disease and dental caries provide etiological factors for each other. Both diseases are permanently scarring.

Until more scientific evidence is obtained to prove that periodontal disease

*Singh, Wardev, and Mehra, B. N.: Tooth mortality in relation to dental diseases amongst the personnel of Armed Forces in India, Armed Forces M. J., India **18:**190-194, 1961.

†The Level of Dental Health, Prog. in Health Service **10:**1-7, 1961.

is the prime cause of oral disintegration, caries should at least be regarded as an equal offender.

Case 12

This patient, a 51-year-old man, presented himself for treatment in 1955 when he was in his early forties. Nineteen teeth were already missing. Upper and lower removable partial dentures were being worn. These were retained by clasps. The history of his teeth revealed that they had become loose and had to be extracted. His arches were unusually wide, indicating tongue thrusting and perhaps false swallowing patterns. His tongue was large—operating in his mouth was difficult. The bite was tip to tip with the lower cuspids spread widely apart. The lower arch was as wide as the upper arch.

A periodontist had treated him previously for pain in the upper left molar area. The report he received contained a paragraph which stated:

"Prognosis: Excellent for all teeth with the possible exception of the upper left second molar tooth. . . . a. Supporting bone destruction varying approximately 1/2 to 1/3 the lengths of the roots of the affected teeth . . . . c. Pathologic mobility of several teeth."

The patient was intelligent. His resources were limited. The treatment decided upon was the insertion of a full upper denture and a well-integrated lower lingual bar using precision attachments as retaining devices. The weakness of his remaining teeth and alveolar structures was explained in detail. Notwithstanding, the patient was still unwilling to lose his upper teeth. A consultation with a second periodontist augmented his own opinion, namely, that it was necessary to remove only his upper left second molar.

After carefully evaluating the various ways of resolution with both the periodontist and the patient, an unorthodox and hazardous method of treatment was decided upon—that of replacing the missing teeth with fixed partial dentures on the assumption that this would prove less traumatic to the weak remaining structures.

A full denture would have involved less risk, time, and, in addition, would have been less traumatic to the lower natural teeth. The responsibility for the retention of the upper teeth was to be assumed by the patient and the periodontist should the case fail in a short time. The periodontist's letter contained the following paragraph:

"He [the patient] is fully aware of the precarious nature of his oral condition and that the expected longevity was projected within a period of five years. I [the periodontist] explained to him that since we both [the periodontist and the prosthodontist] agreed that fixed splinting had better stabilizing effect than an upper removable partial denture, he [the patient] preferred this method of treatment. I [the periodontist] told him that he had a good chance of his teeth standing up for a longer period than five years."

Discussion

One of the important causes of dental prosthetic failures is the retention of problematic teeth. These teeth with questionable futures should be carefully

evaluated by the periodontist, the prosthodontist, and the general practitioner. Although there are many patients who prefer leaving to chance the retention of these teeth, it is still necessary that they be made aware of the problem without either belittling or dramatizing the issue. In reiteration, infected teeth which are likely to cause systemic pathology should be removed or not employed as abutments for restorations. Many patients should refuse to retain teeth with uncertain futures. A serious evaluation of their specific problems should be made.

Whereas the person with unlimited means may be able to gamble with the future longevity of his extensive dental restorations, the average patient cannot afford to do so. He must be guided into obtaining restorations that are functional, esthetic, and have a reasonable chance for longevity. These restorations should not present physical hazards. Teeth which are too risky should be removed. With the combined knowledge of the prosthodontist, the periodontist, and the general practitioner, the patients can better judge what is most beneficial for them. If the strength of the abutment teeth is not able to sustain the superstructure, no matter how expertly the mechanics are executed, the result will be failure.

The reconstruction of the case under discussion began in February, 1955. The transitional work, which consisted of three fixed partial dentures united by precision attachments, was first constructed for the mandibular teeth. This lower temporary work was then used as a pattern for the construction of the upper transitional work. This was also made in three sections united by interlocking joints retained by crowns and screws. These bridges were inserted in March, 1955. Meanwhile, the upper left second molar was extracted, and the periodontal treatment was also being accomplished. This included gum resections. The patient's physical condition had been checked. Dietary corrections had also been suggested.

Gold copings

By November, 1955, the tissues had healed sufficiently to permit proceeding with the final work. Because of the problematic future of all the teeth, especially those which would serve as abutments for the fixed partial dentures, a decision was made to cover them with thin gold copings. These were to be permanently cemented. Telescoping overlay gold crowns would then be placed over them. These would be secured by screws and by temporary cement. These overlay crowns would then be used to support fixed partial dentures.

The gold copings would also be used to parallel the abutment teeth as well as to protect them from caries by providing adequate coverage at the cervical margins. By so doing, the telescope crowns covering them would not have to extend to the gingival margins of the abutment teeth if paralleling should make this impossible. The mechanical retention is accomplished by small screws* placed in advantageous positions in the overlay crowns and in the copings. The tube, which is to carry the screw, is cast directly into the telescope crowns.

When there are spaces between the teeth, such as in this case, the gold copings can be connected by a rectangular gold bar, and the retaining screw can be inserted into this bar rather than into some portion of the abutment copings. This form of positive retention is effective and less dangerous to the teeth.

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*Distal extension screw and round tube, Hartford, Conn., The J. M. Ney Co.

Fixed partial dentures or splints constructed in this manner may remain in position from one to six months. If the mouth requires frequent prophylaxis or periodontal treatment, the prosthesis is removed. The periodontal pockets are far more accessible for treatment with the dental prosthesis removed.*

The final work was made in accordance with the above plan. A modified Hanau Model H articulator was used. The upper fifteen-unit fixed partial denture was constructed in one piece, and the lower prosthesis was constructed in two pieces connected by a precision attachment. The completed work was inserted in February, 1956. In April, 1959, the upper right molar had to have its pulp removed due to infection resulting from a periodontal pocket. In September, 1960, caries developed distally in this same tooth, and it was filled with amalgam. At the time of writing, almost seven years after the insertion of the final work, the patient was 59 years old. He had returned regularly for checkup and gum treatment and was convinced that he chose wisely. The removable overlay splints result in much more effective periodontal treatment. This was a difficult problem case. How long it will continue to function is still uncertain. (Figs. 249 to 276.)

*Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.

Text continued on p. 137.

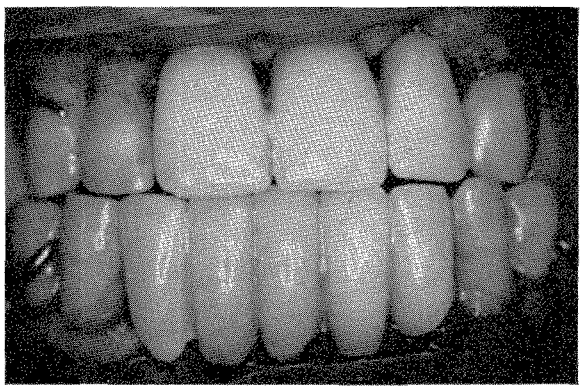


Fig. 249. Anterior view with upper and lower removable partial dentures in position at the start of treatment in January, 1955. (Figs. 249 to 276 are of the same case.)

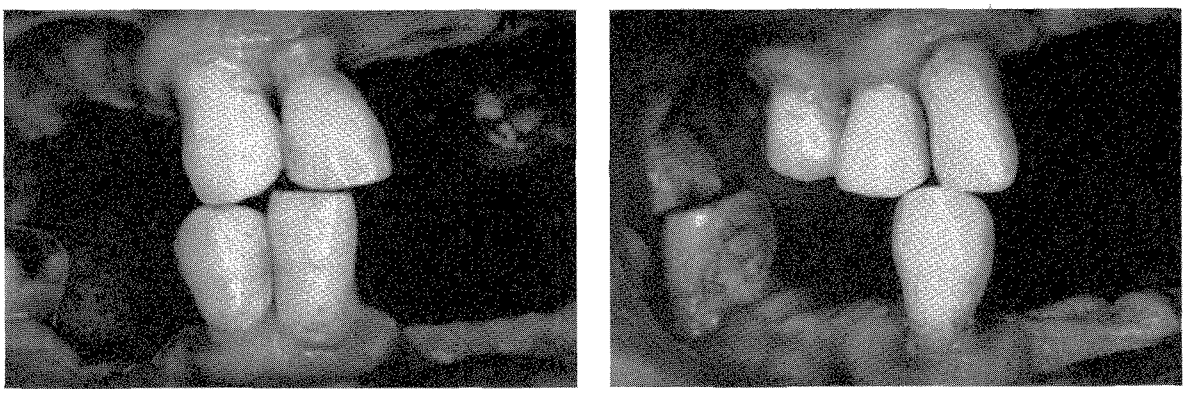


Fig. 250. Right and left views with the removable partial dentures removed.

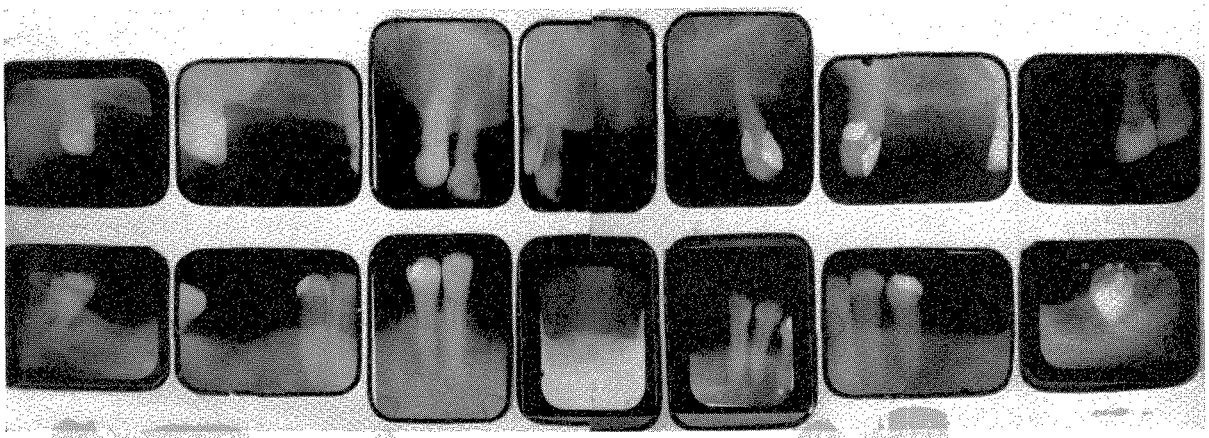


Fig. 251. Roentgenograms taken in October, 1954.

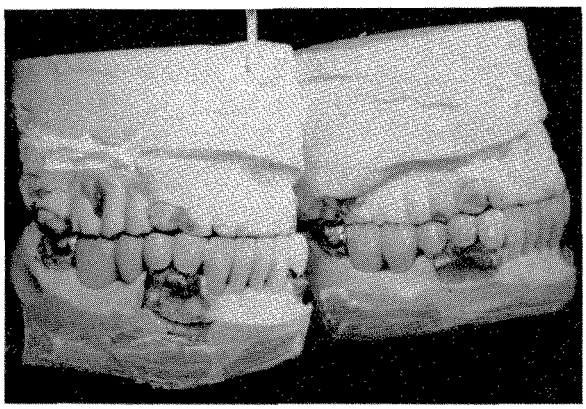


Fig. 252. The lower temporary work. This was made in three sections. Here it is assembled on the casts.

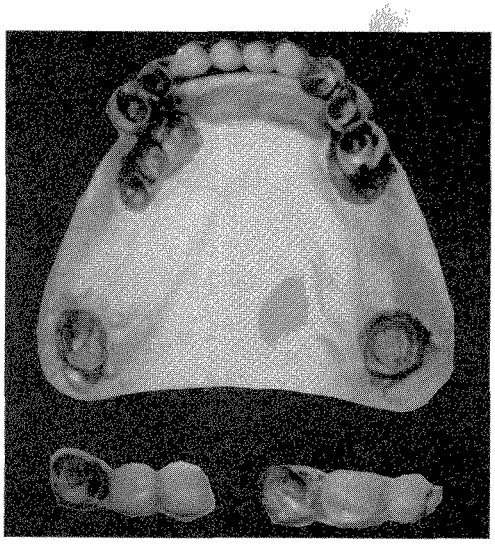


Fig. 253. The lower temporary work. The three sections have been removed from the cast. They were united by means of two precision attachments placed in the distal surfaces of the second bicuspid gold-veneered crowns.

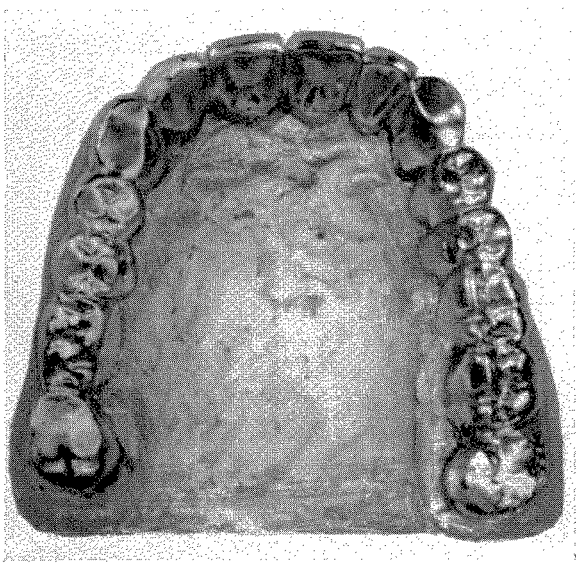


Fig. 254. The upper temporary work assembled on the cast. This was also fixed and was made in three sections as Figs. 255 and 256 show.

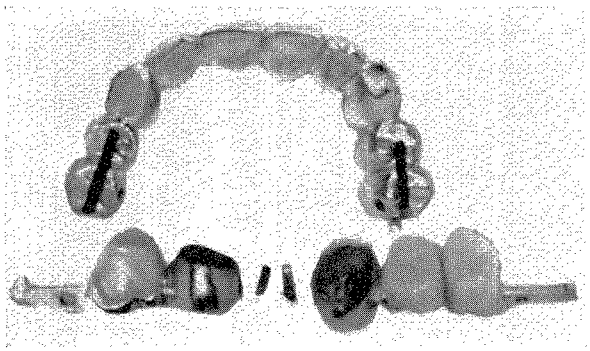


Fig. 255. The anterior section consists of a ten-unit fixed splint. The bicuspid dummies have two slots into which the two metal blades of the posterior sections fit. The blade has a countersunk at its extremity to prevent it from pulling distally. A screw is inserted to unite the parts further and to make it impossible for them to come apart.

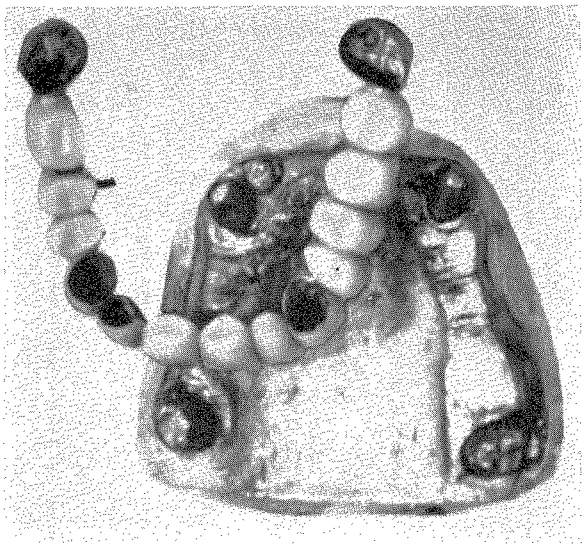


Fig. 256. The upper transitional splint is shown here united into one piece of fifteen units. The right screw is shown projecting from the lingual surface of the second bicuspid.

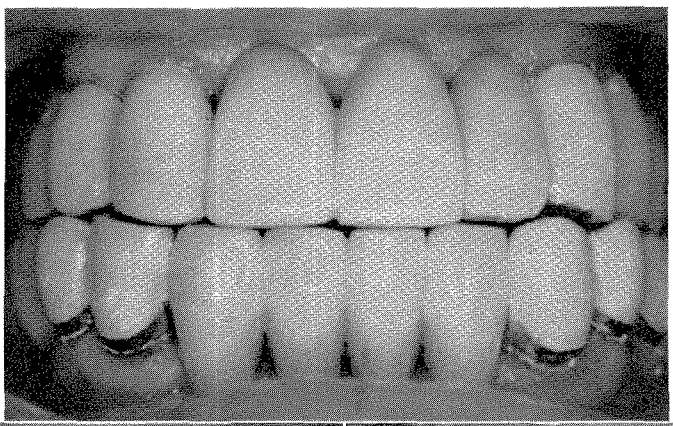


Fig. 257

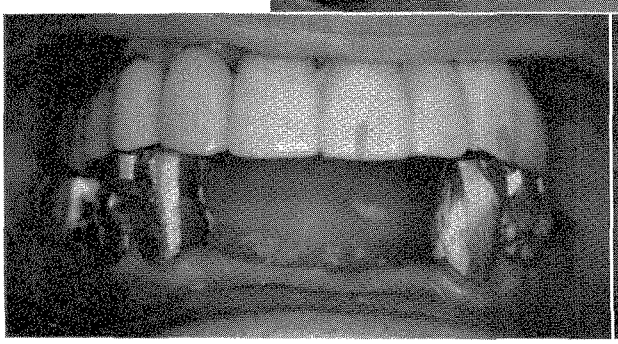


Fig. 258

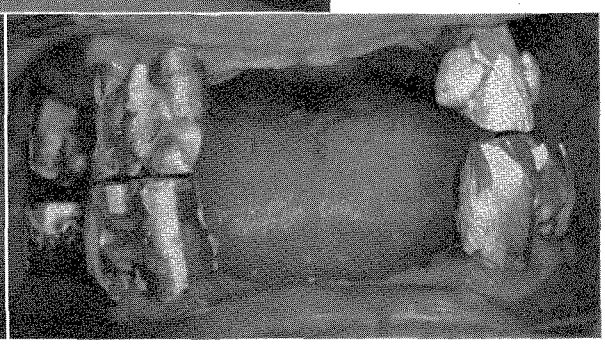


Fig. 259

Fig. 257. The completed transitional work is shown here in the mouth. It was inserted in March, 1955.

Fig. 258. Lower low-fusing metal transfers were ground to the same vertical dimension as the temporary work. The upper temporary work is still in position.

Fig. 259. The upper temporary work was then removed, and the upper transfers were inserted. The same vertical dimension and centric relation bite was maintained as the patient had with the temporary work. This stage was not started until November, 1955, in order to allow the gum resections to heal.

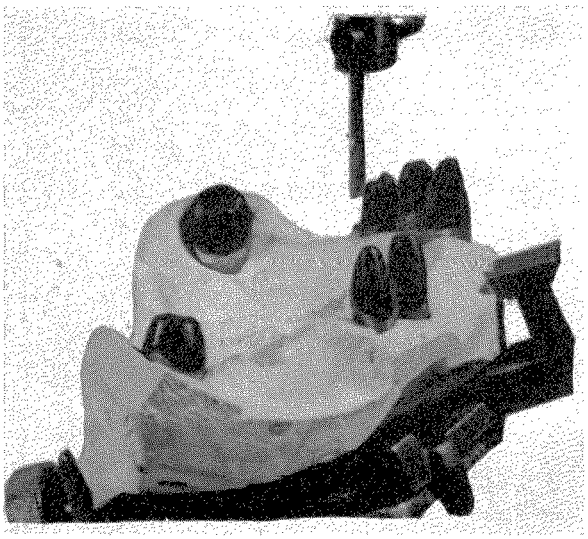


Fig. 260. The wax-up was made so that the crowns which were to fit over the gold copings would all be parallel. The parallelometer may be seen. The copings were then cast and tried in the mouth.

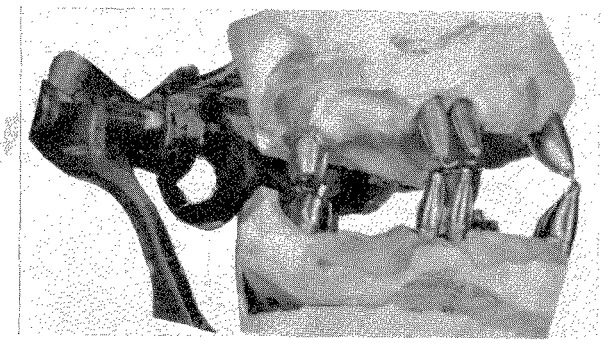


Fig. 261. The cast gold copings are shown on the articulator.

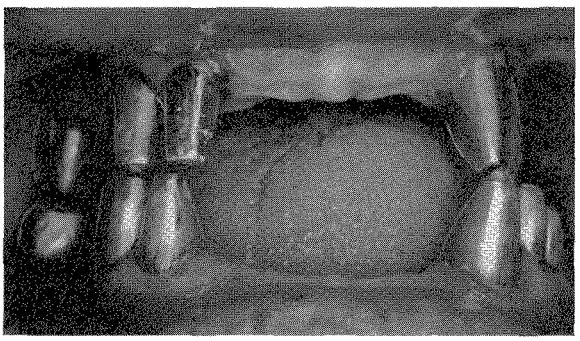


Fig. 262. The gold copings were inserted in the mouth. Centric relation and vertical dimension records are now taken with wax. A face-bow record and upper and lower plaster impressions are taken.

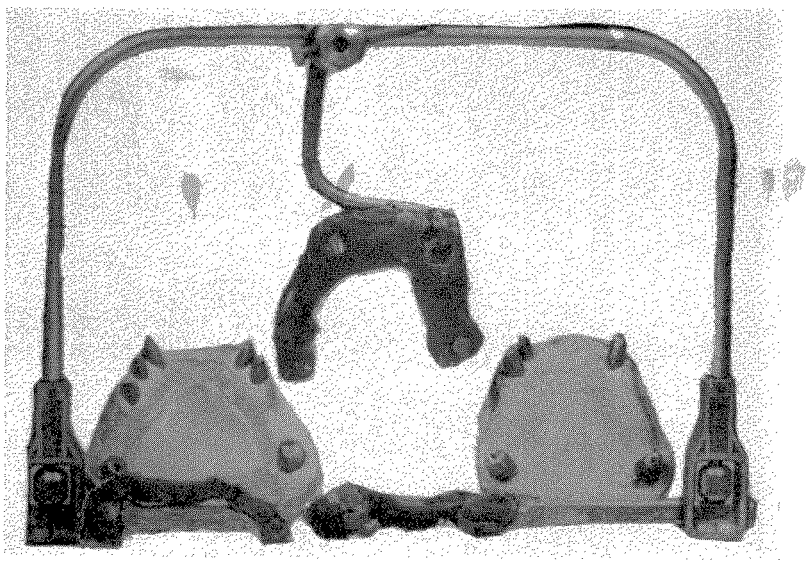


Fig. 263. These are the records described in Fig. 262.

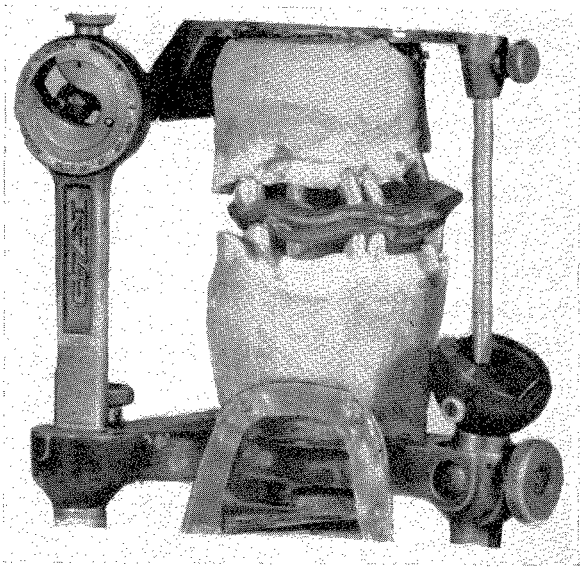


Fig. 264. The work casts were mounted on the articulator. The wax-up was to be started over the copings.

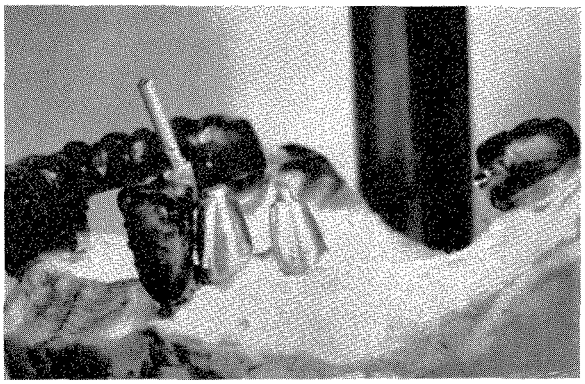


Fig. 265. In the waxed overlay crowns which were to be inserted over the gold copings, various connecting attachments had to be inserted. The cast is shown on the parallelometer. The lug rest and the screws are shown being inserted.

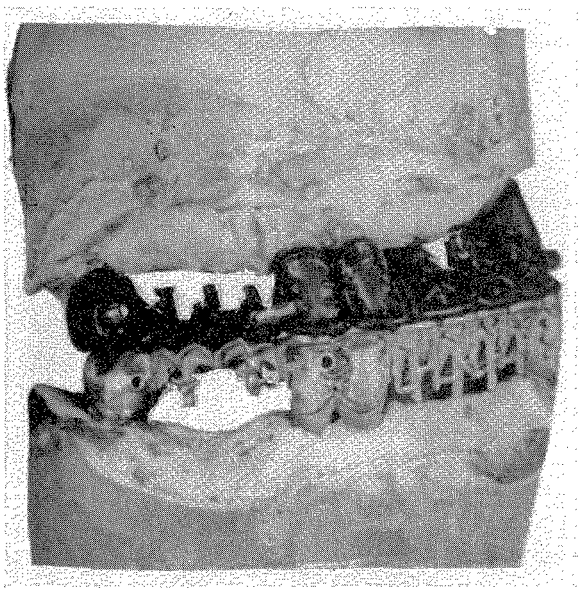


Fig. 266. The lower overlay bridges had been cast and were in position. The upper overlay bridge was still in wax so that any discrepancy could be corrected before the upper fixed partial denture was cast.

Fig. 267. A close-up of the gold copings. Some of these had been soldered together, and the screw hole for the overlay had been placed in the connecting gold bar as shown here.

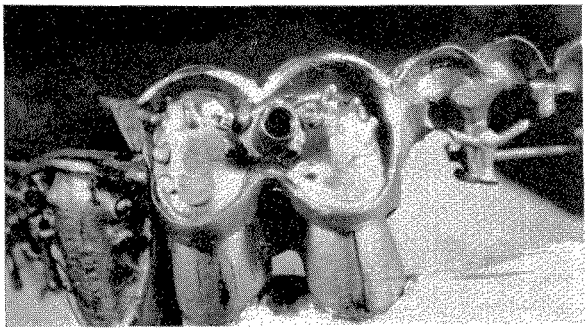


Fig. 268. This is the same as Fig. 267 except that the overlay had been placed on top of the gold copings. The cuspid crown to the left was inserted first. Then the posterior overlay section was inserted. It locked into the distal surface of the cuspid casting by means of a lug. When it was in place a screw was inserted into the screw hole in order to unite the parts more securely. This is the lower fixed partial denture which was made in two sections.

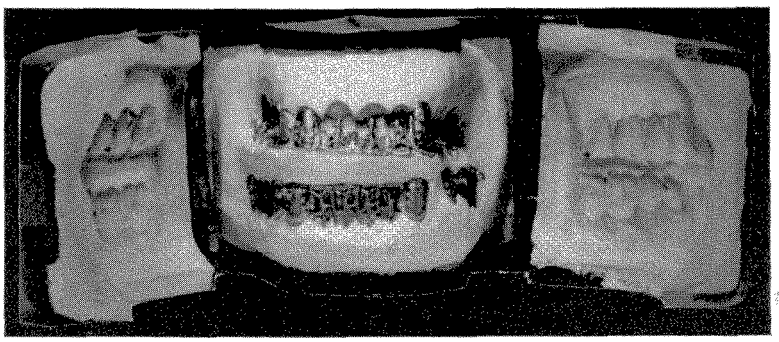


Fig. 269. Because of its size and curvature, the processing of the acrylic is done in a special flask.

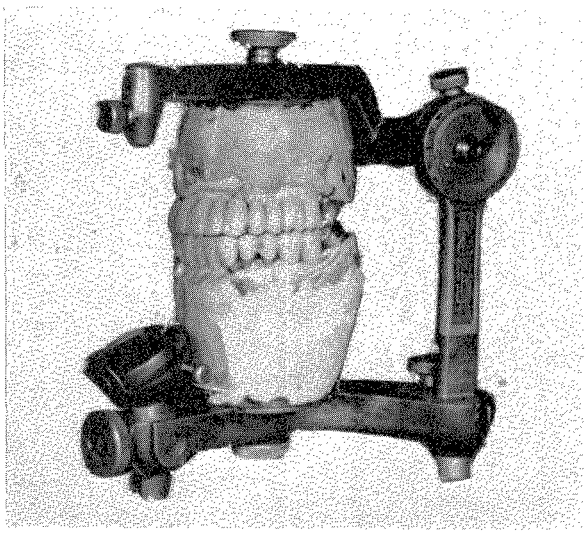
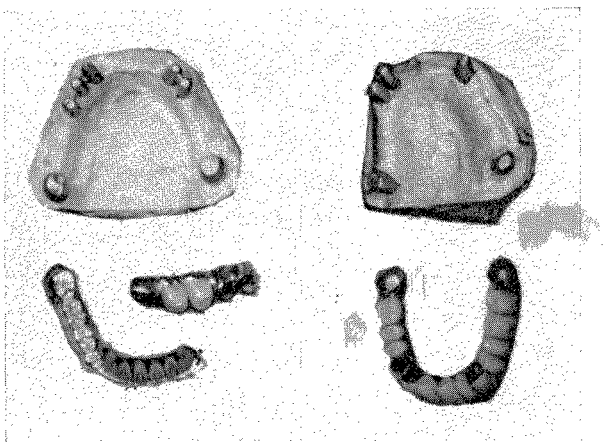


Fig. 270. The completed work is shown here on the articulator.



A B

Fig. 271. A, The lower overlay splints were removed. They were in two sections. When these are inserted, they become one rigid splint. **B,** The upper overlay splint contains fifteen units. It is supported by the five remaining teeth. The cast gold copings are on the casts.

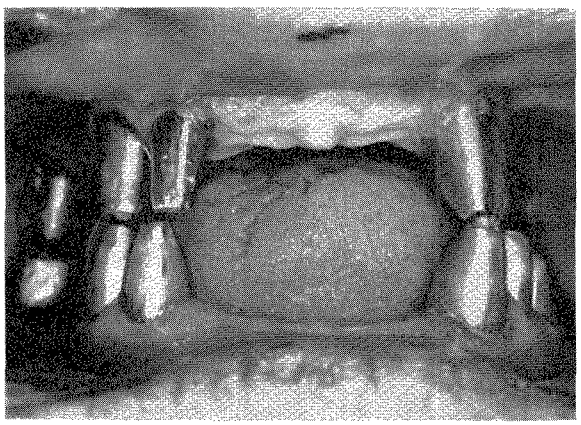


Fig. 272. Silver nitrate has been applied to the teeth, and the gold copings have been cemented.

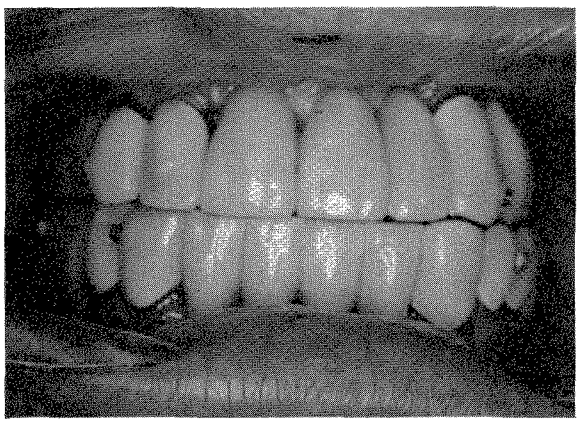
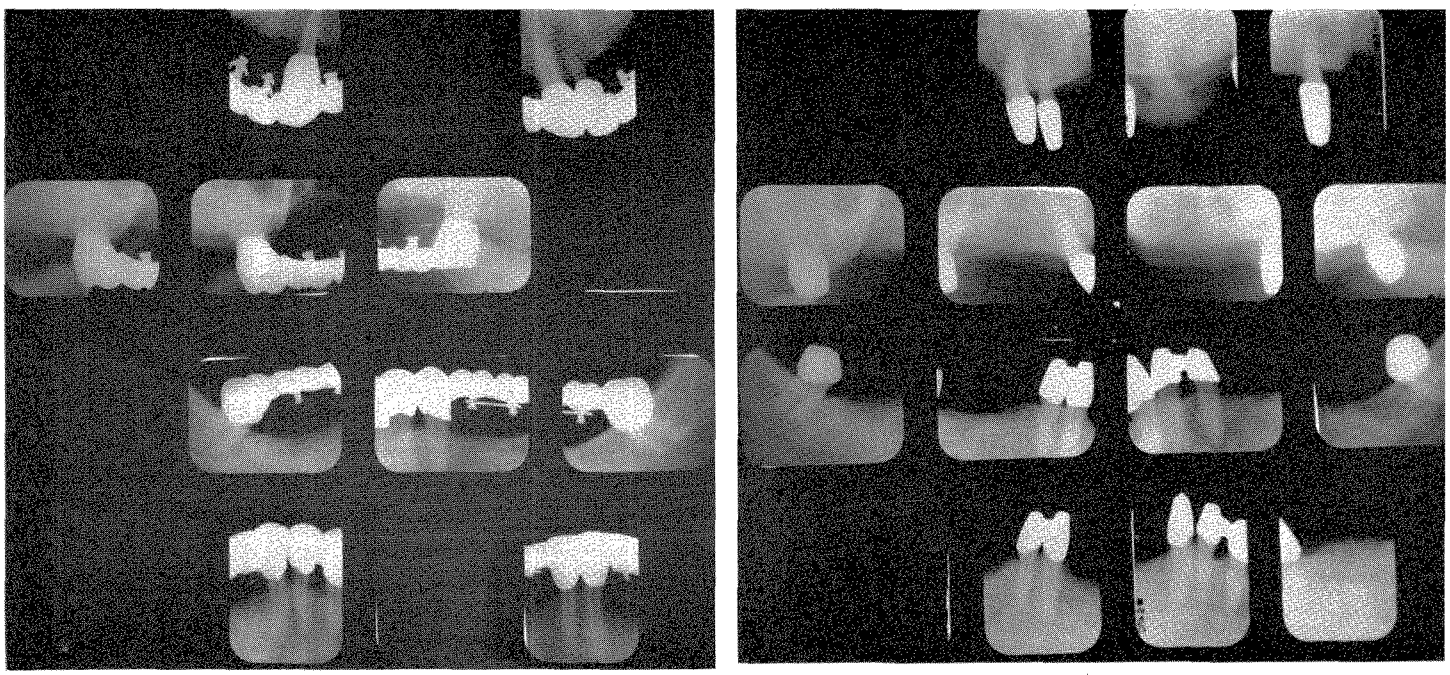


Fig. 273. The completed work in the mouth. The screws are shown slightly extended. They will be screwed in flush with the tooth surface. This work was inserted in February, 1956.



A B

Fig. 274. **A,** Roentgenograms taken in February, 1957. **B,** Roentgenograms taken in December, 1961.

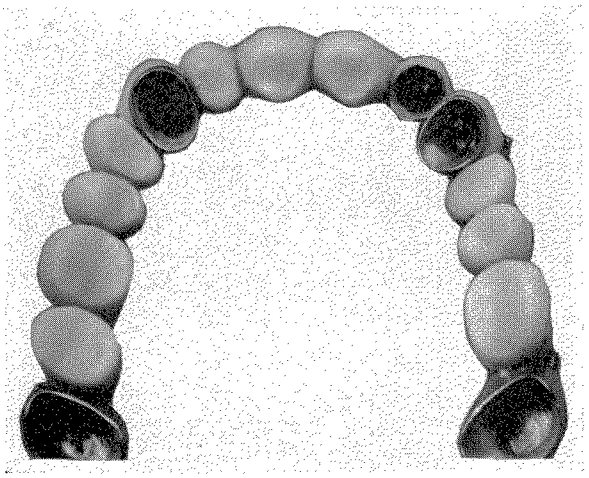


Fig. 275. Undersurface of upper fixed removable partial denture. This photograph was taken in July, 1961.

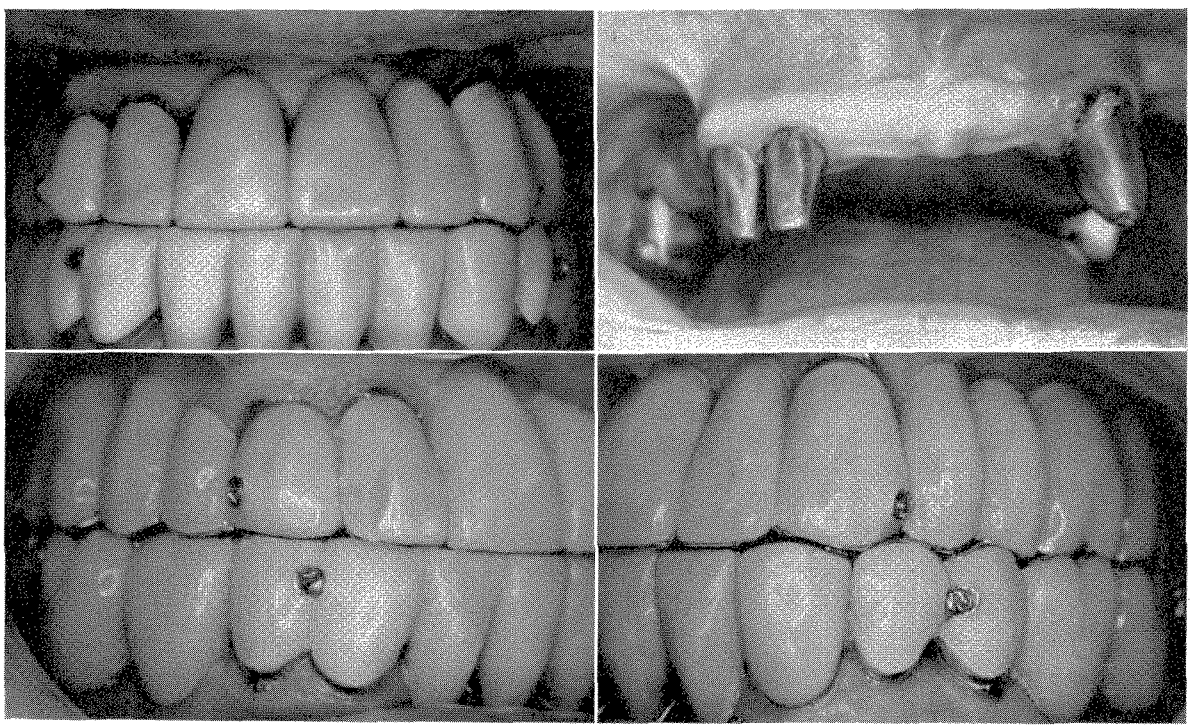


Fig. 276. 1962 photographs, front, right, and left views. The work was completed seven years previously. The upper right molar was devitalized, and its root canal was filled.

DISPARITY IN ARCH SIZE

Case 13

Condition upon presentation

Where there is a disparity in arch size in combination with a systemic factor that has already caused periodontal disease, we may be reasonably certain that we have a problem case. This patient, a 40-year-old woman, presented herself for treatment in June, 1956. Her maxillary arch was much larger and wider than her mandibular arch. This difference in arch size plus the distal position of the mandible resulted in occlusal disharmony. In her centric relation or hinge position, contact was made only between the buccal cusps of the lower posterior teeth and the lingual cusps of the upper posterior teeth. In order to obtain better functional contact and anterior contact she had to protrude her mandible and assume an excentric or convenience bite.

Temporomandibular joint roentgenograms were taken. They revealed no appreciable difference between her anterior and posterior contact positions. She continually ground her teeth. This bruxing took place day and night. As a result, all of her occlusal surfaces were flat with no anatomical detail. A right and left protrusive convenience bite had been established. This was her method of functioning.

The roentgenograms of her teeth indicated severe periodontal involvement. At the beginning of treatment the left central incisor and five molars had already been removed. In addition, there were pockets associated with many of her remaining posterior teeth and her upper anterior teeth. There were open contacts and bifurcation and trifurcation involvements. A two-tooth splint joined the lower left molars. An anterior fixed bridge replaced the upper left central incisor. Orthodontic consultation resulted in the prognosis that she would soon lose all her teeth with the exception of the lower anterior ones.

Discussion

Cases of this nature present serious problems. Not alone are the maxillary and mandibular teeth in malocclusion, but there is also an apparent "lack" of equilibrium between the teeth, the muscles, and the temporomandibular joint. The teeth of many patients are in malocclusion, but often an equilibrium is established. In these mouths the structures are healthy in spite of the malocclusion. However, this was not so in the case just discussed. Here there was a constant clash between the teeth, muscles, and the temporomandibular joints. From an examination of the roentgenograms the teeth were losing the battle. In addition there was also the possibility of a systemic factor which was weakening the oral structures.

With all this in mind, statements regarding the future should be made with reservation. The patient must be made to understand the gravity of her dental condition. She is the one who is about to invest time, energy, and finance in an effort to combat this problem. Specialized periodontal treatment is necessary. Her physician must also be consulted in order to rule out any physical deficiency which could either directly or indirectly contribute to the oral disintegration.

The emotional background should be explored by direct questioning. This case did not appear to have any significant psychosomatic implications.

Treatment

In spite of the questionable prognosis and after due consideration of all the factors, the patient was still willing to undergo the strenuous treatment involved in complete oral rehabilitation. This work was undertaken in three stages.

In the *first stage*, the teeth that are marked for extraction are removed, periodontal treatment is undertaken, and the natural teeth are partially prepared. Quick-cure plastic crowns are used to cover the teeth as the preparations are completed at each session. These quick-cure transitional crowns are facsimiles of the original. There is no change in the occlusion except for a general cleansing of the mouth.

The quick-cure first stage acrylic crowns are often splinted where additional support is needed. These crowns are inserted with one of the conventional temporary cements. Opotow* is used for the average temporary prosthesis. It does not seem to affect the plastic, and the prosthesis may be removed without much effort. For short crowns where retention is questionable, a stronger temporary cement such as Temrex† is used. This stronger temporary cement should be used with caution on long or medium-length metal crowns because of the difficulty of removal. In some instances small amounts of petroleum jelly should be well incorporated in the temporary cement to facilitate removal.

The first stage was completed uneventfully.

In the *second stage* the tooth preparations are further completed while the prescription is being crystallized in the operator's mind. He now is more familiar with the desires of the patient and with the condition of the remaining teeth. Where periodontal resections have been resorted to and the tissues have healed, the teeth must be reprepared. It is now necessary to construct a new set of crowns and bridges. This will be designated as the second transitional work. It has several purposes. For one, the natural teeth are more adequately protected. The future prescription can also be incorporated. This gives the dentist and the patient some idea of what the final work will be like. If the vertical dimension has been raised, the patient tolerance to this increase may be ascertained. The esthetics can be checked and the interocclusal relationship better evaluated. The type of fixed or removable partial prosthesis which will be employed in the final work can be reviewed.

The second transitional work is made either of all slow-cured plastic or of a combination of gold and plastic. This may be in the nature of splints or various combinations of all fixed or fixed and removable prostheses. It is in this state that the vertical dimension is sometimes altered.

The second transitional work was constructed on a Hanau Model H articulator. The upper and lower teeth were occluded with the mandible in its posterior position. In cases such as this, when the mandible is retruded, the vertical dimension is automatically increased anteriorly. This proved to be a great aid because

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*Opotow Dental Mfg. Corp., Brooklyn, N. Y.

†Temrex Anodine Cement, Interstate Dental Mfg. Co., Inc., New York, N. Y.

the original anterior teeth protruded and were labially inclined. The anterior teeth in the final work would be longer and more vertically positioned.

Before the second transitional work was inserted, an upper anterior plastic shell was made. This was constructed so that when the posterior work was inserted, the anterior right central incisor could then be extracted and the temporary acrylic bridge inserted. This would then make contact with the lower anterior teeth. It is especially important in cases of this nature to establish as many simultaneous contacts as possible between the upper and lower teeth in order to divide the occlusal stress over the greatest possible area.

Before the extraction of the right central incisor, the right and left lateral incisors and cuspids had been prepared for veneer crowns. The central incisor was then removed and the anterior acrylic bridge completed and inserted. The posterior fixed partial dentures had been inserted previously. A frenectomy was performed at this time because of a low attachment. The second transitional work provided for the correct positional relationship of the mandible to the maxillae and a better intercuspal relationship. The latter was difficult to coordinate because of the great disparity in arch sizes. The lower posterior tooth surfaces had to be widened buccally, and the upper ones had to be widened lingually. To accomplish this the teeth were so positioned that the occlusal stresses would have to be received and transmitted slightly diagonal to their long axes. This presented future hazards. Occlusal forces are best withstood when they are vertical and in line with the long axis of the teeth.

The second transitional work was completed in October, 1956. Prior to its insertion two of the remaining teeth which were hopelessly involved periodontally were removed. The gum treatment and resections continued during November and December, 1956.

In January, 1957, the *third* or *final stage* of treatment was started. In the third stage the operator now has the advantage of hindsight. Months of treatment have passed during which time a rapport develops with the patient. A better understanding of the patient's desires is attained, and the reactions of the specific oral structures are analyzed. If modifications of the second stage are necessitated, they are done so with biological observation as a basis. This is a comfortable crutch for theory.

Where the gum resections had further exposed tooth surfaces, the teeth had to be reprepared. In the second transitional work the vertical dimension was increased. The patient had no difficulty in accommodating to this new position. It was maintained in the final work.

In constructing the final work, a transverse hinge axis was taken. Gold transfers were used to position the copper-plated dies. A modified Hanau Model H articulator was employed. This permitted the use of an axis orbital plane. The upper splinting consisted of three separate fixed bridges joined by precision attachments and involving thirteen units. In this manner good rigidity was obtained.

The right and left final lower posterior splints contained three and four units, respectively. The upper anterior splint had a lingual platform in order to provide for a means of establishing definite contact with the lower incisors. The final work was inserted in April, 1957, exactly ten months after the work was first undertaken.

Postinsertion treatment

At the beginning of treatment all the lower molars had bifurcation involvements, and the upper right second molar had a trifurcation involvement. In March, 1958, the lower right second molar was removed because of a periodontal infection.

In September, 1958, the distal root of the lower left first molar was removed after the mesial root had had its root canal filled. This removal was also due to periodontal infection.

In September, 1958, the upper left gingivae were again resected.

In July, 1959, the upper right second molar was removed because of a periodontal abscess involving the trifurcation.

Further discussion

The three molars that were involved after the completion of the case had already been involved previous to the commencement of the work. They were retained principally to find out what effect occlusal reintegration would have upon their health. Although the two right molars were removed, only one functional chewing unit was sacrificed since both of these molars opposed each other. The retention of the mesial root of the lower left first molar made it possible for that tooth to function still as part of the lower left splint.

Up to the time of writing this patient had had five years of function after completion. She was entirely satisfied with the result. In retrospect one may ask: (1) Would this case have been served better by the insertion of removable partial dentures in addition to the fixed partial denture? (2) Would it have been better to have restored all the teeth except the third molars?

To the first question there are no certain answers. It is the consensus that a fixed rigid prosthesis possesses passivity and is less traumatic to the remaining weak structures than removable prosthesis. The latter must be removed and inserted frequently. In this case there was only one throw-off, namely, half of the lower left molar. Where throw-offs in the form of cantilevers are resorted to, there is extra stress brought to bear upon the supporting teeth. However, when splints are used and the throw-offs are planned judiciously, the effects still are not as traumatic as removable partial dentures.

The second question is actually related to the first. It concerns the replacement of all the teeth except the third molars. Where extreme weakness of the abutment teeth is known to be present, all the natural teeth should not be replaced. It may be true that when the second molars are not replaced, the powerful temporal, masseter, and internal pterygoid muscles may cause excessive pressures in the areas formerly protected by the contact of the upper and lower second molars. However, unless positive temporomandibular joint symptoms have been present, there can be no reason for restoring the original function. If temporomandibular symptoms of dysfunction become apparent later, then such support may be given, but more often than otherwise such symptoms never develop.

Relative to the restoration of normal function in our restorative cases, it is considered poor judgment to restore total pre-extraction function to an organ

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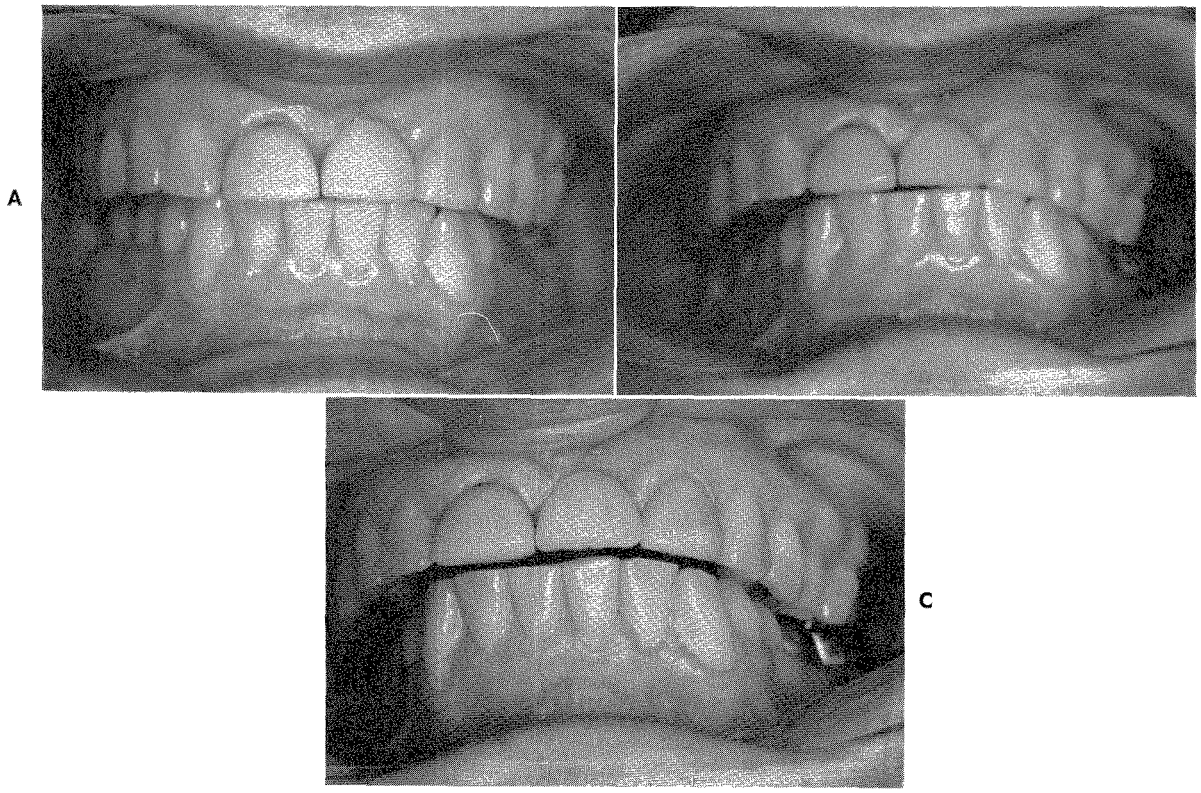


Fig. 277. Three views of the mouth at the start of treatment. All three represent functional convenience bites. **A,** Protrusive. **B,** Protrusive left lateral position. **C,** An attempt to attain centric relation, but this is impossible at this stage due to the great disparity of arch size between the mandibular and maxillary teeth. The patient was 40 years old in 1956 when these photographs were taken. (Figs. 277 to 319 are of the same case.)

Fig. 278. Roentgenograms taken in May, 1956, at the start of treatment.

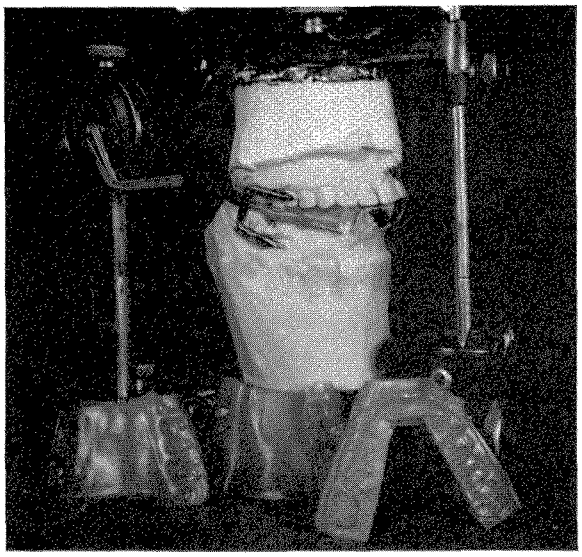


Fig. 279. The study casts are being mounted on the modified Hanau Model H articulator by means of a centric relation wax record. The right, left, and protrusive wax records seen in the foreground will then be used to adjust the instrument.

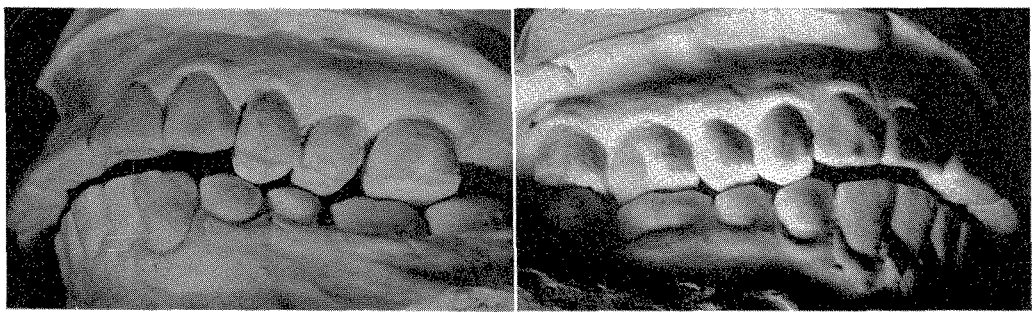


Fig. 280. In its hinge relationship, the posterior mandibular teeth only make slight contact with the lingual cusps of the maxillary teeth.

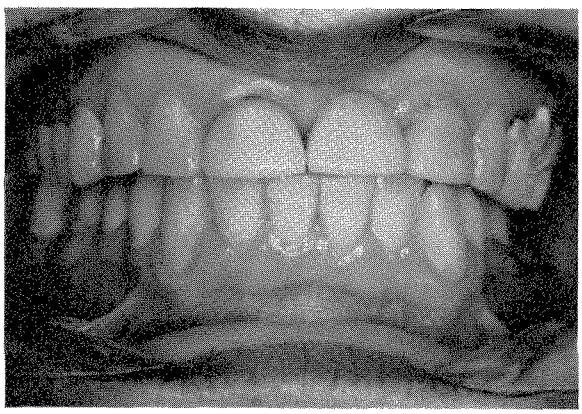


Fig. 281. The first posterior transitional work is in place. These are quick-cure acrylic crowns which were made directly in the mouth as the teeth were prepared. The gums were resected during this stage. The periodontal packing can be seen in the upper left bicuspid and molar area.

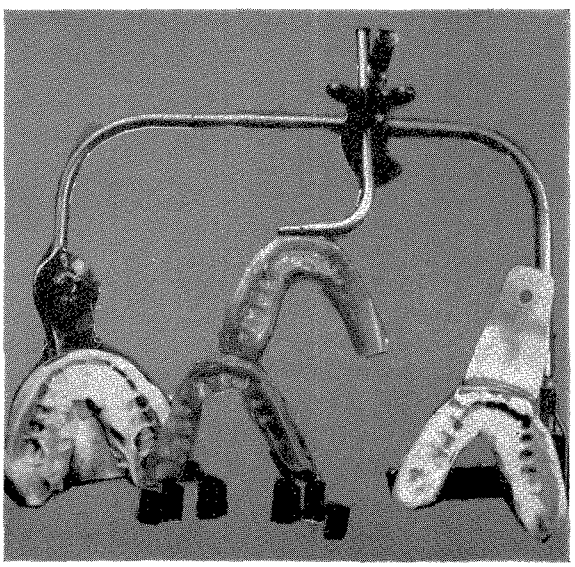


Fig. 282. Copper bands of upper and lower prepared posterior teeth, upper and lower plaster impressions, face-bow and centric wax bite. The second transitional work is about to be made starting on the left side.

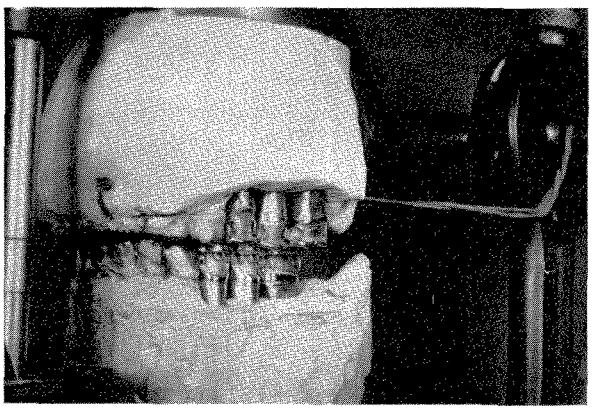


Fig. 283. The upper and lower gold crowns were cast and are shown on their dies in position. The upper crowns had been extended lingually and the lower ones buccally in order to compensate for the disparity in arch size. These crowns are tried in the mouth.

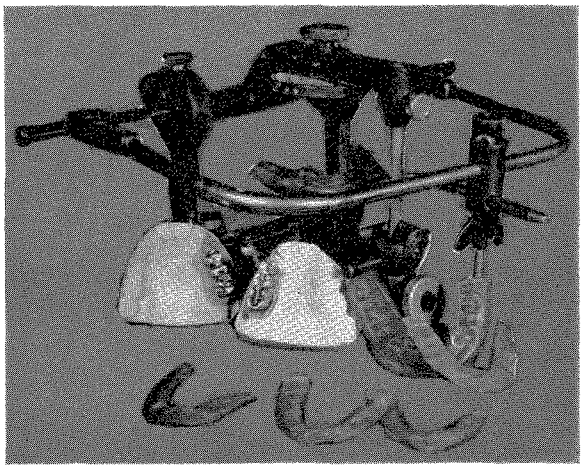


Fig. 284. New work models were made from plaster impressions. Wax records were taken to check the articulator settings. The crowns were then soldered together to form two three-unit splints. The bite was further coordinated. On the right side the first transitional work was still in position. Where it interfered with the occlusion it was relieved on the articulator and in the mouth.

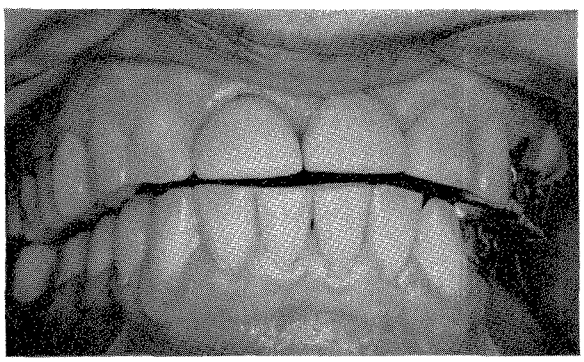


Fig. 285. The left upper and lower second transitional splints were tried in the mouth. The right-side acrylic crowns were corrected where necessary.

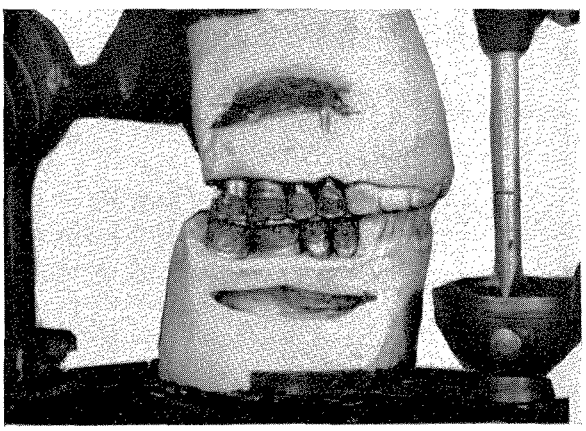


Fig. 286. Now the upper and lower second transitional crowns for the right side were constructed using the left completed splints as the control. Here, the eight right crowns are shown on the articulator. These are then tried in the mouth with the second transitional left splints in place.

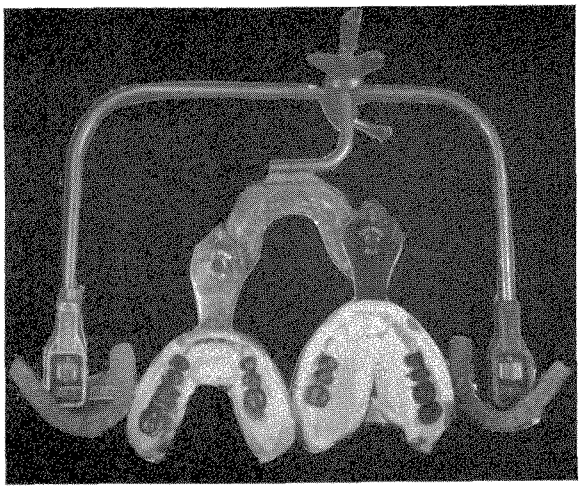
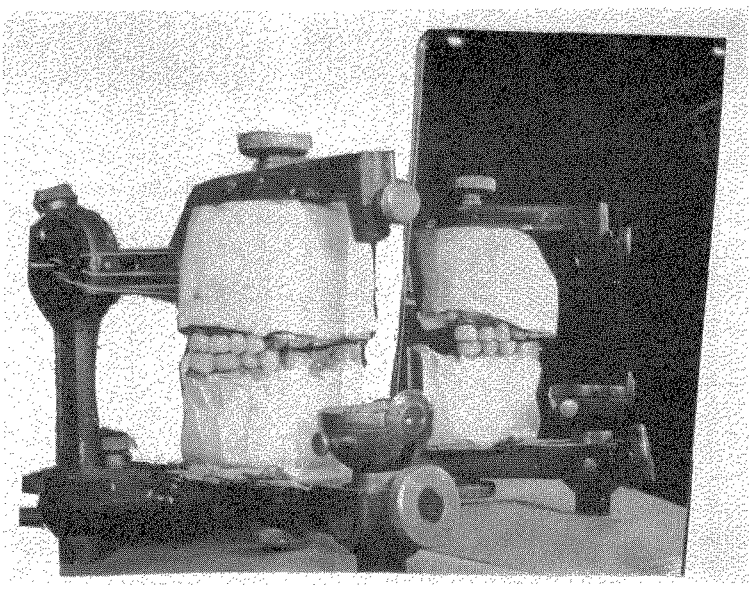


Fig. 287. New records are again taken with wax and a face-bow. New work casts are made from plaster impressions. On those the right-side splints will be constructed, and finally the acrylic will be processed.

A



B

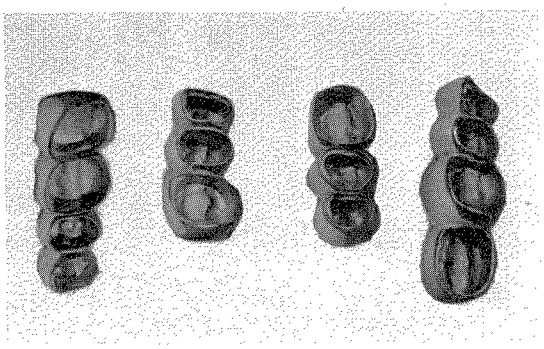


Fig. 288. **A**, The second transitional posterior splints on the articulator. Actually, these castings set a pattern for the future final work. **B**, The four splints just prior to their insertion in the mouth.

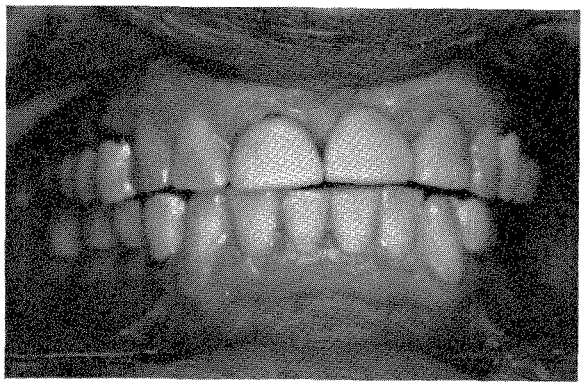


Fig. 289. The posterior second transitional splints were inserted in the mouth, after which the upper anterior transitional work was started.

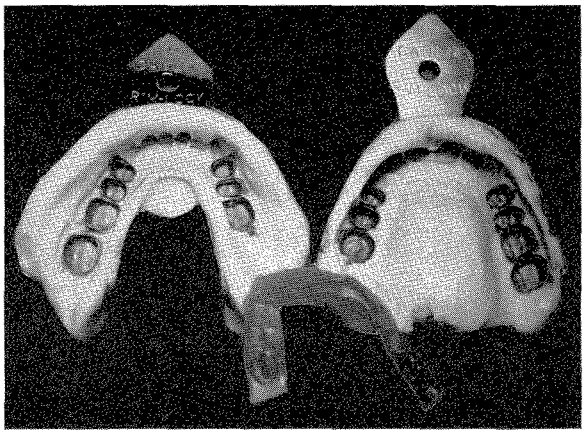


Fig. 290. Upper and lower alginate impressions and a centric relation wax bite have been taken. The second transitional splints have been removed and inserted in these impressions.

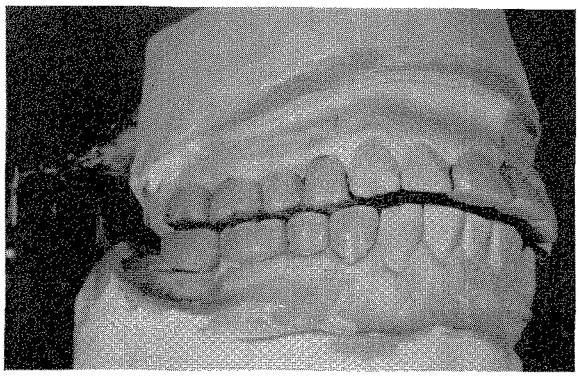


Fig. 291. The casts were related on a simple articulator.

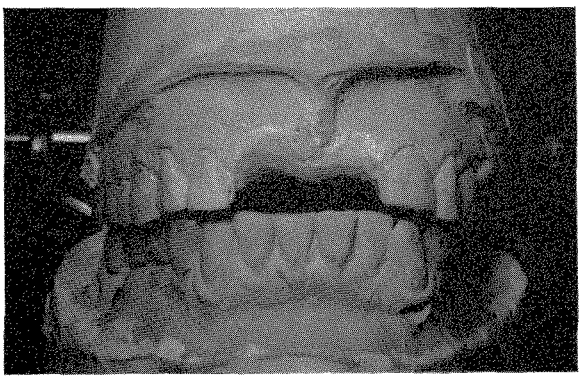


Fig. 292. The anterior stone central incisors were removed. The left central incisor was a dummy. The right central incisor was marked for extraction.

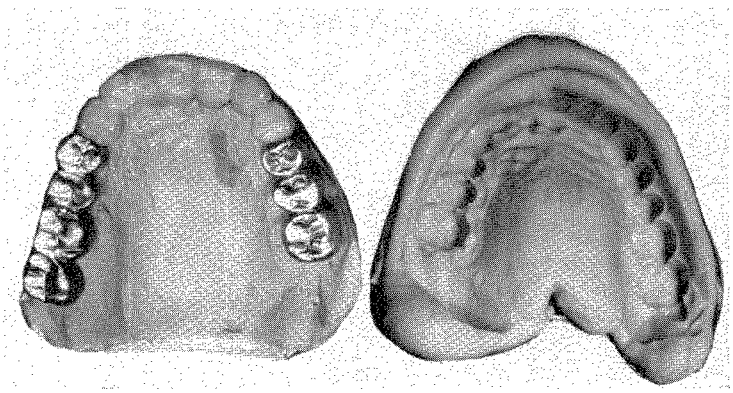


Fig. 293. The lateral incisors and cuspids were prepared on the cast for veneer crowns. Then the wax-up was made. Three teeth were finally used to replace the two central incisors in order to reduce their size. After the wax-up was completed, an alginate impression was made of the upper cast, and a shell of quick-cure acrylic was made by painting in the soft acrylic directly into the alginate cast.

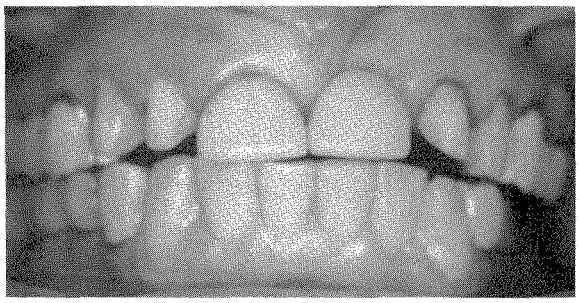


Fig. 294. The right and left upper lateral incisors and the cuspids were prepared for veneer crowns as shown here.

Fig. 295. The upper right central incisor was extracted. With it came the dummy left central incisor. A frenectomy was performed.

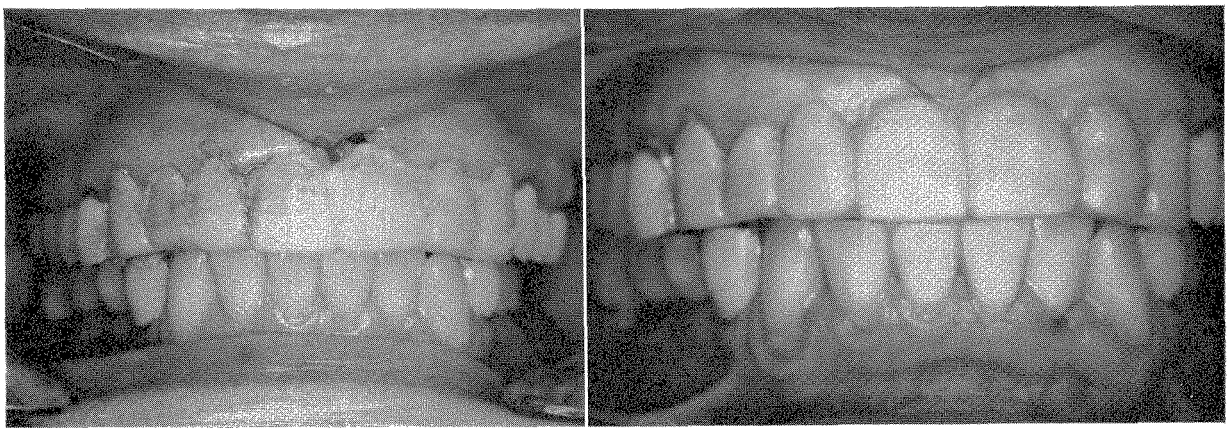


Fig. 296. The acrylic shell was first inserted and trimmed where necessary. Then it was filled with quick-cure acrylic and again inserted as shown on the left. After the acrylic hardened, the bridge was removed and trimmed and polished. It was inserted with temporary cement as shown on the right. This phase of the rehabilitation was completed in January, 1957.

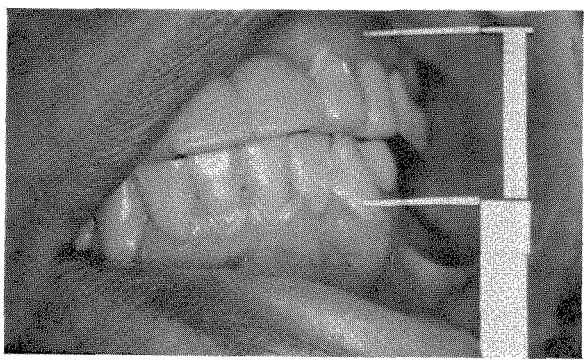


Fig. 297. One month later, in February, 1957, the final phase was started. In the final phase, every effort was made to copy the vertical dimension of the second transitional work.

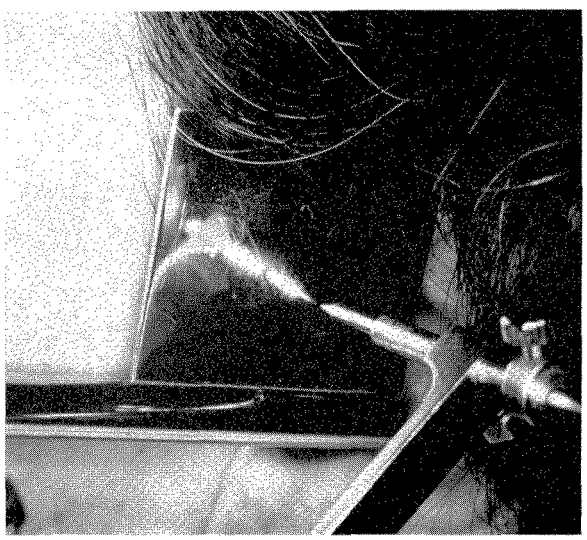


Fig. 298. Hinge axis recordings were made using the McCollum face-bow. The points where the transverse hinge axes emerged from the sides of the face were tattooed.

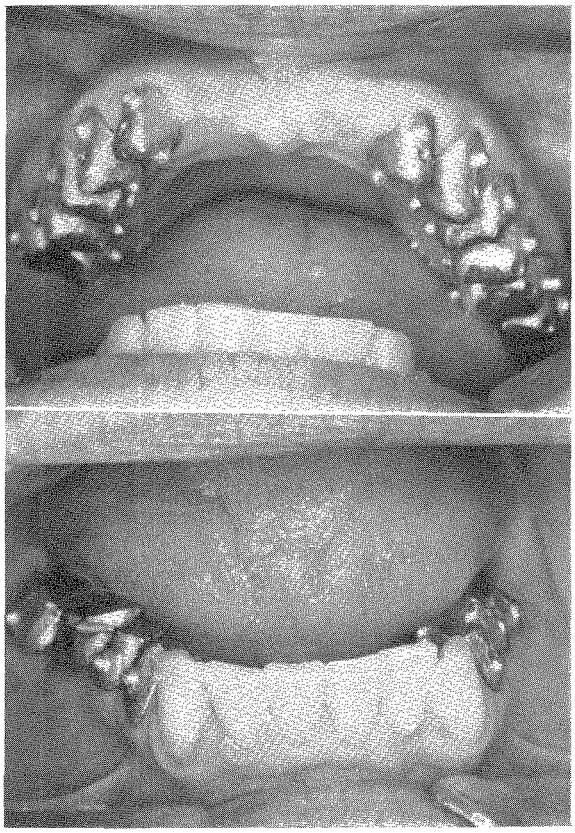


Fig. 299. Upper and lower gold transfers were constructed on copper-plated dies and inserted on their respective teeth in the mouth. Each had a window to observe its fit.

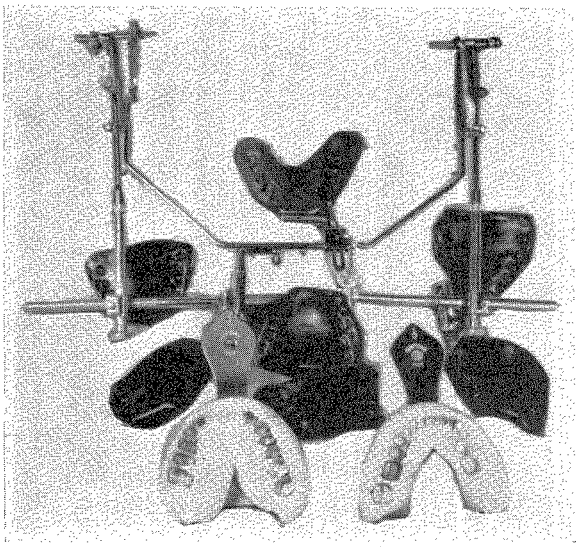


Fig. 300. The McCollum face-bow with the axis orbital record, right and left lateral records, a protrusive record, and three centric records taken at different degrees of opening. Plaster upper and lower impressions in the foreground.

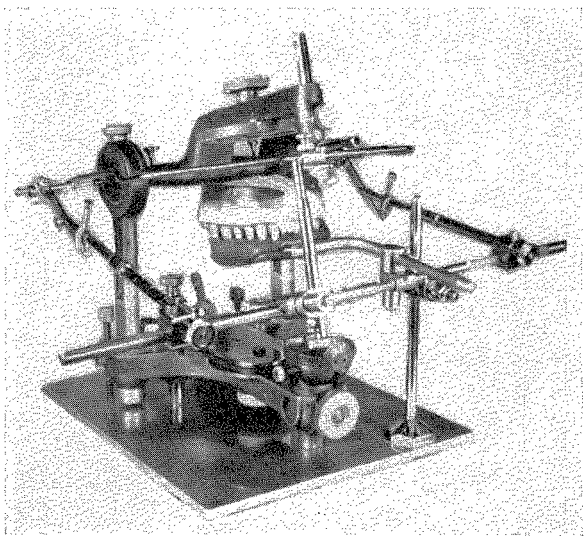


Fig. 301. The upper cast being mounted upon the modified Hanau Model H articulator. The mounting frame is being used.

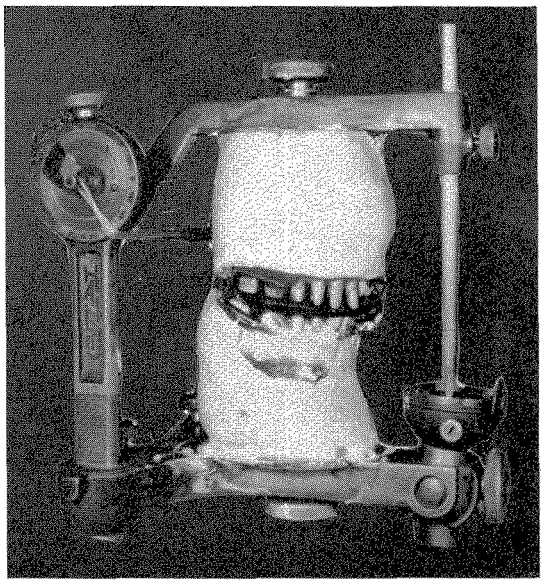


Fig. 302. The lower cast is being related to the upper cast by means of one of the centric relational waxes. This mounting will be checked later by the other centric relation or so-called hinge bites. The cant of the condyle paths and the Bennett movement will then be set by means of the lateral and protrusive bite waxes.

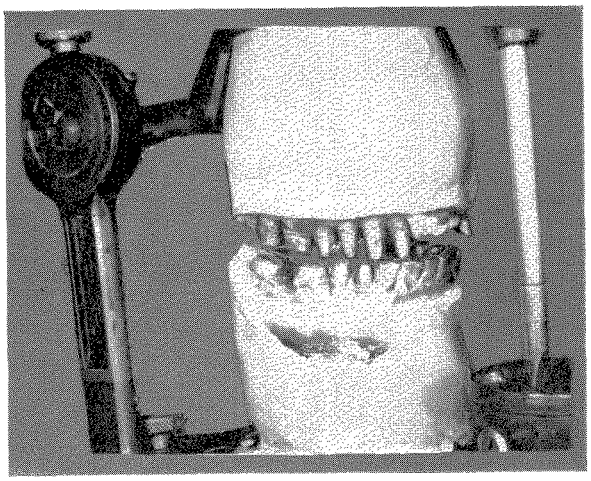


Fig. 303. The occlusion will be fabricated in wax at the vertical dimension shown in this photograph.

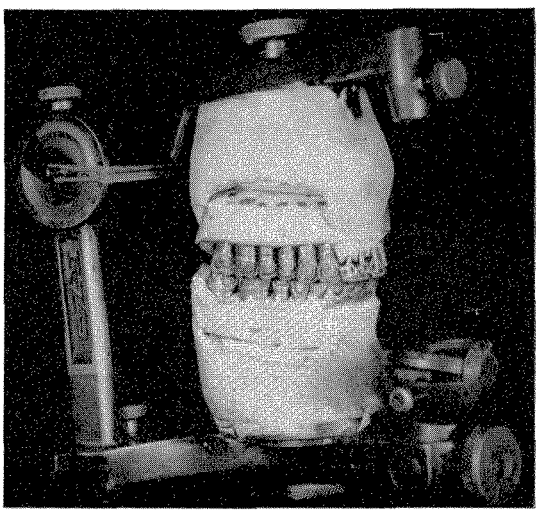


Fig. 304. The castings were constructed and are shown in place on the articulator. They will be inserted in the mouth, and slight corrections will be made. If large corrections are necessary, these will be done upon the articulator.

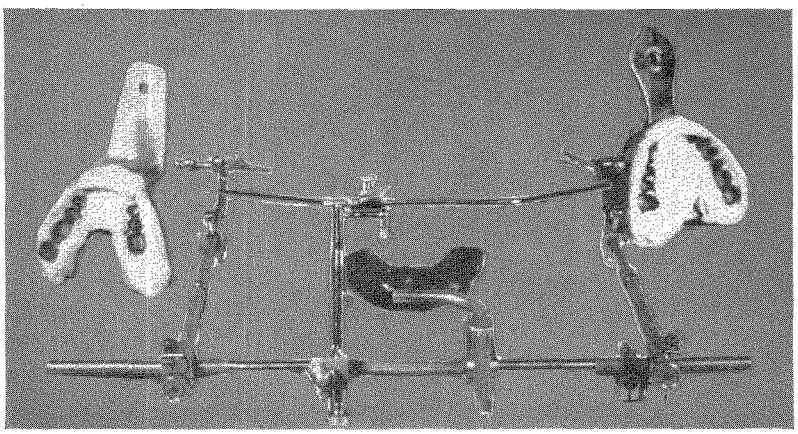


Fig. 305. A new face-bow recording was made, and new plaster impressions were taken. These are to make new work casts upon which to further coordinate the occlusion and complete the work.

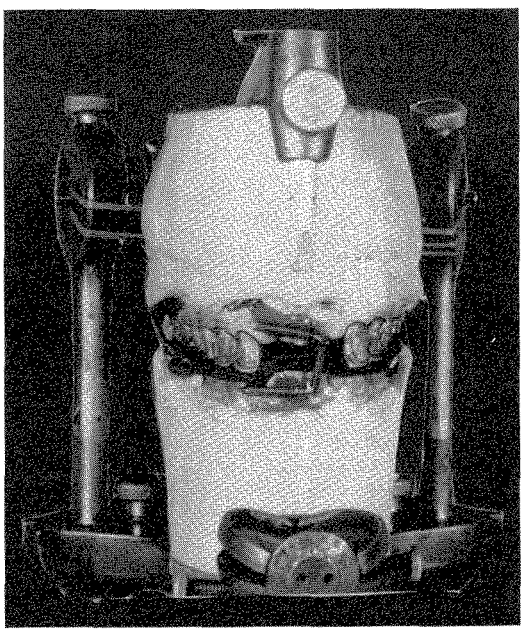


Fig. 306. Another checkbite and remount. The crowns are then splinted together, and the fixed partial dentures are constructed.

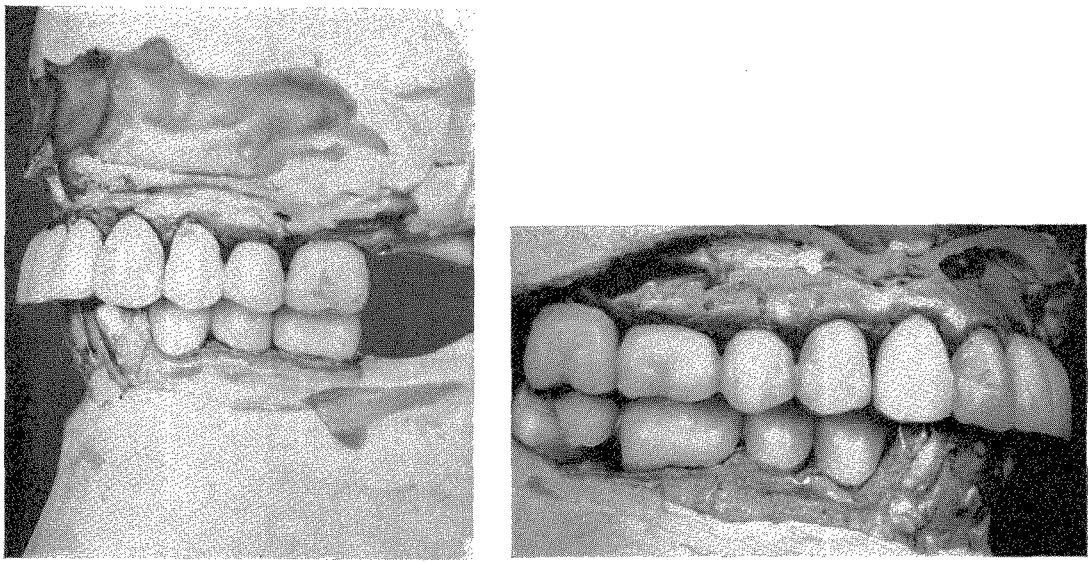


Fig. 307. The splints and bridges were completed. White wax was applied to the buccal and labial surfaces. Once more, they will be tried in the mouth.

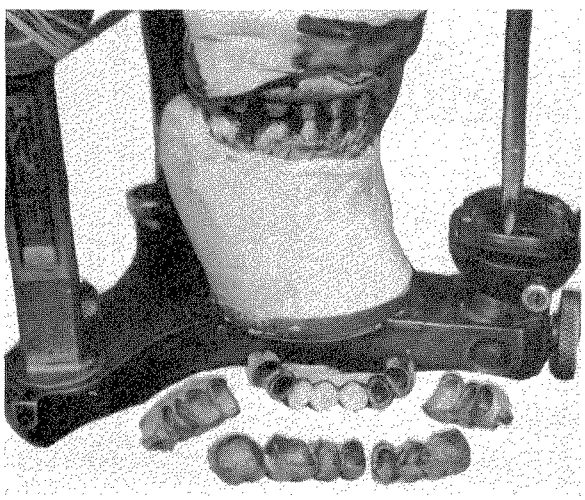


Fig. 308. The upper and lower prosthesis is in the foreground. The upper posterior splints are connected to the anterior splint by means of precision lug rests. (See Figs. 327 and 328 for additional views of the same splint.)

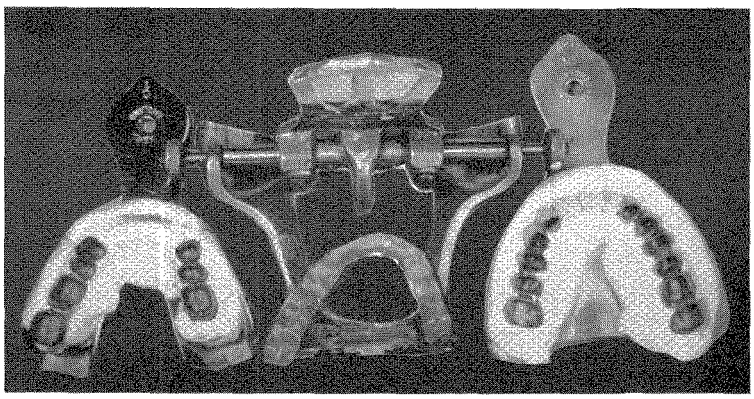


Fig. 309. New plaster impressions were taken, and a very thin centric occlusion wax record was made. A simple articulator was used to make the final slight adjustment in the coordination of the occlusion.

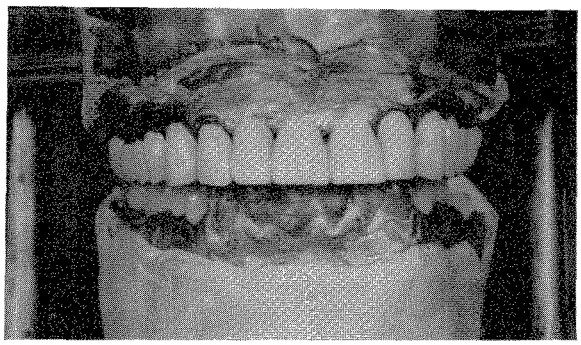


Fig. 310. The completed work on the articulator. This work was inserted in April, 1957.

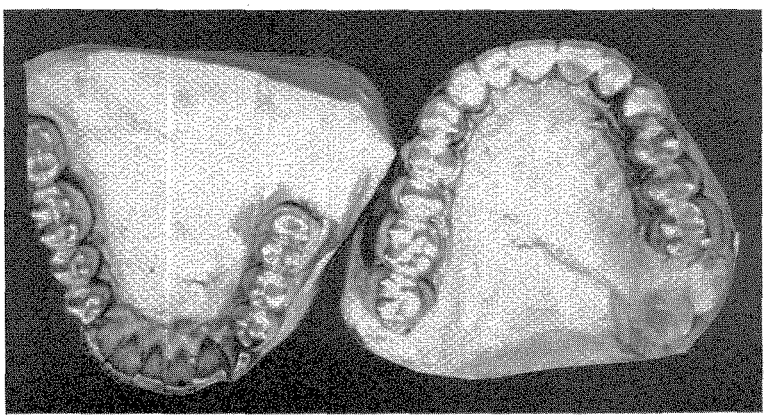


Fig. 311. Occlusal view of the completed work.

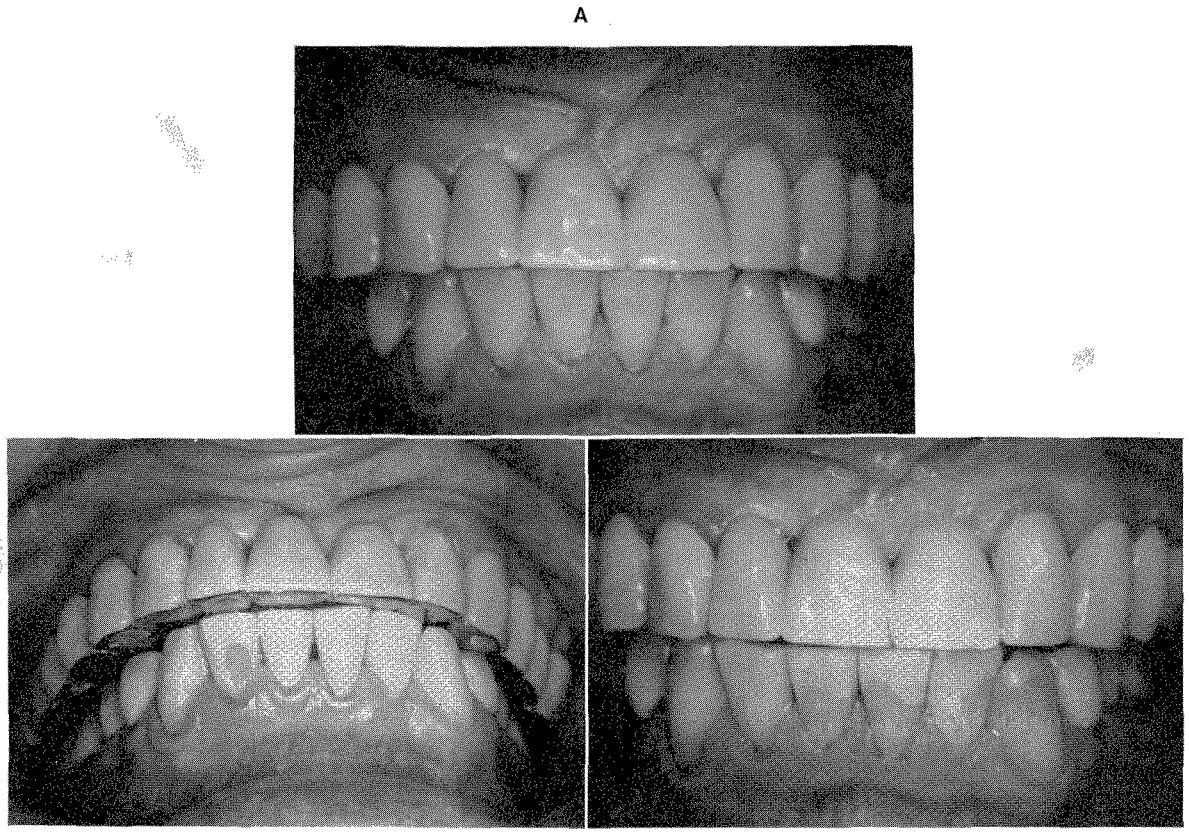


Fig. 312. Completed work. **A,** Centric relation. **B,** In centric relation the lower teeth contact the upper lingual platform. **C,** The protrusive bite.

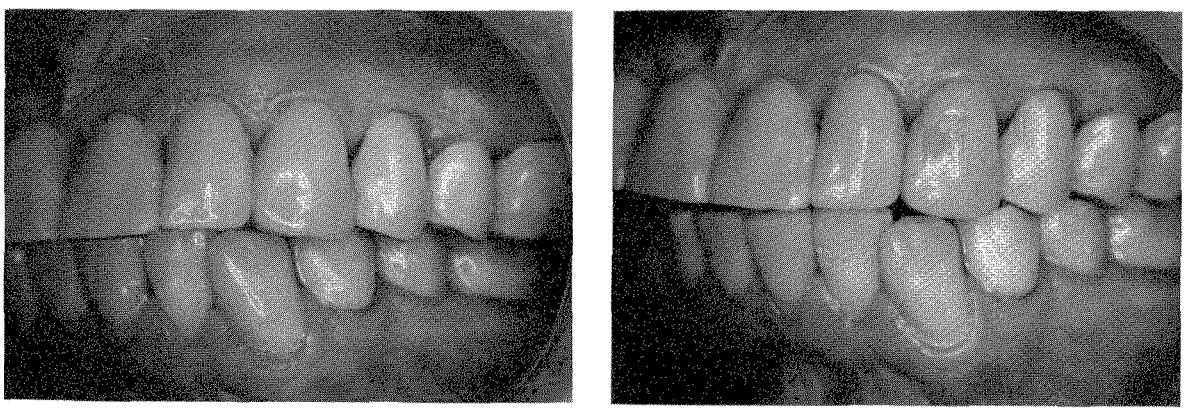


Fig. 313. Completed work. **A,** Left centric bite. This is in a slight lateral position as the patient moved. **B,** Left-side working bite.

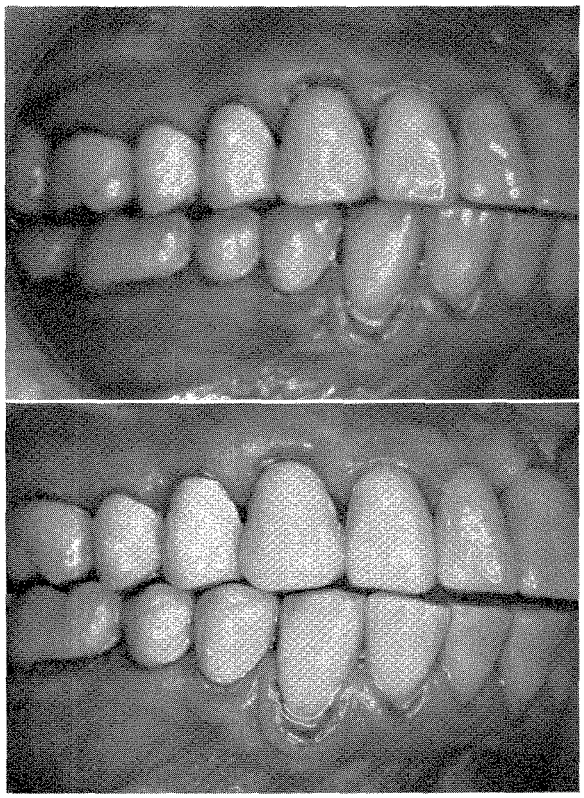


Fig. 314. Completed work. **A,** Right centric bite. **B,** Right working bite.

Fig. 315. Roentgenograms taken in April, 1957, of the completed case.

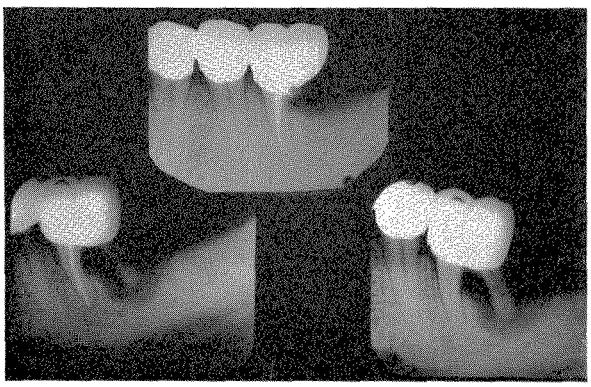


Fig. 316. The lower left molar became involved in periodontal infection in 1958. Its distal root was removed. The root canals were filled, and the mesial root was retained.

Fig. 317. Additional periodontal resections were performed in September, 1958. The pack is shown in position.

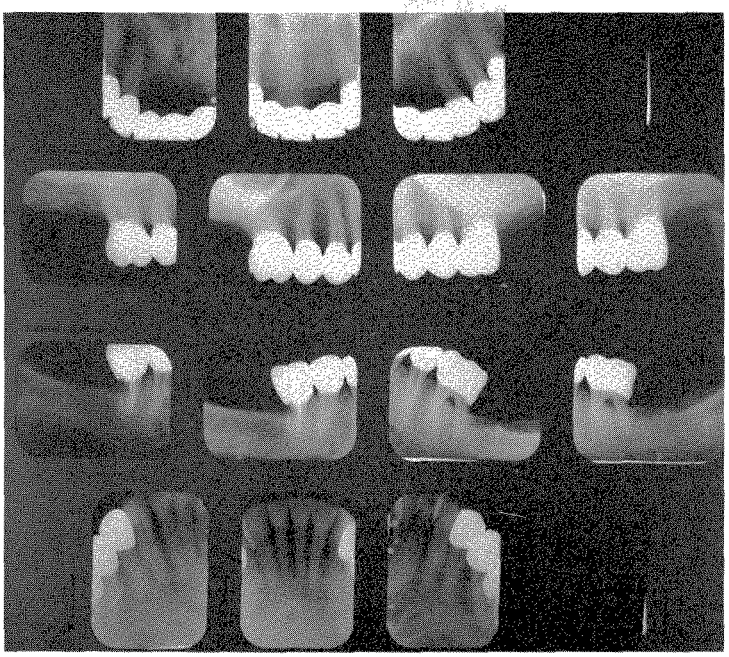


Fig. 318. Roentgenograms taken in March, 1962.

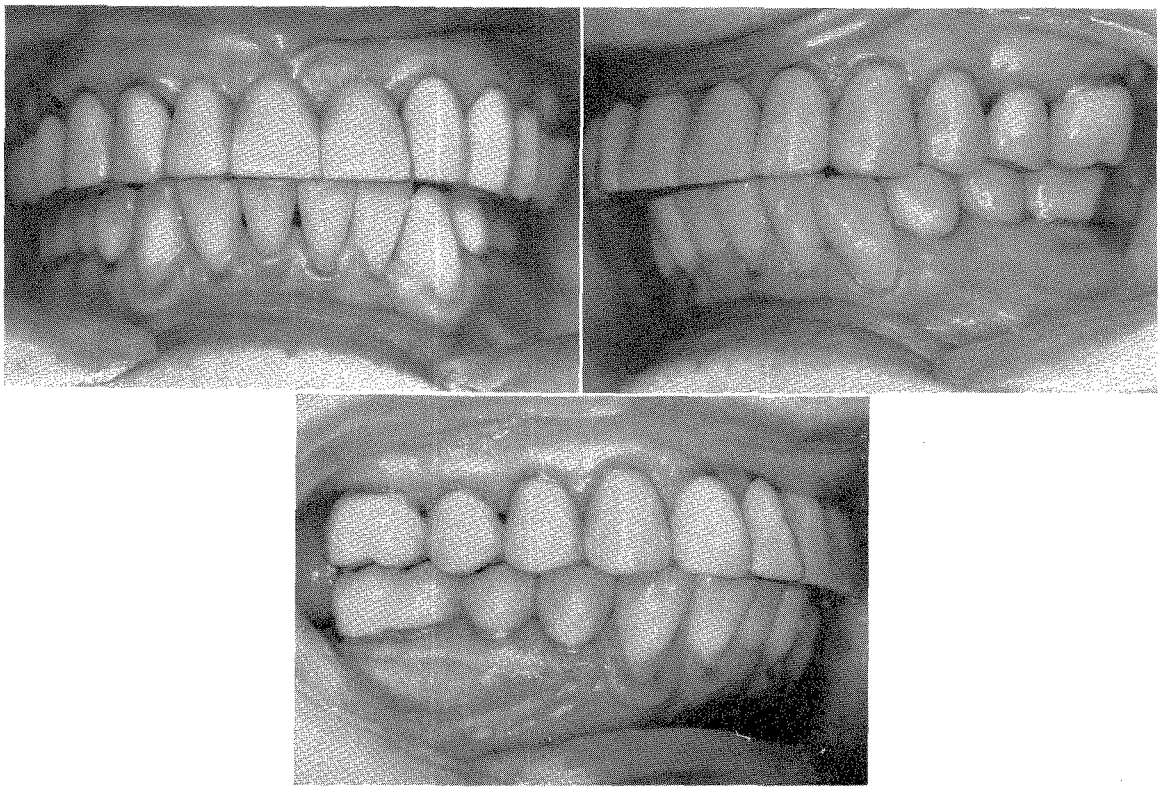


Fig. 319. Photographs, front, right, and left views, taken in 1962.

which has lost so much of its original structure. The consensus is to preserve what remains rather than to restore all the former function. In order to do this, function must be decreased. One of the methods is to eliminate some teeth. This was used in the present case. Teeth may also be splinted for mutual support. The buccolingual diameters of the restored posterior teeth may be decreased.

The last method was not possible in the present case owing to the original occlusal disharmony. Had precision attachments been inserted in the distal surfaces of the upper and lower second bicuspids, even with the future loss of all the molars, it would have been possible to insert a removable partial denture. This has been the procedure with other problem cases and may have afforded additional protection in this case. (Figs. 277 to 319.)

Chapter 4

SPLINTING FROM THE POINT OF VIEW OF THE PROSTHODONTIST

Inasmuch as simple and extensive dental prosthesis has already been referred to in which splinting teeth for greater strength and protection was necessary, it is timely to say more about this important subject. In *Oral rehabilitation** many different types of splints were described. In addition, various kinds of splinting were demonstrated throughout the text, particularly in the case reports. Splinting teeth from the point of view of the prosthodontist will now be presented.

DEFINITION

A splint is "a rigid or flexible appliance for the fixation of displaced or movable parts. Splinting (of abutments) is the 'joining of two or more teeth into a rigid unit by means of fixed restorations.' " †(Fig. 320.)

SPLINTING PRACTICED IN EUROPE

The technique of splinting teeth was practiced in Europe long before it was adopted in the United States, perhaps because the dental profession in this country is so much younger than abroad. (Figs. 321 to 325.)

GENERAL CLASSIFICATION

Splints may be divided into two general classes, fixed and removable. A combination of both classes is sometimes used. Fixed splints may be further subdivided

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 957-984.
†Glossary of prosthodontic terms, St. Louis, 1960, The C. V. Mosby Co.

Text continued on p. 159.

Fig. 320. Three natural molars whose roots were fused. Nature permanently splinted these teeth together.

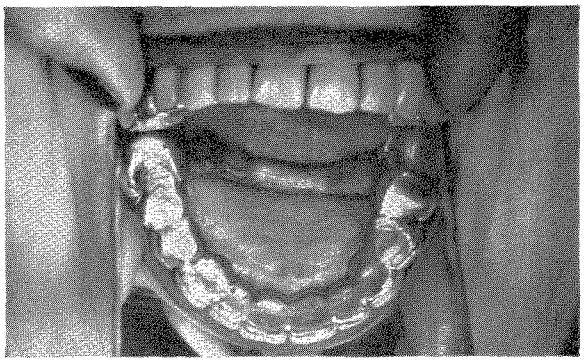


Fig. 321. An example of the splinting technique practiced in France in the 1930's. A nine-unit upper fixed splint covers seven nonvital abutment teeth. A removable partial denture replaces the molar teeth and is united to the fixed partial denture by means of precision attachments. When this patient was first seen, the removable section had not been removed in over ten years.

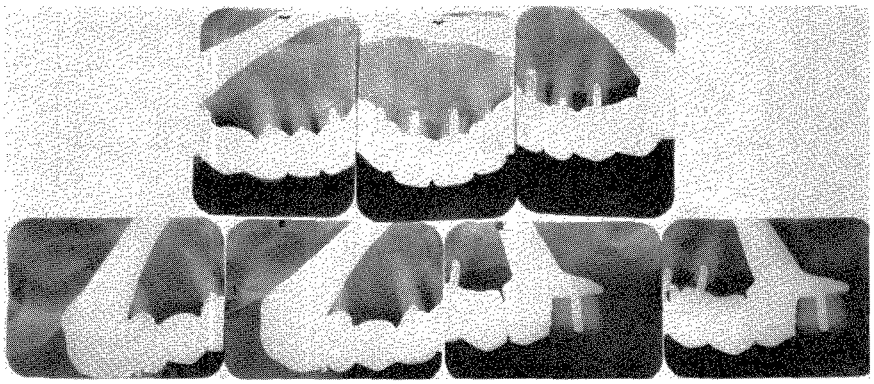


Fig. 322. The roentgenograms which were taken of the teeth of the patient shown in Fig. 321 in May, 1950. She was then 75 years old. She died in 1960 at the age of 85. The bridge was still in place.

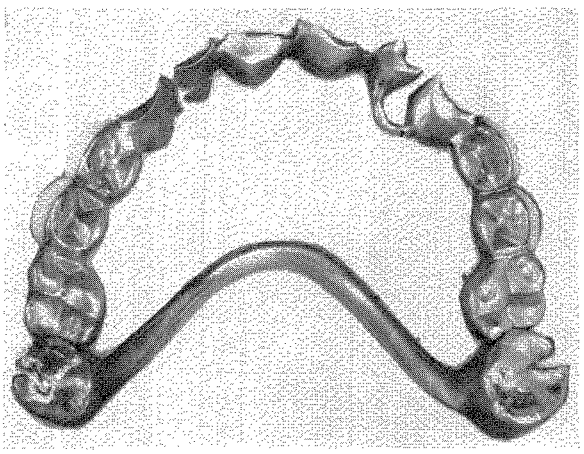


Fig. 323. An example of a dental fixed fourteen-unit splint made in Europe in the 1930's. I removed this splint from the mouth in 1941. There was a break-stress hinge attached to the crowns of the second molars. The anterior castings were retained by vertical pins which had loosened.

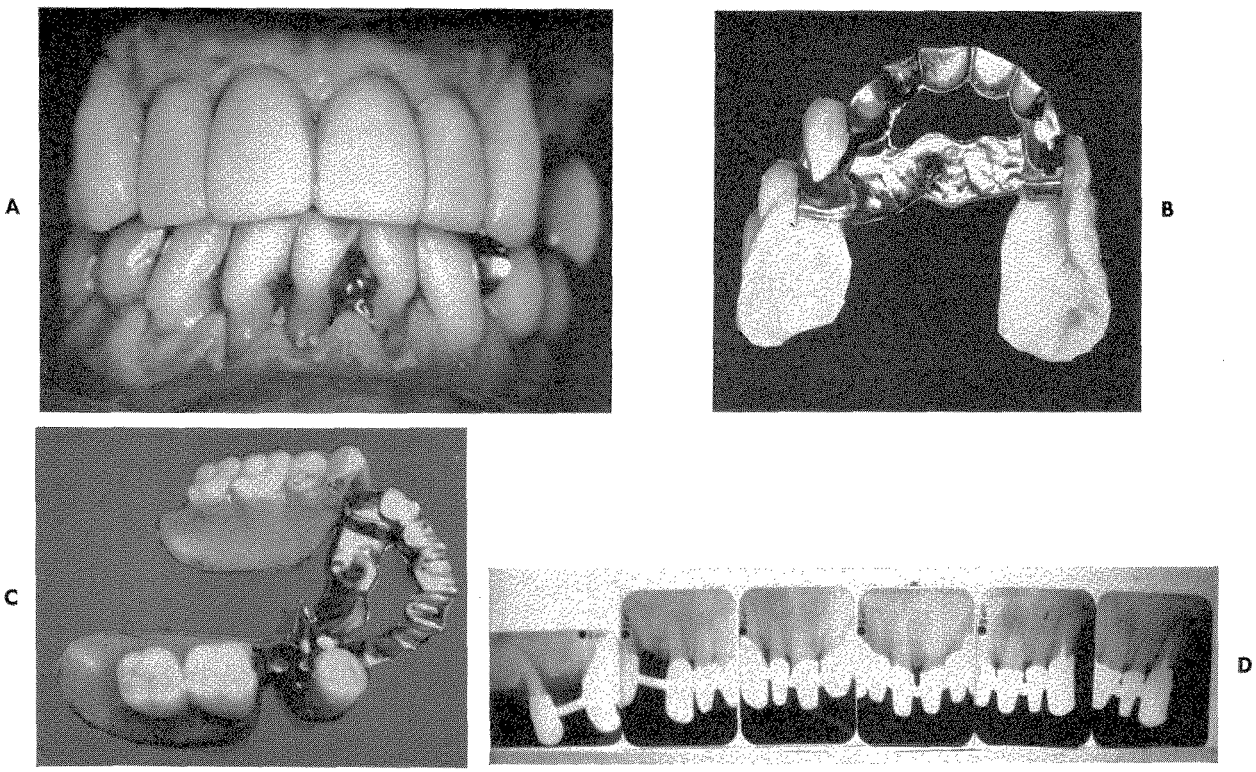


Fig. 324. A, Another example of European splinting. Eight-unit upper fixed splint. Seven abutment teeth were used. Three of these teeth were infected. This splint was in only a short time. It supported the removable partial denture shown in **B** and **C. B,** The removable partial denture had two complicated breakstress joints which permit movement only in a tissuewise direction. The removable partial denture locks into the fixed splint by means of two attachments which were released by two small levers operated by the patient. **C,** The levers are seen here. The extent of the movement of the breakstress in a tissuewise direction is also shown here. The pity is that so much time was spent in the superstructure when the abutment teeth were so deeply involved in infection. **D,** Roentgenograms revealing the three infected teeth and the splinting arrangement.

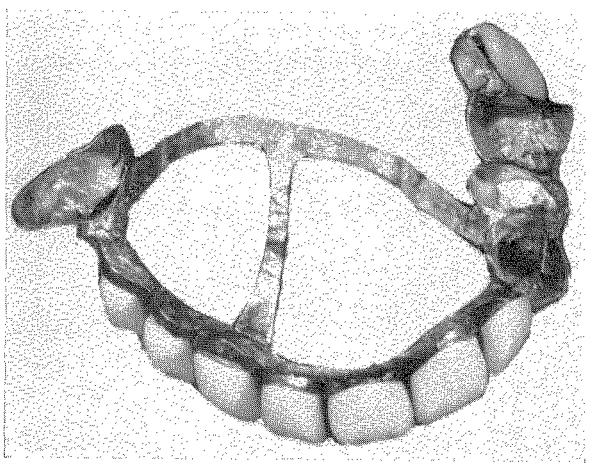


Fig. 325. Still another example of European splinting—at least thirteen units. This was permanently cemented in place and was worn for eight years before it was removed.

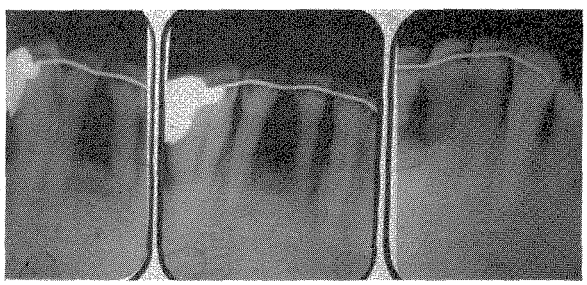


Fig. 326. Stainless steel wire embedded in plastic serves to join the lower six anterior teeth together to create a rigid splint. This splint was in place for two years.

into (1) completely rigid and (2) semirigid. Splinting may be temporary or permanent in nature. Temporary splinting is often resorted to in order to stabilize periodontally involved teeth during the treatment period. At the termination of this period either fixed or removable splints of a more permanent nature are usually employed. (Fig. 326.)

USE OF MULTIPLE ABUTMENTS

In problems involving the replacement of missing teeth, by means of either fixed or removable partial prosthesis, it often becomes necessary to strengthen the health and longevity of the remaining teeth by using multiple abutments splinted together. In this way the work of supporting the restored missing members is more equally divided over a broader base. This is still more effective where several teeth are missing that adjoin each other, such as two bicuspids and a molar, or four incisors in the same arch.

DESIRABILITY OF ANTEROPOSTERIOR RIGID SPLINTING

Inasmuch as the anterior teeth are used primarily for incision, whereas the posterior teeth are generally used for grinding food, it has been rationalized that the anterior and posterior splints should not be joined by a rigid connection, but rather should be separated entirely, or, at best, have a tapered lug and lug rest between them which would permit limited motion. (Figs. 327 and 328.) Clinical experience demonstrated, however, that where weak teeth need support, the anteroposterior rigid splint is desirable. (Figs. 329 to 331.) It is difficult to maintain a good contact between the anterior and posterior splints without the aid of at least a tapered precision lug rest. This is the minimum requirement in replacing large numbers of missing teeth from one arch where the remaining teeth have good osseous support. In cases in which the remaining teeth are periodontally

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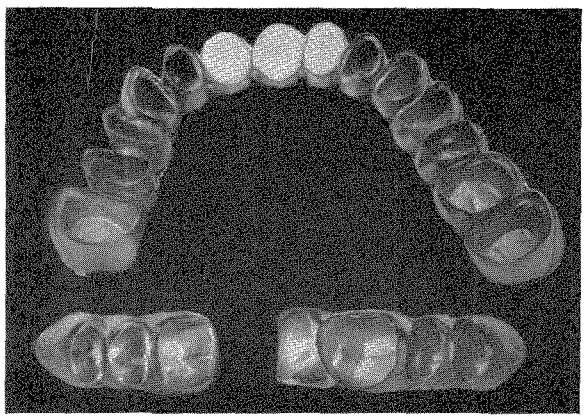


Fig. 327. The fourteen-unit splint shown in the upper part of this photograph was constructed in three sections and joined by lugs. The two separate splints of four and three units, respectively, were constructed for the lower teeth. This is the same case that was shown in Figs. 277 to 318.

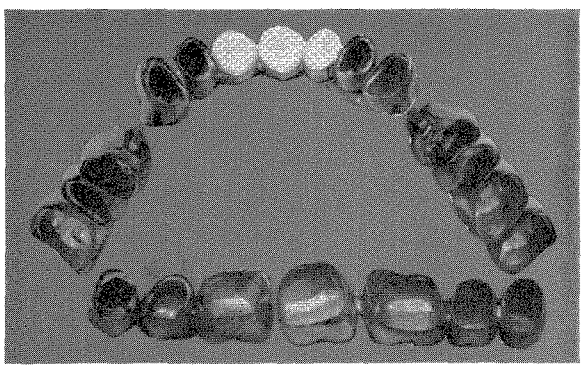


Fig. 328. Same as Fig. 327 except that the upper splint was disconnected, and the three parts, together with the connecting lugs and lug rest, may be seen.

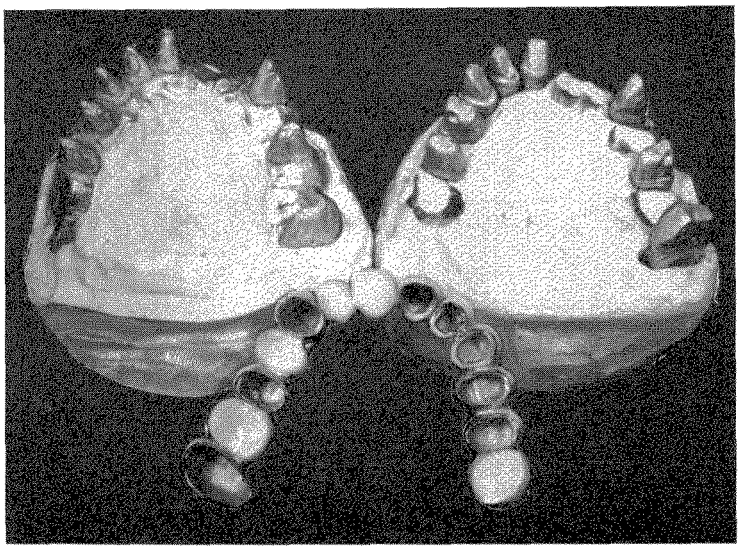


Fig. 329. A thirteen-unit fixed splint utilizing eight abutment teeth and five dummies. A molar throw-off is on the extreme right end.

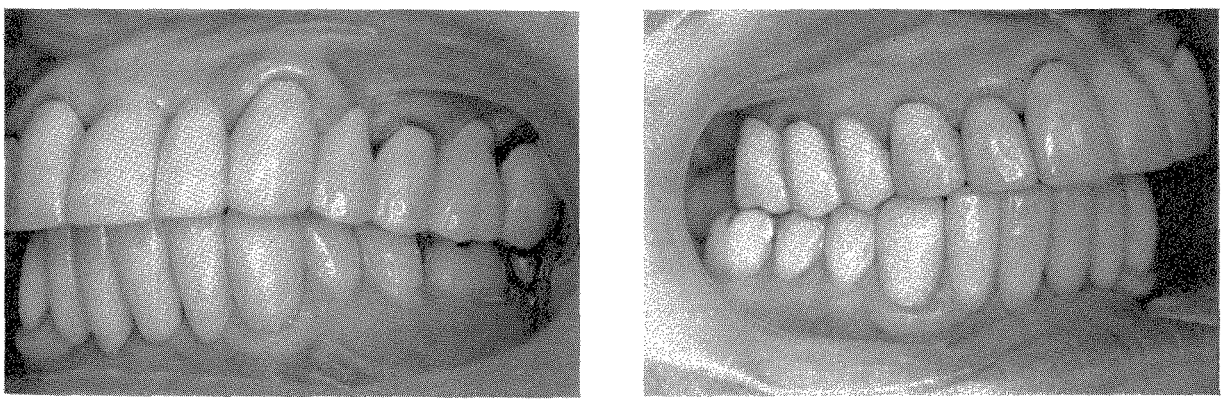


Fig. 330. The splint shown in Fig. 329 in position in the mouth. At the time these photographs were taken, the prosthesis was five years old.

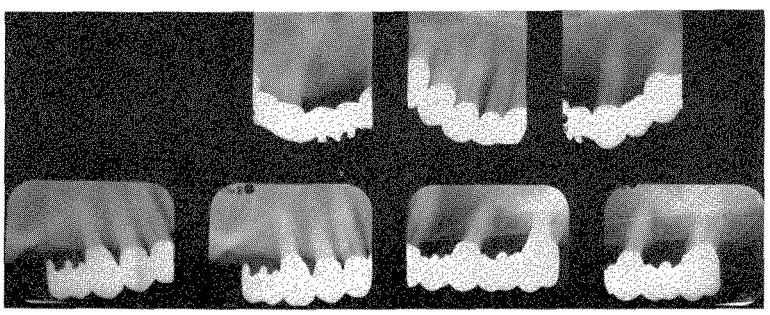


Fig. 331. Roentgenograms of the splint shown in Figs. 329 and 330.

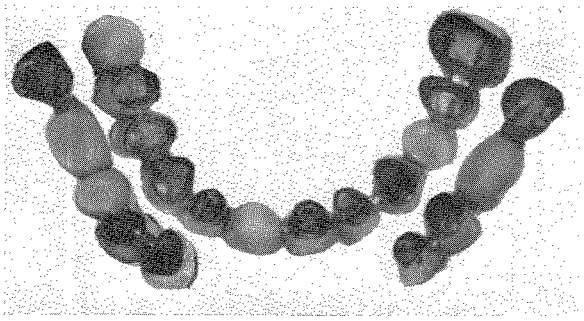


Fig. 332. An example of an upper twelve-unit fixed splint utilizing nine abutment teeth with three dummies. Due to the lack of parallelism, this splint was constructed in four sections joined by precision attachments. The two other five-unit and four-unit splints are for the lower posterior teeth.

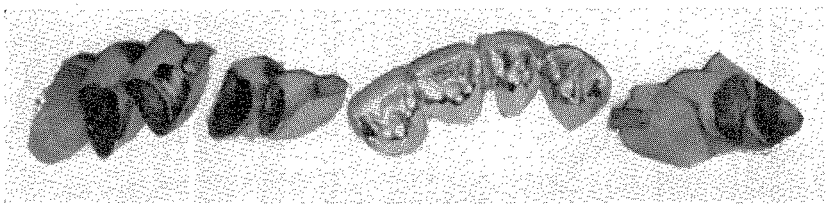


Fig. 333. The upper splint shown in Fig. 332 was separated to show the four sections. Three sets of precision attachments were used to create parallelism.

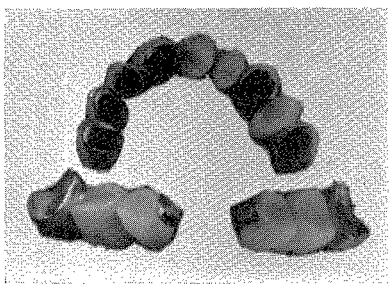


Fig. 334. A fifteen-unit upper fixed splint constructed in three sections. The female precision attachments in the distal portion of the bicuspids are made parallel. The last molars have questionable prognosis. In case of the necessity for their removal, a removable partial denture can be constructed without having to remove the entire anterior section.

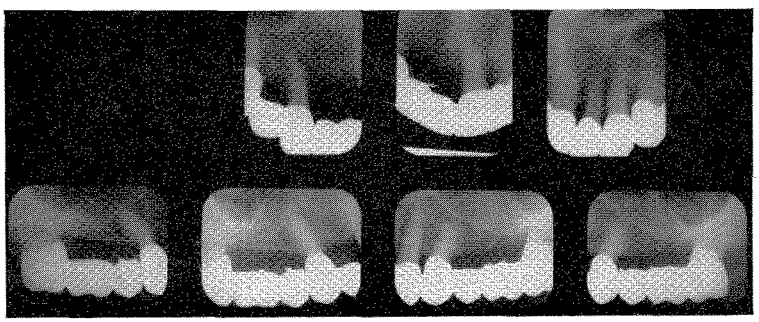


Fig. 335. Roentgenograms taken in 1962 of the upper splint shown in Fig. 334.

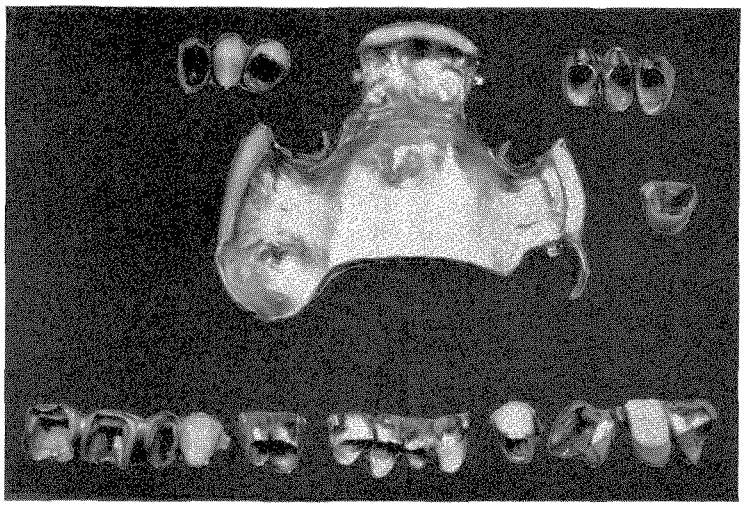


Fig. 336. A fourteen-unit lower fixed splint was constructed by utilizing a series of lugs and rests plus precision attachments. The work is shown in the foreground in six sections. Three-quarter and full crowns were resorted to. At the top of the photograph the upper prosthesis may be seen. Only six upper teeth remained. Splinting was also resorted to in order to obtain the most advantageous stress distribution.

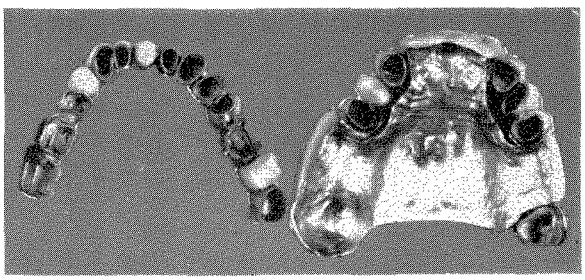


Fig. 337. The fourteen-unit fixed lower splint shown in Fig. 336 was united into one piece. It will be cemented in sections. The upper prosthesis is seen on the right side.

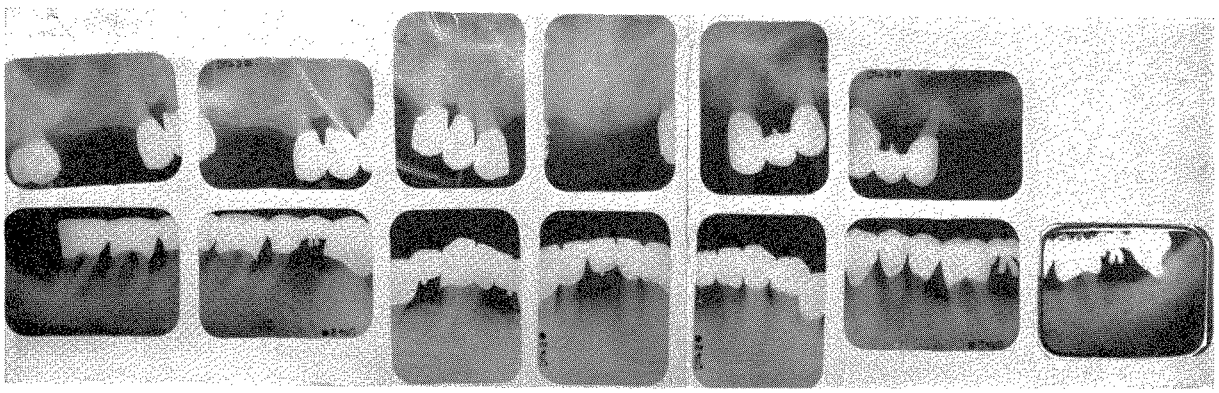


Fig. 338. The roentgenograms of the work shown in Fig. 337. These were taken in August, 1962. This prosthesis is 3½ years postinsertion.

involved, the tapered lug and rest may be replaced by a precision attachment or a fully soldered joint. Because of its parallel walls and precise construction, the precision attachment creates a more rigid joint than the tapered lug and rest. It may also be used where it is not possible to parallel all the abutment teeth together. (Figs. 332 and 333.) In addition, the precision attachment may be used where extensive splinting is inserted containing problematic molars whose future is questionable. If these teeth must be removed, the remaining splints with the terminal precision attachments lend themselves to either fixed or removable replacement. (Figs. 334 and 335.)

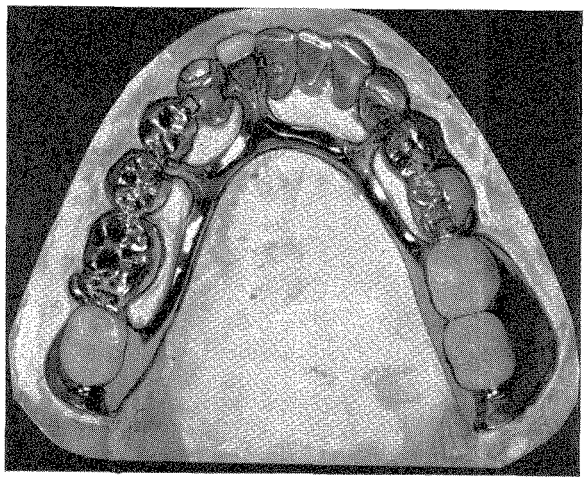
BROKEN STRESS SPLINTING

In case of general over-all periodontal weakness with several missing teeth in the same arch, it is possible to have the abutment teeth either crowned or inlaid and connected together by lugs, precision attachments, and completed soldered joints without any removable partial prosthesis. (Figs. 336 to 338.)

REMOVABLE SPLINTS

In the case of a combination of fixed and removable prosthesis in the same arch, it is possible to have the abutment teeth either crowned or inlaid but not connected together in a rigid fixed splint. In this instance, the removable prosthesis would splint these individual teeth by having fingers in the form of precision lugs or attachments resting in seats in the abutment teeth. Still, it involves more intricate details in its construction, and it presents a much more difficult problem in maintaining good hygiene because of the increased number of arms. In addition, it is not as rigid as complete fixation. (Figs. 339 and 340.)

Fig. 339



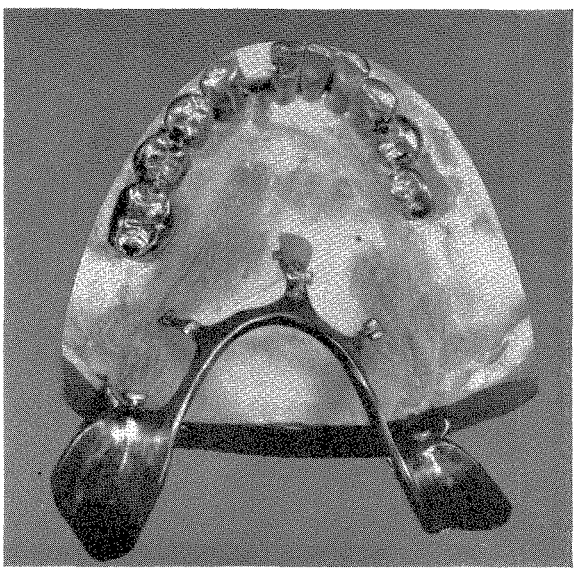


Fig. 340

Figs. 339 and 340. A combination of fixed and removable splinting. The fixed castings were united by lugs and precision attachments. The removable partial denture has precision attachments and lug rests associated with eight individual abutment teeth.

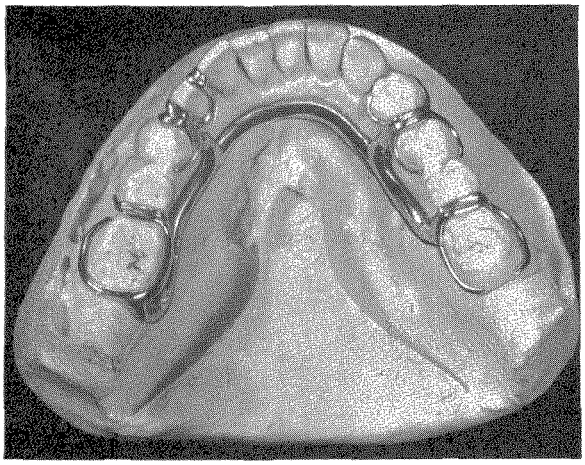


Fig. 341. Two unilateral fixed bridges are being supported by a bilateral removable splint. This gives protection against the dangerous lateral thrust.

An example of fixed and removable splinting used in combination with each other is shown in cases of unilateral fixed splints being supported bilaterally by a removable metal frame, whose sole purpose is to support the unilateral units against horizontal masticatory forces. (Fig. 341.)

METHODS OF OBTAINING GREATEST FOUNDATIONAL STABILITY

Clinically it has proved more satisfactory to splint the abutments rigidly and then attach the removable prosthesis. (Fig. 342.) In the case of missing anterior and posterior teeth in the same arch, the greatest foundational stability is provided by rigidly connecting the anterior teeth by a fixed partial prosthesis, then having the removable partial prosthesis supply the posterior missing teeth. Cohn* showed that the axis of rotation, tending to unseat the removable prosthesis, takes a posterior and much more favorable position if the anterior segment is rigidly fixed. Otherwise, the removable partial prosthesis exerts unfavorable tipping leverages in the bicuspid or cuspid areas. Even in the case of the lower lingual bar, where the teeth are missing posterior to the bicuspids and the four bicuspids are being used as abutments, greater strength is obtained by soldering the two bicuspids on each side together by means of three-quarter or full crowns than by having precision lugs and rests in the individual teeth. This may also be said in cases in which the cuspid and first bicuspids are being used as abutments. (Figs. 343 to 351.)

TYPES OF RETAINERS USED

There is no one form of abutment preparation that can be considered exclusively for all teeth that require splinting. Good retention is desirable to

*Cohn, L. A.: In Glickman, Irving: Clinical periodontology, Philadelphia, 1953, W. B. Saunders Co., chap. 59, pp. 938-971.

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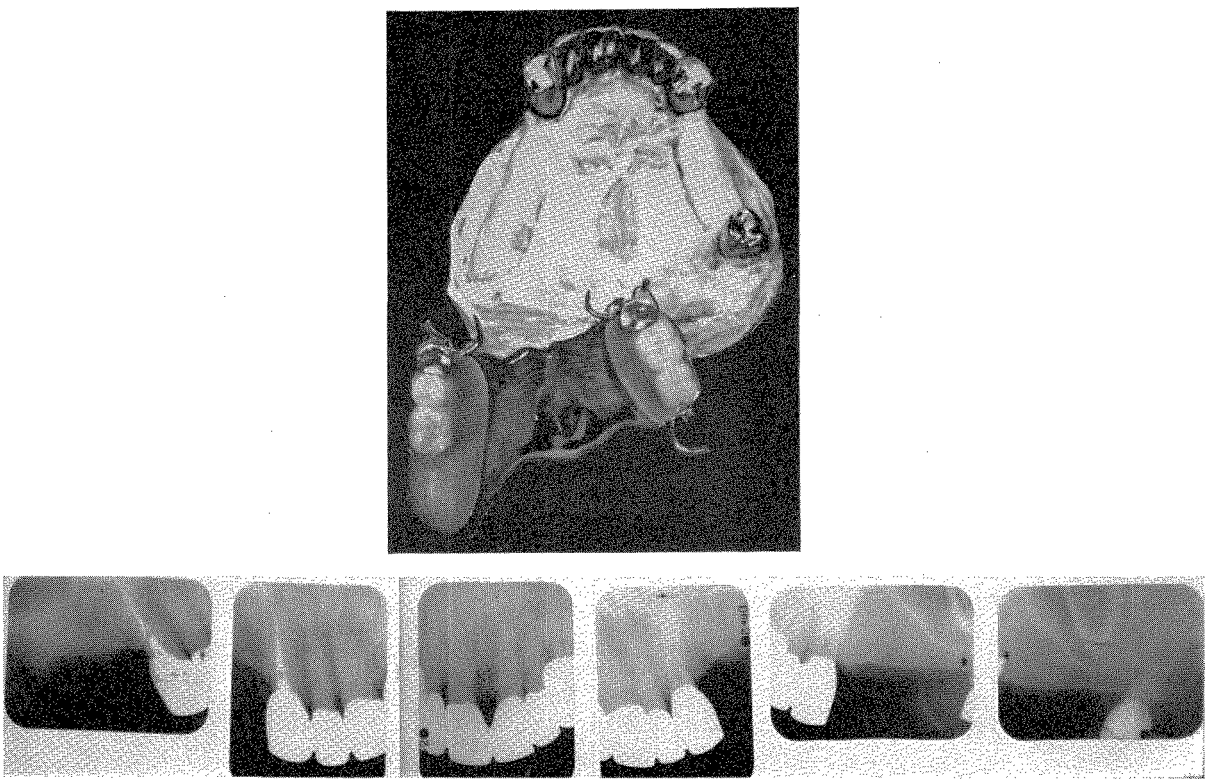
A



B

Fig. 342. **A,** A six-unit fixed partial denture on the cast. The abutments were all soldered together. The removable partial denture was best supported in this manner. **B,** Roentgenograms of the splint shown in **A.** This prosthesis is five years postinsertion.

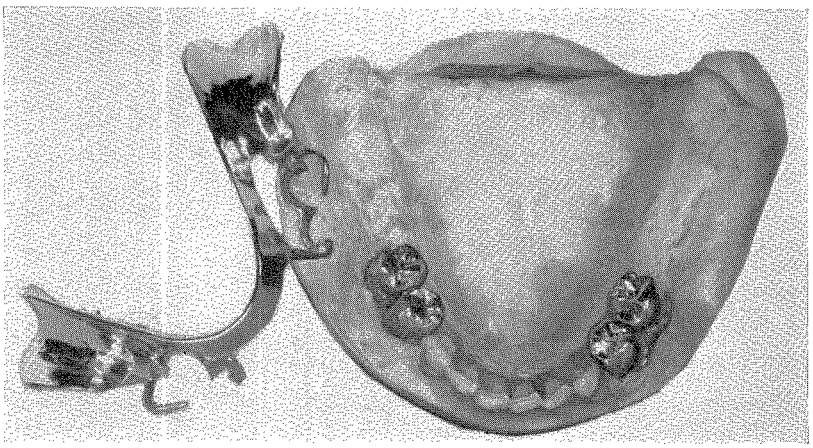


Fig. 343. A lower removable partial denture. The bicuspids, which act as the abutment teeth, have individual inlays and lug seats. They are not soldered together.

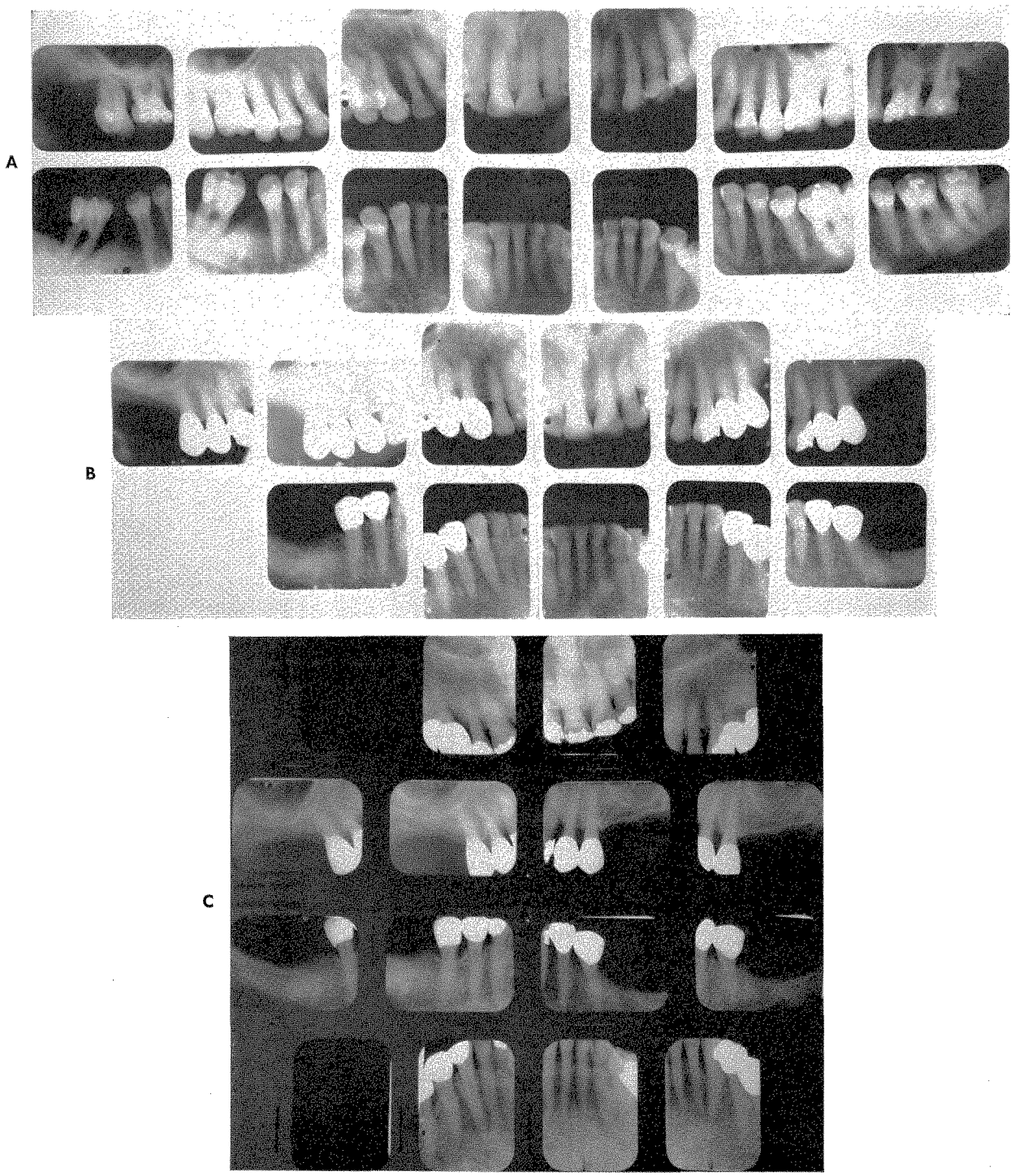


Fig. 344. Roentgenograms of the case shown in Fig. 343 taken in 1948, **A**; in 1950, **B**; and in 1962, eleven years after completion, **C**. This is another case similar to the one shown in Figs. 244 to 248 in which the periodontal disease was checked.

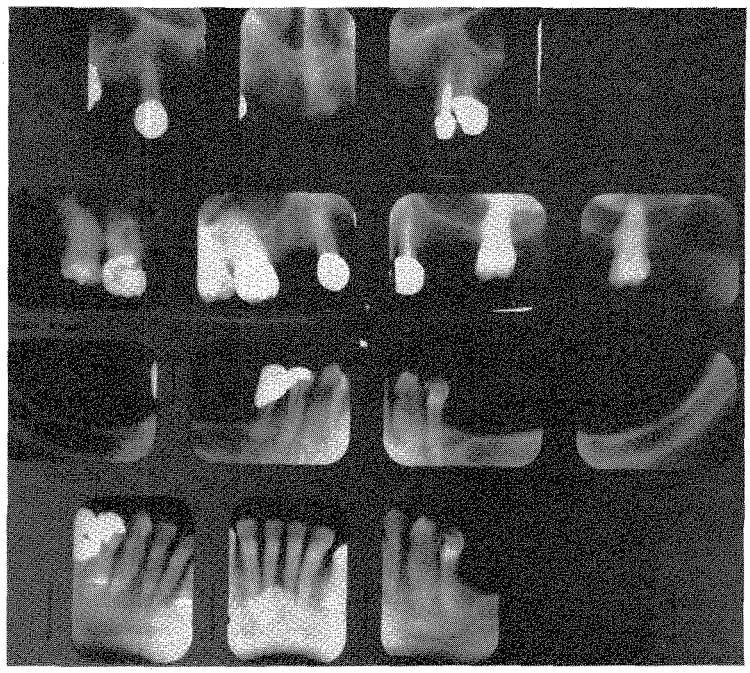


Fig. 345. The mouth of the patient whose 1945 roentgenograms are shown here was reconstructed in 1945. The right bicuspids were splinted together, but the left bicuspid acted as a single abutment. (Figs. 345 to 351 are of the same case.)

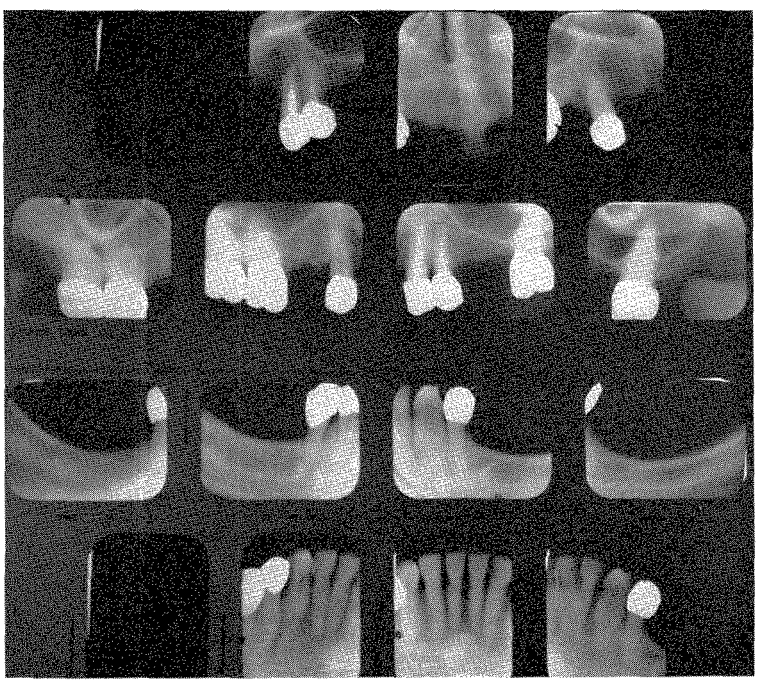


Fig. 346. Roentgenograms which were taken at the completion of the work.

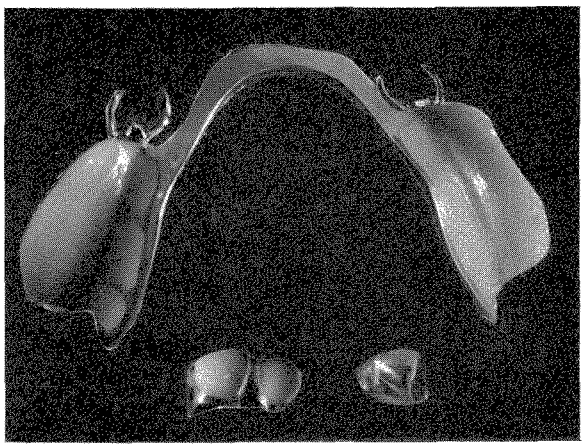


Fig. 347. The lower removable partial denture and abutment castings in 1945.

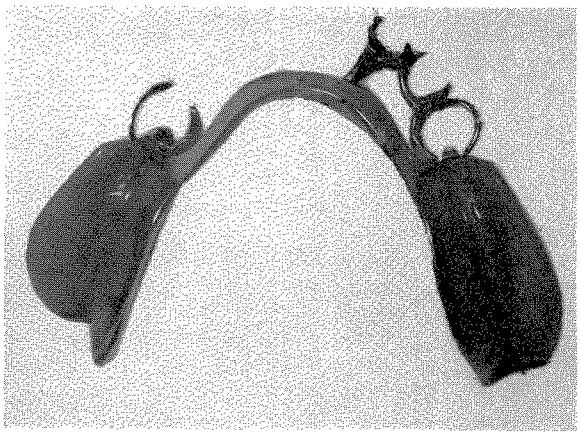


Fig. 348. In 1949 the left abutment became loose, and the splint was added to the removable partial denture to engage two additional left teeth. The left cuspid was crowned.

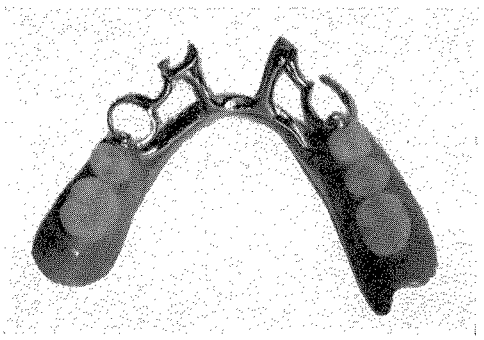


Fig. 349. In 1952, due to negligence on the patient's part, the right bicuspid became infected. The root canal was filled, and a new right two-unit splint was constructed. The removable partial denture was also modified by adding the right continuous clasp.

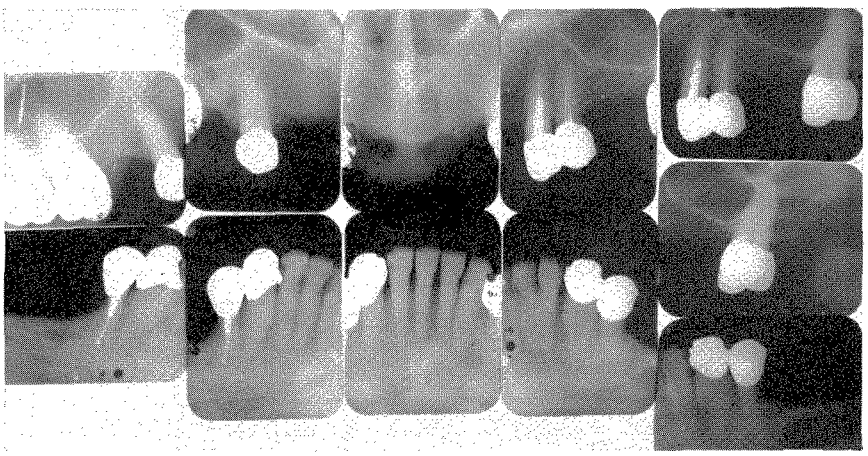


Fig. 350. In 1954 the left abutment became more mobile, and a two-unit splint was constructed as shown in the roentgenograms.

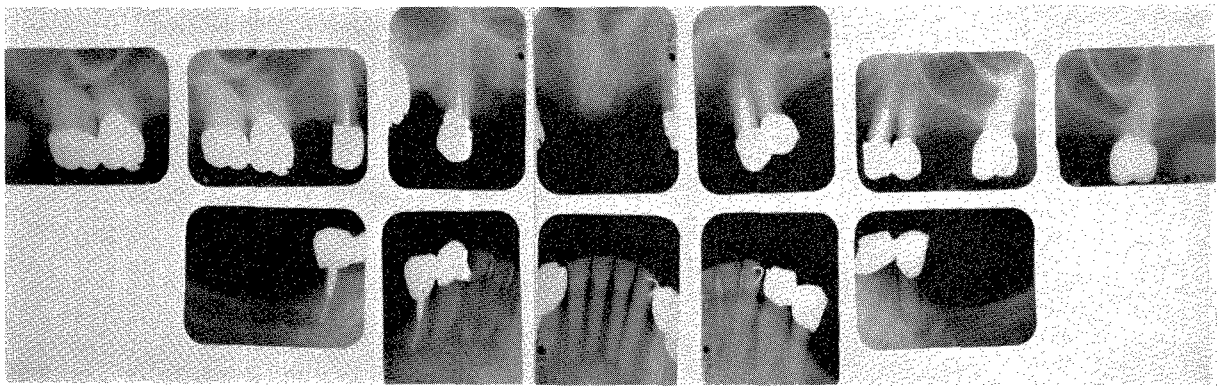


Fig. 351. Roentgenograms taken in December, 1962. This was seventeen and one-half years after the original rehabilitation. The lower teeth were retained only because of the rigid splinting.

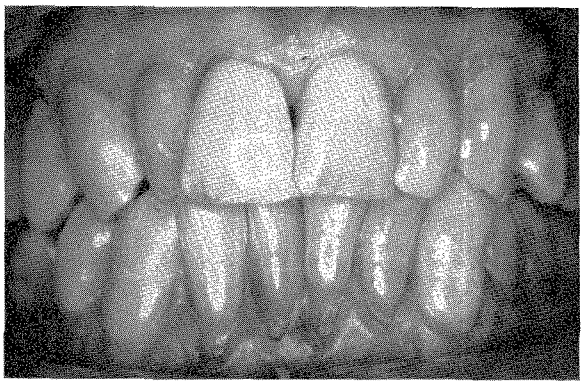


Fig. 352. Front view of the teeth of a 62-year-old female patient. The left central incisor had a fracture of its labial alveolar plate. (Figs. 352 to 359 are of the same case.)

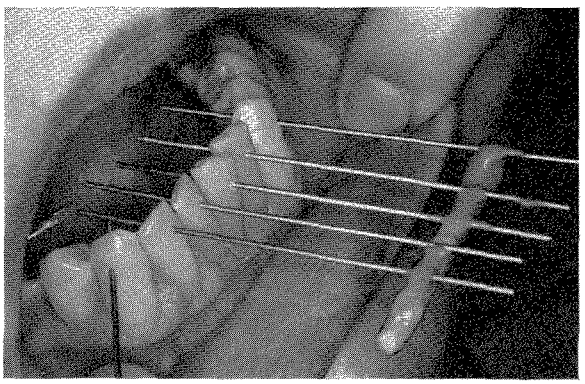


Fig. 353. The Pontostructor shown in Figs. 364 and 365 was used to make the five parallel horizontal holes and the one which is not parallel in the right cuspid. A stick of sticky wax holds the pins together outside the mouth.

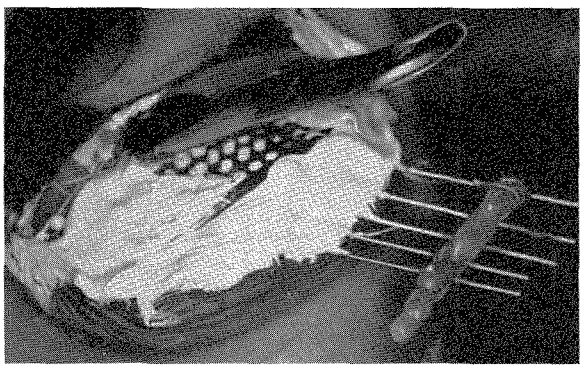


Fig. 354. An impression was taken with the same tray shown in Fig. 364. The material is rubber.

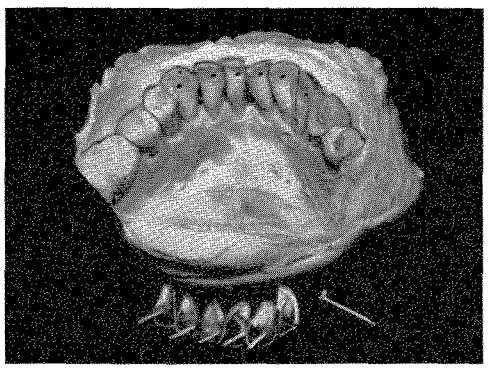


Fig. 355. A duplicate stone cast is shown here on which the splint will be fitted. It was completed upon a cast of investment material. The six pinholes shown in this cast will receive the horizontally placed pins. The position of the right cuspid is unfavorable so that its pin will be in a different direction and cemented in separately. The completed casting is shown in the foreground. The pin for the right cuspid is separate and has a small angular head. Where this head rests, the tooth was cut to allow for a shallow concavity to permit a thickness of gold for the key.

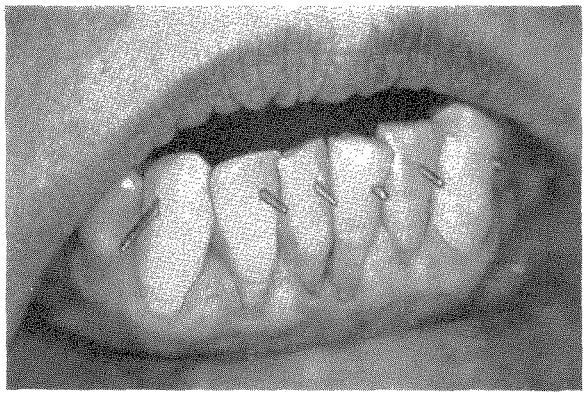


Fig. 356. The finished splint was inserted in the mouth. The six pins are seen projecting from the labial surfaces. The right cuspid pin was inserted separately. The splint will be cemented and the labial projections of the pins reduced in order to insert small acrylic or synthetic porcelain fillings in the labial pinholes.

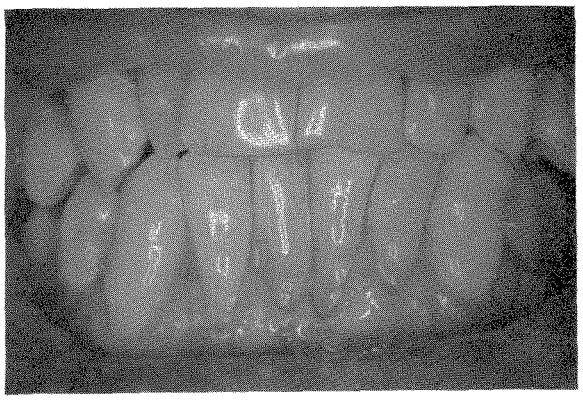


Fig. 357. The completed work. The six labial pinholes were filled. The esthetics is very satisfactory.

Fig. 358. The lingual surface of the completed splint is shown here. The teeth are exposed on their incisal tips and also at their cervical surfaces. This permits access for maintaining good mouth hygiene.

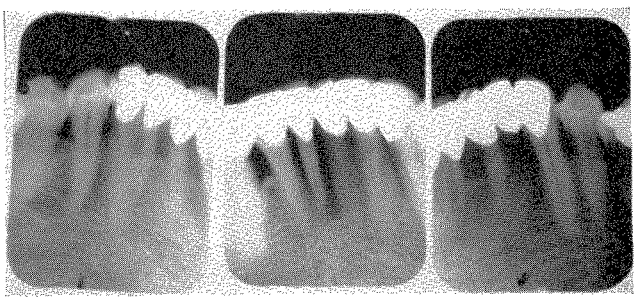


Fig. 359. The roentgenograms of the completed work. The alveolar bone destruction between the central incisors can be seen. It will now be given a chance to heal.

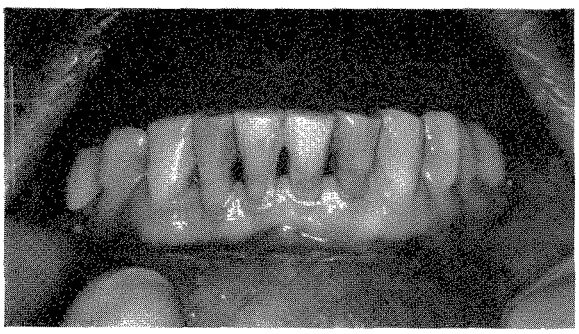


Fig. 360. Anterior view of the lower incisors at the start of treatment. Three of the four incisors are nonvital and mobile. (Figs. 360 to 362 are of the same case.)

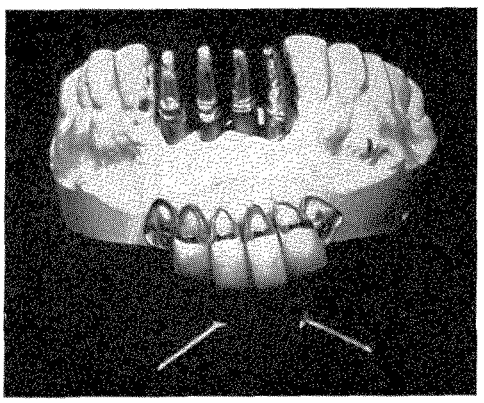
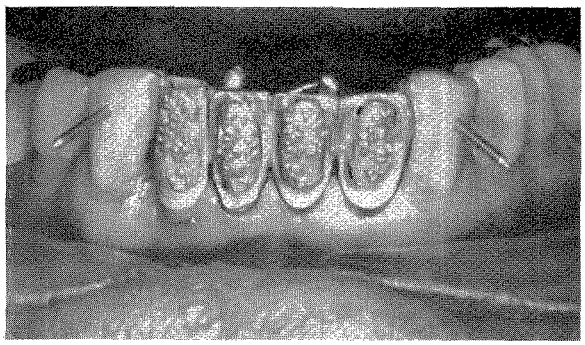
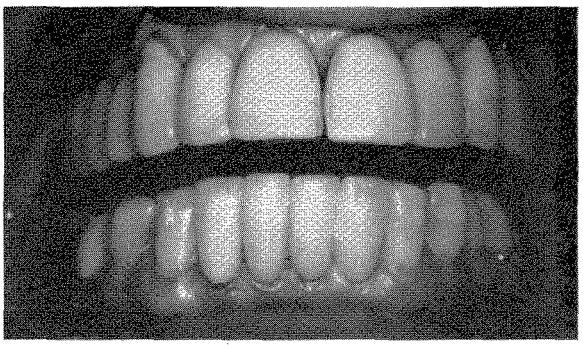


Fig. 361. The completed bridge. The incisors will be covered with full veneer crowns. The cuspids have lingual gold coverage with horizontal pin ledges. The pins, shown in the foreground, are inserted separately and have rectangular gold heads which provide keys for insertion.



A



B

Fig. 362. A, The completed bridge minus the acrylic is tried in the mouth. The pins have been inserted separately. The lingual pins shown on the crowns permit malleting to position the bridge correctly without damaging the acrylic incisal edges. **B,** The completed bridge. Small synthetic porcelain fillings have been inserted to cover the pins in the labial surfaces of the cuspids.

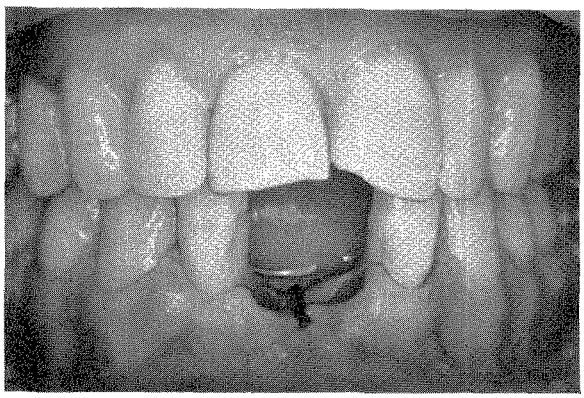


Fig. 363. The mouth of a 35-year-old male patient. The two central incisors had just been removed. A single suture prevented the flaps from spreading. (Figs. 363 to 369 are of the same case.)

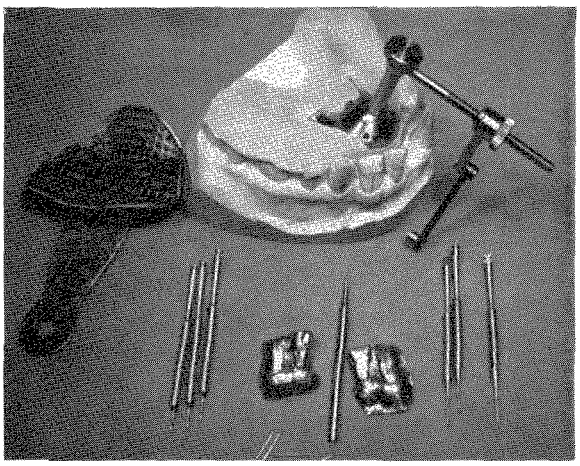


Fig. 364. The Pontostructor on the model embedded in an acrylic frame. The angle along which the burs will be applied was already chosen on the cast. The lead foil in the foreground was burnished onto the stone teeth on the cast, and the starting holes were marked on each tooth. This will be inserted in the mouth and these holes followed in drilling. The various drills used in the technique are shown in the foreground, as well as the prefabricated platinum iridium pins. The tray for the rubber impression is also shown.

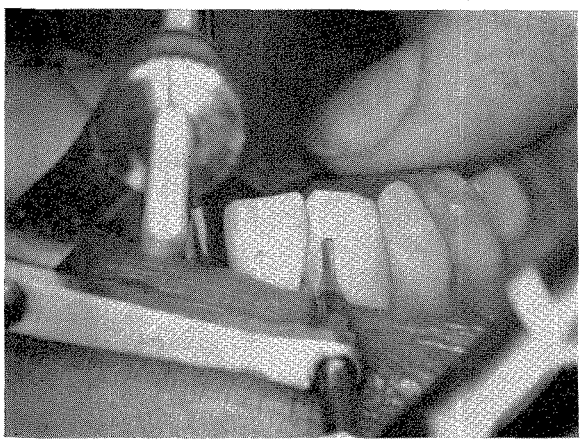


Fig. 365. Enlarged view of the Pontostructor instrument in position in the mouth. The acrylic lingual index is being stabilized with the finger. The drill is going through the left cuspid. The lateral incisor had already been drilled.

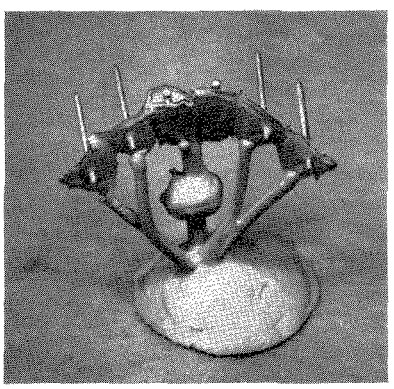


Fig. 366. The completed bridge was cast in one piece together with the platinum iridium pins. The dummy teeth will be Steele's facings.

Fig. 367. The completed bridge ready for insertion in the mouth. Duplicate steel facings were ground in. The metal frame was first cemented—then the porcelain facings were cemented.

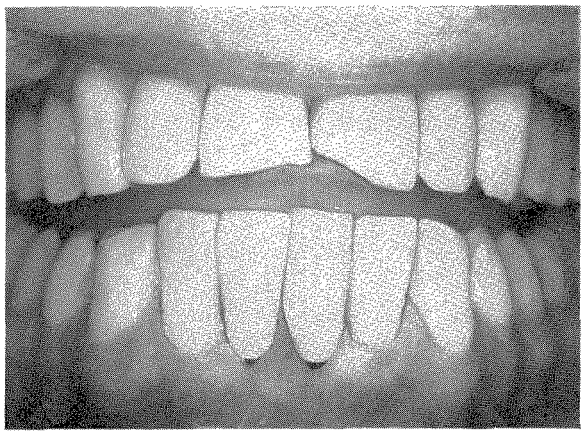
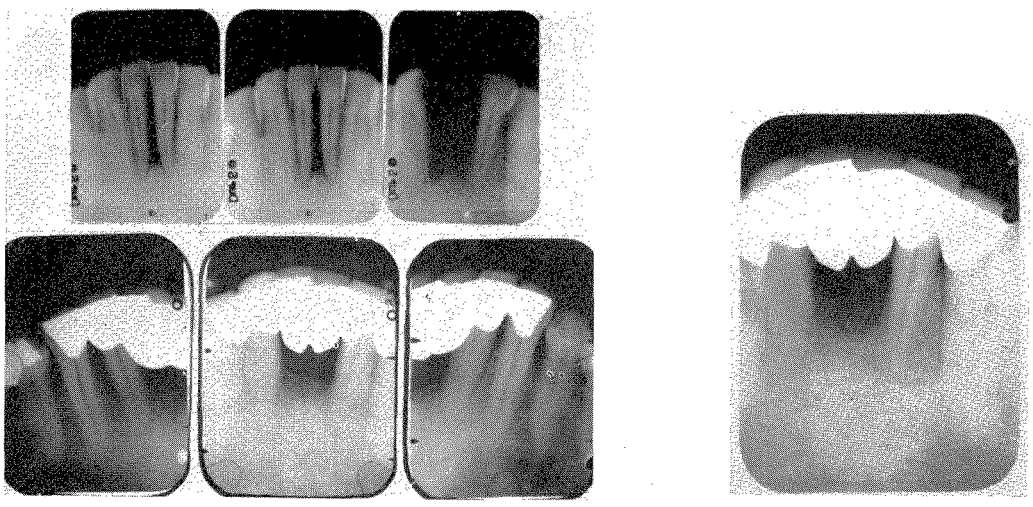


Fig. 368. The completed work. The very small plastic fillings have been inserted. It is difficult to detect them.



A **B**

Fig. 369. A, Roentgenograms of the start and of the finish. This bridge was inserted in June, 1961. **B,** Roentgenogram taken in February, 1962. The bone had filled in to a much higher level than shown in **A.**

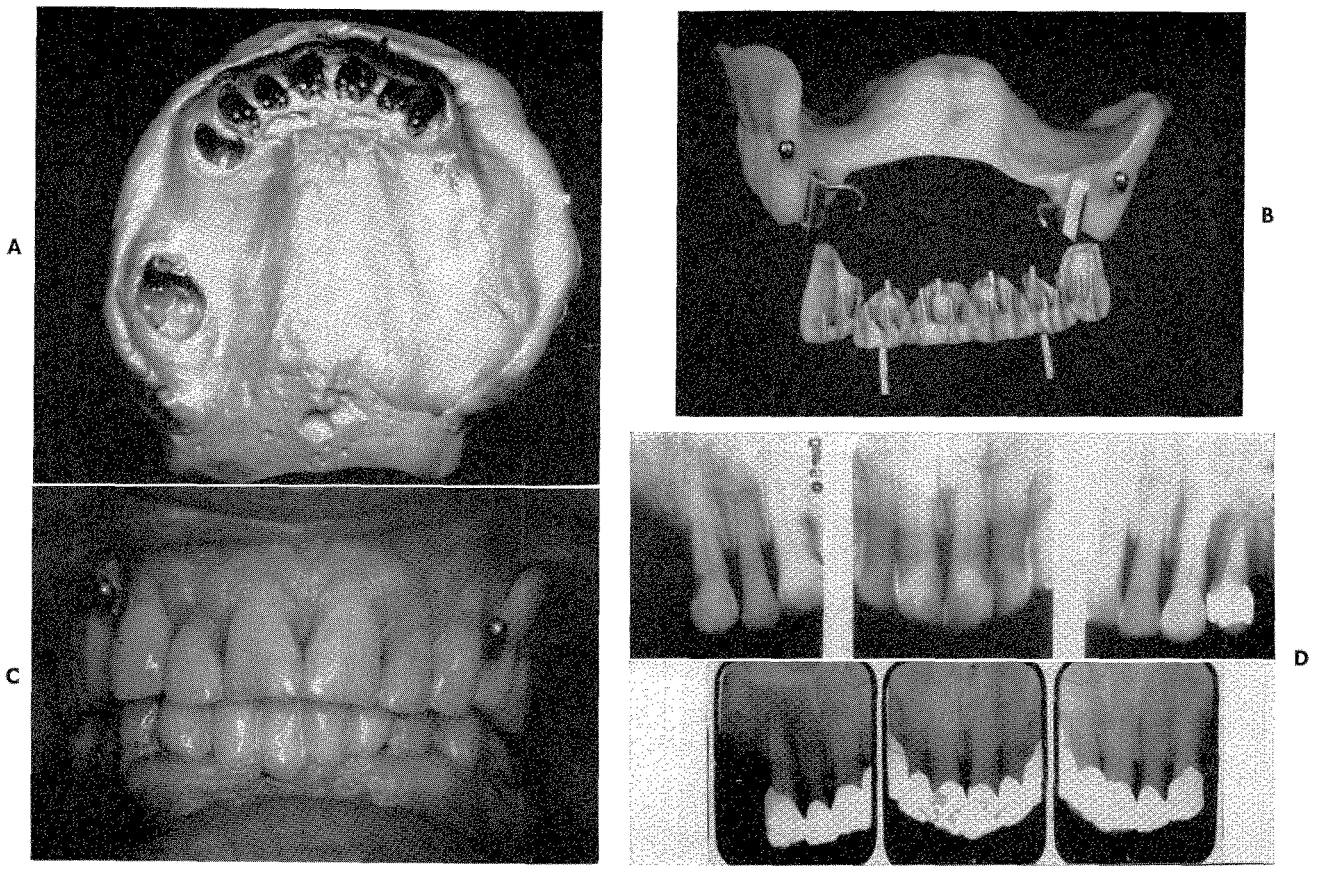


Fig. 370. **A,** An example of vertical pin splinting. The anterior six teeth had a total of eighteen pins, three in each tooth. The impression shown in this illustration was taken in rubber in a specially prepared plastic tray, utilizing a heavy-setting rubber for the base and a thinner-setting rubber over this. The left first bicuspid and second molar were infected and were to be extracted. This impression was to be silver-plated and the vertical pin ledge splint constructed upon the finished cast. **B,** The completed six-unit vertical pin ledge splint. Each tooth contains three vertical pins. These eighteen pins, paralleled by means of the instrument known as the Pontostructor, have distal metal extensions into which precision attachments have been soldered. The two extension pins projecting above the lateral incisors are used for handling the splint during the fitting and the cementation. Just prior to its cementation, the splint is gold-flashed in order to block out any dark shadow which the metal may cast through the labial enamel. The temporary precision removable partial denture was constructed on the same cast after removing the bicuspid and the molar. This removable partial denture is to be inserted immediately after the extraction of the two posterior teeth. It will then be worn until healing takes place. **C,** The anterior vertical pin ledge was finally cemented. The bicuspid and the molar were removed, and the upper temporary removable partial denture was inserted. All of this was performed at the same sitting. When the sockets have healed, a new upper removable partial denture is to be constructed. The vertical pin ledge splint is final. I am aware of no other method in which the character of the anterior teeth can be preserved and the splinting effect obtained. The gold is completely hidden. The two gold extensions from the removable partial denture are placed there to facilitate its removal. They can be removed at the request of the patient. **D,** The roentgenograms which were taken before the work was started are shown above. The infected bicuspid was extracted just after the insertion of the splint. The roentgenograms of the completed splint are shown below. This is a very effective method of treating a case of this nature. It is practical, conservative, esthetic, and physiological.

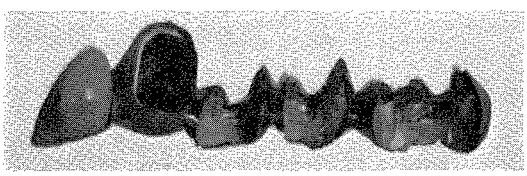


Fig. 371. The patient for whom this upper right bridge was constructed had his mouth rehabilitated in 1949. This was the upper right construction. It consisted of three MOD inlays, one cast crown, and a single thrown-off lateral incisor. (Figs. 371 to 375 are of the same case.)

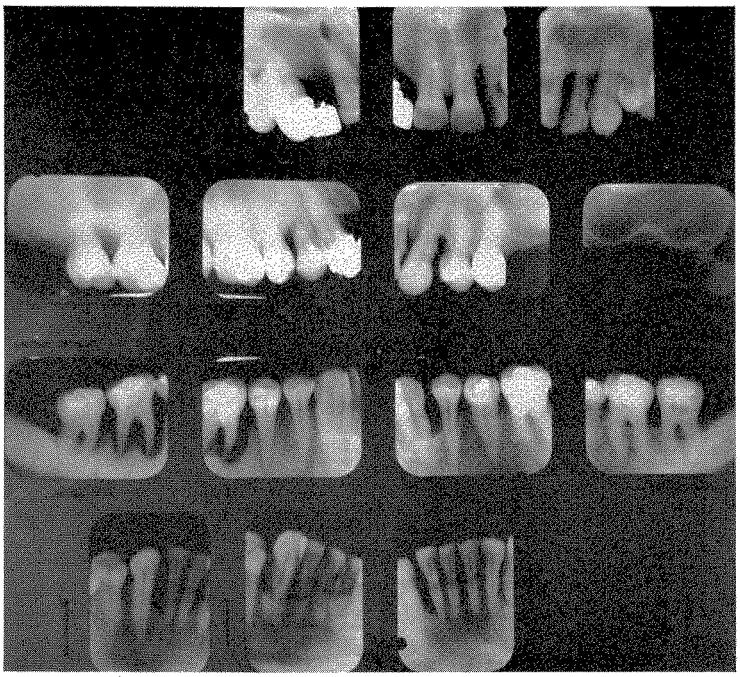


Fig. 372. These roentgenograms were taken in 1946. They reveal the extent of the periodontal pathology before the work was undertaken.

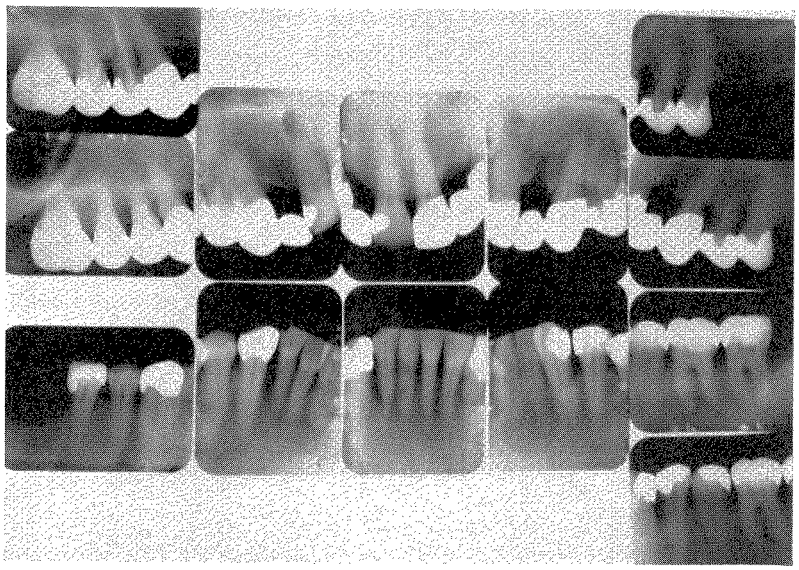


Fig. 373. The roentgenograms taken after the rehabilitation was completed are shown here. The lower castings were related to each other by interlocking lugs and lug seats. The lower removable partial denture was constructed in a manner similar to that shown in Figs. 339 and 340.

Fig. 374. This is the right side of the completed work. The photograph was taken in 1949.

Fig. 375. These roentgenograms were taken in 1961. The oral structures remained stable ever since treatment was completed twelve years previously.

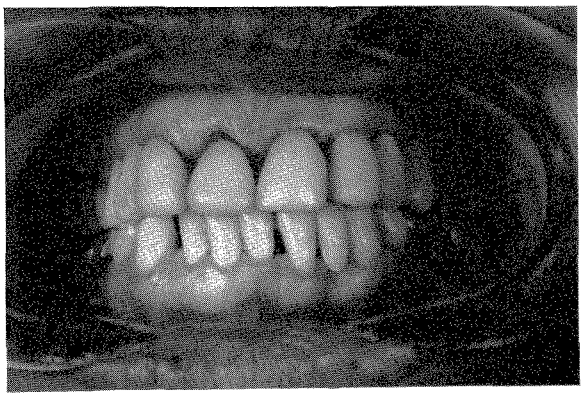


Fig. 376. The mouth in 1946 before the rehabilitation was undertaken. (Figs. 376 to 383 are of the same case.)

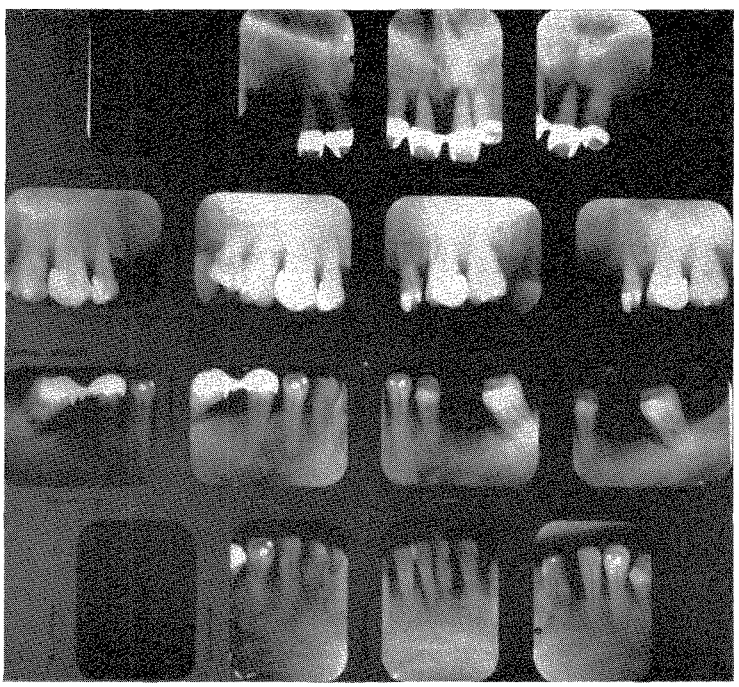


Fig. 377. The roentgenograms that were taken in October, 1946, before the mouth rehabilitation was undertaken are shown here. There was extensive periodontal involvement.

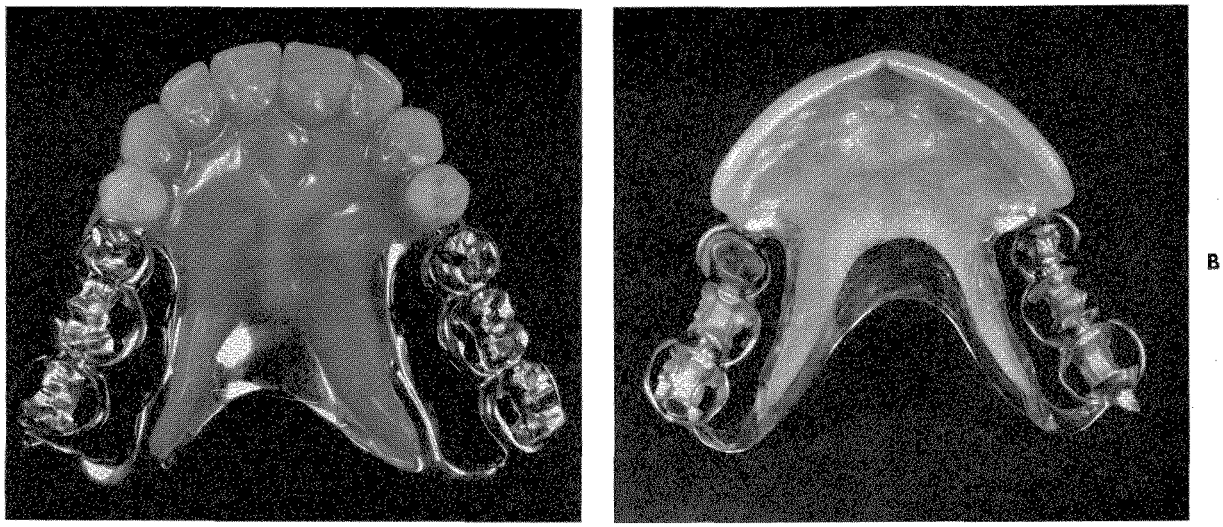


Fig. 378. A, The upper removable partial denture shown in this illustration was constructed in June, 1947, as part of a dental rehabilitation program. It has three MOD gold inlays on the right side, all soldered together in the form of a three-unit splint, and two MOD gold inlays and a veneer crown on the left side soldered together. These two fixed splints support the removable partial denture. **B,** The tissue side of the removable partial denture is shown. The fixed splints described in **A** are in position. The fixed splints will be cemented in the mouth. Then the removable partial denture will be inserted.

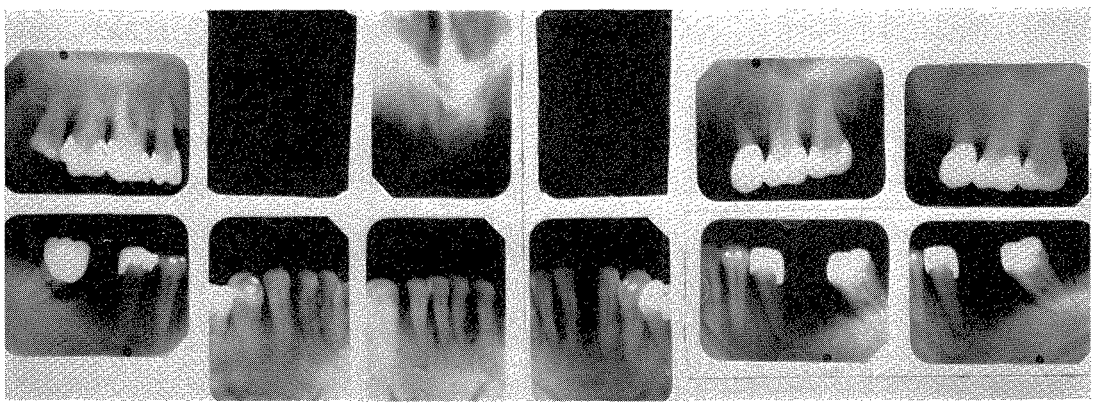


Fig. 379. The roentgenograms that were taken in July, 1947, after the rehabilitation was completed are shown here.

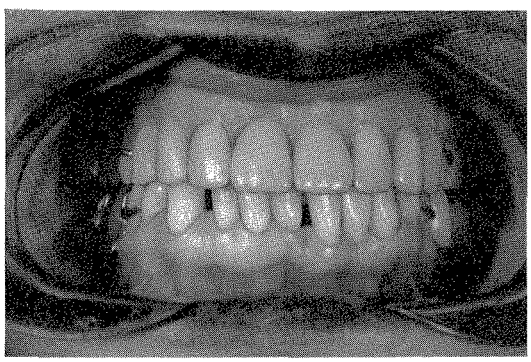


Fig. 380. The mouth after the rehabilitation was completed. This was taken in 1947.

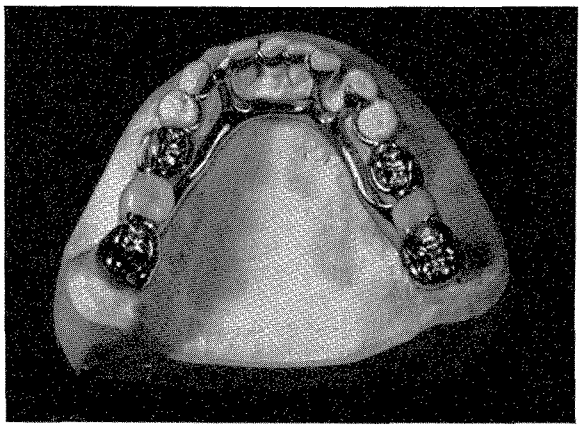


Fig. 381. The completed lower prosthesis consisted of castings in the second bicuspids and molars which contained precision lugs and countersunk lingual arms. The removable partial denture had a lingual continuous clasp which acted as a splint for all the remaining teeth. The reconstruction was carried out on a Hanau Model H articulator.

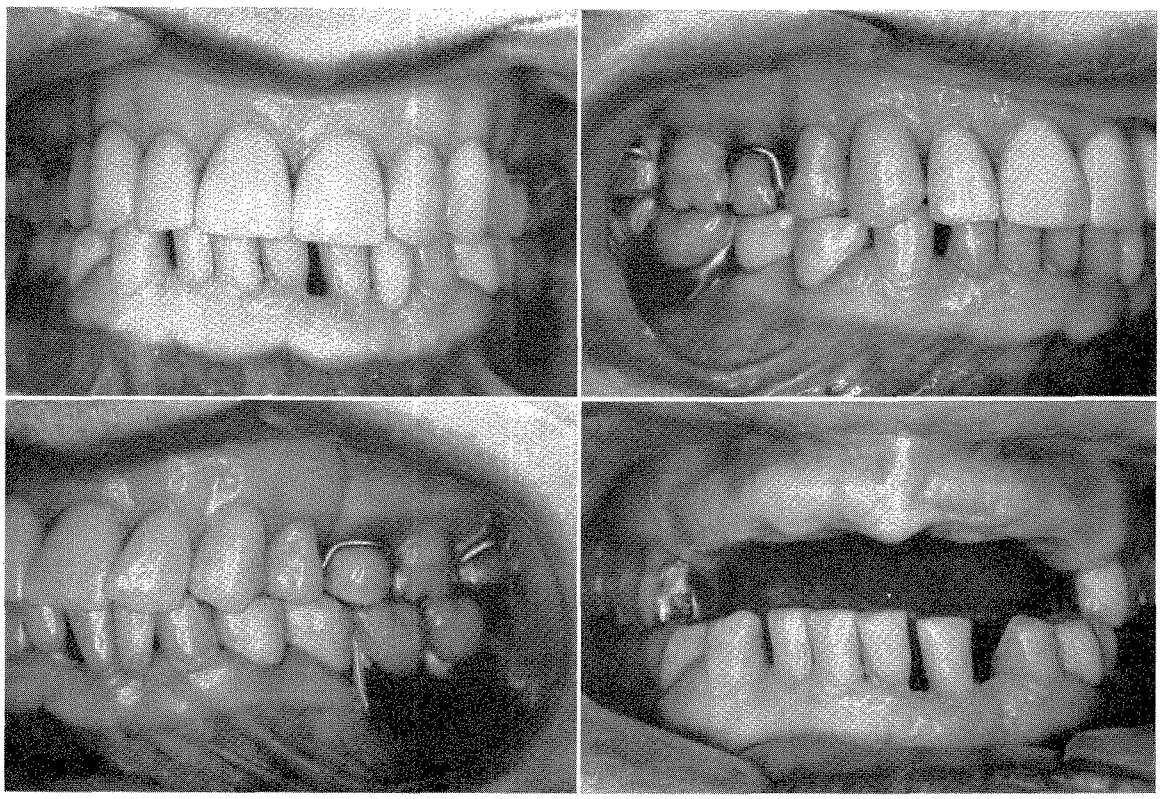


Fig. 382. Four views of the mouth taken in 1962. This was fifteen years after the completion of the rehabilitation.

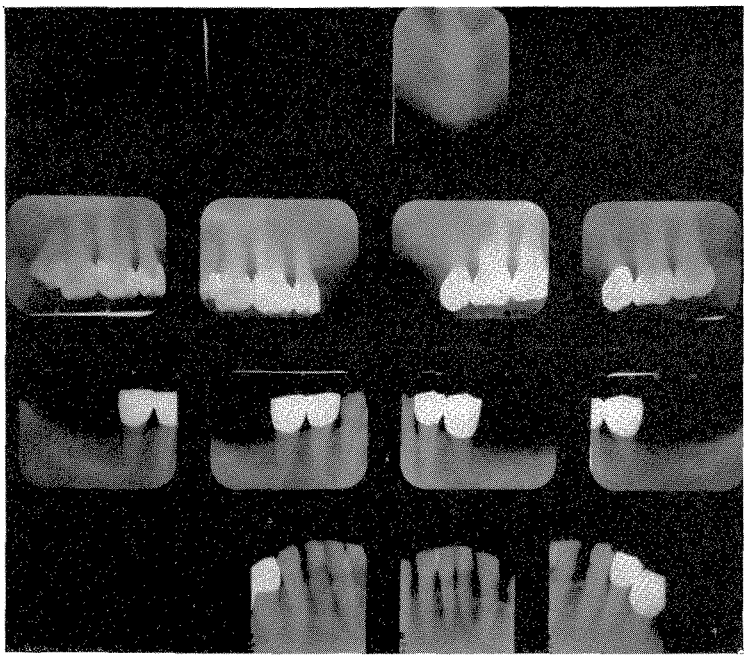


Fig. 383. The roentgenograms taken in 1962. In the fifteen years since completion, only the lower two molars were lost. These teeth were deeply involved in periodontal pathology in 1946. The upper teeth were healthier when these roentgenograms were taken than when the work was started. The splinting was very effective.

prevent the loosening of any involved casting. Where the crowns are short, full coverage is indicated. In long-crowned teeth, good retention may be obtained by means of vertical or horizontal pin ledges, three-quarter crowns, MOD inlays, or a combination of one or more of them. In complete rehabilitation when it becomes desirable to change the tooth anatomy and the interocclusal relationship, full crowns may be the casting of choice. Conformative dentistry lends itself to three-quarter crowns, pin ledges, and three-surfaced inlays. It is desirable to become proficient in all forms of abutment preparations in order to conserve tooth structure, so that where good retention is possible without resorting to full coverage, the operator is able to carry out this type of preparation. (Figs. 352 to 383.)

ADVANTAGES OF FULL CROWN AS A RETAINER

Complete fixation requires abutment castings that are able to resist torque coming from vertical and horizontal masticatory pressures. Two-surface, or even three-surface, inlays are not able to withstand these pressures nearly as well as three-quarter or full crowns. The crown completely covering the tooth serves to hold it together, whereas the inlay may act as an internal wedge. The full crown engages a greater layer of cement. The amount of metal is the same for both inlays and crowns. The full crown has two proximal surfaces and two vertical surfaces. These resist dislodging forces better than any other form of retainer.

USE OF PIN LEDGE

Where the pin ledge is used, it is strongest when it has one proximal surface with a retaining groove. Let us take the upper cuspid as an example of an anterior abutment for a posterior splint. The flat metal lingual surface with its three vertical pins is usually weak around the area where the pin engages the flat metal. Occlusal forces act upon these pins and sometimes dislodge the casting. (Figs. 384 to 386.) A heavy gold lingual surface, together with a distal proximal wall with a vertical groove, greatly strengthens this abutment casting. Although the pin ledge is esthetic and requires the removal of less tooth structure in its preparation, it is not as strong as the three-quarter or full crown.

EFFECTIVENESS OF SPLINTS IN PREVENTING DRIFTING AND EXTRUSION

Splinting may be an effective means of stabilizing a single tooth or an entire arch. Where there is drifting of a second or third molar, two interlocking inlays can be very effective in stabilizing these teeth. (Fig. 387.) This same splinting effect can prevent the extrusion of a lower or upper molar when no antagonist is present. (Fig. 388.)

SPLINTING AROUND ENTIRE ARCH MOST EFFECTIVE

If, when the crown-to-root proportion is less than the one third crown to two thirds root ratio or even two fifths crown to three fifths root ratio, there is a danger of occlusal trauma. This is especially so with high cuspid teeth and improper interocclusal relationships. The correct maxillary-mandibular centric and eccentric relations are important. No form of splinting can be considered successful without first attending to this major consideration. In conditions of incorrect crown-to-root proportions, even though the occlusal relations are correct, splinting will strengthen and add longevity to the remaining natural teeth. Unilateral splinting is much more effective than single-tooth units. (Figs. 389 to 391.) Splinting around three fourths of an arch is still more effective because it supports the teeth against the dangerous lateral thrusts. (Figs. 392 to 395.) Splinting around the entire arch is most effective. This type is necessary where all the teeth are present but have lost considerable osseous support. It protects the teeth against clenching and bruxing habits and against continued interocclusal contacts in deglutition. (Figs. 396 to 398.) This type of splinting is necessary where the periodontal tissues are weak or where many teeth have been lost and the remaining teeth must take an additional load.

TEMPORARY SPLINTS

Temporary splinting (Figs. 399 to 402) in the form of ligation alone or in combination with acrylic has proved very effective during treatment. Aluminum crowns splinted together with acrylic can be made quickly and used immediately to stabilize weak teeth. Quick-cured and slow-cured acrylic splints are very effective tools in many periodontal and prosthetic techniques.

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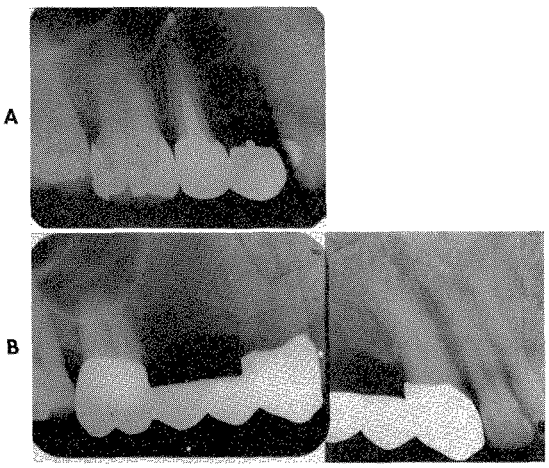

Fig. 384. A, Roentgenograms taken in 1935 and in 1947. The second bicuspid was removed in 1946, and a fixed partial denture was constructed to replace both bicuspids, **B.** (Figs. 384 to 386 are of the same case.)

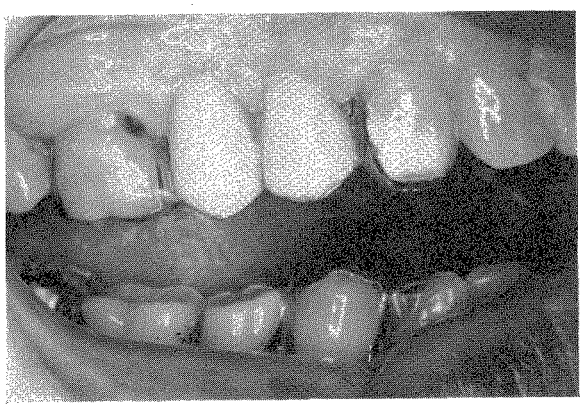

Fig. 385. In 1956 the bridge was removed because of deep caries in the upper right anterior abutment tooth. The pulp was involved. The root canal was treated and filled, and a new bridge was inserted.

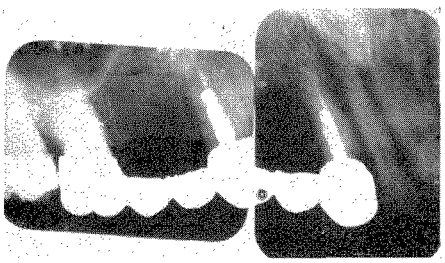

Fig. 386. Roentgenogram taken in 1962 of the upper right bridge. Two full crowns now acted as abutment castings.

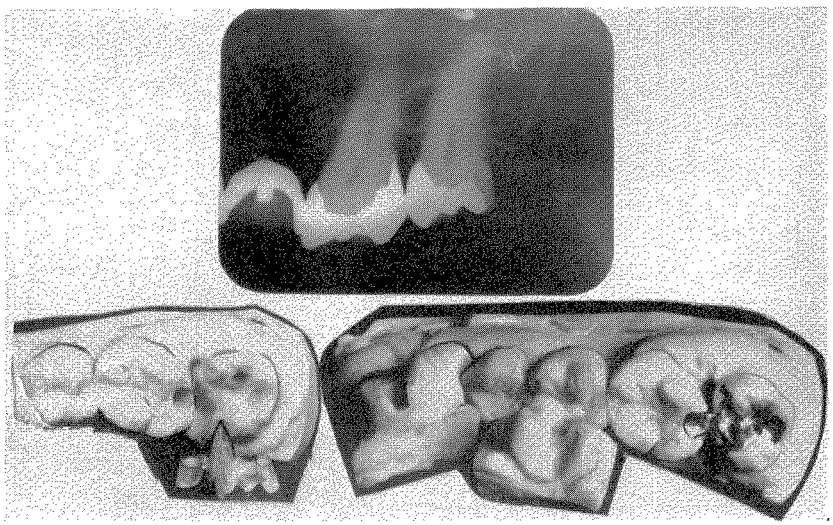

Fig. 387. A fixed bridge replaced the upper left first molar. Vertical food impaction caused great annoyance. A gold inlay placed in the third molar with a lug inserted into a dove-tailed, tapered lug rest in the second molar casting splinted these teeth together and prevented food impaction and drifting. This was accomplished without removing the bridge.

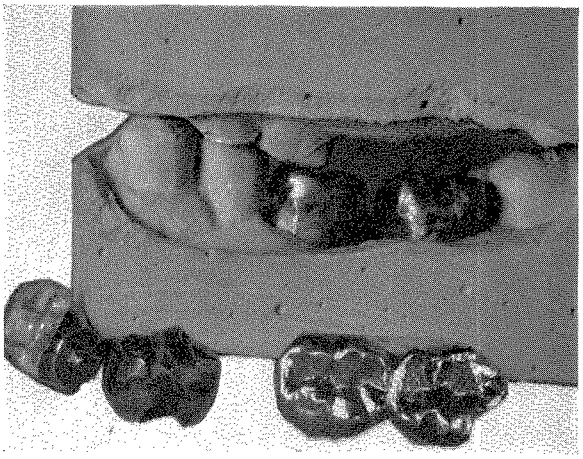

Fig. 388. Two interlocking gold inlays to prevent the extrusion of the lower left second molar. There are no teeth above it.

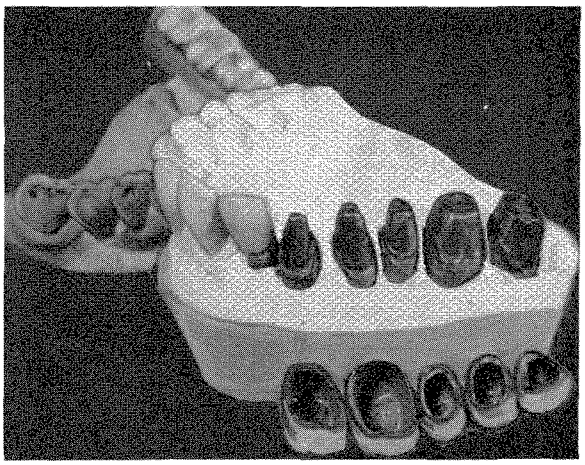

Fig. 389. A five-unit fixed partial denture. The lateral incisor is a porcelain jacket crown. The splint is made of gold crowns veneered with plastic. (Figs. 389 to 391 are of the same case.)

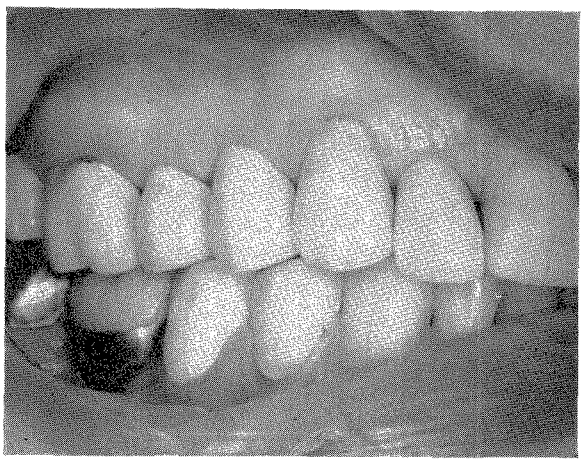

Fig. 390. The splint is shown assembled in the mouth.

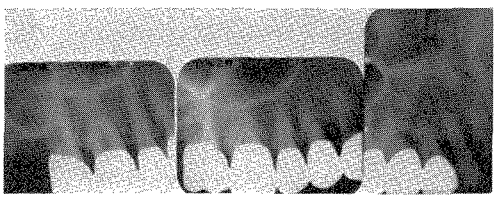

Fig. 391. Roentgenograms of the completed work.

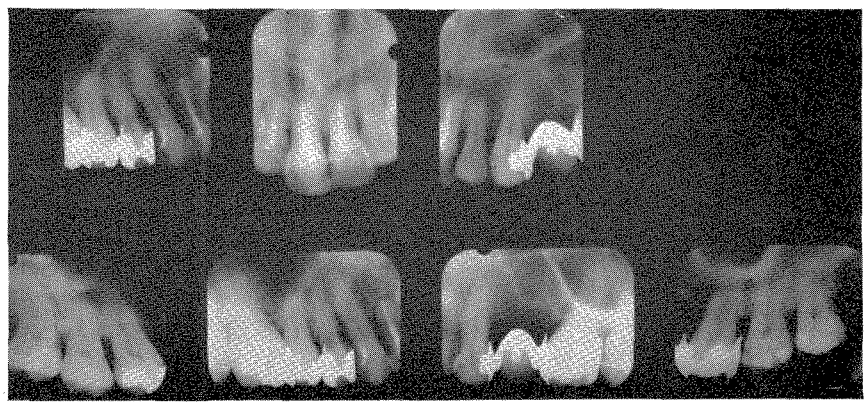

Fig. 392. Roentgenograms taken in 1944 before the work was undertaken. The right lateral and central incisors were removed, and a ten-unit splint was subsequently inserted. (Figs. 392 to 395 are of the same case.)

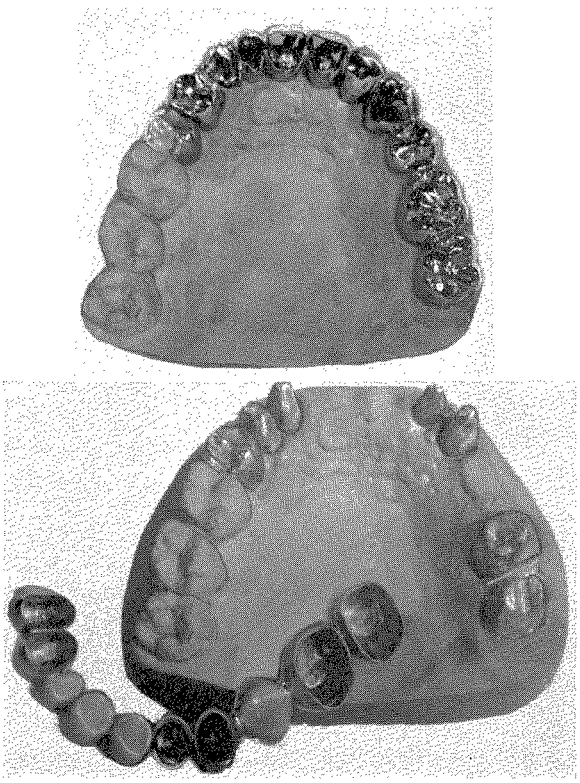

Fig. 393. A ten-unit upper fixed partial denture. There are six abutment teeth and four dummies. This splint goes around three quarters of the arch. It is shown on the cast and off the cast.

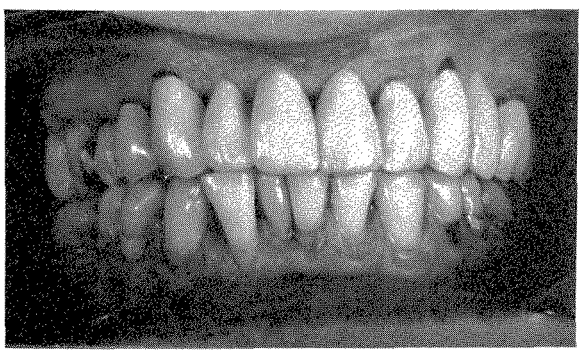

Fig. 394. The splint shown in Fig. 393 in the mouth.

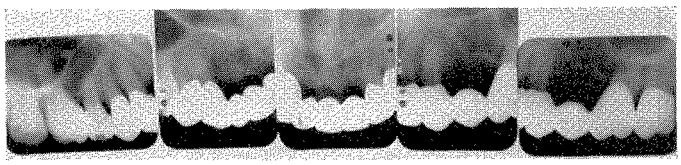

Fig. 395. The roentgenograms of the splint shown in Figs. 393 and 394.

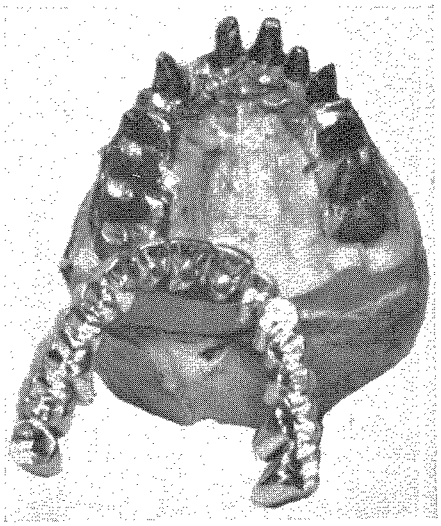

Fig. 396. This is the final upper cast of a rehabilitation case. This case is described in detail on pp. 450 to 464, Figs. 975 to 999. The upper splint consists of fifteen units. (Figs. 396 to 398 are of the same case.)

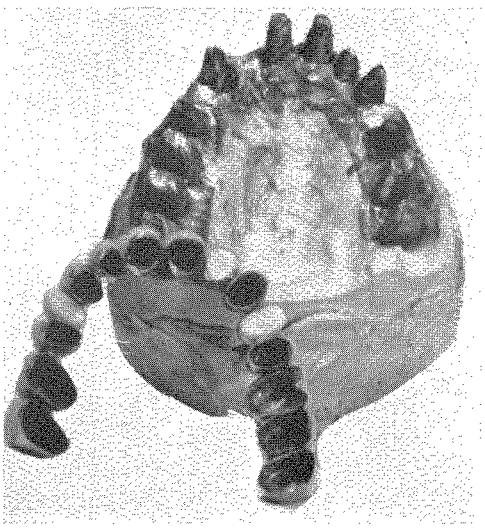

Fig. 397. The prosthesis was removed from the casts. The undersurfaces are shown. The fifteen-unit splint has twelve abutments and only three dummies.

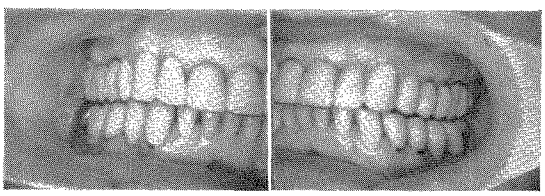

Fig. 398. Right and left sides of the splint in the mouth. These photographs were taken in 1962. This was eight years after completion. The roentgenograms of the prosthesis shown in Figs. 396 and 397, just after completion, are shown in Fig. 997, p. 462.

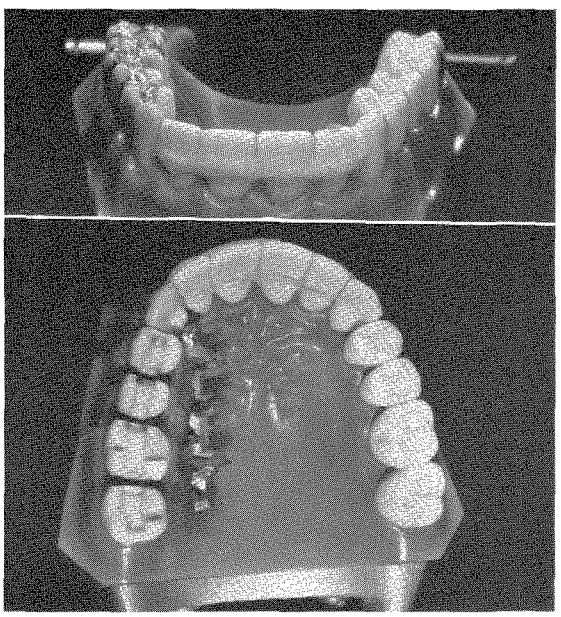

Fig. 399. A temporary splint cast in one piece consisting of four gold inlays. This is for the posterior teeth. The anterior teeth have dental floss ligating them together. Quick-cure plastic has been painted on their labial surface. That makes a practical immediate transitional splint to stabilize weak periodontally involved teeth. In the upper photograph the gold posterior inlay splint is in place. This may also be cast in silver or in any alloy.

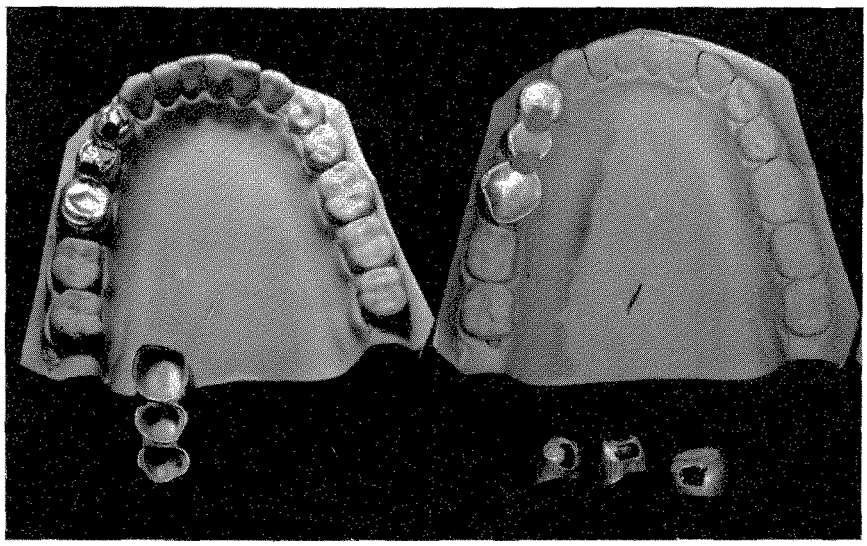

Fig. 400. Aluminum shell crowns are easily perforated with mesial or distal holes and fitted over the involved teeth to make a very practical temporary splint quickly. They are filled with quick-cure plastic as shown in the illustration. If more time can be spent, this technique may be refined.

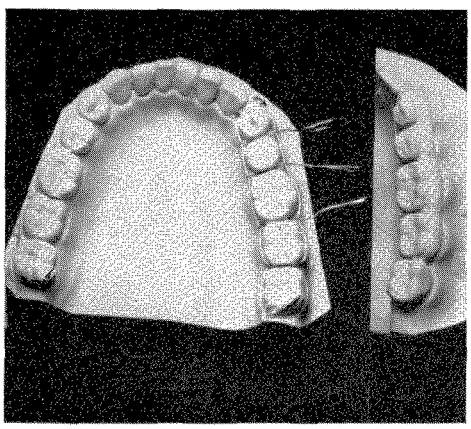

Fig. 401. Stainless steel wire may be used to ligate teeth as shown here on the bicuspids and molars. Then, when the edges are removed, quick-cure plastic is applied as is shown on the right side. This plastic may also be applied to the lingual surface. It gives rigidity and smoothness to the temporary splint.

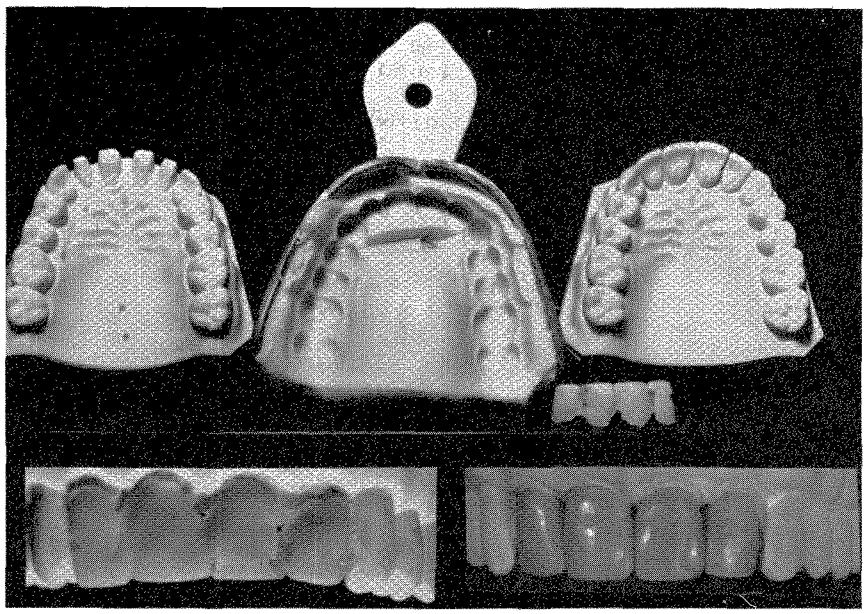

Fig. 402. A temporary plastic quick-cure bridge can be made by first taking an alginate impression before the teeth have been prepared. Quick-cure acrylic is then painted in the teeth that are to be splinted. A thin shell is obtained which is shown to the right and below the original cast. The teeth are then prepared in the mouth as shown on the upper left cast. The shell of acrylic is then fitted over the preparations and adjusted for proper contacts and for the bite. It is then filled with quick-cure acrylic and inserted once more. When the plastic has cured, the bridge is further finished, polished, and, finally, inserted as shown at the bottom right of this illustration.

NIGHT GUARDS

Acrylic night guards

Slow-cured acrylic splints covering the occlusal and incisal surfaces of an entire arch have been used as therapeutic tools, being worn at night or even during the day to correct bruxism. The splint prevents injury to the periodontal tissues which otherwise are exposed to the excessive forces produced by bruxing and clenching habits. As a night guard it serves to stabilize the teeth. Its surface is polished, and its cusps are low so that almost all the opposing teeth contact it in centric and excentric positions. The teeth cannot be intercuspated when the splint is in position. Therefore, it prevents the application of the unfavorable lateral stresses. (Figs. 403 and 404.)

Hazards of soft rubber night guard

Salkind stated that the soft rubber splint, which is recommended by some, presents a number of hazards: "The occlusal portion of the rubber is displaced by the opposing teeth when they are in contact with the rubber. By this occurrence, the opposing teeth become seated or locked into the rubber. Consequently, when the lateral movements of bruxism are performed, mobile teeth, which lie within

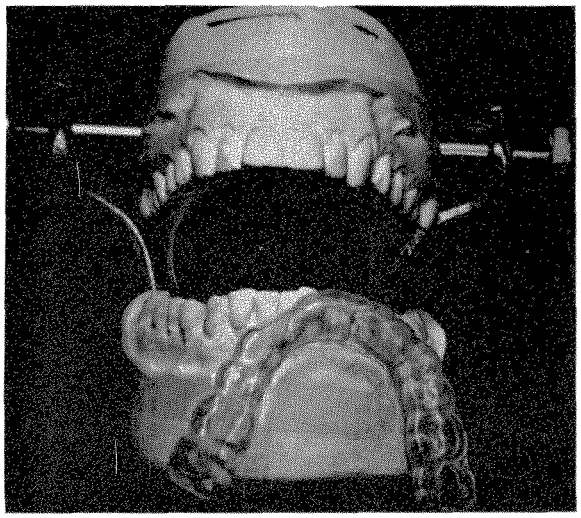

Fig. 403. Clear acrylic splint which completely covers the lower occlusal surfaces and is worn at night in order to help curb the pernicious habit of bruxism and of clenching the teeth together. This is made on the lower cast shown here. It is constructed as thin as possible to occlude with the upper teeth. It is again adjusted in the mouth. After it has been completed, it should be refitted upon a duplicate cast. This saves the dentist considerable chair time in fitting it.

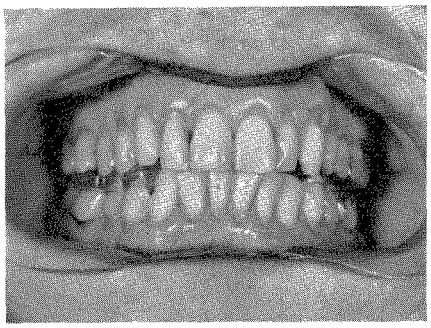

Fig. 404. This patient is wearing an acrylic night guard which has no incisal coverage. Only the posterior teeth contact. There are all forms of this type of night guard including the Hawley bite plate which is worn on the upper teeth and has only incisal contact.

the splint, will move. At the same time, teeth adjacent to the mobile teeth will be placed under additional stress because of the distortion of the rubber. Opposing mobile teeth will also move because they are grasped by the occlusal portion of the splint.

"The acts of bruxism and clenching produce tremendous pressure which can be transmitted through the soft rubber to the teeth underneath the splint. Soft rubber does not seem to be an effective material to serve as a buffer against such excessive forces."*

CAST METAL TEMPORARY SPLINTS USED IN RECONSTRUCTION

Use of throw-offs

Cast metal temporary splints have been used for many years as protection to the teeth during reconstruction procedures. A cantilever which is soldered to a splint may be used to restore a missing posterior tooth. An example of such a restoration would be the replacement of a lower first molar using full crowns soldered together on the bicuspids and cuspid. There are many combinations of this procedure. It is intelligent to decrease the size of the dummy because of the great leverage effect a free-end dummy will create. Some form of precision attachment or

*Salkind, Albert: Abstracts, New York State D. J. **28**:36, 1962.

rest may be placed in a throw-off from the last abutment casting if there is insufficient room in which to place the precision attachment in the casting itself. (Figs. 405 to 409.) The gum tissue remains healthier around the throw-off than it does around the abutment casting. Here, again, the throw-off should be as small as possible to control the tilting leverage on the splint.

When a dummy is thrown off the end of a splint, considerable pressure may be exerted. This has been responsible for the fracturing of the crown of the abutment tooth adjoining the throw-off. The imperceptible movement caused by the throw-off has also caused a loosening of the casting on the abutment teeth. For these reasons, throw-offs should not be used indiscriminately.

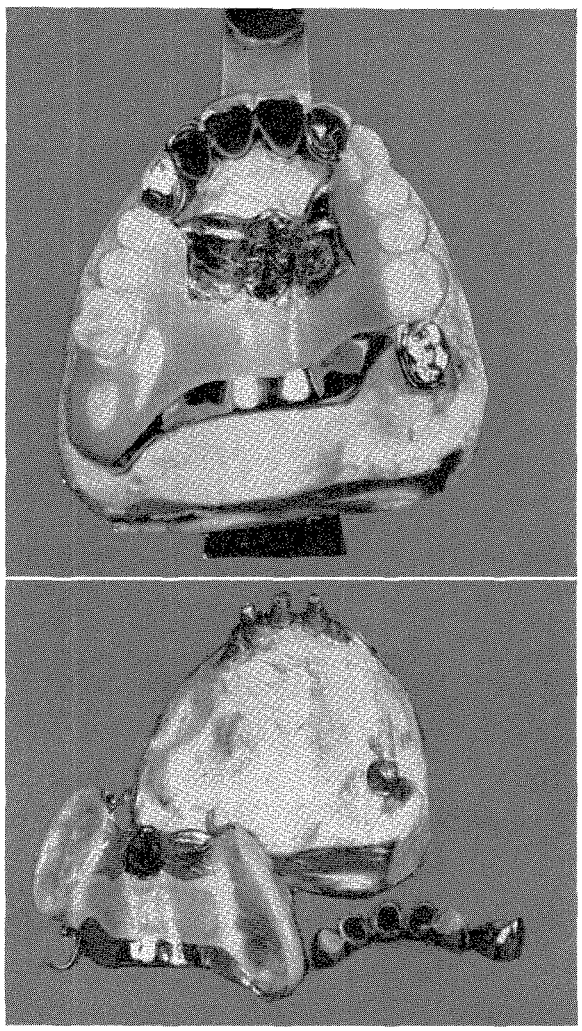

Fig. 405. Only four maxillary teeth remained to support this upper removable partial denture. Two throw-offs were used in which to place the precision attachments with their lingual arms. The left third molar was crowned and an attachment also placed in it. This work is shown on and off the casts. It was inserted in June, 1956. (Figs. 405 to 407 are of the same case.)

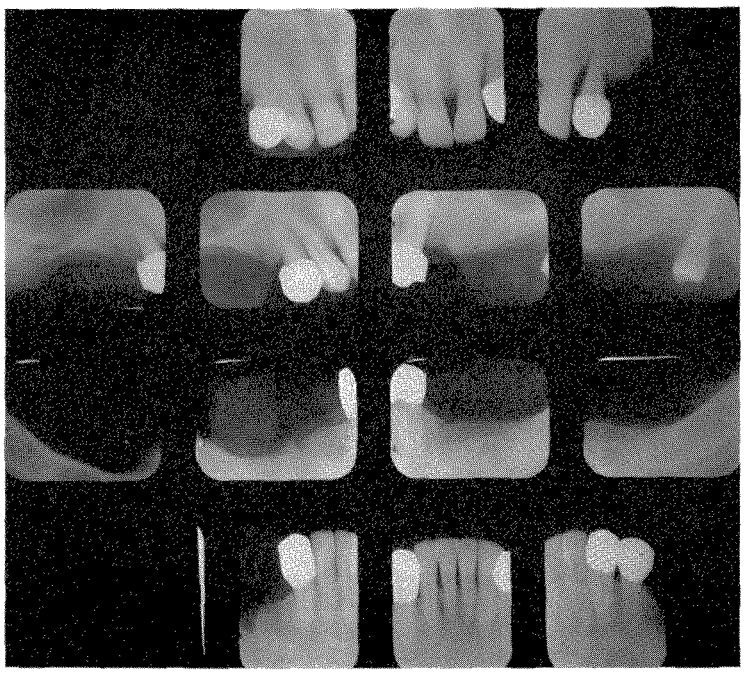

Fig. 406. The roentgenograms are shown before the work was started in March, 1956. The prosthesis was inserted in 1956.

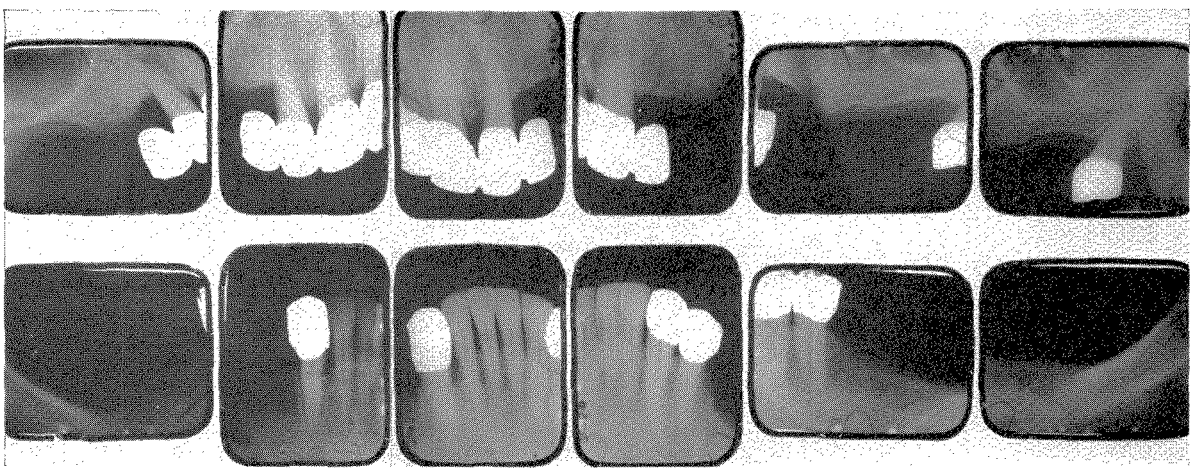

Fig. 407. These are the roentgenograms taken in March, 1962, six years after the upper prosthesis was inserted.

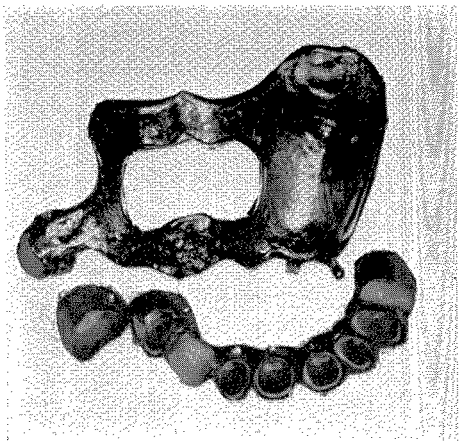

Fig. 408. In the fixed splint at the bottom of the photograph the first bicuspid throw-off contains the female part of the precision attachment.

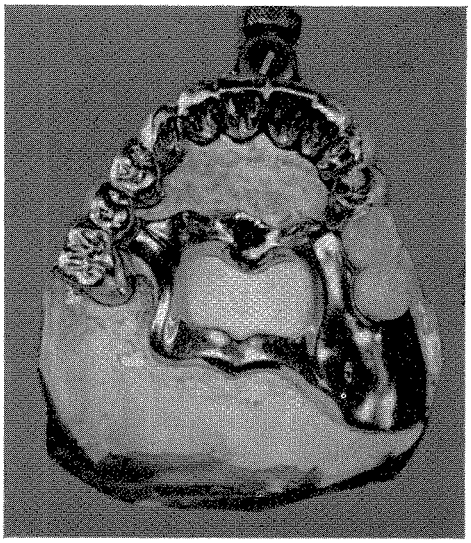

Fig. 409. Removable and fixed partial dentures shown in Fig. 408 assembled on the cast.

PHYSIOLOGICAL, BIOLOGICAL, AND MECHANICAL PROCESSES INVOLVED IN SPLINTING

The physiological and mechanical as well as the biological processes involved in splinting will now be considered. A careful study of the aging process of an individual will reveal significant stages in the development, the usefulness, and the final degeneration of the tissues and organs of the body. (Fig. 410.) Bone is no exception. Our subject concerns itself with the teeth and their investing structures —more especially with the alveolar bone in which they are cradled.

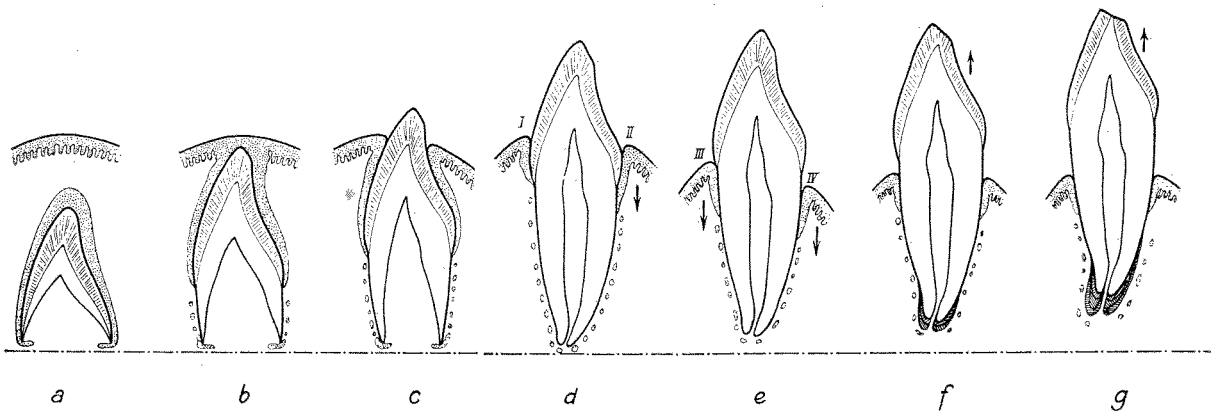

Fig. 410. Tooth eruption. (From Gottlieb, B., and Orban, B.: Biology of the investing structures of the teeth. In Gordon, Samuel M. (editor): Dental science and dental art, Philadelphia, 1938, Lea & Febiger.)

Alveolar bone

In the infant, before any teeth have erupted, there is no alveolar bone because there is no need for it. It is a specialized bone whose sole purpose is to support the teeth as they erupt. At this stage of development the tooth buds are contained within the basal bone. As the primary teeth erupt, they bring this alveolar bone with them, and with the eruption of the primary dentition we have the first matrix of alveolar bone which surrounds and supports them.

The loss of the deciduous teeth and their replacement by the final dentition calls, once again, for the resorption, rebuilding, and, finally, the consolidation of alveolar bone about their roots. This matrix reaches its maximum in amount and strength at the peak of man's life as with his other tissues and organs.

Effect of aging on crown-to-root proportion

As age progresses, degenerative processes set in. Teeth continue to erupt throughout life. Continuous eruption is paced by tooth wear. New bone is laid down at the apex as the tooth moves occlusally or incisally in its socket. As the individual ages and as the teeth continue to erupt, the hard and soft tissues are attached further toward the tooth apex with less support than heretofore. (Fig. 411.) The crown-to-root proportion becomes more unfavorable, and tolerance to vertical and horizontal pressures decreases. Age reduces the size of the alveolar ridge. This is a part of general senile atrophy. With the loss of the teeth, the alveolar ridge disappears entirely. According to Jarabak* there are four factors that seem to hasten the disappearance of the specialized alveolar ridge: (1) occlusal trauma, (2) undue abrasion, (3) glandular disturbances, and (4) local diseases. In many individuals the alveolar process does not wait for the teeth to disappear but begins to atrophy before its full purpose of providing a stable base for the teeth has been served. (Fig. 412.) We are, therefore, confronted by the disturbing and nonreversible process of aging taking place in an area in which, together with abrasion and continuous eruption, we are confronted with elongated teeth and insufficient alveolar bone support.

As dentists our concern is to attempt to provide greater stabilization to the teeth by whatever means we have at our command, in order to compensate for what we know to be "the normal physiological process of aging." Actually, our problem concerns itself with the breaking down of the bony matrix which invests the final dentition.

Types of forces present in masticatory function

The tooth is embedded in the alveolar bone by means of the periodontal membrane. (Fig. 413.) Suspensory fibers from this membrane completely surround and are attached to the root and to the bone. There are two types of forces present in normal masticatory function, vertical and horizontal, or a combination of both.

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*Jarabak, Joseph R.: Alveolar bone and its apical bases, their significance in prosthetic dentistry. Presented at the meeting of the American Prosthodontic Society, Congress Hotel, Chicago, Feb. 3, 1961.

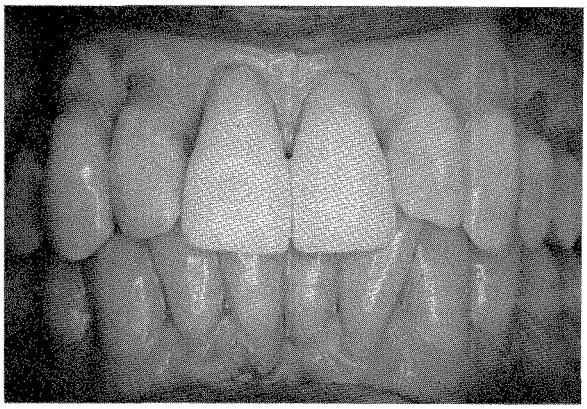


Fig. 411. In some individuals the aging process is accompanied by alveolar absorption and gum recession. No pocket formation is present. These are the teeth of an elderly woman.

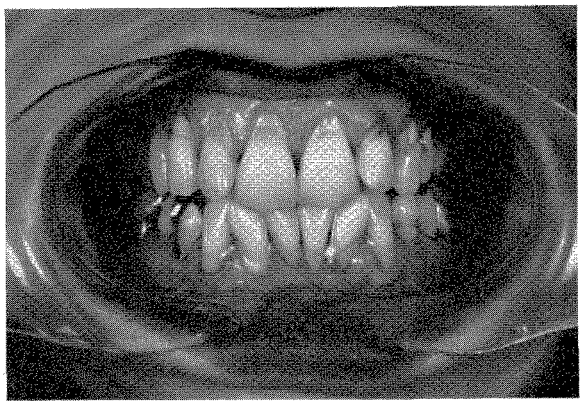


Fig. 412. This is the mouth of a female patient still in her thirties. The alveolar resorption and the gum recession are premature.

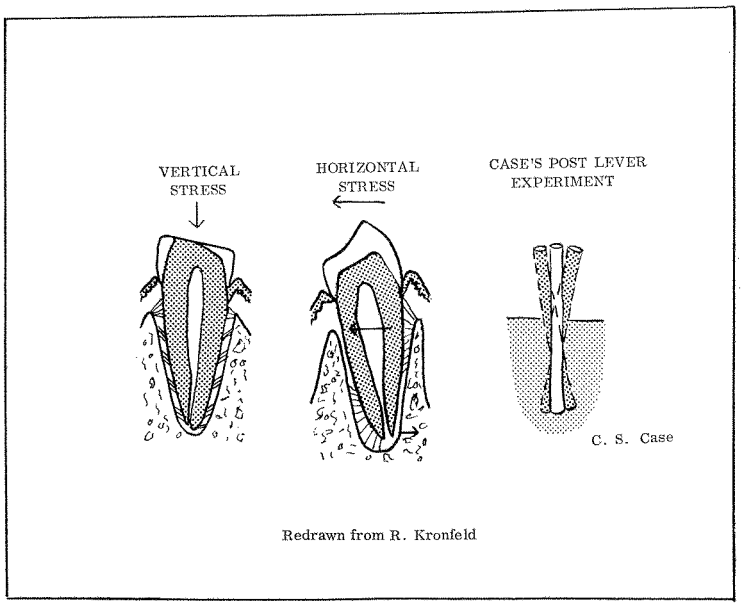


Fig. 413. Diagram of vertical and horizontal stresses. (Redrawn from Boyle: Kronfeld's histopathology of the teeth, ed. 4, Philadelphia, 1955, Lea & Febiger.)

A vertical force serves to stretch almost all of the peridontal suspensory fibers, except those at the very apex of the tooth, and if it is intermittent, serves as a physiological stimulus to the involved teeth. The tooth becomes tighter unless the vertical force is excessive or sustained for a long period of time. A horizontal or lateral force only stretches a relatively small area of periodontal suspensory fibers in opposing root areas. Lateral forces are not physiological and not well tolerated. Cohn* showed that with large crowns and short roots even vertical forces can be excessive. (Figs. 414 and 418 to 421.)

*Cohn, L. A.: In Glickman, Irving: Clinical periodontology, Philadelphia, 1953, W. B. Saunders Co., chap. 59, Fig. 725, p. 952.

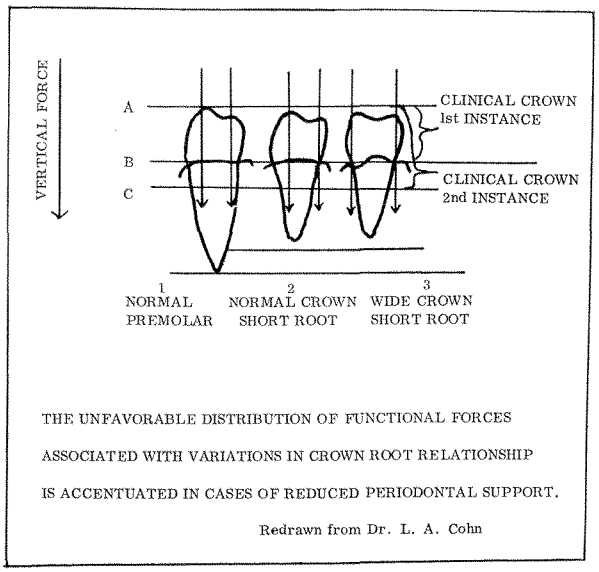


Fig. 414. The unfavorable distribution of functional forces. (Redrawn from Cohn, L. A.: In Glickman, Irving: Clinical periodontology, ed 2, Philadelphia, 1958, W. B. Saunders Co.)

Fig. 415. The force exerted upon the single-rooted and double-rooted teeth of a dog. (From Gottlieb, B., and Orban, B.: Die Veränderungen der Gewebe bei übermässiger Beanspruchung der Zähne, Leipzig, 1931, Georg Thieme.

The experiments of Stuteville* while working with dogs showed that single-rooted teeth when acted upon by lateral forces of mastication, tend to tip with the axis of rotation somewhere in the region of the apical third of the root. Multi-rooted teeth, such as a lower first molar, when subjected to a mesiodistal force, tend to rotate upon a buccolingual axis which is located in the alveolar bone between its two roots. (Fig. 415.) In this instance, if the force comes from a distal direction, the mesial root would be depressed in the socket, whereas the distal root would be elevated. Thus, in a comparison between a single-rooted and a multiple-rooted tooth, subject to the same mesiodistal force, the tipping action would be much less in the case of the latter.

Although we were aware of the favorable clinical results of splinting, it was the research of Box, Stuteville, Smyd, Case, Schwarz, Kronfeld, Gottlieb, Coolidge, Hay, and others which related the theory to the practice. The multirooted tooth can be regarded as a small splint in which two single-rooted teeth have been united. The three-unit fixed bridge is a small splint in which the axis of rotation against mesial or distal pressure is situated in the alveolar bone between the two roots and at right angles to the pressure instead of in the apical third of the individual tooth. Movement is more bodily than tilting or tipping. More periodontal suspensory fibers resist the pressure, and there is less overloading.

Consideration of axes of rotation when force exerted

With buccolingual or linguolabial pressures being exerted, it has been shown that the axis of rotation is in a mesiodistal direction at right angles to the direction of the force. This causes unfavorable tilting and tipping. Therefore, the unilateral posterior bridge or the three-unit or four-unit anterior bridge, although aided by having two or more abutment teeth resist the horizontal stresses, still is not as well supported as it would be if additional support were obtained from a different segment of the arch.

Lateral pressures best resisted when at least two different segments of arch united by rigid splinting

Let us consider the example of connecting the posterior and anterior segments together by means of one continuous rigid splint. (Fig. 416.) In this instance, the linguolabial forces which tip the incisors labially about a rotational axis running through the apical third of their roots in a mesiodistal direction have the direction of the axis changed so that the resultant force is neither in a linguolabial nor in a buccolingual direction. The resultant force is somewhere between the anterior and posterior segments of the arch, and the tooth movement is more bodily than tipping. The same applies to buccolingual forces on posterior splints. When antero-posterior teeth are connected, the axis of rotation for the posterior teeth no longer runs anteroposteriorly but rather runs between the two individual axes. The posterior abutment teeth now move more bodily. A similar situation exists to a small degree because of the curvation of the human dental arch. Rigidly uniting any two

*Stuteville, O. H.: Orthodontic studies, D. Res. and Grad. Quart. Bull., 1935.

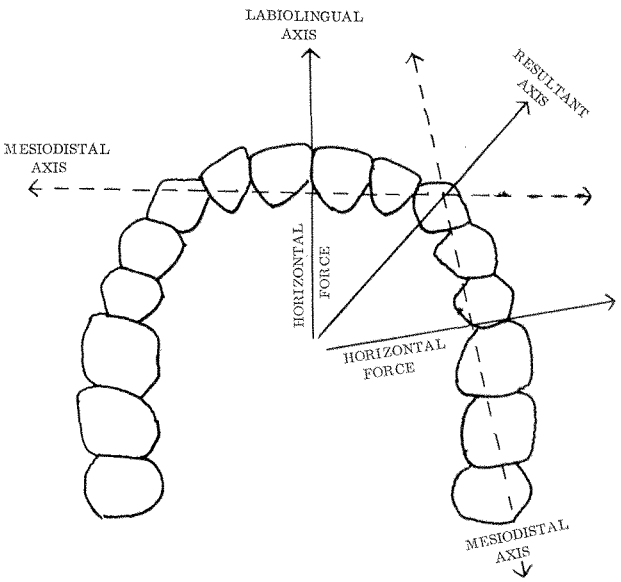


Fig. 416. Horizontal forces are more favorably counteracted by splinting anterior and posterior teeth together.

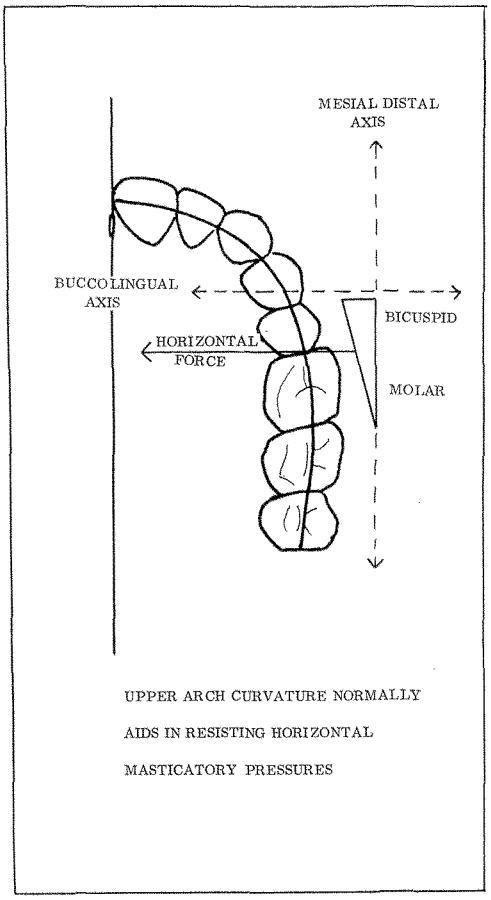


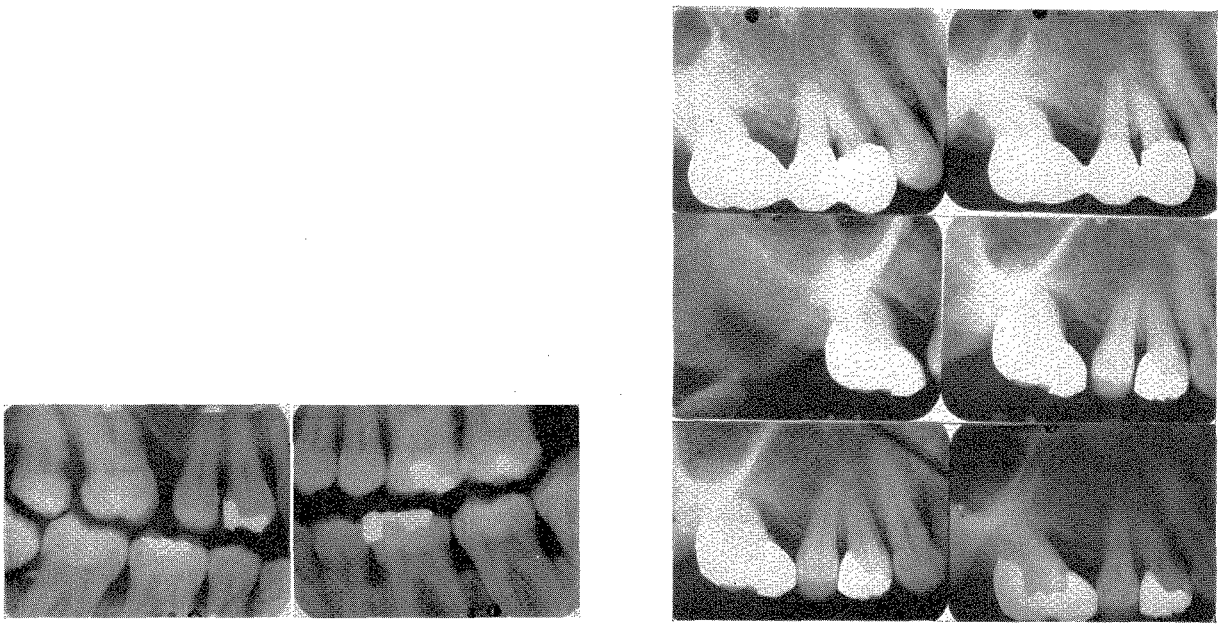
Fig. 417. Upper arch curvature normally aids in resisting horizontal masticatory forces.

adjoining posterior teeth, such as a molar and a bicuspid, provides greater foundational stability in their ability to resist lateral forces because of this arch curvature. (Fig. 417.)

Where posterior teeth require unilateral splinting and a cuspid has been lost on the same side, the use of a single lateral incisor as the anterior abutment to the fixed partial prosthesis may not be sufficient to prevent the bridge from resisting buccolingual forces which tend to rotate it about a mesiodistal axis. In these cases the lateral incisor will be subject to forces which may become traumatic and result in its separation from the adjoining central incisor.

Figs. 413 to 415 explain why lateral forces are unfavorable. Even when vertical forces are present, the center of gravity should fall within the clinical crown. If a small space is to be filled, the correct procedure is to join it rigidly to one adjoining tooth or more, if necessary, in order to give it adequate support. If the same small space is filled by simply enlarging the clinical crown of the already weakened tooth, the vertical forces directed against it are well outside this clinical crown, and the tooth will soon be lost. Such a case is shown in Figs. 418 to 421. Wedging effects must also be avoided if contacts are to remain closed. Modern man is subject to bruxing and clenching. Where a wedge is provided by abrasion and attrition, these

Text continued on p. 197.



A B

Fig. 418. A, Roentgenograms of a 35-year-old male patient taken in 1948 showing periodontal disease on both sides of his mouth. The right side is considerably more involved because of the failure to replace the upper first molar. The wedging effect of the lower second molars is evident. **B,** The spaces on the right side were closed by means of inserting gold inlays which provided contact. The lower plunger cusps were also eliminated (lower roentgenograms). In 1953 the periodontal tissues were in a continued state of degeneration, and the contacts were once again opened, allowing for vertical food impaction (middle roentgenograms). Vertical forces acting upon the upper molar were converted into lateral thrusts because of the oversized and off-base gold restoration. This condition was corrected by an upper three-unit rigid splint as shown in the upper roentgenograms. This immediately neutralized the noxious influences and stabilized the teeth. (Figs. 418 to 421 are of the same case.)

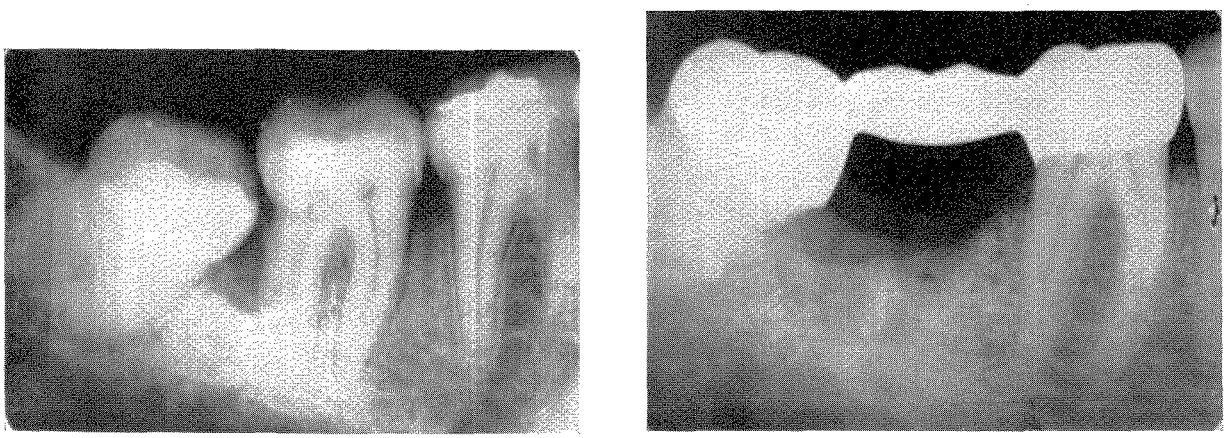


Fig. 419. In November, 1950, the lower second molar was removed in an effort to control the advanced periodontal disease. A fixed bridge splint was inserted as the right radiograph reveals. Low cusps and a well-coordinated interocclusal relationship augmented the healing process.

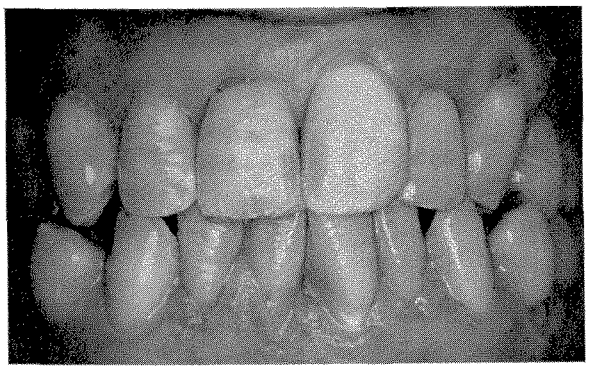


Fig. 420. Front view of the mouth as it looked in 1961. The patient was then 50 years old.

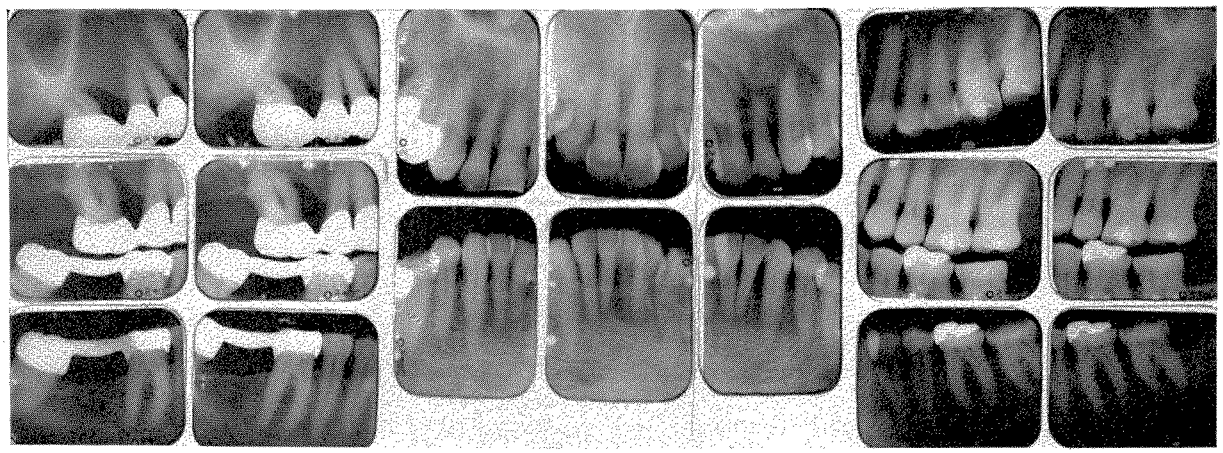


Fig. 421. Roentgenograms taken in March, 1961. The health of the periodontal tissues had improved. No teeth had been lost since 1948.

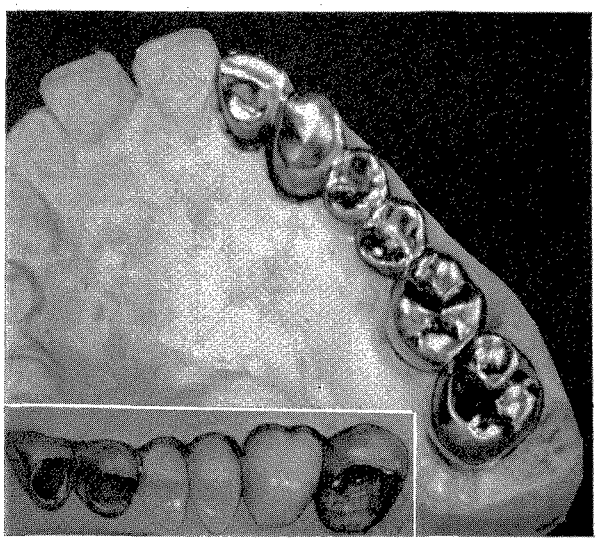


Fig. 422. A molar and two bicuspid dummies are being supported by three natural teeth. This bridge has now served for twelve years. (Figs. 422 to 424 are of the same case.)

Fig. 423. At the top is the bridge shown in Fig. 422. At the bottom the mouth is shown at the start of treatment with the old bridge in position.

Fig. 424. The cuspid had been nonvital for over twenty-five years. It formerly supported a pivot. In making the new bridge in 1951, this pin was left in rather than attempt its removal. The patient was a severe gagger, and a removable partial denture would have been difficult to tolerate. The 1962 roentgenograms of this bridge are shown here.

noxious influences become more profound, with the resulting loss of the teeth. This is also shown in Figs. 418 to 421.

Simring and Smyd showed that a greater stability results when the abutment teeth are farther apart, in the case of the mesiodistal forces, because of the desirable, more nearly vertical resistance of the abutment teeth. However, in the case of buccolingual forces directed against the posterior splint, the farther apart the abutment teeth are placed, the greater the tendency to tip or tilt or rotate the abutments due to the rotation of one tooth about the other as though it was a fulcrum. In this instance, where three missing teeth adjoining each other in the posterior section are to be replaced, the use of more than two abutments, or combining an anterior and a posterior splint, or the use of a bilateral removable connector is desirable. (Figs. 422 to 424.)

Chayes' theory on connecting teeth in a rigid splint

When Chayes conceived his idea of movable removable bridgework utilizing the precision attachment, which was then known as the Chayes attachment, he believed that each tooth moved in function and that it was unhealthy to connect several teeth together in a rigid splint because it prevented this necessary physiological movement. We are aware today that in order to have mobile teeth repair their periodontal investing tissues, they must be immobilized. In addition, sometimes we even take these teeth out of function and equilibrate them against noxious occlusal forces during this period of repair. However, no matter how effective the fixation may be, there is always a certain amount of periodontal stimulation which these teeth receive. They are in no sense rigidly fixed to the osseous structures, as Chayes thought. We also are familiar with roentgenographic evidence of thickened periodontal membranes in the case of mobile teeth. When these teeth are treated successfully, these membranes become thinner, as does the lamina dura, and the tooth becomes tighter in its socket. Clinical evidence demonstrates that regardless of the splinting effect physiological movement is always present.

Decided advantages of multiple abutments

Chayes also believed in the stimulating effect of unilateral partial removable bridges and the additional support given by the use of the saddle areas.

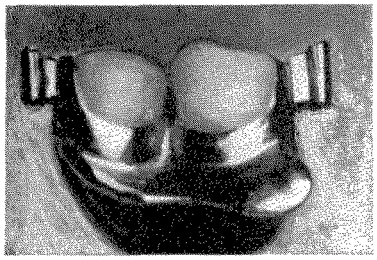


Fig. 425. Example of a lower two-tooth unilateral removable partial denture which was retained by precision attachments. This bridge was inserted in 1935 and was still being worn twenty-seven years later. A similar one was inserted on the right side, also in 1935, but was replaced for a fixed partial denture in 1957. (Figs. 425 to 427 are of the same case.)

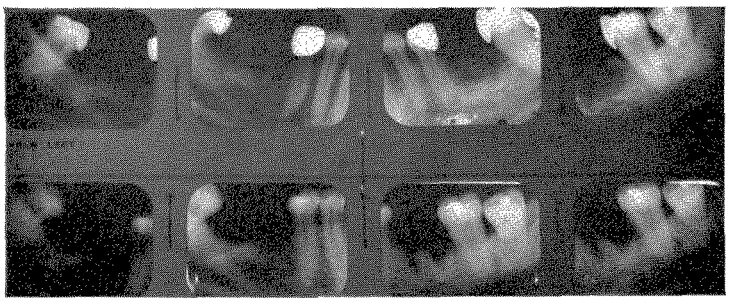


Fig. 426. The lower roentgenograms were taken in 1934 before the insertion of the bridge shown in Fig. 425. The upper roentgenograms were taken in 1935 after the insertion of the right and left removable partial dentures.

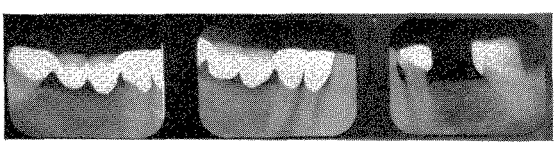


Fig. 427. The roentgenograms shown here were taken recently. The right removable bridge was replaced in 1957 for the fixed partial denture which is shown here. It was used for twenty-two years.

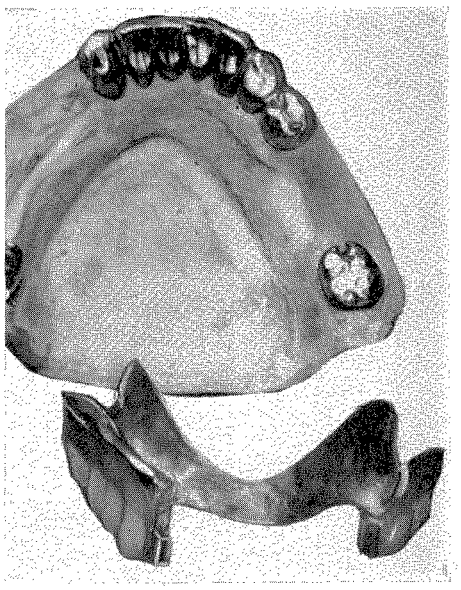


Fig. 428. The bar which connects the abutments should be rigid in order to have the strong teeth support the weak teeth. The lingual bar shown here is strong.

(Figs. 425 to 427.) Careful observations since his reports seem to indicate, in the case of the unilateral removable partial denture, that although additional support may be obtained by the use of a saddle, still the use of multiple abutments in the case of the fixed partial denture offsets this advantage and provides a replacement which resists and distributes the masticatory forces more favorably.

Desirability of a rigid connecting bar in removable partial dentures

Where a removable partial prothesis is resorted to, the bar or casting which connects the abutments should be sufficiently rigid to be able to distribute the masticatory forces evenly to all abutments. (Fig. 428.) If this connecting casting were able to bend, a weak tooth would not receive sufficient support from the stronger abutments to become healthy and then in turn lend its strength to the support of the appliance. Instead, one by one of the abutments would be lost, the weaker ones going first. With removable partial prosthesis, multiple abutments should be the rule.

Decided advantages of precision attachment when used as retaining device in removable partial dentures

Inasmuch as the precision attachment provides one of the best methods of tooth fixation, its use in the fabrication of removable partial dentures is recommended. Cohn* advocated the use of precision attachments in removable partial denture construction because (1) they provide the best method of splinting mobile teeth, (2) they provide an inflexible path of removal and insertion so that no abutment tooth is subject to excessive stress, (3) they fix the teeth between their extremes and thereby prevent the abutments from moving, (4) they create vertical intrusive forces which are best tolerated by the suspensory mechanism, and (5) since there is no circumferential pressure, the supporting structure of the tooth is not under constant strain. The teeth are only in stress when functional force is applied.

DISADVANTAGES OF SPLINTING

Splinting has its evils. It creates a problem of maintaining good hygiene under difficult circumstances. With soldered joints connecting the teeth, the interproximal embrasures either are nonexistent or are small, and access is difficult. (Fig. 429.) The gum tissue is strangled. Even where good mechanics has been employed, and the soldered joints are as high occlusally as is possible, it is difficult to massage the gums in order to promote healthy tissue reaction to function. Consider all the cases in which the mechanics is poor and the soldered joints are too far cervically. In these cases, it is impossible to use rubber tips, Stim-U-Dents, or any form of proper massage. Irritation, poor hygiene, and inflammation result. Then, there are those

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*Cohn, L. A.: The physiologic basis for tooth fixation in precision attached partial dentures, J. Pros. Dent. **6**:220-244, 1956.

cases in which the teeth are so close together anatomically that, no matter how skillful the mechanics, it is impossible to create embrasures.

It is also evident that where splinting is resorted to, the opposing teeth should be protected against the extra load which is transmitted to them. Should the opposing teeth be subject to periodontal pathology, the effect of the extra loading caused by a multiple-unit splint may be more than their suspensory mechanism can tolerate. In such cases it is advisable that one splint should oppose another.

PROBLEMS CREATED BY PERIODONTAL SURGERY

Where periodontal surgery has been performed and as a consequence root surfaces have been exposed, it is difficult to identify the cementoenamel junction and the position of the pulp chamber while preparing these teeth for castings. This is especially true when these teeth have been prepared once before gum resection and again after healing. The conventional landmarks have been removed. (Figs. 430 to 433.) Unless extreme caution, aided by roentgenograms, is used, the pulps of these teeth are more apt to suffer injury and exposure than teeth which are not surgically prepared before they are ground for the castings.

In the majority of splinted cases, the full crown is the abutment casting of choice. With the high-speed instruments which are available, this may invite excessive tooth destruction in addition to improper contours and faulty margins. The procelain jacket crown coping bridge does not lend itself to proper splinting because the soldered joint is placed within the cervical third. With this type of splinting a higher soldered joint is often difficult to attain.

POSTINSERTION FOLLOW-UP

In all restorations involving multiple abutments, there is danger of caries and pulp involvement. This need not be the fault of the operator, but it may be due to a high caries index plus the fact that interproximal debris is difficult to remove. As time passes, the gum tissues may recede and expose root surfaces which are then subject to caries. (Figs. 434 to 437.) Regular clinical examination and radiographs are necessary for good postinsertion checkups. Frequently, caries can be detected in its incipient state, and posterior restorations of amalgam or gold can be inserted. Anteriorly, it is often necessary to resort to plastic or synthetic porcelain. Although these fillings are not as durable as the metal ones, still they help in extending the usefulness of the splints.

Occasionally, a crowned tooth which forms part of a splint becomes devitalized. This can often be detected by roentgenograms or by clinical symptoms and evaluation. It is sometimes possible to do pulp therapy without removing the crown, whereas at other times it is possible to remove and repair only a section of the bridge. (Figs. 438 to 440.)

The hazard in these cases is to gain access to the pulp chamber without removing too much tooth structure. Otherwise the crown will separate from the root even though the root canals may be well filled. It sometimes becomes necessary to fill the tip of a root, whose canal is inaccessible, with amalgam by means of a root amputation. (Fig. 441.) In fact, many infected roots have been removed from extensive splints without removing the splint. (Figs. 442 to 444.) When healing has

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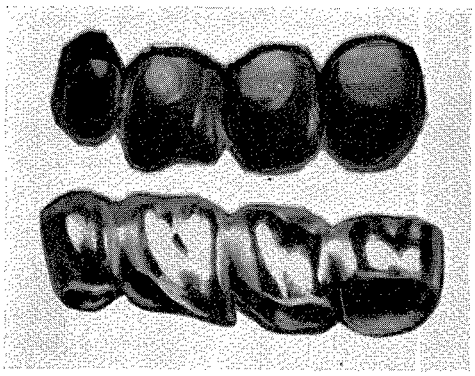

Fig. 429. A four-unit upper left fixed splint involving a bicuspid and three molars. These teeth were so close together that it was impossible to create proper interproximal embrasures. In cases such as these, proper hygiene is difficult to maintain.

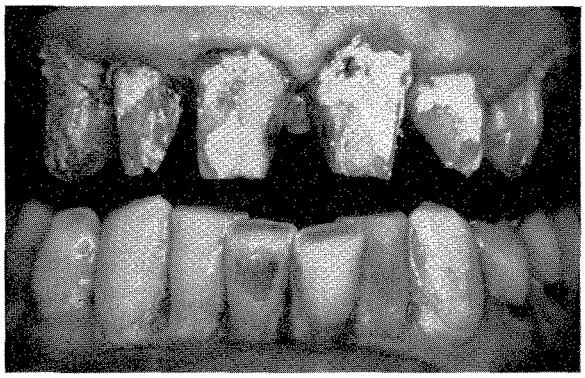

Fig. 430. An old fixed splint was removed from the upper anterior teeth. It was worn for ten years. (Figs. 430 to 433 are of the same case.)

Fig. 431. The gums were then resected to remove the periodontal disease and to eliminate the pockets.

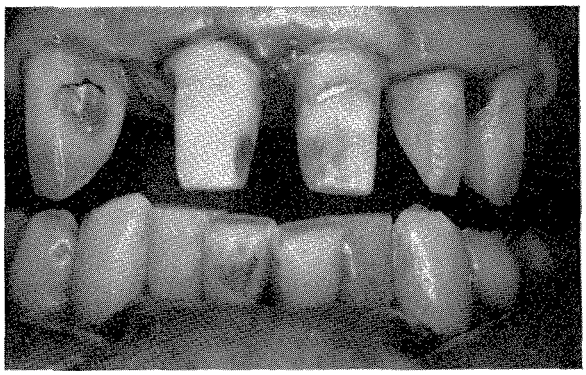

Fig. 432. The teeth were reprepared. Observe the former cervical shoulder which was positioned at the former gum line. In reducing the vertical height in the second preparation, care must be exercised in order not to expose a pulp because of the loss of the landmarks.

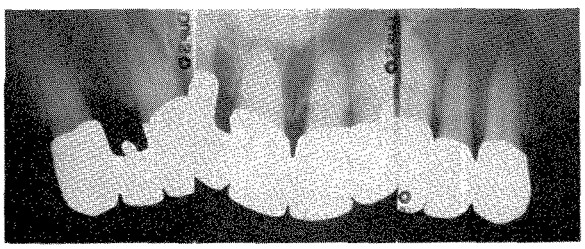

Fig. 433. The roentgenograms of the completed new splint.

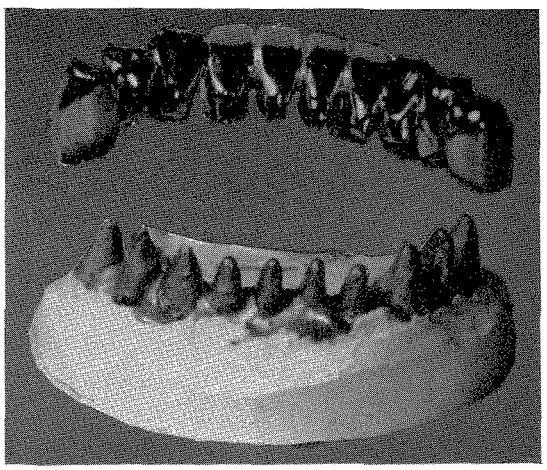

Fig. 434. This ten-unit lower fixed splint was inserted in 1951. The patient was then 73 years old. (Figs. 434 to 437 are of the same case.)

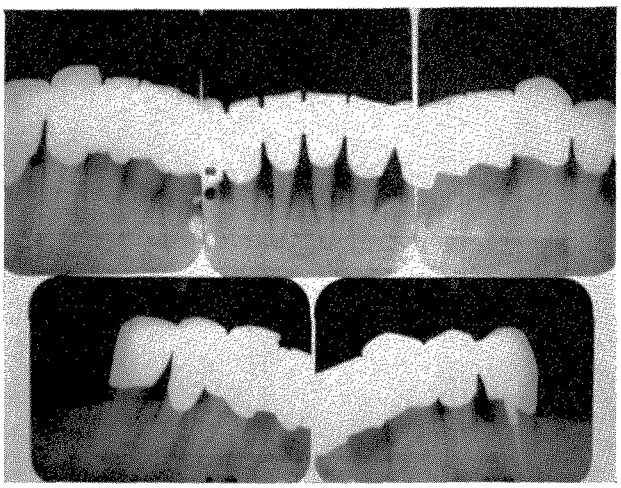

Fig. 435. These roentgenograms were taken when the splint was inserted in 1951.

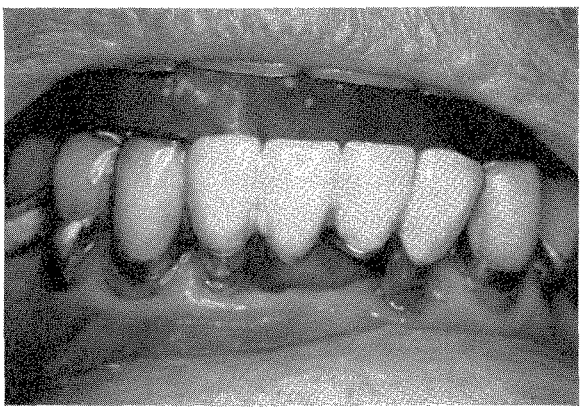

Fig. 436. This is how the splint looked in 1961. During the ten years the lower central incisors were removed, and several teeth had to be filled at their cervical margins with amalgam. The gums had also receded. Elderly people very often lack proper muscular coordination. As a result, adequate hygiene is missing, and caries is more pronounced.

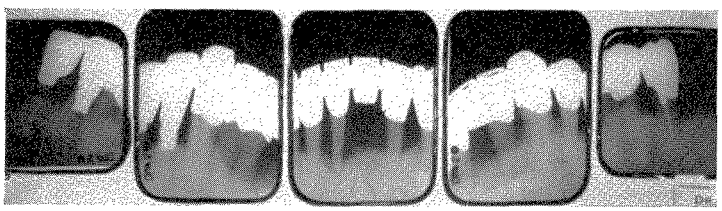

Fig. 437. These roentgenograms were taken in March, 1961. The patient was then 82 years old. This splint was subsequently removed and redone.

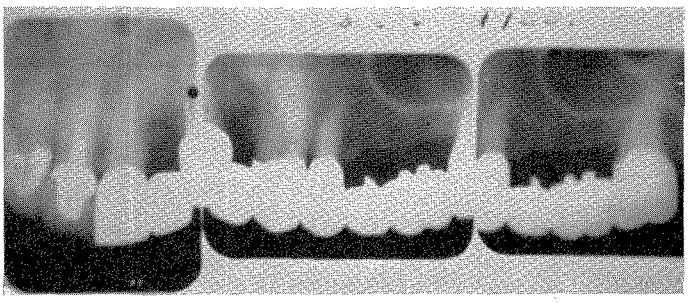

Fig. 438. Roentgenogram of a seven-unit fixed bridge inserted in 1955. The patient was a 68-year-old woman. (Figs. 438 to 440 are of the same case.)

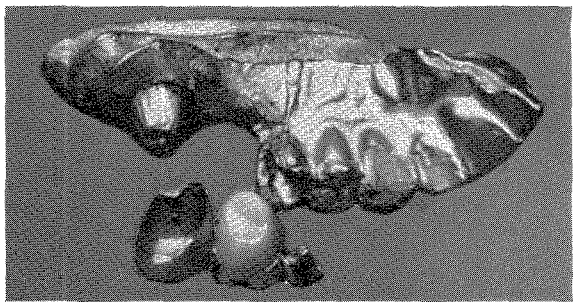

Fig. 439. In May, 1960, deep mesiocervical caries made it necessary to remove the posterior section of the bridge and to remove the pulp of the molar. A new section was constructed as shown here. The deep lug and rest made it possible to repair the bridge without removing the anterior large section.

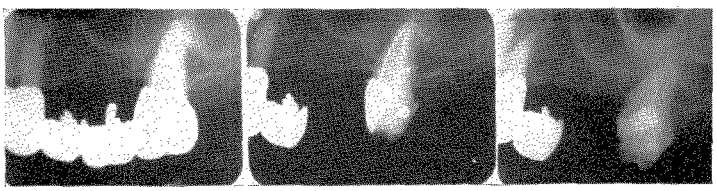

Fig. 440. Roentgenograms of the removal of the posterior section and the final repair. The patient at this time was 75 years old.

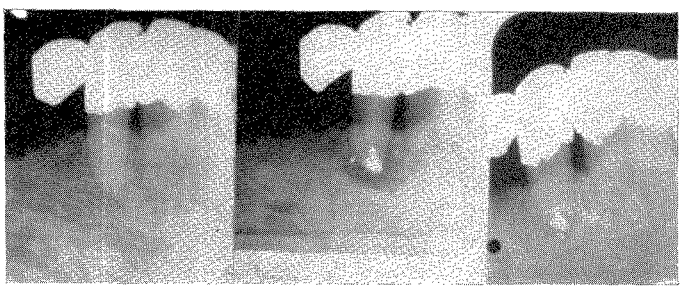

Fig. 441. This lower fixed splint was inserted in 1952 (left film). In 1955 the right cuspid became infected. To gain access through the gold crown would have been hazardous. The root tip was, therefore, filled with amalgam. The infection shown in the center film cleared up within two years, as is shown in the film on the right side.

Fig. 442. The first bicuspid became infected beneath a three-unit splint which covered the cuspid and the two bicuspids. This splint carried a precision attachment which supported an upper removable partial denture. The root was removed without disturbing the splint. This photograph was taken two weeks postoperatively. (Figs. 442 to 444 are of the same case.)

Fig. 443. When the socket was completely healed, a plastic root tip was inserted. This photograph was taken a year later.

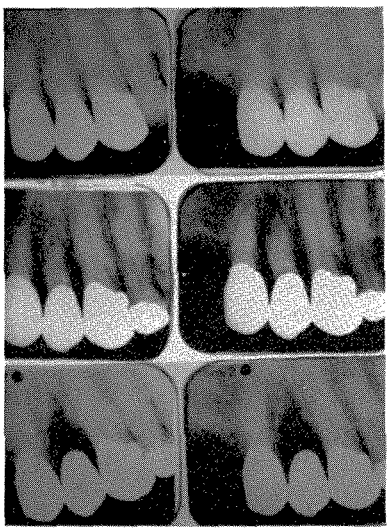

Fig. 444. Roentgenograms before and after of the case shown in Figs. 442 and 443. **Top,** Insertion of the splint. **Middle,** Caries has attacked the first bicuspid. **Bottom,** The bicuspid has been removed. The splint is still in place.

taken place and the tissues have resorbed, the metal crown is filled with amalgam, plastic, or cement. Entire sections of the plastic faces may be removed and replaced by slow-cured new sections. This is necessary when the plastic wears and becomes unsightly. The impression is taken with rubber in a specially made tray. The new facings are cemented in with plastic cement. (Refer to Chapter 6.)

SUMMARY

Proofs that the beneficial effect of proper splinting in conjunction with good crown and bridge practices fortifies the osseous and periodontal structures and enhances the longevity of the teeth are too numerous to be denied even by the severest critics. It would not be possible to insert extensive prosthetic replacements without this valuable adjunct to our therapy. The fact that splinting has been abused by trying to retain teeth which should have been removed is no condemnation of the technique. Without it, total reconstruction would be much more difficult, if not impossible. When properly used, the art and practice of splinting which distributes the masticatory load over a greater number of teeth has helped both patient and dentist. It has provided greater health and longevity to the remaining structures while at the same time permitting better function.

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Chapter 5

DIFFICULTIES ENCOUNTERED IN WEARING A REMOVABLE APPLIANCE

For many people the thought of having to wear a removable dental appliance is unacceptable. This is especially true of the younger and the middle-aged groups. Some of these people associate the removable partial denture with the aging process. For others the appliance acts as a source of irritation no matter how well it has been constructed. There is also a very small group for whom any foreign body stimulates the gagging reflex. For these patients the insertion of a lower lingual bar creates a serious problem.

Case 1

The first patient to be presented was a man who came for dental treatment in 1943 at the age of 54. Any foreign body, even a toothbrush, would initiate violent gagging. Because of this his hygiene was poor. When he was first examined eight teeth were already missing. It is surprising that more teeth had not been lost. He was wearing a lower lingual bar of mediocre design and poor fit. It was only occasionally worn.

Past history

Roentgenograms were difficult to take. Those first presented had been taken in 1943. The gagging reflex was responsible for the subsequent events in the dental history. It was difficult, if not impossible, to do good operative or prosthetic dentistry in his mouth. In the following two years four fixed partial dentures were inserted. How the original pulp therapy was performed is a mystery.

In August, 1949, it became necessary to remove the lower left molar because of caries. It was replaced by splinting the cuspid and bicuspids and throwing off a cantilever molar. In October, 1953, the upper right bridge was replaced by a similar one using full crowns as the abutment castings. The failure had been caused by caries. In 1956 the lower left bridge had to be removed because of caries and pulp infection of the second bicuspid. The pulp was treated, and the teeth were reprepared. A new bridge was inserted. In 1957 the lower right bridge failed because of a deep periodontal pocket associated with the distal root of the posterior molar. The distal root was removed, and the mesial root was filled. A new bridge was inserted in December, 1957. Meanwhile, the lower left bicuspid did not respond to pulp therapy and had to be removed. A smaller bridge was inserted in December, 1957. The mesial molar root of the lower right molar finally had to be removed in June, 1960. In December, 1960, a lower temporary lingual bar was inserted using clasps as the retainers.

In May, 1961, the lower left nonvital bicuspid fractured. This was probably the result of the throw-off attached to it. These throw-offs cause considerable unfavorable lateral pressure and occasionally cause fractures either of the roots or at the gum line. In July, 1962, the lower anterior teeth were splinted together for greater strength, and a precision partial denture was inserted. This lower removable partial denture had limited posterior extension. The patient was making every effort to wear the lower prosthesis as long as possible.

Discussion

There are several aspects of this case to be considered with the benefit of the hindsight provided by the eighteen years that expired since it was first undertaken. Could the patient have been persuaded, some time ago, into wearing a lower removable partial denture? Even though this was often discussed, the patient continually refused. He knew that it was inevitable, yet continued to procrastinate. Seeing how happy and how comfortable he was without one, pressure was never applied. Finally, when no lower posterior teeth remained, he submitted as a last resort because without the removable bridge he was no longer able to masticate adequately.

Although he was not wearing the bridge at all times, he was becoming more accustomed to it and was pleased to be able to wear it at all. If he had a period of gagging, he removed the bridge and replaced it when he felt better able to tolerate it. He was 74 years old (1963) at the time of writing and was in excellent health. Perhaps his ability to wear the removable bridge was concomitant with his age and his acceptance of the inevitable. The loss of most of the teeth took place as the indirect result of the gagging.

Caries took place because of his inability to clean his teeth properly. In addition, the left molar cantilever proved too much of a mechanical obstacle to the already nonvital second bicuspid. The right molar did additional work after the left fixed bridge failed and finally succumbed. The effort to retain its mesial root to support another bridge was the last desperate attempt to stave off a lower lingual bar. The anterior tip-to-tip interocclusal relation and his left cross-bite might have been an additional factor in causing the loss of the teeth. Actually, however, only four teeth were lost in eighteen years. Of these, the left molar and

the left first bicuspid were nonvital in 1943, and the right second molar gave roentgenographic evidence at that time of a beginning bifurcation involvement. But these four teeth were in strategic positions, and their loss necessitated the lingual bar. (Figs. 445 to 454.)

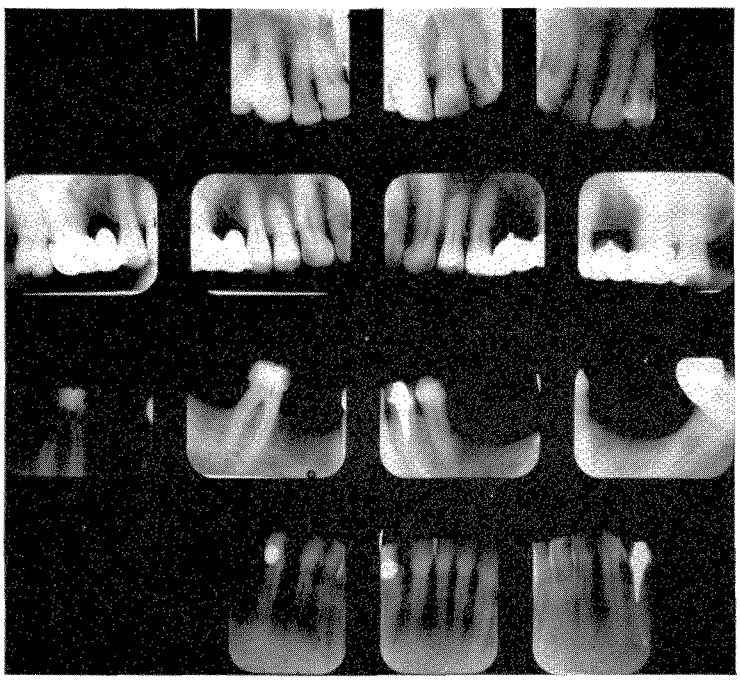


Fig. 445. Roentgenograms taken in 1943 when the patient was first examined at the age of 54 years. (Figs. 445 to 454 are of the same case.)

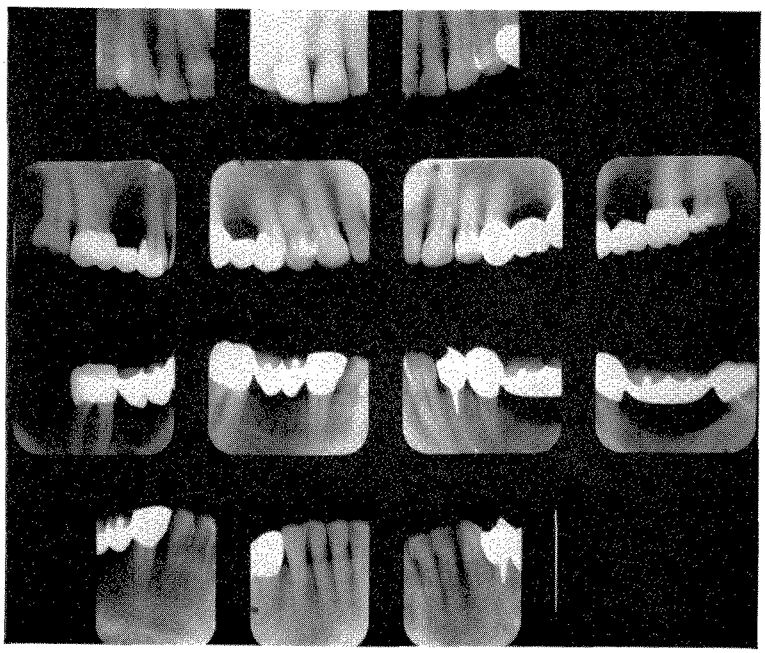


Fig. 446. Roentgenograms taken in 1946 upon the completion of new fixed partial dentures.

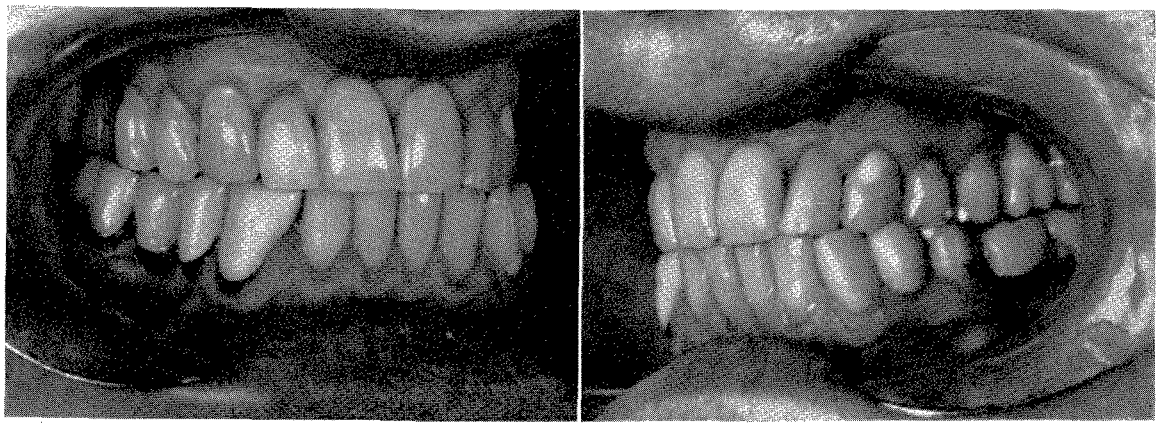


Fig. 447. Right and left views of the mouth after the completion of the restorative work in 1946.

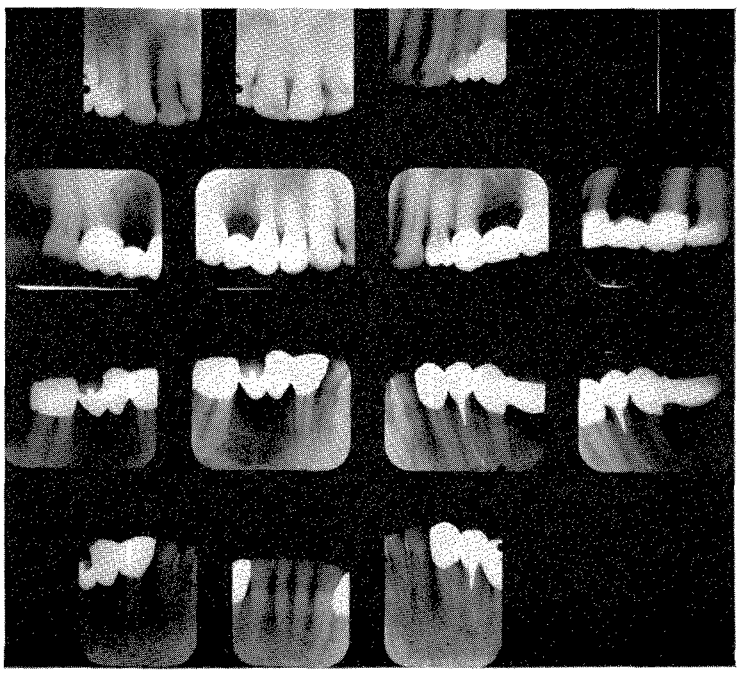


Fig. 448. Roentgenograms taken in 1953 after insertion of the lower left cantilever. There are three abutment teeth.

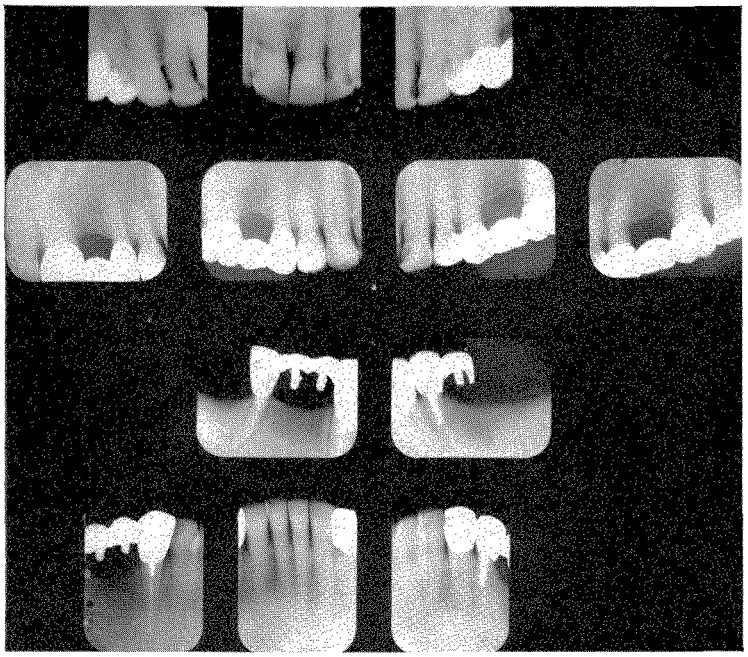


Fig. 449. Roentgenograms taken in 1958 after the removal of the lower right first molar distal root and the insertion of the new bridge. Also, the lower left second bicuspid was lost, and a new cantilever was inserted.

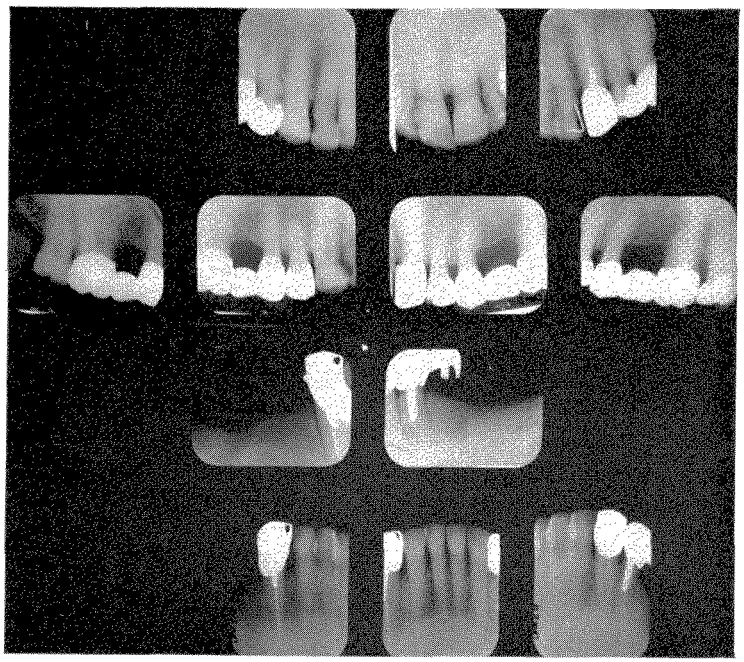


Fig. 450. Roentgenograms taken in 1961 after the removal of the lower right molar root.

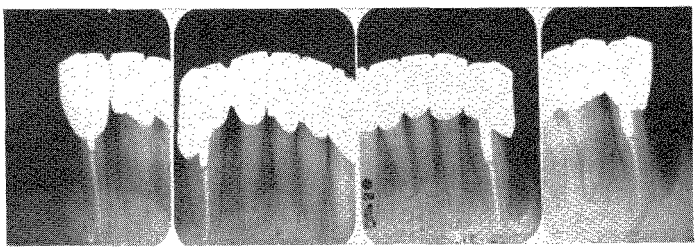


Fig. 451. Roentgenograms taken in 1962 after the removal of the lower left first bicuspid root and the splinting of the lower six anterior teeth.

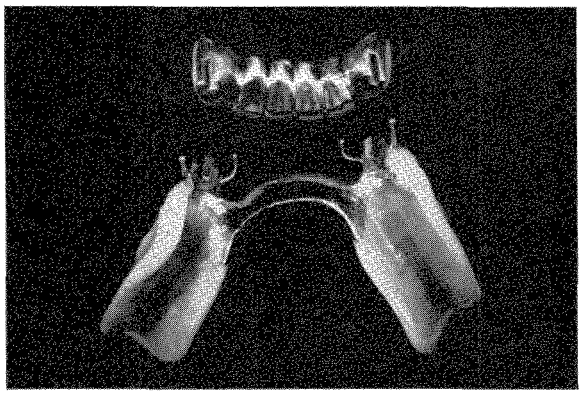


Fig. 452

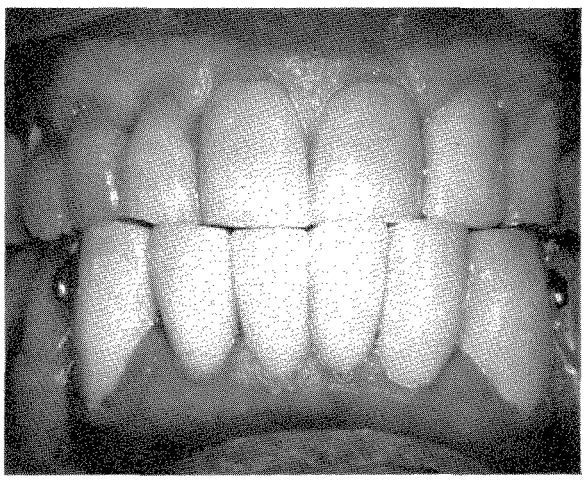


Fig. 453

Fig. 452. The final prosthesis which was inserted in 1962.
Fig. 453. The anterior view of the mouth in July, 1962. The patient was then 73 years old.

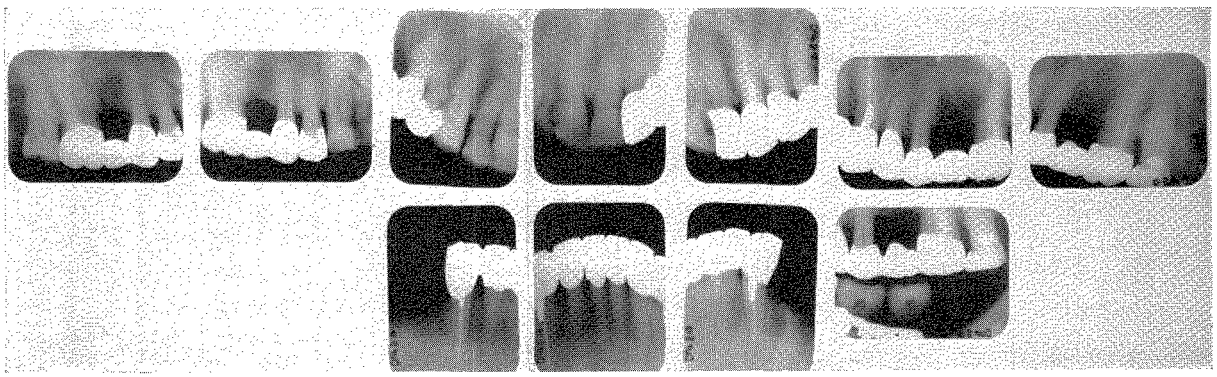


Fig. 454. Roentgenograms taken in September, 1962.

Case 2

This patient was a 45-year-old man examined in October, 1960. He had a periodontal abscess associated with a lower left posterior tooth. He was an actor professionally and was, therefore, sensitive as to his appearance and diction. His having to wear a full upper denture further embarrassed him. An examination of the mandibular teeth revealed a fourteen-unit splint divided in two sections and connected by a lug which rested in a shallow concavity. The lug extended from the right second bicuspid and rested in a lug seat in the distal aspect of the first bicuspid crown. This method of connecting two segments of the arch was totally inadequate. It permitted motion in all directions. The lower left third molar had not been included in the splinting even though its root appeared to be the strongest of the remaining natural teeth. The splints were supported by seven teeth.

The work had been inserted by his previous dentist two years earlier. He was pleased with not having to wear a lower removable partial denture. Of the seven natural teeth which had been used to support the prosthetic work, three were nonvital, and three had deep periodontal infection. The emergency treatment called for, when he presented himself, consisted in incising lower right and left acute periodontal abscesses. According to his history, this had been resorted to on several previous occasions by his former dentist. I also united the right posterior three-unit bridge more rigidly to the anterior bridge by using quick-cure acrylic on the buccal surfaces. This may be seen in the illustrations. He remarked that his dental work had been very expensive and time consuming. He was nervous and apprehensive.

Discussion

Let us examine this case in the light of what was just reported. First, it can be assumed that the dentist was able and conscientious. Second, we know that the patient was unwilling to wear a lower removable partial denture. He had the alternative of fixed partial dentures. Finally, we know from the evidence that the patient succeeded in persuading his dentist to retain these problematic and infected teeth and to insert extensive fixed partial prostheses. The results caused nothing but discomfort for both dentist and patient.

What is not so commendable is the inadequacy of the mechanics. With such evident weakness of structure, why the ineffective lug and rest between the two separate parts of the fixed restorations? A more rigid joint, which would have permitted very limited or no movement, was indicated. Why was the left third molar excluded from lending its support to the splint when it was the strongest tooth remaining and readily accessible?

Even with insistent patients, there is a point in the doctor-patient relationship beyond which only harm can result to both parties. This was such a case. The dentist who is willing to insert fixed partial dentures, under circumstances such as these, hurts both patient and himself and lowers the standards of dentistry as a healing profession. The patient could ill afford the financial outlay of these costly procedures or the physical trauma. An insidious systemic factor was undoubtedly responsible for the loss of the upper teeth at a very early age. There are many unknown factors which must be seriously considered, but these people should

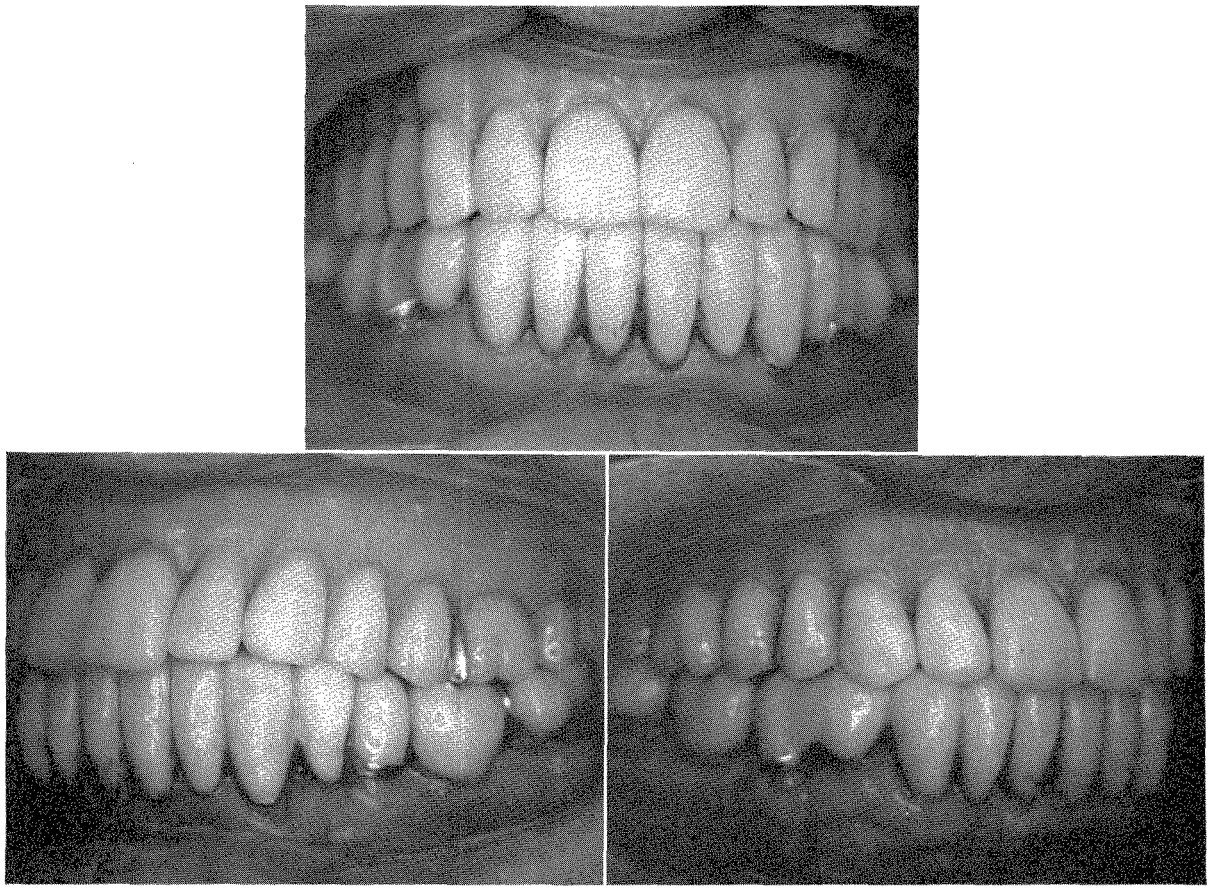


Fig. 455. Anterior, left, and right views of the mouth taken in 1960. The upper prosthesis is a full denture. The lower prosthesis consists of two sectional fixed partial dentures united by a lug rest. As may be seen in the bottom photograph, I attempted to stabilize the right posterior bridge by uniting it more rigidly to the anterior bridge with quick-cure acrylic. (Figs. 455 and 456 are of the same case.)

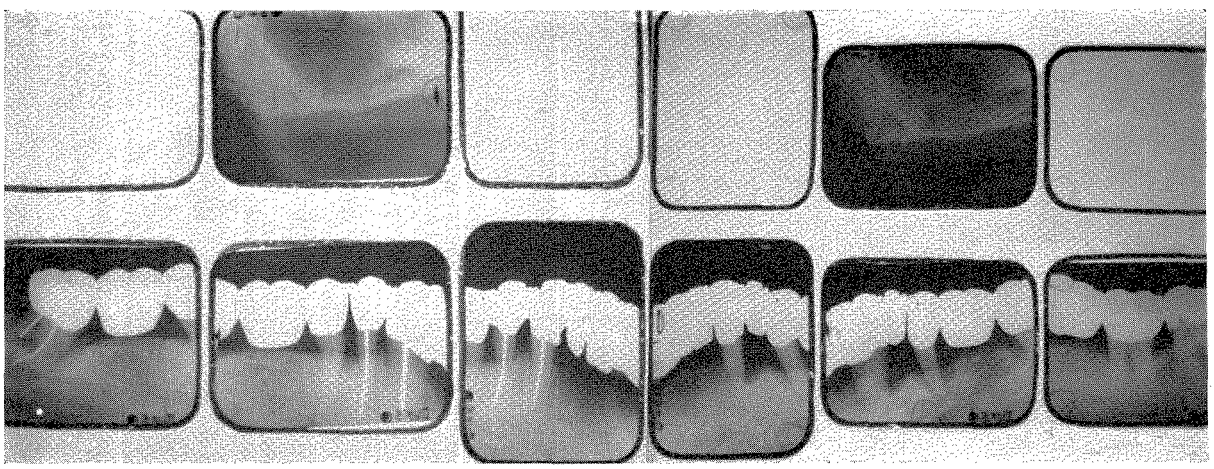


Fig. 456. The roentgenograms taken in October, 1960. This bridgework was inserted two years previously. (See text.)

be handled with sympathy and wisdom. At best, several teeth should have been removed and a partial removable denture inserted. Even this prescription would have had a very problematic future. (Figs. 455 and 456.)

RETENTION OF INFECTED TEETH

The patient's financial status should not dictate the dental prescription. Teeth that are too risky should be removed. Such patients need definite guidance. There are many times when the correct and obvious treatment will not be accepted. It is wiser not to accept these cases rather than to permit these patients to persuade us to insert prostheses which will only be condemned. Infected teeth that will not respond to treatment should be removed. Teeth with problematic futures should

Fig. 457

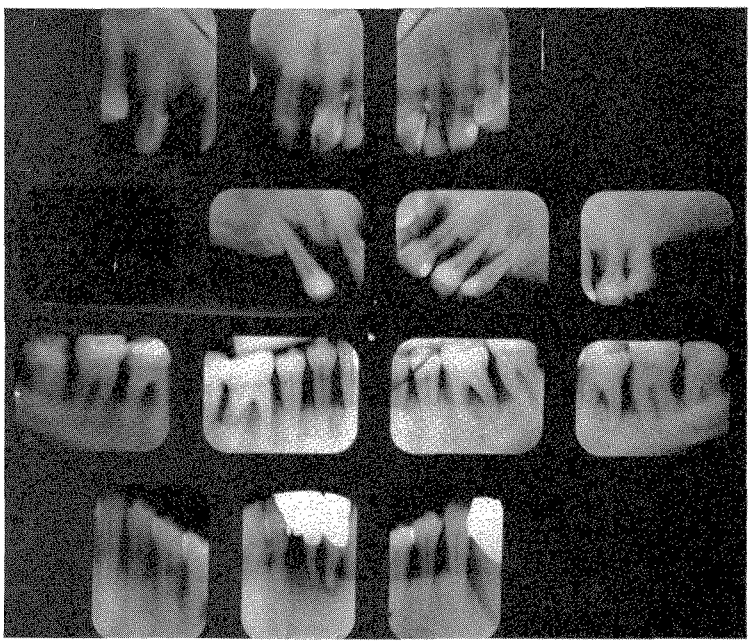


Fig. 458

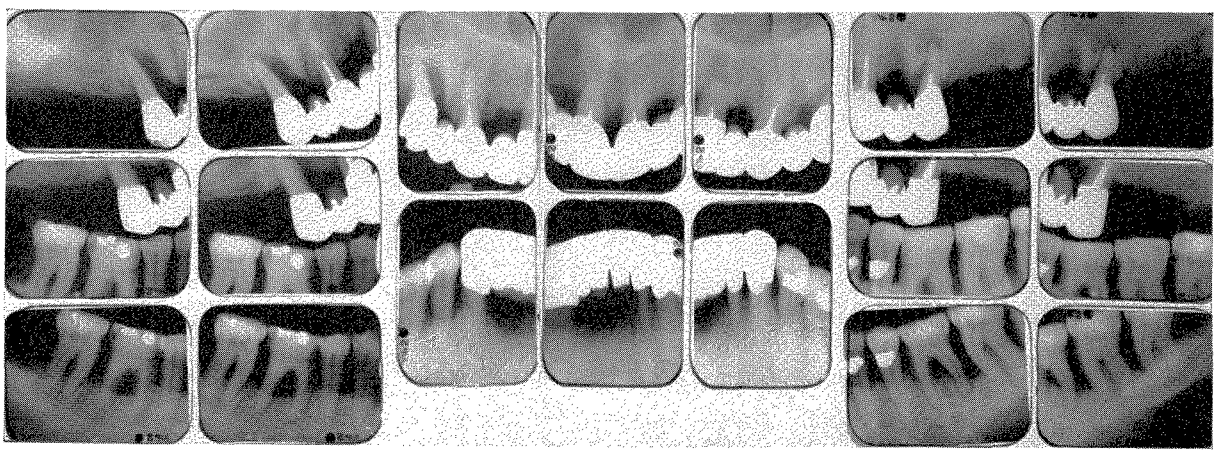


Fig. 457. Roentgenograms taken in June, 1961, before the work was started. (See text.) (Figs. 457 and 458 are of the same case.)

Fig. 458. Roentgenograms taken in August, 1961. The fixed partial dentures were inserted in July, 1961. (See text.)

be evaluated and discussed with the patient. Should the patient then be willing to have these teeth retained, a signed contract indicating his acceptance of the responsibility should be obtained. Often, when confronted with such a document, the patients reconsider and are willing to accept treatment planning with a safer future.

Case 3

The third patient was a man in his mid-forties who was referred for treatment in August, 1961. His upper teeth were sensitive. The roentgenograms revealed an upper ten-unit rigid splint supported by six natural teeth. These six abutments were nonvital, and most of them were deeply involved in periodontal disease. The work had been completed just one month previously. The mechanical details were carried out satisfactorily. The dentist exposed himself to the possible criticism of his colleagues. Patients quickly forget that it was upon their insistence that the infected teeth were retained. A careful examination of the roentgenograms also revealed the possibility of a systemic factor. Generalized progressive alveolar bone destruction was evident. The patient was still in his forties at the time of writing. (Figs. 457 and 458.)

There are others who prefer not to wear removable partial dentures. There is an understandable mental and physical block where removable dental appliances are concerned. A compromise is possible for some of these people. If possible, it is better to eliminate the removable bridge than to insist upon its insertion if it is not going to be worn. Nevertheless, when all the natural teeth must be removed and full dentures inserted, these same individuals seem better able to face up to their problem.

Case 4

In 1956 a physician came for treatment. He brought with him a lower lingual bar which had been retained by precision attachments. Double abutments had been used on either side. Although it was well constructed, the bridge had made the patient very uncomfortable and was rarely, if ever, worn. In July, 1958, the crown of the upper right first bicuspid had fractured. The patient urged that an attempt now be made to increase his function by inserting fixed partial dentures to replace the removable lower bridge.

Two lower splints were inserted using three natural teeth with a throw-off on each side. An upper right three-unit fixed partial denture replaced the first bicuspid. This work was constructed on small unilateral articulators. In 1961 the lower left lateral incisor had its pulp removed and its root canal filled. Other than that, the patient was comfortable with the fixed bridgework. His function is now adequate. It had been impossible for him to wear a large removable appliance. (Figs. 459 to 461.)

Case 5

Some people are unable to wear a lower lingual bar because of the tongue irritation which it causes. This patient, a middle-aged woman, had lost all the lower

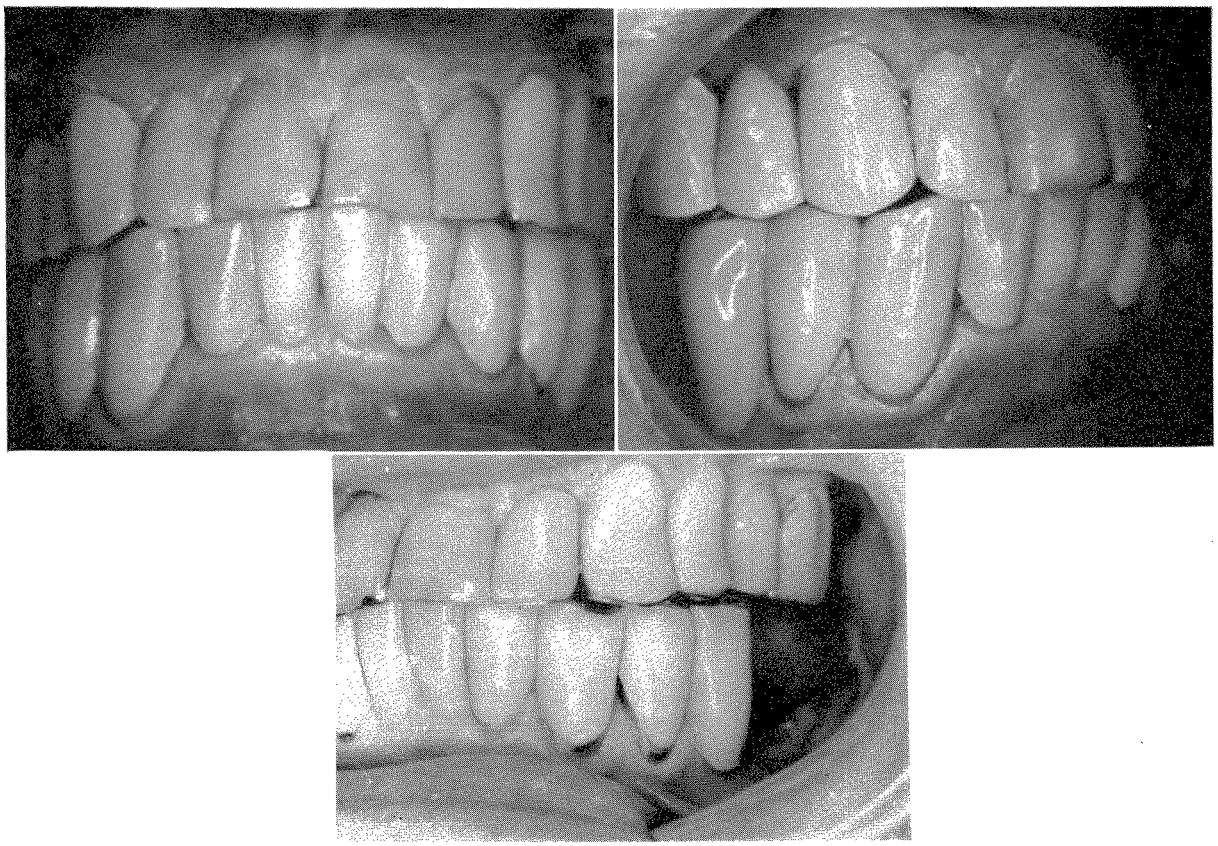


Fig. 459. Anterior, right, and left views of the teeth. All the bridges are fixed. (Figs. 459 to 461 are of the same case.)

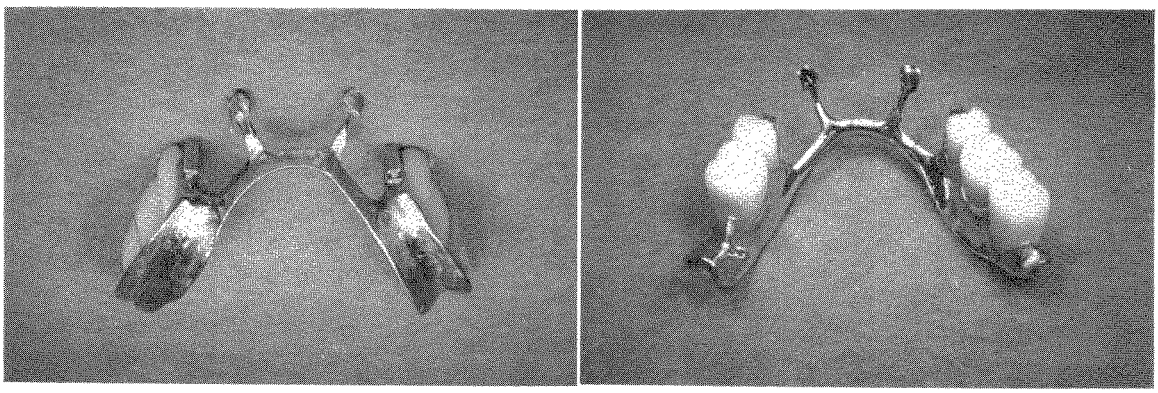


Fig. 460. Two views of the lower removable partial denture. This was retained by precision attachments and lug rests. Although it was well planned and constructed, the patient was never able to wear it.

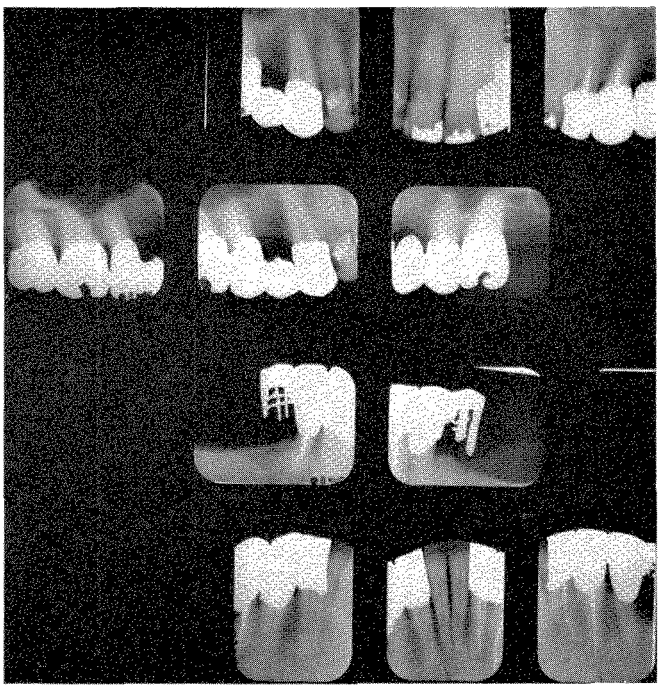


Fig. 461. Roentgenograms taken in 1962 of the case shown in Figs. 459 and 460.

molars. The upper molars were present. She missed these lower molars in mastication.

The first lower lingual bar was constructed as a temporary appliance. Lower right and left fixed three-unit splints were already present. The lug rests were prepared in the posterior bicuspid veneer crowns. This appliance was to be used during the healing of the right lower first molar socket.

The lingual bar had to be removed for some periods of time during the day. When this was done, the edges of the lug rests produced an unbearable irritation. The patient claimed it was impossible to wear the bridge constantly because of pressures which, she said, it created. Although temporary, it was reasonably well constructed, and the complaints did not seem justifiable. In order to smooth the edges of the lug rests, it was finally necessary to destroy their efficiency. At last, the entire lug rest had to be filled with amalgam and the bridge kept out.

Upon the healing of the molar socket, another partial removable denture was constructed. The three posterior teeth on each side were splinted. The retainers were precision attachments. The restoration was executed carefully. When the bridge was in position, there were no rough surfaces or sharp edges. The second partial denture proved no more satisfactory than the first. It was impossible for the patient to wear it continually. When it was removed, sharp edges of the female portion of the attachments acted as irritants to her tongue. If these edges had been rounded off, the attachments would have been destroyed.

Another lingual bar with two male attachments and no posterior teeth was made. This was worn between meals in order to prevent the tongue from being irritated. The patient was not seen in one and one half years. She may have gone elsewhere for another opinion. (Figs. 462 to 468.)

Discussion

Many facts that bear examination were revealed by this case. The patient was an understanding person with above-average intelligence. She realized that she needed the removable denture for normal masticatory efficiency, yet she was unable to cope with the irritiation produced by the lug rests. While her attitude was one of tolerance, she nevertheless claimed that the physical disturbance caused by the prosthesis was unbearable.

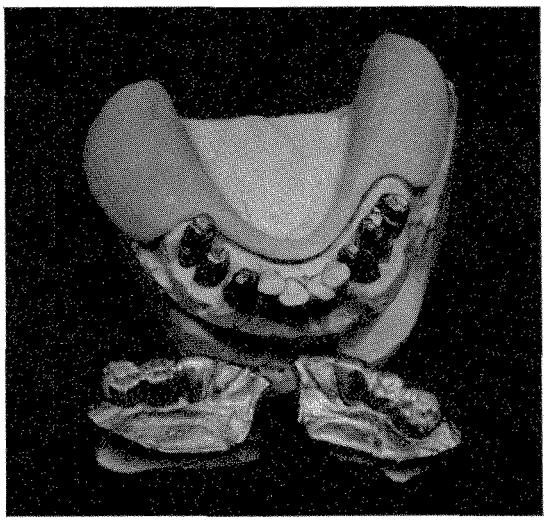


Fig. 462. Individual tray made of acrylic. Three-unit fixed splints are shown in the foreground. (Figs. 462 to 468 are of the same case.)

Fig. 463. The lower impression was made in two parts. First rubber was used inside the specially prepared acrylic tray; then an over-all plaster impression was taken to relate the soft and rigid parts.

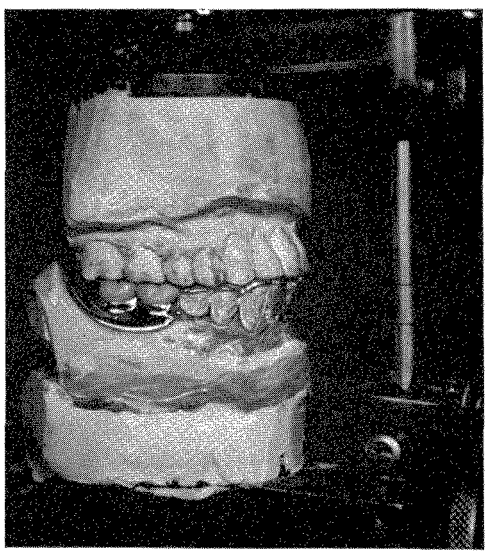


Fig. 464. The prosthesis was constructed on the Hanau Model H articulator using conventional methods.

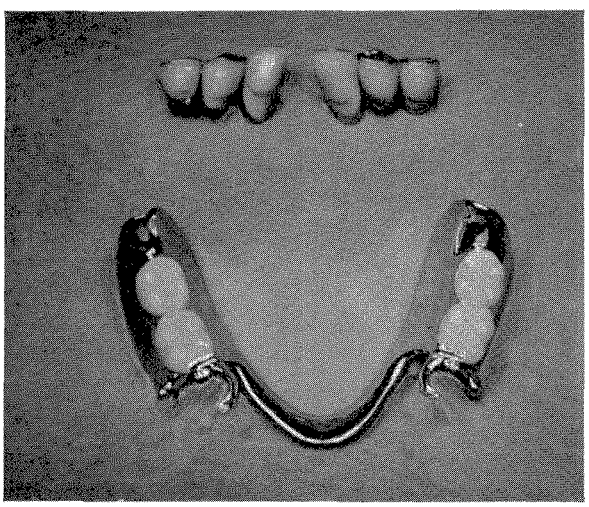


Fig. 465. The completed lower work. The buccal extensions are for convenience in removing the bridge. The fixed splints are also shown.

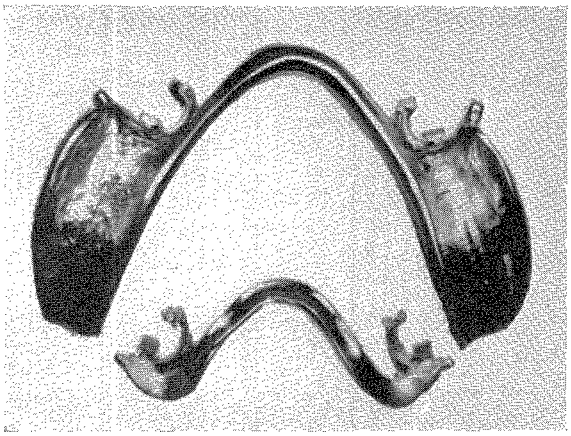


Fig. 466. The tissue surface of the lower lingual bar is shown in the foreground. The rigid lingual clasp arms with the countersunk pins aid in the retention and stabilization. The lingual bar is rigid and strong. The appliance in the lower part of the illustration is worn more often than the lower bridge. It simply serves to smooth out the sharp edges of the attachments when the lower bridge is not worn. (See text.)

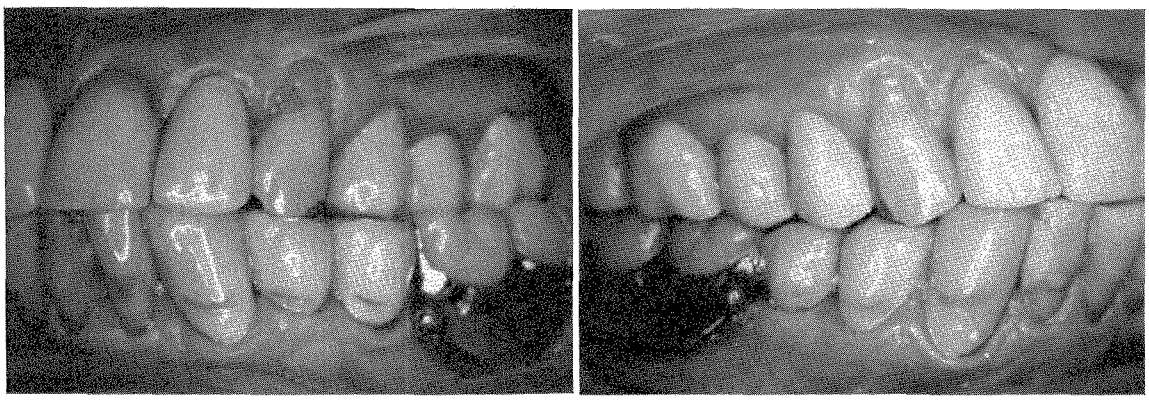


Fig. 467. Left and right sides of the mouth showing the lower prosthesis in place.

Fig. 468. Roentgenograms taken in 1961.

For the dentist, it was a challenge. Fixed partial dentures had been used previously with one posterior dummy thrown off from each side. This had not been successful, especially on the right side where the first molar had been lost as a result. The idea of the throw-off was to carry the fixed prosthesis further posteriorly and to place it behind the area reached by the anterior portion of the tongue. Because of this, the periodontal membrane of the right second bicuspid had thickened. The left bicuspids were not strong. Taking the above into consideration, it did not seem wise to again resort to right and left throw-offs.

To eliminate lug rests, or some form of precision attachments, from counteracting the vertical and lateral masticatory forces to which a removable partial denture is subjected would be sacrificing basic mechanical and physiological principles. In addition, the occlusion had been checked carefully. There was no tissue irritation from the saddles. The second removable partial denture was acceptable by all our standards, yet in spite of my best efforts the results were unsatisfactory. (Figs. 462 to 468.)

Case 6

This patient was a middle-aged woman who was referred for oral reconstruction in October, 1956. Periodontal treatment had just been completed. This included surgical gum resection. When first examined the lower teeth were supported by wire ligatures. All the molars had been removed previously. Several sets of upper and lower removable partial dentures had been made to replace the missing molars, but she had been unable to tolerate them. It is possible that these bridges had not been well constructed, but they were a great aid in evaluating the physical and mental stresses of this patient. She refused to wear a removable prosthesis.

Treatment

The roentgenograms revealed extensive alveolar bone resorption. The oral reconstruction was accomplished in three stages. In the first, the teeth were prepared and the upper teeth were covered with quick-cured acrylic crowns. These were joined in order to support the natural teeth better. In the second stage, an upper gold acrylic twelve-unit fixed bridge splint was constructed, including one throw-off at each end. A Hanau Model H articulator was used. This upper fixed splint was inserted in November, 1956. The lower teeth were now prepared first, using quick-cured acrylic crowns, followed by the second stage in which a fixed gold acrylic splint of twelve units was constructed. This fixed bridge also had two terminal throw-offs and a left lateral incisor dummy. It was inserted in January, 1957.

The patient left New York on a long journey and did not return until April, 1957. It was then that the third stage, the final work, was constructed. A Hanau Model H articulator was used. The remaining natural teeth were again evaluated. As a result the upper right lateral, the lower central, and the right lateral incisors were extracted. Only six lower teeth and nine upper teeth remained to support two twelve-unit fixed partial dentures. The final work was inserted in the late fall of 1957. Better esthetics was created by placing a labial acrylic mask where the periodontal surgery had necessitated an unsightly lengthening of the upper incisors.

Postinsertion events

In 1959 this patient suffered a severe cerebral stroke, causing her to lose the use of her right hand and also causing other serious physical and mental handicaps. As a result her hygiene was inadequate, and it became necessary for her to come every third week for dental prophylaxis and examination. The survival of her dental structures, under their additional burdens, may be a consequence of this. Had removable partial dentures been inserted, the poor hygiene would have caused more rapid deterioration. It should be remembered that this patient originally had been opposed to wearing removable partial dentures. Her final work was

Text continued on p. 227.

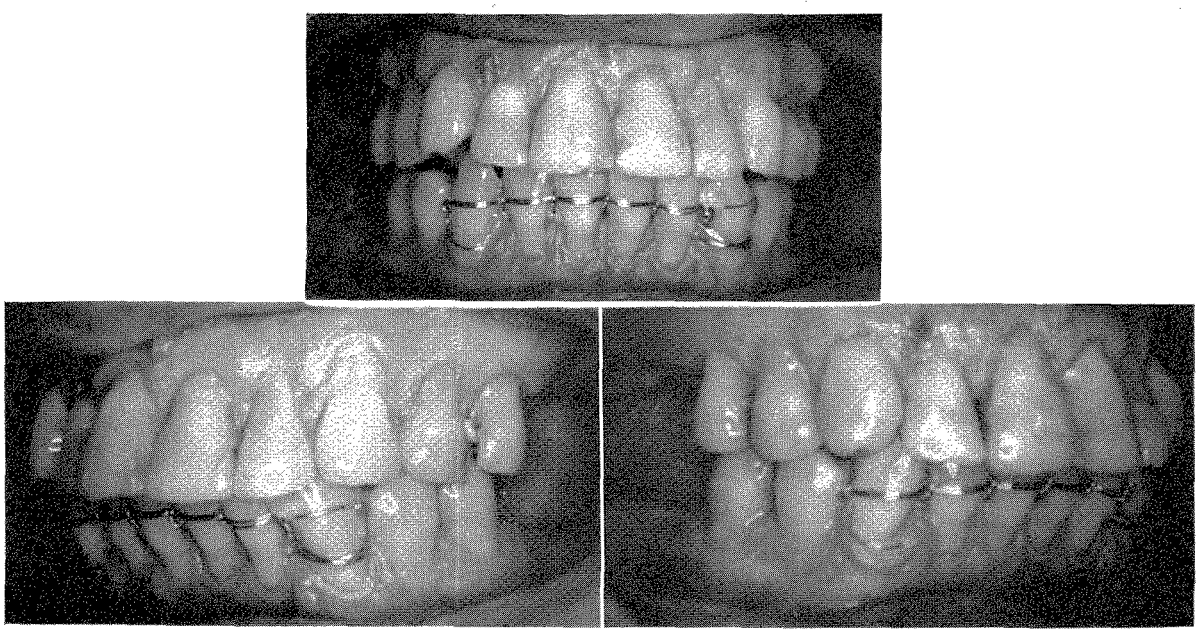


Fig. 469. Front and side views of the teeth at the start of treatment. (Figs. 469 to 494 are of the same case.)

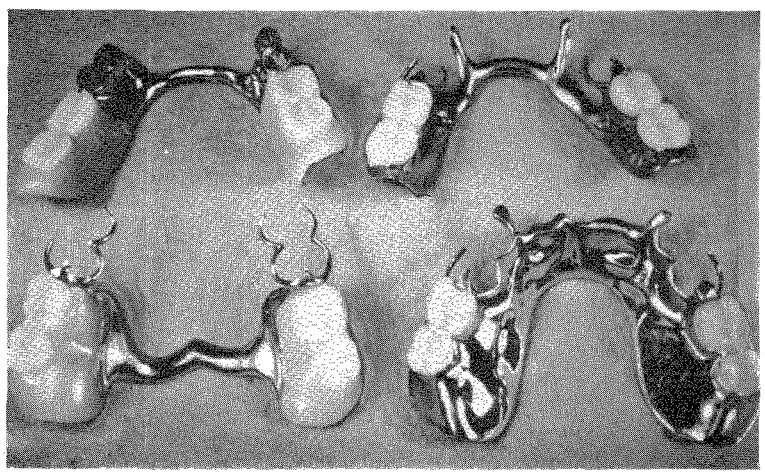


Fig. 470. Removable partial dentures which had been constructed previously by other dentists but which the patient was never able to wear.

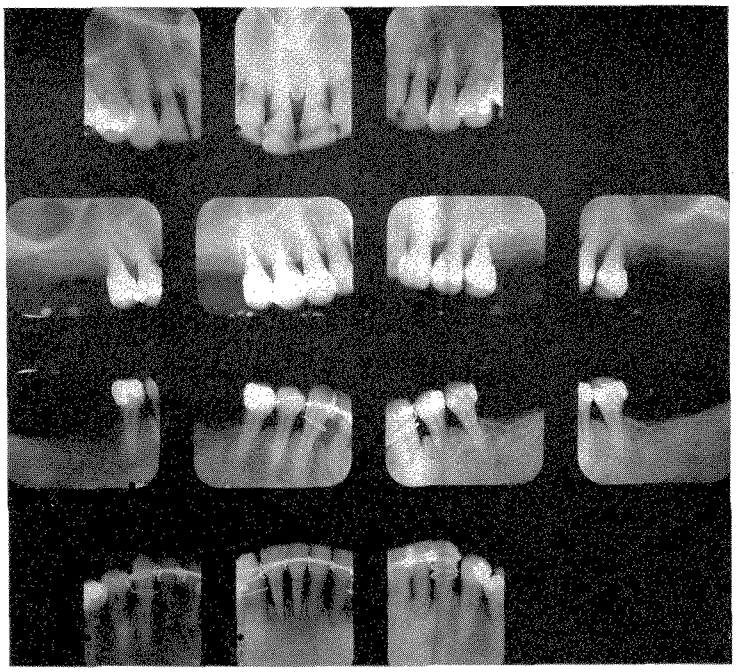


Fig. 471. Roentgenograms taken in 1956 at the start of treatment.

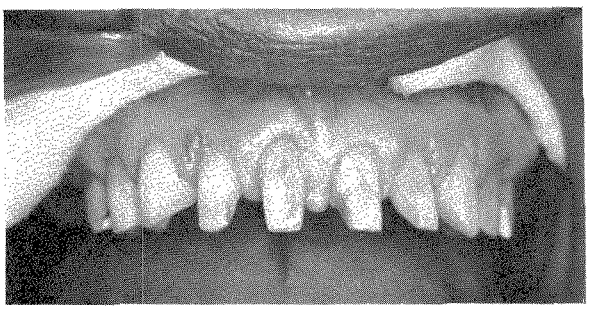


Fig. 472. The upper teeth were prepared for the transitional splint.

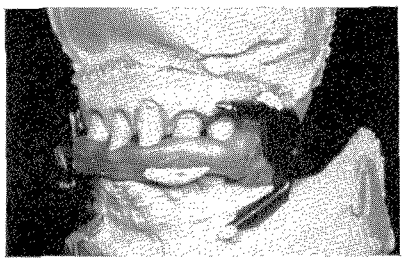


Fig. 473. The upper cast was made from a rubber impression of the prepared teeth. In this photograph the casts are being related to each other on the Hanau Model H articulator.

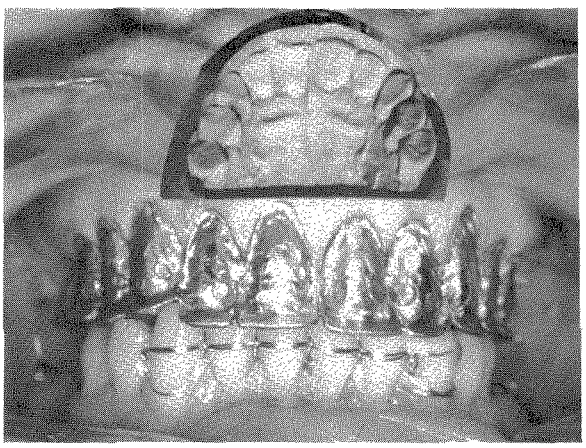


Fig. 474. The upper ten-unit splint is shown here in the mouth. It is being checked for fit, vertical dimension, and centric relation. The wax-up was performed with the use of a lingual matrix taken from the original cast shown above in the center insert.

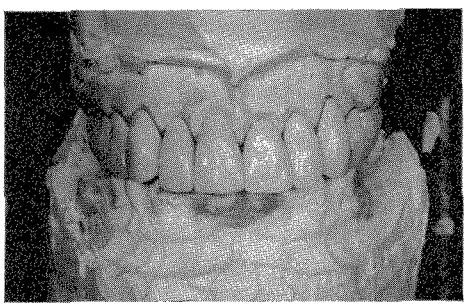


Fig. 475. The completed upper transitional twelve-unit splint on the model. There are two throw-offs, one on each side. This splint was cast in one unit.

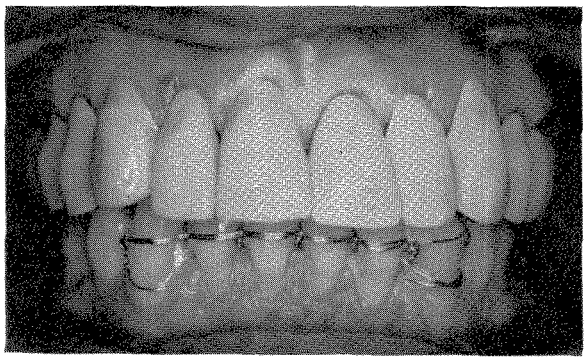


Fig. 476. The completed upper transitional splint in the mouth.

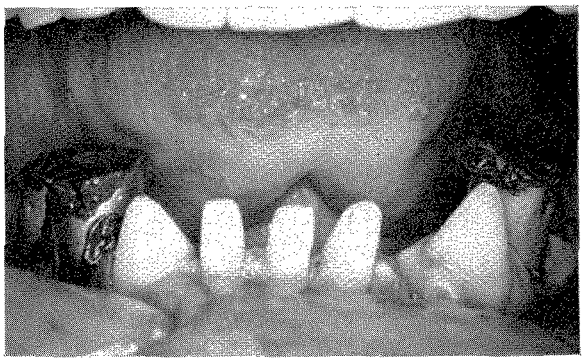


Fig. 477. The prepared lower teeth. Modeling compound in copper bands is in place on the right and left bicuspids. When the impression is taken, these bands will be removed with it.

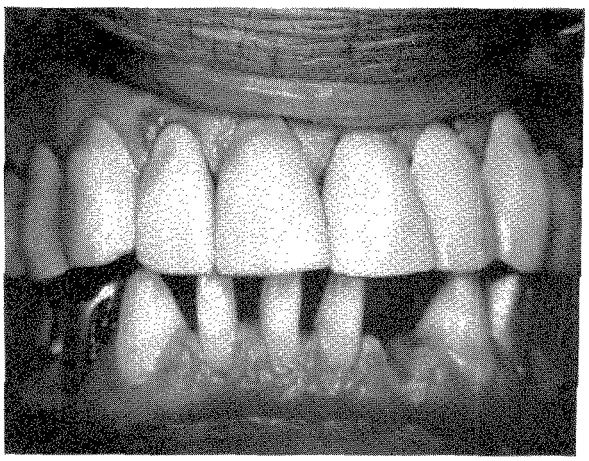


Fig. 478. The vertical dimension and the centric bite have been taken by means of the copper band impressions shown in Fig. 477.

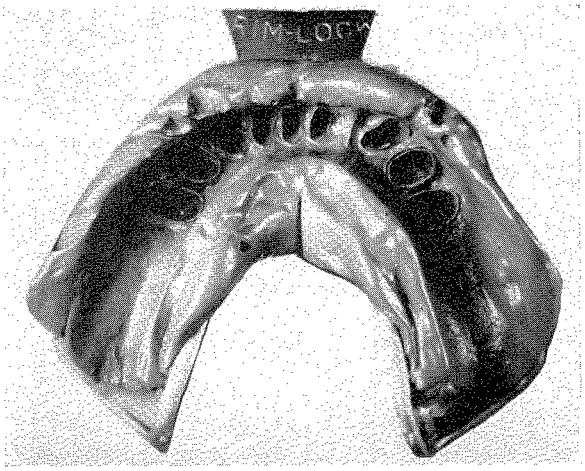


Fig. 479. A rubber over-all impression has been taken, and the copper bands have been removed from the mouth with this impression.

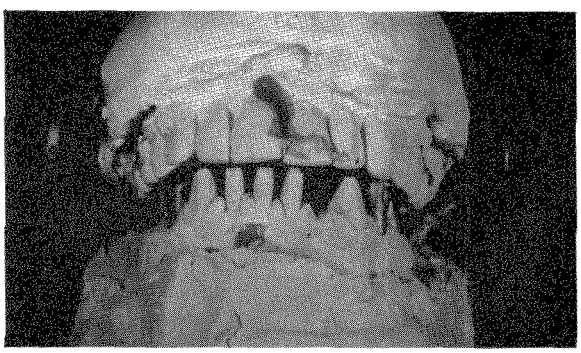


Fig. 480. Stone casts were poured and related to each other on a simple articulator.

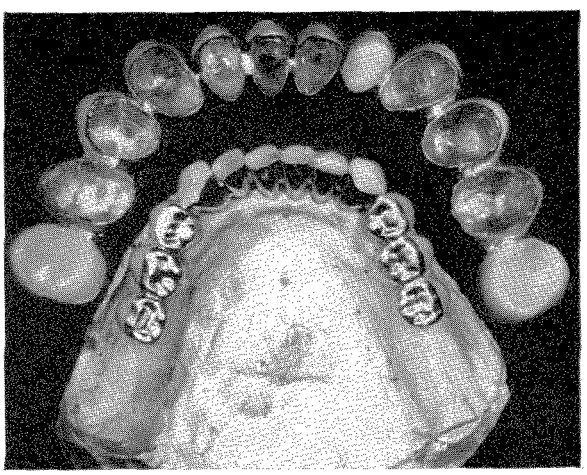


Fig. 481. The lower twelve-unit transitional splint was cast in one piece and is shown here on and off the cast. There are nine abutment teeth and three dummies.

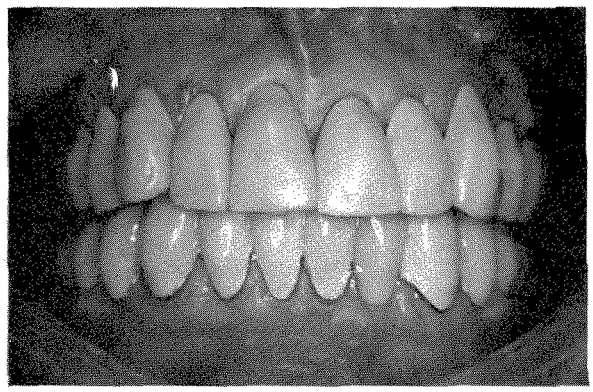


Fig. 482. The completed upper and lower transitional work in the mouth. These splints were worn for four months.

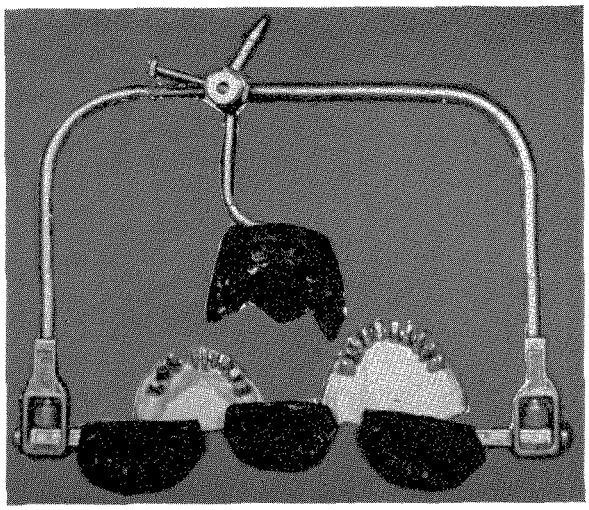


Fig. 483. For the final work, gold transfers were prepared for the copper-plated dies. They were placed on the teeth in the mouth, and wax registrations were taken, together with a face-bow and plaster impressions.

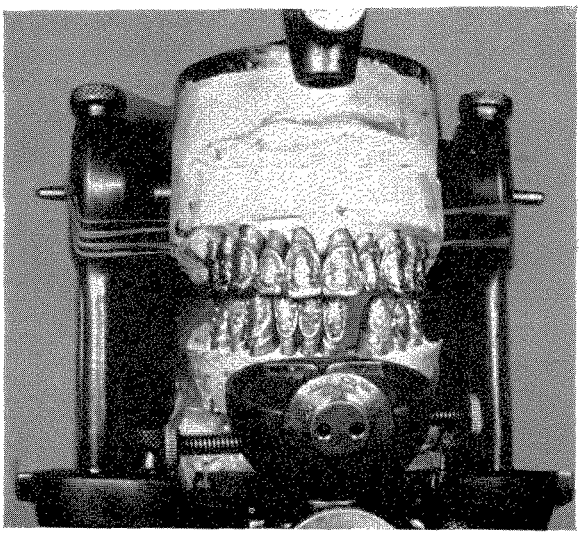


Fig. 484. The casts were mounted upon a Hanau Model H articulator and were related to each other. Then the final castings were constructed as shown here.

Fig. 485. This is the second try-in. The crowns were soldered together to form splints. Several problematic teeth were removed before the final work was completed.

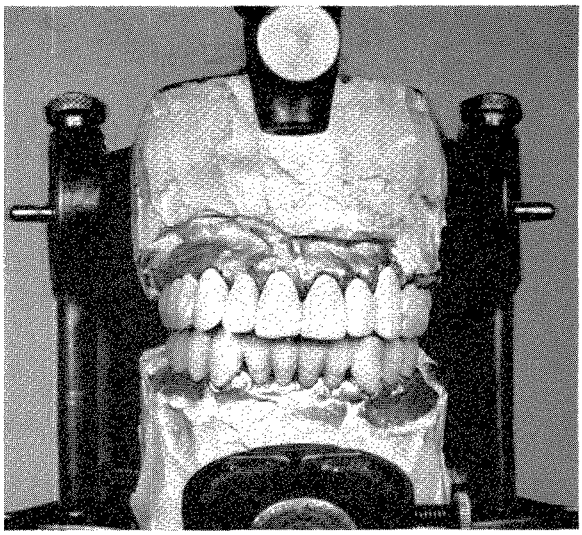


Fig. 486. The completed prosthesis on the articulator.

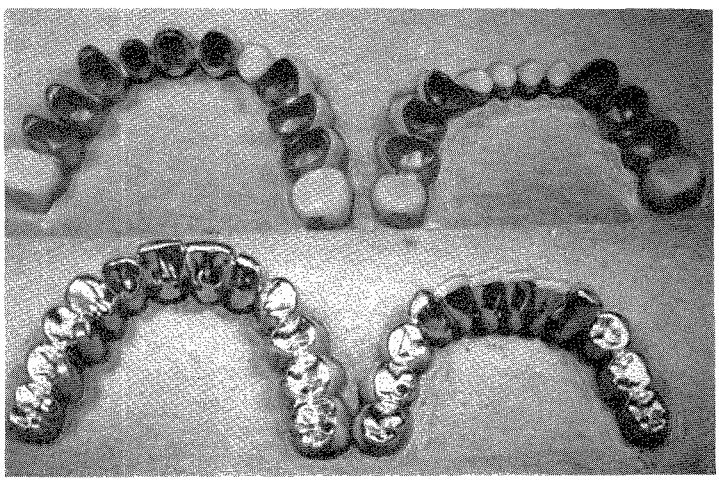


Fig. 487. The upper and lower twelve-unit splints showing the occlusal surfaces and the underside.

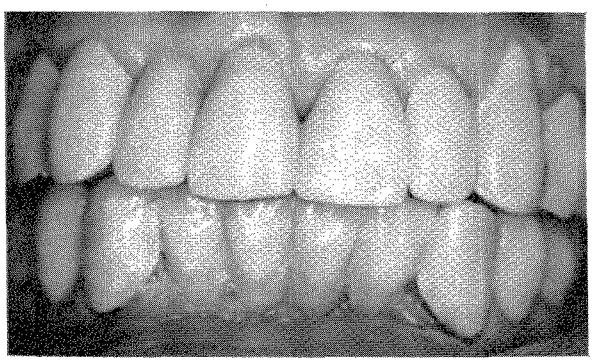


Fig. 488. The completed final work is shown here. It was inserted in January, 1958.

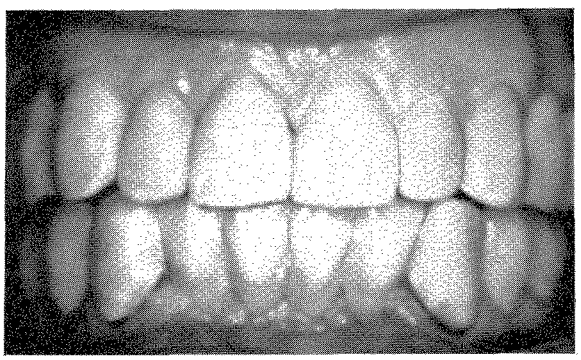


Fig. 489. Because the periodontal surgery had resulted in elongated crowns, an acrylic plastic mask was constructed to be worn in the labial vestibule. It shortened the upper crowns as shown here.

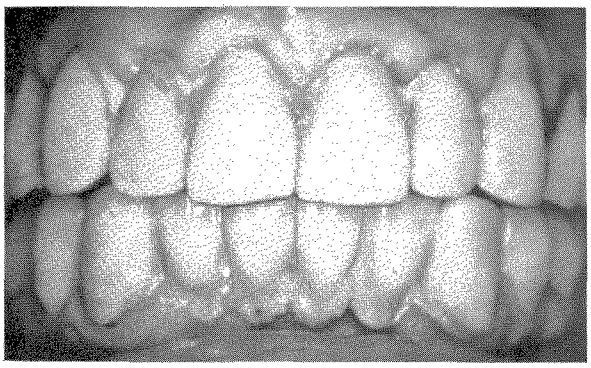


Fig. 490. After a severe coronary and cerebral embolism, the mouth hygiene was not maintained. The periodontal tissues became inflamed as shown in this photograph which was taken in November, 1959. The patient was able to use only her left hand. She reported for gum treatments every three weeks. In addition, her attendant was instructed in her home dental care.

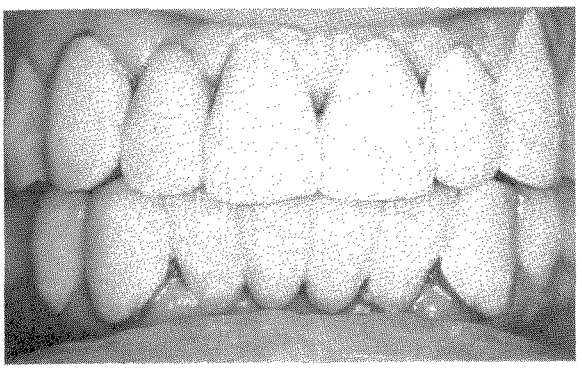


Fig. 491. As a result of constant vigilance, the dental tissues improved as shown here. This was taken in October, 1960.

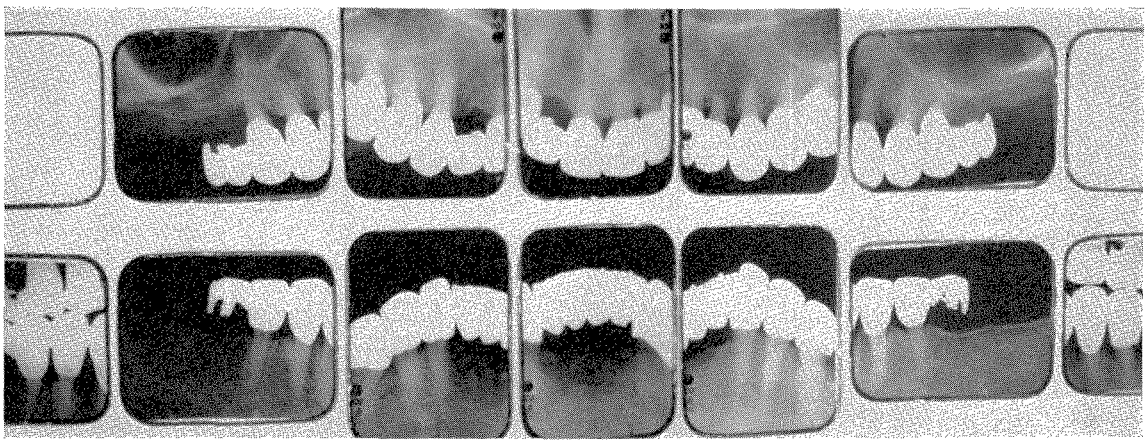


Fig. 492. Roentgenograms taken in November, 1961, four years after completion.

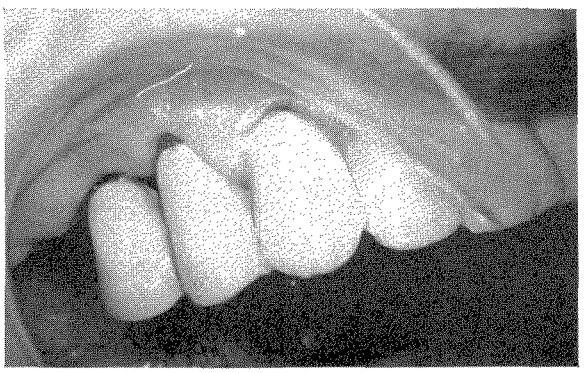


Fig. 493. In 1962 a cavity developed beneath the crown of the upper right second bicuspid. This was not detected until the patient complained of pain, when it was too late. The root of this tooth was removed. The former throw-off was eliminated, and the second bicuspid became the new throw-off.

Fig. 494. Roentgenograms taken in September, 1962.

constructed with this in mind. For this she was pleased. However, because there were no removable appliances, better hygiene was possible. (Figs. 469 to 494.)

Case 7

This case demonstrates the aversion many patients have to wearing removable partial dentures. In February, 1956, an eleven-unit upper rigid bridge splint was inserted in the mouth of a man in his late fifties. No upper natural teeth were present posterior to the left cuspid. Two small throw-offs were used on this side. Their buccolingual diameters were narrowed to reduce function. This large fixed appliance remained in good condition after having functioned for seven years. The patient was intelligent and understood exactly the compromises made in order to eliminate the removable appliance. He was very appreciative of the consideration shown him. A more conventional approach might have called for a combination of fixed and removable partial dentures. Should the time arrive with no other choice, the removable prosthesis will be accepted with equanimity. (Figs. 495 to 500.)

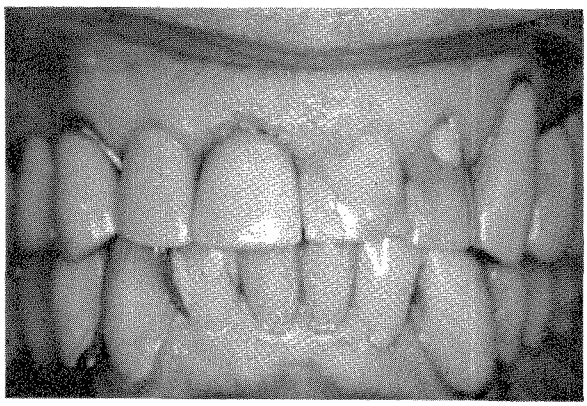


Fig. 495. Front view of the mouth of a middle-aged man before treatment was undertaken. This photograph was taken in April, 1955. (Figs. 495 to 500 are of the same case.)

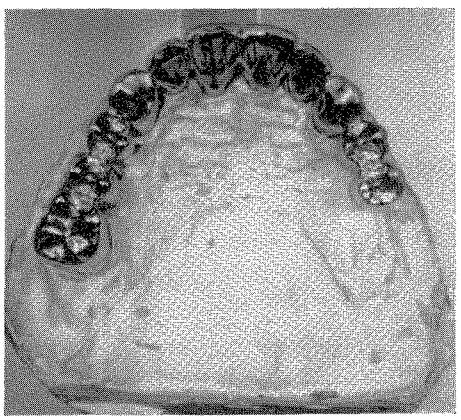


Fig. 496. An eleven-unit upper splint was employed to replace the upper missing teeth. The upper left bicuspids are throw-offs. Their size is reduced to lessen the trauma. Work of this nature is hazardous.

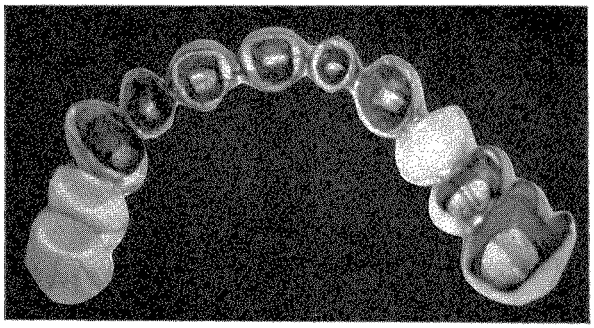


Fig. 497. The undersurface of the splint shows eight abutment teeth and three dummies.

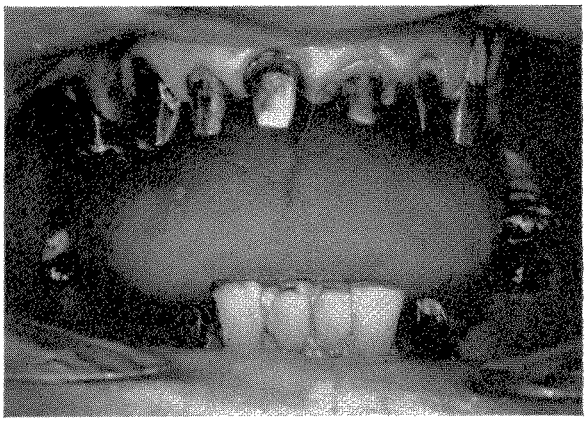


Fig. 498. The appearance of the mouth just prior to the insertion of the reconstruction. The teeth were treated with silver nitrate. The lower prosthesis is a combination of fixed and removable prostheses. The lower anterior teeth were finally covered with porcelain jacket crowns.

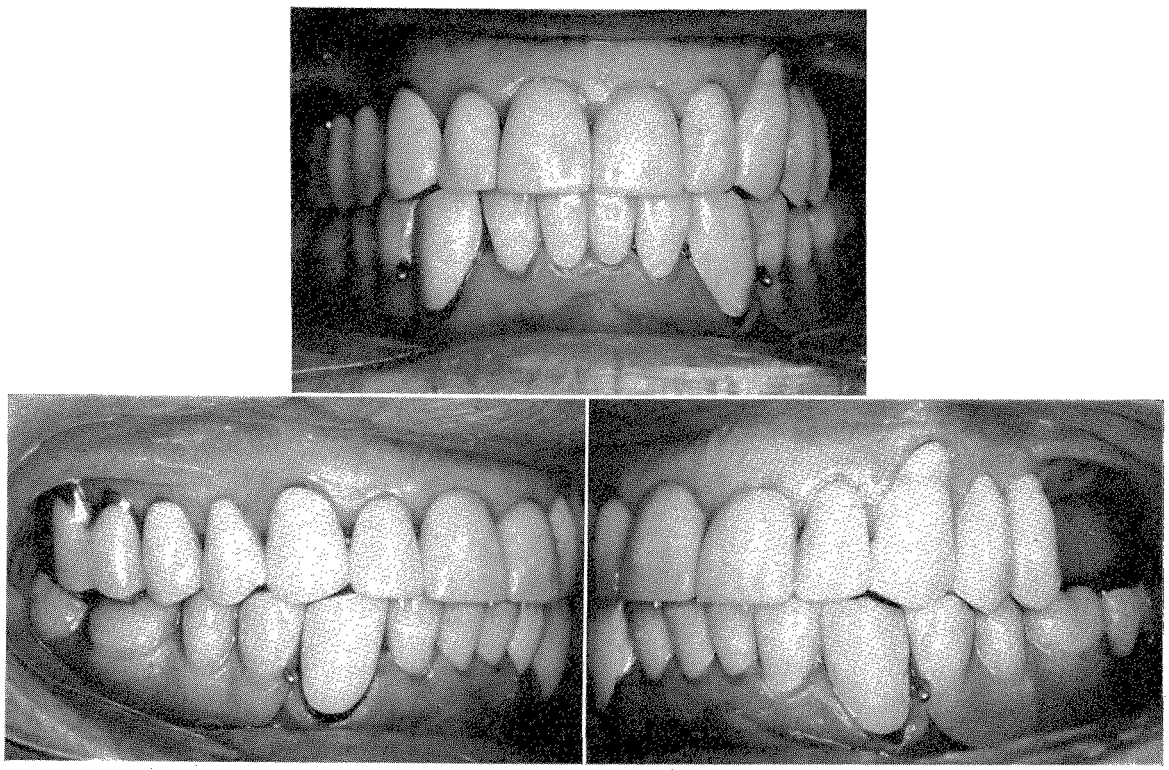
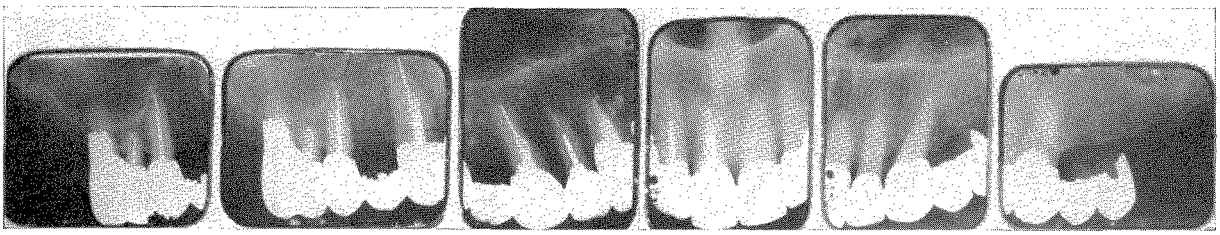
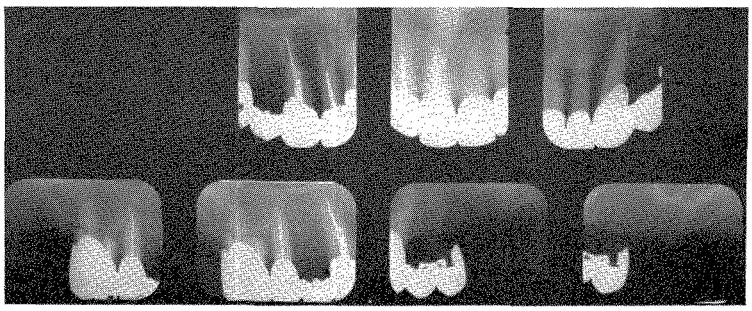


Fig. 499. The front, right, and left views of the completed work. These photographs were taken in February, 1956.

A





B

Fig. 500. Roentgenograms of the upper splint taken in 1956, **A**, and in 1962, **B**.

Case 8

This patient was a middle-aged man whose dental work was undertaken in October, 1956. Extraction of all his upper teeth and several of his lower teeth was indicated. He had already been subjected to specialized periodontal treatment including the surgical resection of the diseased soft tissues. Whereas a full upper denture would have been the generally accepted procedure, both he and his periodontist insisted upon the retention of the remaining upper natural teeth. The lower right second molar had a deep bifurcation involvement and should also have been removed. However, the periodontist insisted upon its retention. Although the nature of the problem was explained carefully to the patient, he remained unwilling to consider a removable appliance regardless of whether it was a partial or a full upper denture.

A second transitional upper splint was made in gold and inserted with a temporary cement in January, 1957. The final lower fixed partial dentures were inserted in June, 1957. The upper temporary splint contained eleven units supported by six natural teeth. In January, 1958, the upper final bridge was inserted. This was also inserted with only a temporary cement, in order to permit its removal for periodontal treatment.

Because of the great length of the upper natural teeth, the removal of the bridge created problems. To overcome this handicap, two years later gold copings were constructed to cover the teeth. A fixed partial denture retained by screws was made to fit over these copings. These copings, with their overlay crowns and bridges, are described on pp. 237 to 241. The work was inserted in October, 1959.

Two and one-half years after the insertion of the lower right bridge, both abutment molars had to be removed because of periodontal infection. It should be remembered that when this bridge was first inserted, the second molar was deeply

involved, and its removal had been recommended. In the new fixed bridge, the lower right cuspid and both bicuspids were united. One throw-off extended distally with the resulting four-unit bridge. In September, 1961, the upper left cuspid became nonvital. Its pulp was treated without removing the gold coping. In 1962 the upper left bicuspid was more deeply involved in periodontal pathology.

Discussion

Although the insertion of a full upper denture had been delayed for several years, the question is whether or not the patient was better served by the retention of problematic teeth. Had the periodontist agreed with the prosthodontist, the first procedure would have been to remove all of the upper teeth. A full denture may have provided equally as good function because of the inclusion of the posterior molars. The interocclusal contact provided by opposing teeth would enable the lower posterior teeth to function. These additional functional areas may have compensated for the increased stability provided by the fixed partial prosthesis.

A full upper denture would have provided for the maintenance of better hygiene. It would have been considerably less costly and time consuming. Because of the generalized periodontal involvement, it would have been less traumatic to the lower natural teeth. Esthetically, the result would have been more satisfactory with a full upper denture. (Figs. 501 to 523.)

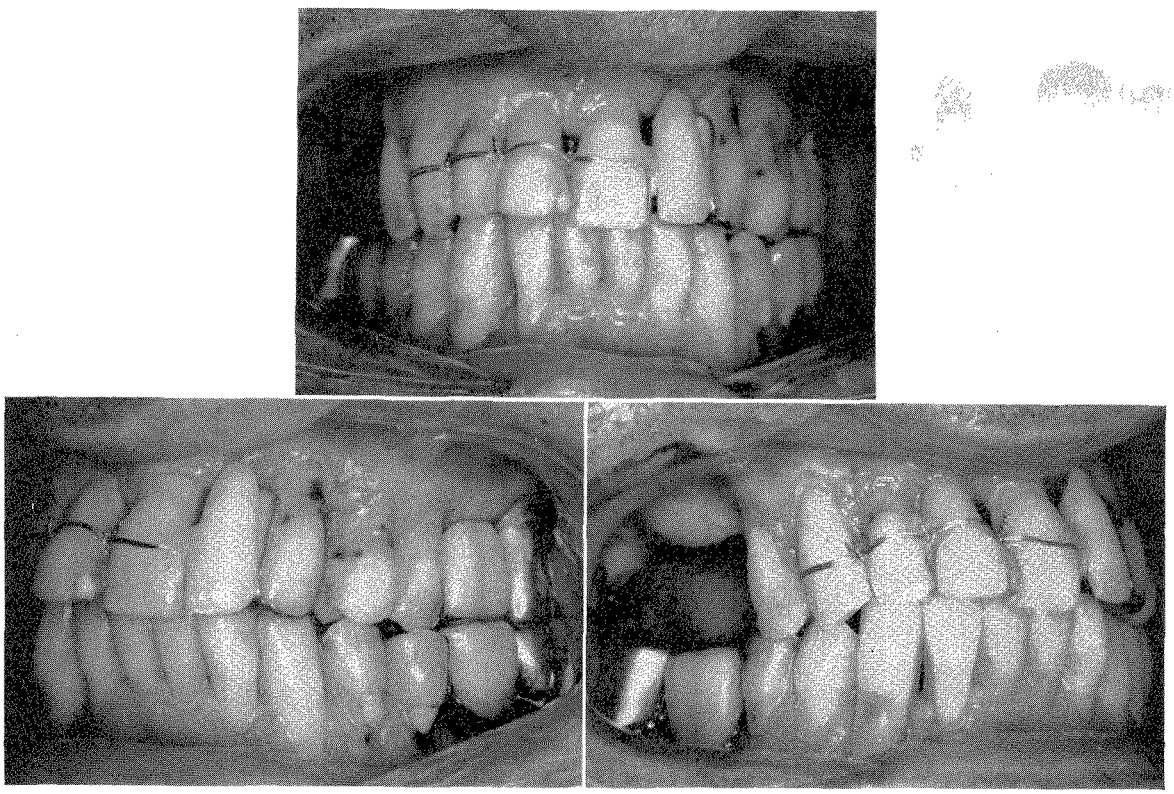


Fig. 501. Front, left, and right views of the patient before work was started. These photographs were taken in October, 1956. The periodontal treatment had been concluded. The wire stabilizing splints were still in place. (Figs. 501 to 523 are of the same case.)

Although it would appear that the patient's function may have been served better by the full upper denture, he remained completely satisfied with more costly and mediocre benefits. It would seem that his psyche had been more satisfied than his soma. As with many patients, their mental attitude is the most important consideration. From the prosthodontist's point of view, there was the constant temptation to experiment with the unorthodox type of fixed partial prosthesis which was just described.

The patient at the time of writing was 63 years old. At any time in the future he will be ready to wear a full upper denture. (Figs. 501 to 523.)

Text continued on p. 237.

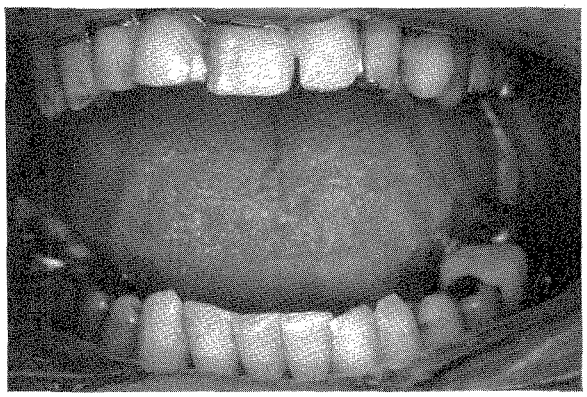


Fig. 502. The oversized tongue plus a probable faulty swallowing habit caused the widened lower arch and contributed to the malocclusion and oral disintegration.

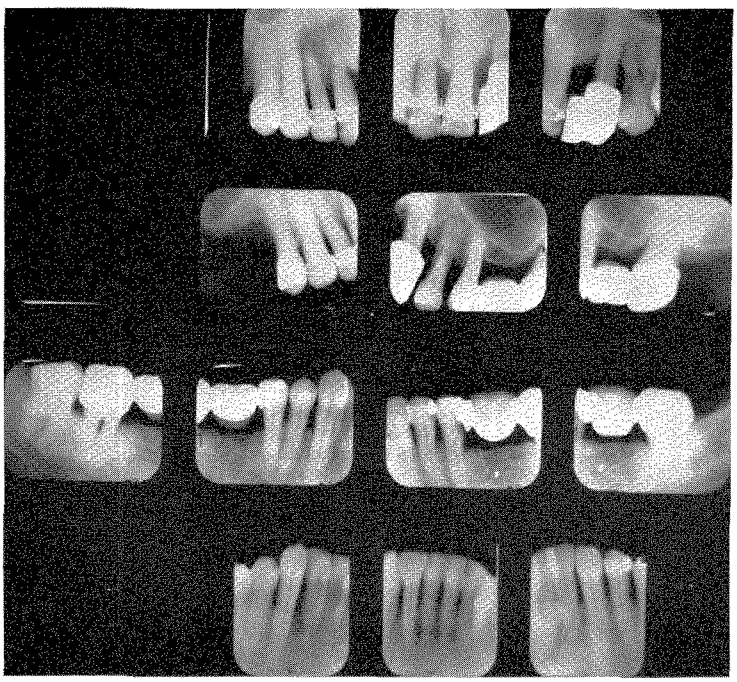


Fig. 503. The roentgenograms which were taken in August, 1956, before treatment was undertaken.

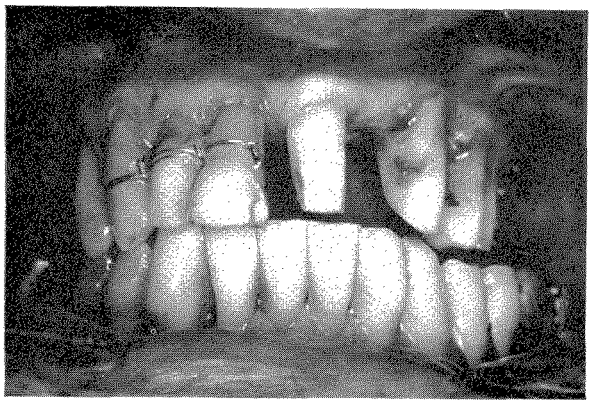


Fig. 504. The upper left teeth were prepared for crowns. The upper right teeth will act as a guide for centric occlusion and vertical dimension. The first temporary acrylic splint is being made.

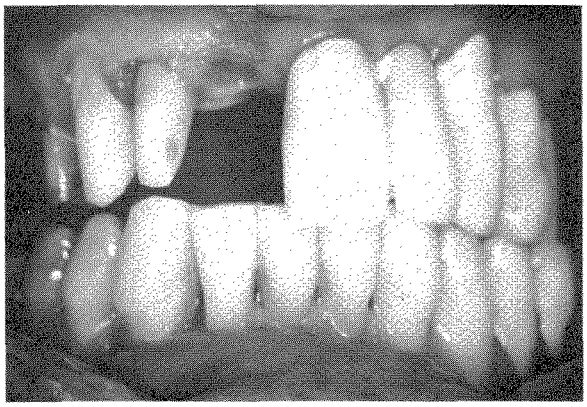


Fig. 505. The upper left side is covered with an acrylic splint which was made using the upper right natural teeth as a guide. Now, the upper right teeth were prepared, and the right central incisor was removed. The upper left teeth will act as a guide to centric and vertical height.

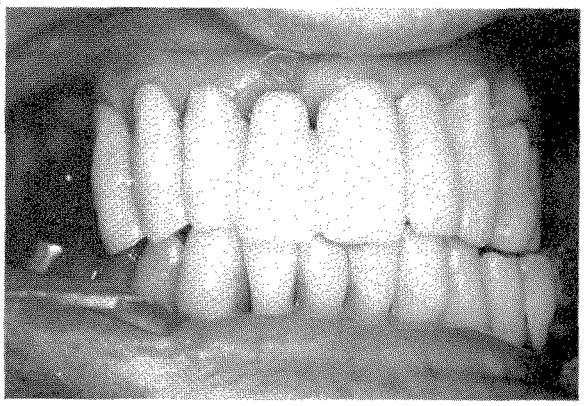


Fig. 506. The temporary acrylic upper splint in place. This was inserted in January, 1957. It was cured directly in the mouth in two sections, and then these were joined together.

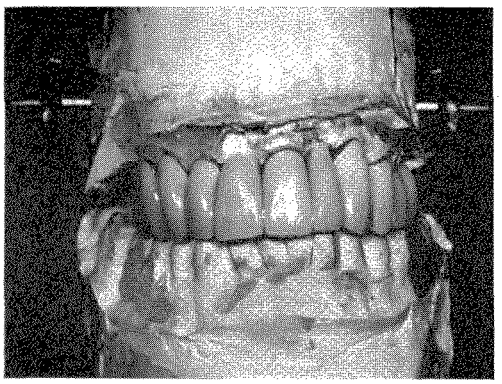


Fig. 507. A second transitional upper gold splint was made, again using the same vertical height and centric occlusion as before. It was constructed in two sections on a cast which had been made from a rubber impression. The final splint was in one piece. It was completed and inserted in January, 1957.

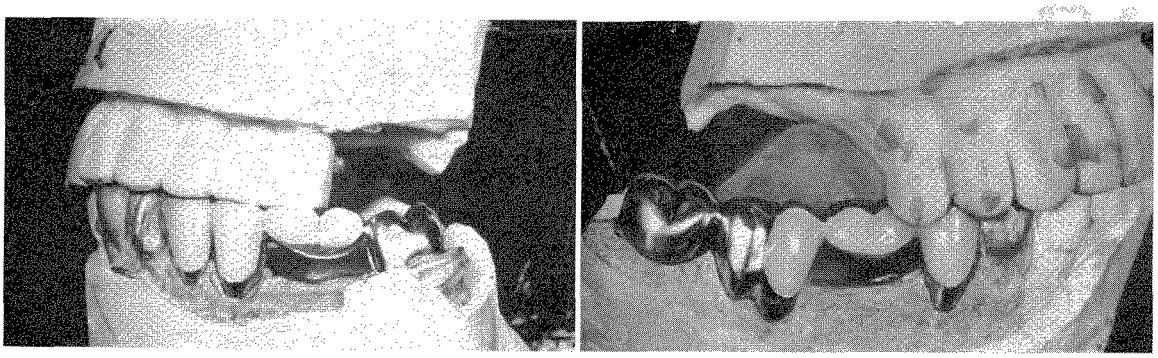


Fig. 508. In May, 1957, the left and right lower fixed partial dentures were constructed. These consisted of three abutment teeth supporting one dummy. The dummy had no saddle and was of the sanitary type. The dentures were inserted in June, 1957.

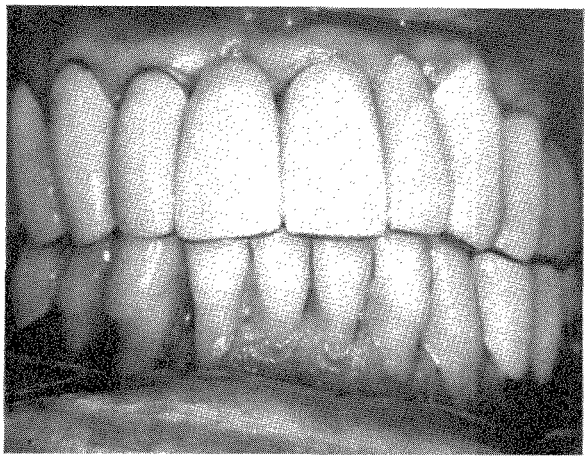


Fig. 509. The lower final bridges were inserted. The upper transitional bridge was inserted with a temporary cement.

Fig. 510. In January, 1958, the final upper bridge was constructed. Individual crowns were made and tried in as shown here. The old vertical dimension was maintained.

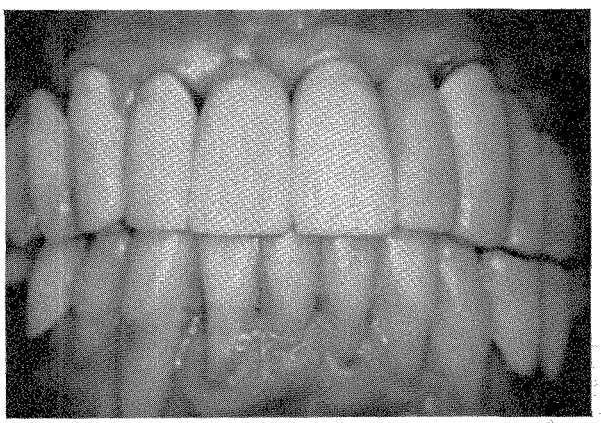


Fig. 511. Anterior view of the final work taken in January, 1958.

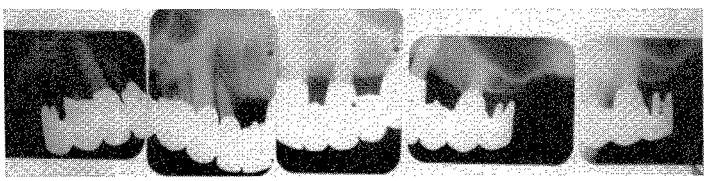


Fig. 512. Roentgenograms taken in February, 1958.

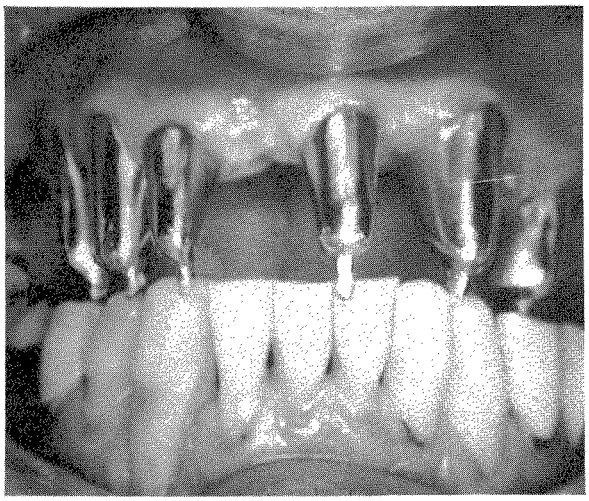


Fig. 513. Very thin gold copings made upon copper-plated dies and inserted in the mouth. The vertical dimension was established by means of the sprues.

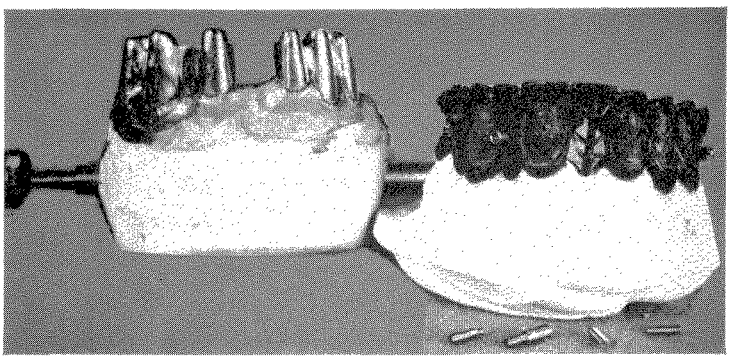


Fig. 514. The copings are united in areas where the screw holes will be placed for the retention of the overlay splint. The wax-up is made upon a duplicate model made of investment material. The screws are seen in the foreground, and the screw holes are seen in the wax-up.

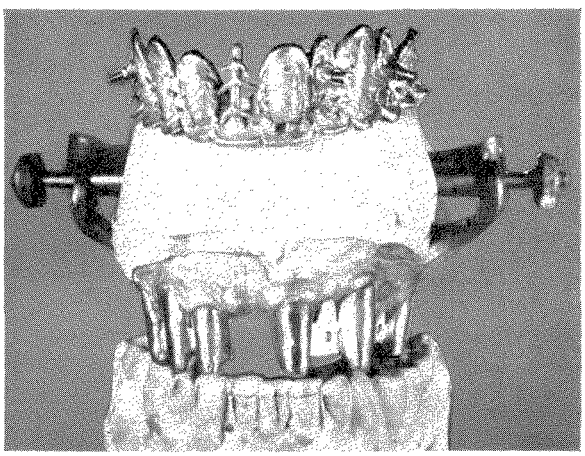


Fig. 515. The overlay casting is shown here on top of the articulated models. This fits over the copings.

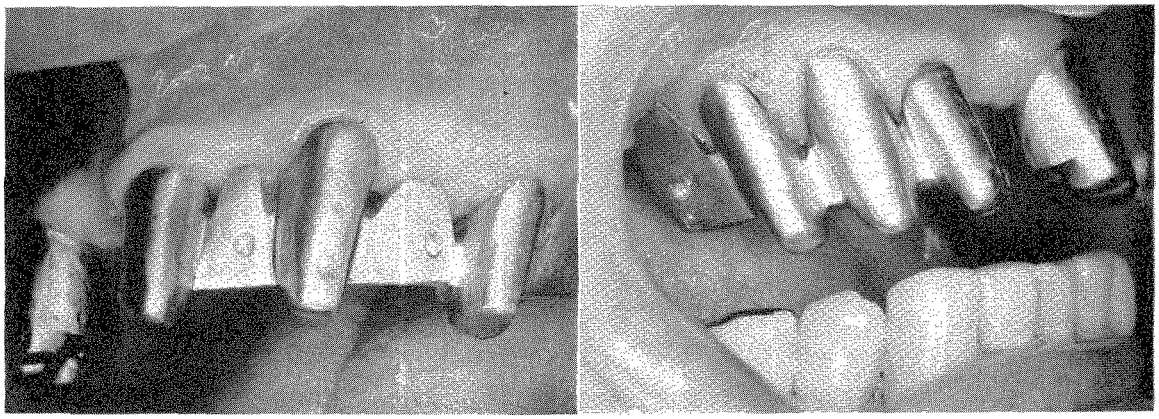


Fig. 516. The right and left views of the copings with their connecting metal blades and the recesses in the gold to receive the screws.

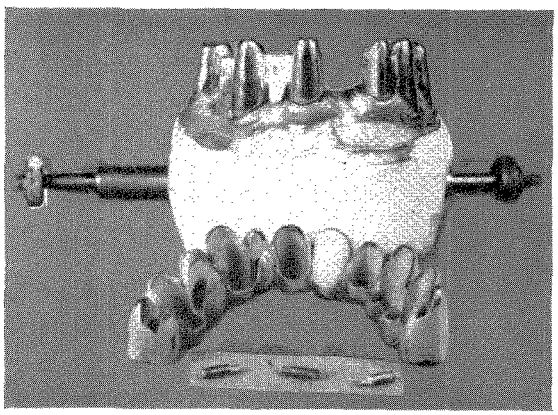


Fig. 517. The completed overlay splint is in the foreground. The screws are also shown.

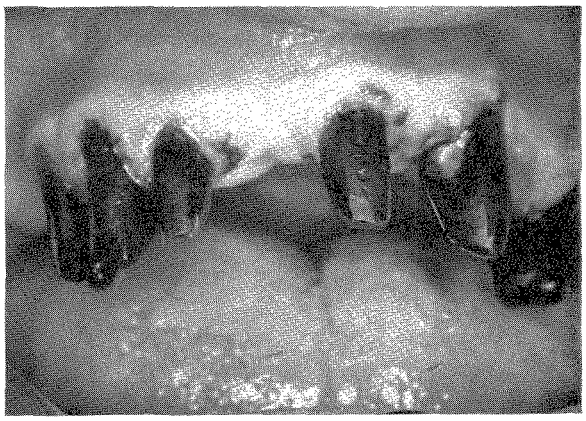


Fig. 518. Photograph taken in August, 1959. Teeth cleaned up and silver nitrate applied just prior to the insertion of the gold copings.

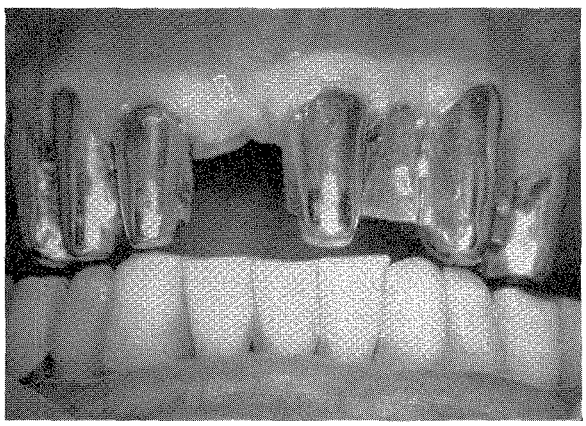


Fig. 519. The copings were cemented on their respective teeth.

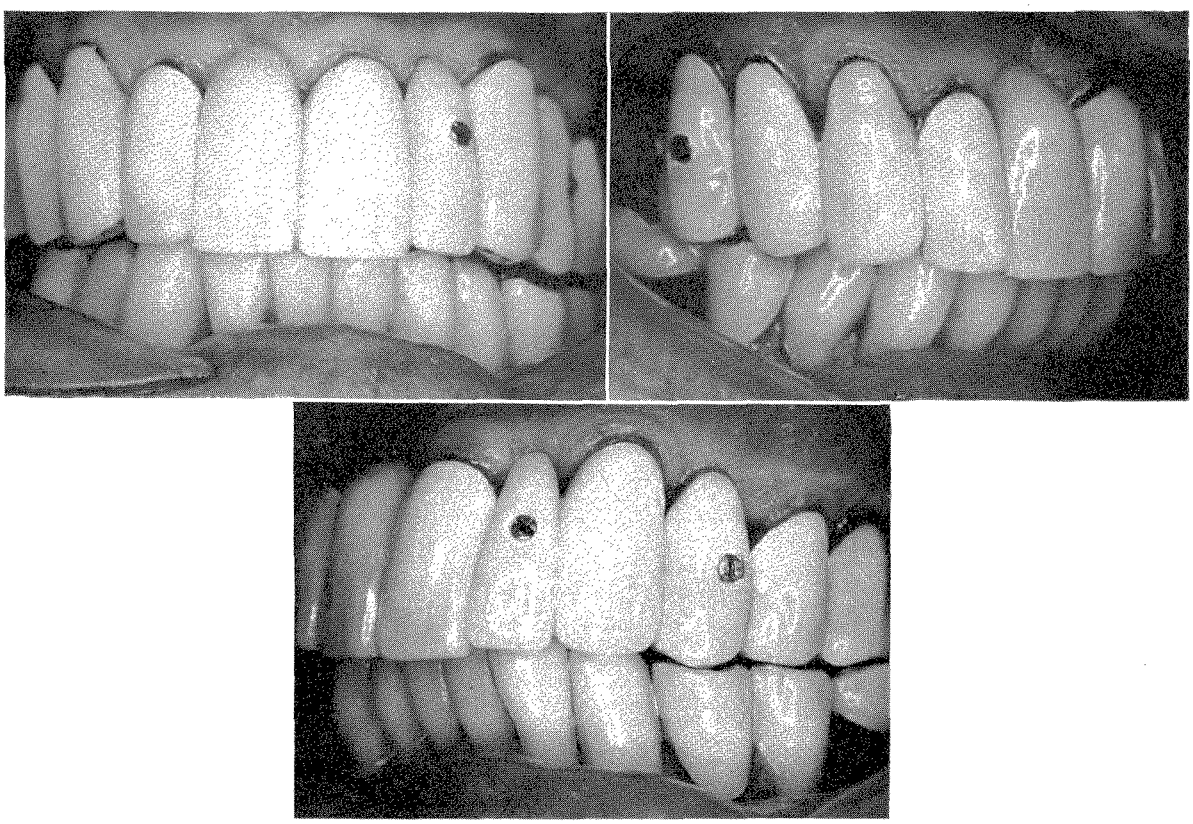


Fig. 520. Front and side views of the completed work. This was inserted in October, 1959.

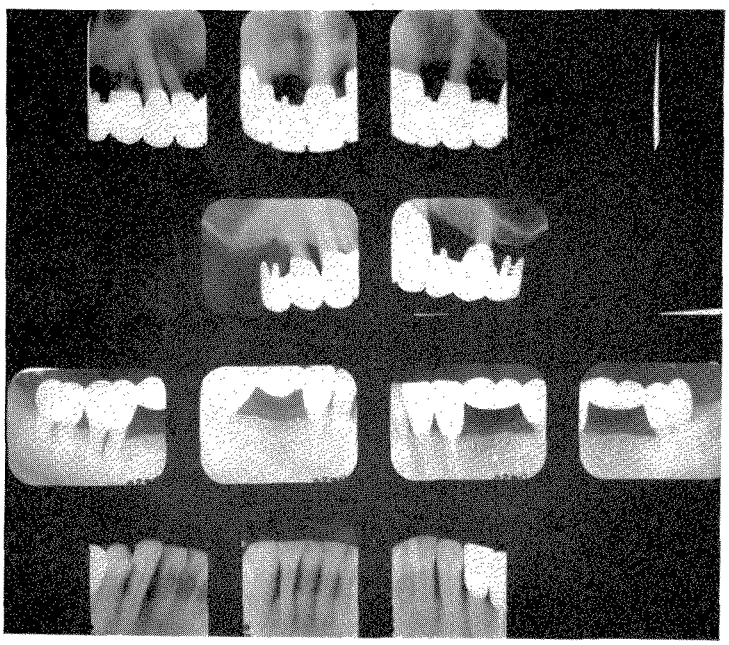


Fig. 521. Roentgenograms of the completed work taken in February, 1959.

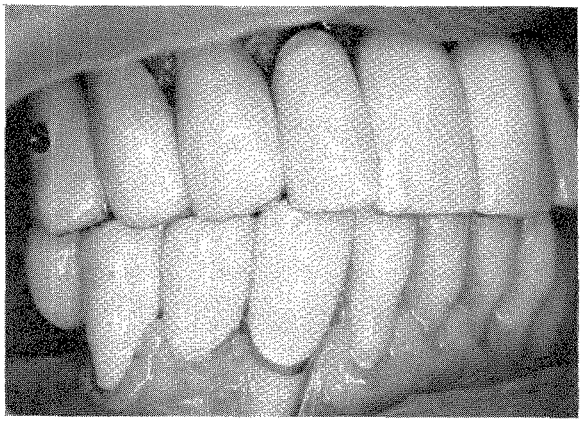


Fig. 522. In September, 1961, the lower right molars had to be removed because of periodontal pathology. A four-unit splint was inserted utilizing the lower right cuspid and the two bicuspids with one throw-off.

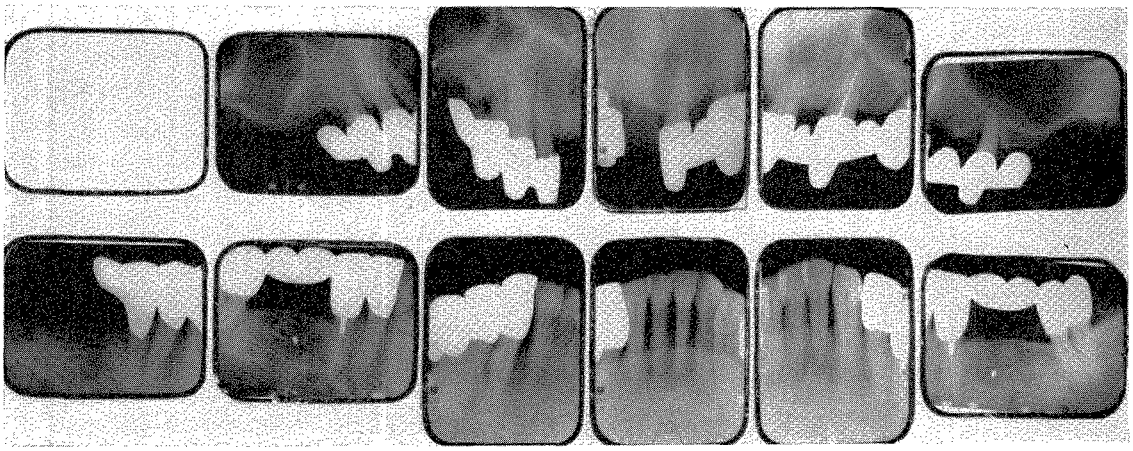


Fig. 523. Roentgenograms taken in 1962. The upper left cuspid became nonvital and infected. Its root was treated through the gold coping and filled.

In the case just described there was reference to gold copings cemented over the original prepared abutment teeth. These were described in the literature in 1960. The technique bears repetition.

GOLD COPINGS

Gold copings for problematic teeth

"It is [frequently] advantageous to be able to use teeth with doubtful longevity as abutments for a fixed or removable prosthesis or as units of a multiple splint. Teeth with periodontal involvement, pulpless teeth, short-rooted teeth, teeth with narrow, tapered single roots, and some teeth with bifurcation or even trifurcation involvements *may* be used as abutments if they are protected properly.

"Such problematic teeth may be covered with thin gold copings. These copings are cemented permanently to the prepared teeth before the telescoping overlay

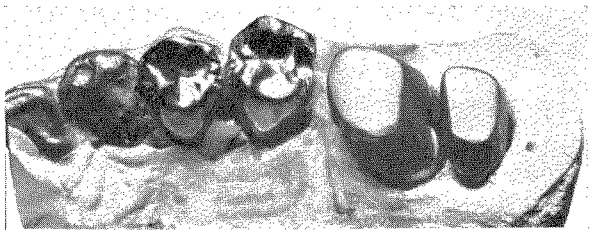


Fig. 524. The bicuspids and molars will be splinted together. There is a deep pocket between the molars. Thin gold copings are in place on the molars. The bicuspid veneer crowns are soldered together. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.) (Figs. 524 to 529 are of the same case.)

crowns are made. (Fig. 524.) When the teeth are protected by gold copings, temporary cement can be used to secure the fixed partial denture or splint in position. Without such protection, a temporarily cemented fixed prosthesis cannot remain in the mouth long because of cement destruction by the mouth fluids and resultant caries. This situation is especially dangerous when the restoration is cemented temporarily to multiple abutments. The temporary cement on one or more of the abutments may leak without being detected, while the other abutments retain their cement and give a false impression of good retention. Unprotected teeth with no cement are subject to severe caries before the fault can be detected. The permanently cemented gold copings underneath the crowns of the fixed partial denture or splint prevent the development of caries when the temporary cement becomes defective. The gold copings cover and protect the individual teeth if the temporary cement washes out.

"If the problematic tooth must later be removed, the temporarily cemented prosthesis can be removed easily and the condemned tooth extracted. Then the crown which had covered the coping can be filled with plastic, silicate cement, or gold. Thus, the same fixed partial denture or splint can be recemented and made still serviceable to the patient."*

Other uses for copings

"Gold copings can be used to make abutments parallel as well as to protect teeth. Teeth which are not parallel can be covered by gold copings shaped so they are parallel to the other abutment preparations or castings. The telescoping crown that goes over the coping does not have to extend to the gingival margin of the tooth. It needs only to extend far enough to provide retention and at the same time be parallel with the other abutment castings on the restoration."*

Retention

"The cast crown which covers the coping should be held in position by active mechanical retention in addition to the temporary cement. Mechanical retention

*Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. 10:163-166, 1960.

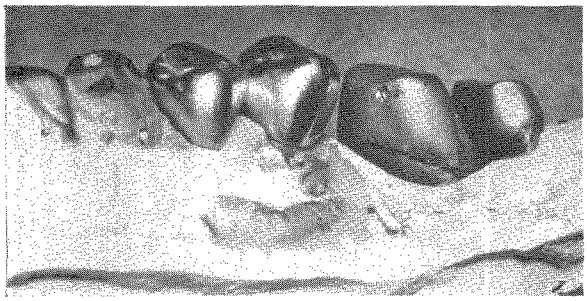


Fig. 525. A screw fits into the small hole in the lingual surface of the first molar coping to provide mechanical retention for the telescoping overlay castings. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

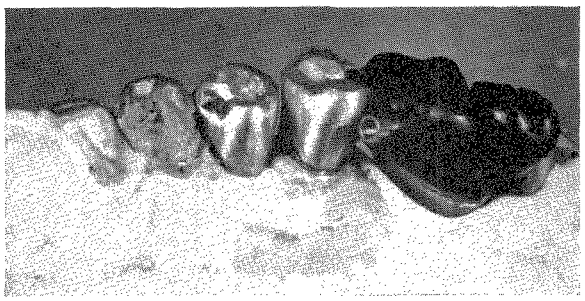


Fig. 526. The threaded tubing that accommodates the retention screw is in position in the wax pattern. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

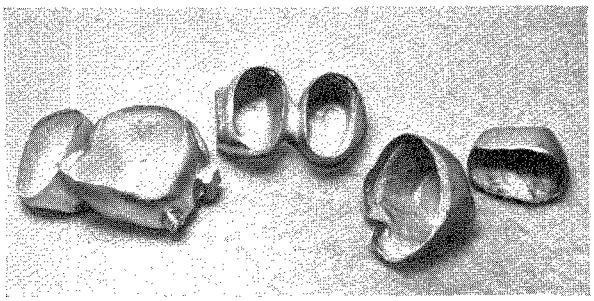


Fig. 527. The various parts of the completed fixed partial denture before insertion in the mouth. The molar trifurcation involvement is indicated by the contour of the molar casting. The screw is in position in the casting and will help secure it to the coping. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

can be accomplished by placing small screws* in advantageous positions through the crowns and into the copings. (Figs. 525 to 527.) The tube to carry the screw is made a part of the overlay casting. Care should be taken to avoid drilling the hole for the screw too deep and perforating the coping. If the tooth should be exposed through the coping, silver nitrate is applied, and the exposed surface is watched carefully. A silver filling can be inserted if caries develops.

"The screws are inserted after the fixed partial denture or splint is secured in place in the mouth with a temporary (zinc oxide and eugenol) cement. (Figs. 528 to 530.) There are several advantages in the use of a temporary cement. There is no chance for saliva to seep into the gold joints and to produce a foul odor because of its stagnation. Leaks in the overlay crowns may be detected by looking for brown oxidation when the fixed partial dentures are removed.

"When there is a space between teeth, the copings can be connected by a rectangular gold bar, and the retaining screw can be inserted in this bar rather than into some portion of the abutment coping. (Figs. 531 and 532.) This form of positive retention is effective and less dangerous to the tooth.

"Fixed partial dentures or splints constructed in the manner described may remain in position from one to six months. If the mouth requires frequent pro-

*Distal extension screw and round tube, Hartford, Conn., The J. M. Ney Co.

Fig. 528. The copings are secured separately with a permanent cement. Then the bicuspid veneer crowns are cemented. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

Fig. 529. The molar splint is attached to the gold copings with a temporary cement, and the screw is inserted from the lingual surface. The molar crowns are removable, which permits easy access for periodontal treatment. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

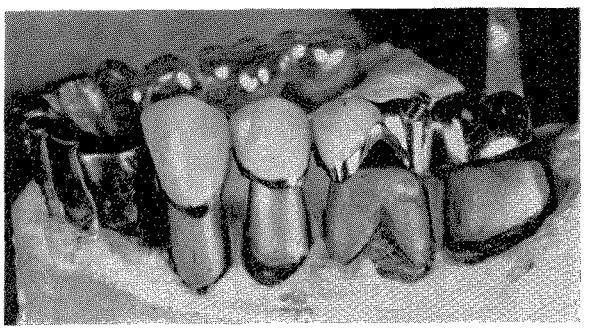


Fig. 530. The gold copings will be attached with permanent cement. The overlay splint will be secured with temporary cement. The screw is in the buccal distal surface of the first molar crown. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

Fig. 531. The copings are joined by a flat gold bar. The hole in the bar for the screw provides for positive retention without the danger of perforating an abutment coping. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.) (Figs. 531 and 532 are of the same case.)

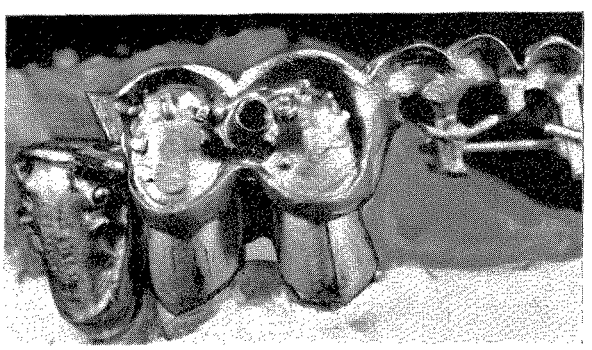


Fig. 532. The telescoping overlay fixed partial denture for the copings shown in Fig. 531. The receptacle for the screw is between the teeth. (From Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.)

phylaxis or periodontal treatments, the prosthesis is removed. The periodontal pockets are far more accessible for treatment with the dental prosthesis removed."*

Summary

"With the increased use of multiple splints and extensive dental reconstruction, gold copings under crowns provide an additional tool for the dentist. More questionable teeth may be retained. The copings permit thorough prophylaxis, provide a method of paralleling teeth without removing their pulp, and permit restorations to be cemented temporarily without endangering the abutment teeth."*

Case 9

This patient was another man in his mid-forties. Because of extremely weak periodontal tissues, specialized treatment was instituted before oral reconstruction was undertaken. Sixteen teeth were missing at the onset. The first stage of the oral reconstruction consisted of tooth preparations and the insertion of quick-cure acrylic crowns. In this stage the bite remained as it was originally. In the second stage an upper gold acrylic twelve-unit fixed bridge splint was inserted. This was constructed on a Hanau Model H articulator. In this second stage two lower gold acrylic splints were made for the lower right and left missing teeth. These were also constructed on a Hanau Model H articulator. In this time the occlusion was coordinated. The work was begun in October, 1956. The second stage was completed in December, 1956. It was carefully planned and executed.

The transitional work was worn for four months. In April, 1957, the third or final stage was started. Transverse hinge axis registrations were taken by means of cemented clutches and the McCollum face-bow. The hinge axis points were tattooed on the skin in the neighborhood of the right and left condyles. The articulator that was used was the Transograph.† This is the first instrument in which the face-bow becomes the articulator.

The vertical dimension was determined carefully, and the occlusion was coordinated. Gold transfers were used for accuracy in positioning the dies. Three wax hinge bite records were taken at different degrees of opening in order to determine the arc of closure in accordance with the theory of Transographics. Finally, a removable partial denture was constructed to replace the upper left missing teeth. This partial denture was retained by precision attachments. It was made from an original mucostatic impression. A separate relational impression was taken in order to connect the fixed and removable castings. The area of palatal coverage was as small as good mechanics would permit.

One year after the insertion of the completed work, the patient requested that he be permitted to discontinue the wearing of the removable partial denture. After consultation with his periodontist, it was mutually agreed that the removable denture be eliminated. The male attachments were cut off and cemented into the female boxes. His present function is adequate. (Figs. 533 to 556.)

*Schweitzer, J. M.: Gold copings for problematic teeth, J. Pros. Dent. **10**:163-166, 1960.
†Schweitzer, J. M.: The Transograph and Transographic articulation, J. Pros. Dent. **7**:595-620, 1957.

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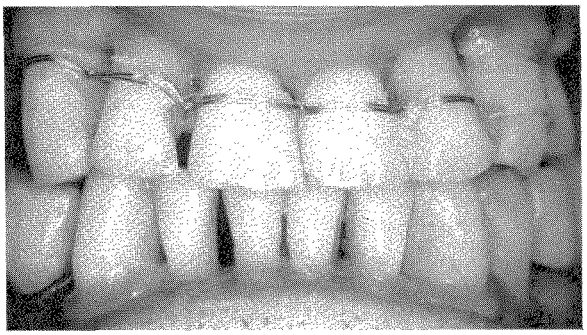

Fig. 533. This case was started in October, 1956. The periodontal treatment was concluded. The teeth had been wired for stabilization. (Figs. 533 to 556 are of the same case.)

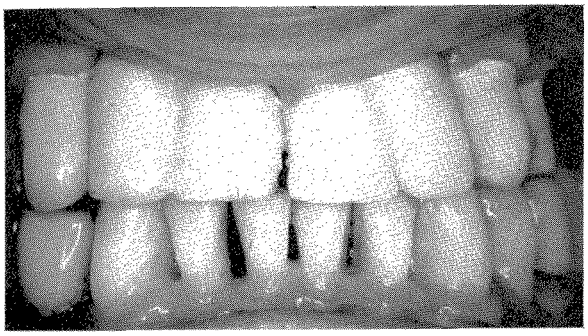

Fig. 534. Quick-cured acrylic splints were resorted to in the first stage as shown here.

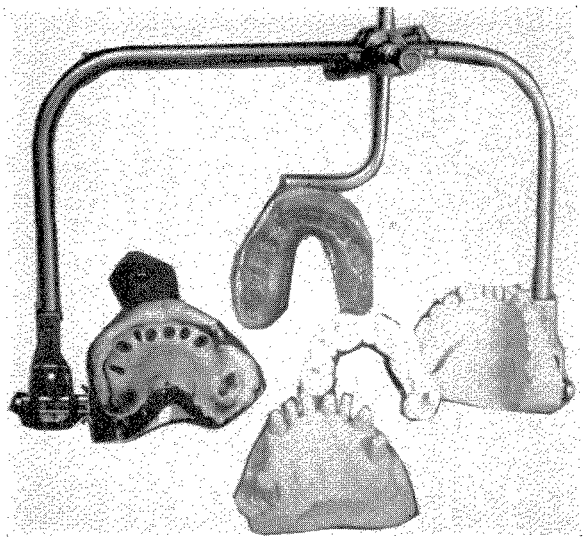

Fig. 535. Registrations were taken for the second stage of transitional work. Centric relation was registered with plaster.

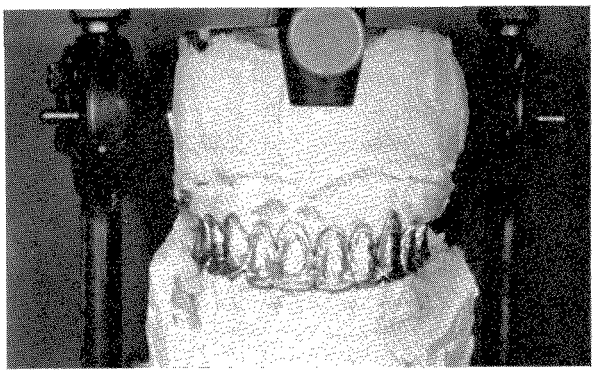

Fig. 536. The second transitional work was completed using a Hanau Model H articulator. The upper gold splint which was finally veneered with plastic is shown here.

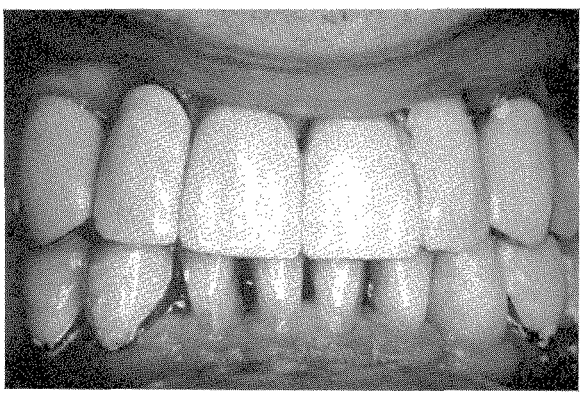

Fig. 537. Front view of the completed second transitional work. This consisted of a single upper splint and right and left lower posterior splints. This work was inserted in December, 1956.

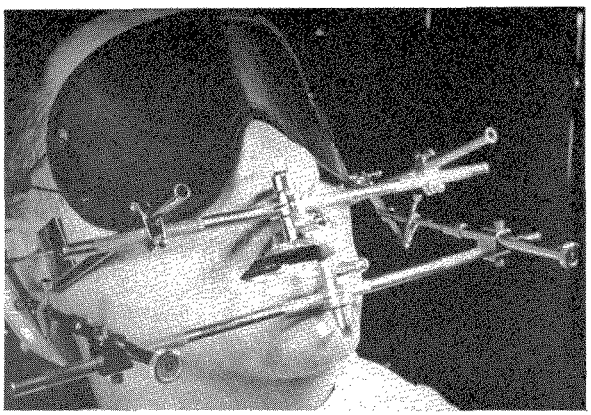

Fig. 538. The final work was started in April, 1957. The transverse hinge axis was recorded by means of the McCollum face-bow.

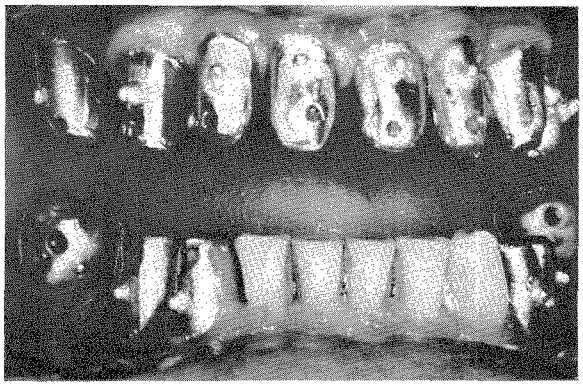

Fig. 539. Gold transfers were inserted on all the prepared teeth. They had labial and buccal windows to test the fit. The copper-plated dies were more accurately positioned because of these transfers.

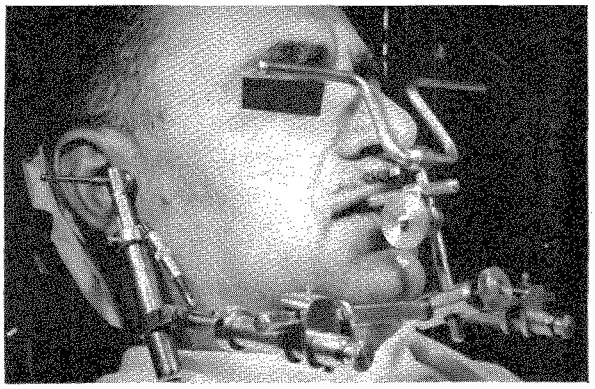

Fig. 540. The face-bow of the Transograph was used to make records in order to mount the casts on the articulator known as the Transograph. A cranial plane is also taken at this time.

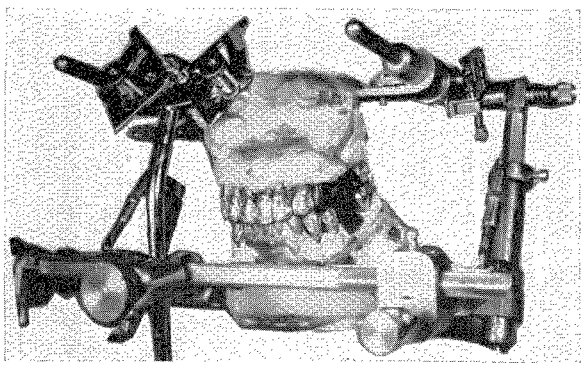

Fig. 541. The final castings were constructed. They are shown here on the Transograph ready for their try-in in the mouth.

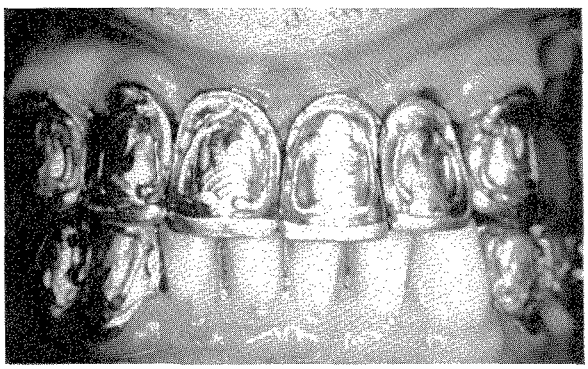

Fig. 542. The first try-in of the final castings. This is for fit, vertical dimension, and hinge bite. Wax records are then taken, and new work casts are made. These are mounted on the Transograph in place of the old casts.

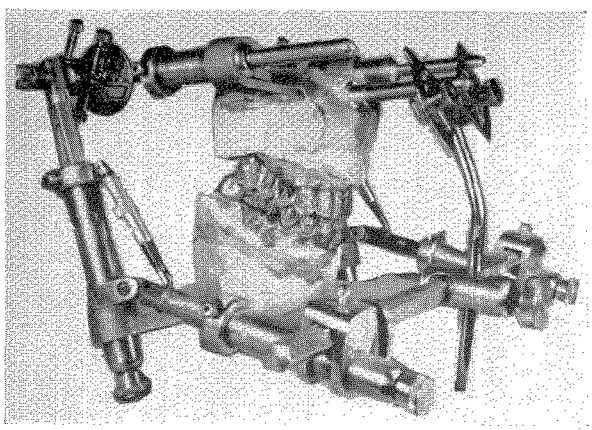

Fig. 543. The new work casts were mounted on the Transograph, and the fixed partial dentures were further advanced in their construction. Another try-in is to be made.

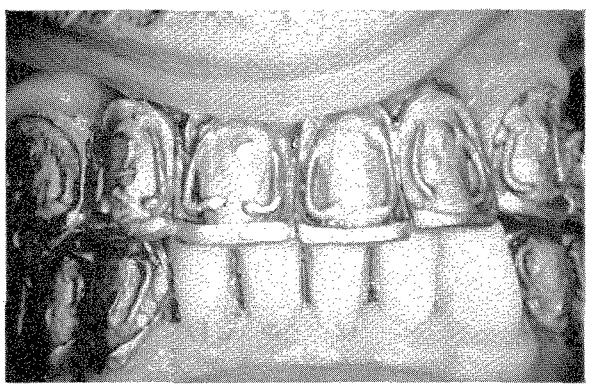

Fig. 544. The fixed partial dentures were inserted in the mouth, and the hinge position was again checked. Additional checkbites will be taken to gauge the accuracy of the maxillomandibular relationship before the final work is completed. The upper removable partial denture will now be constructed.

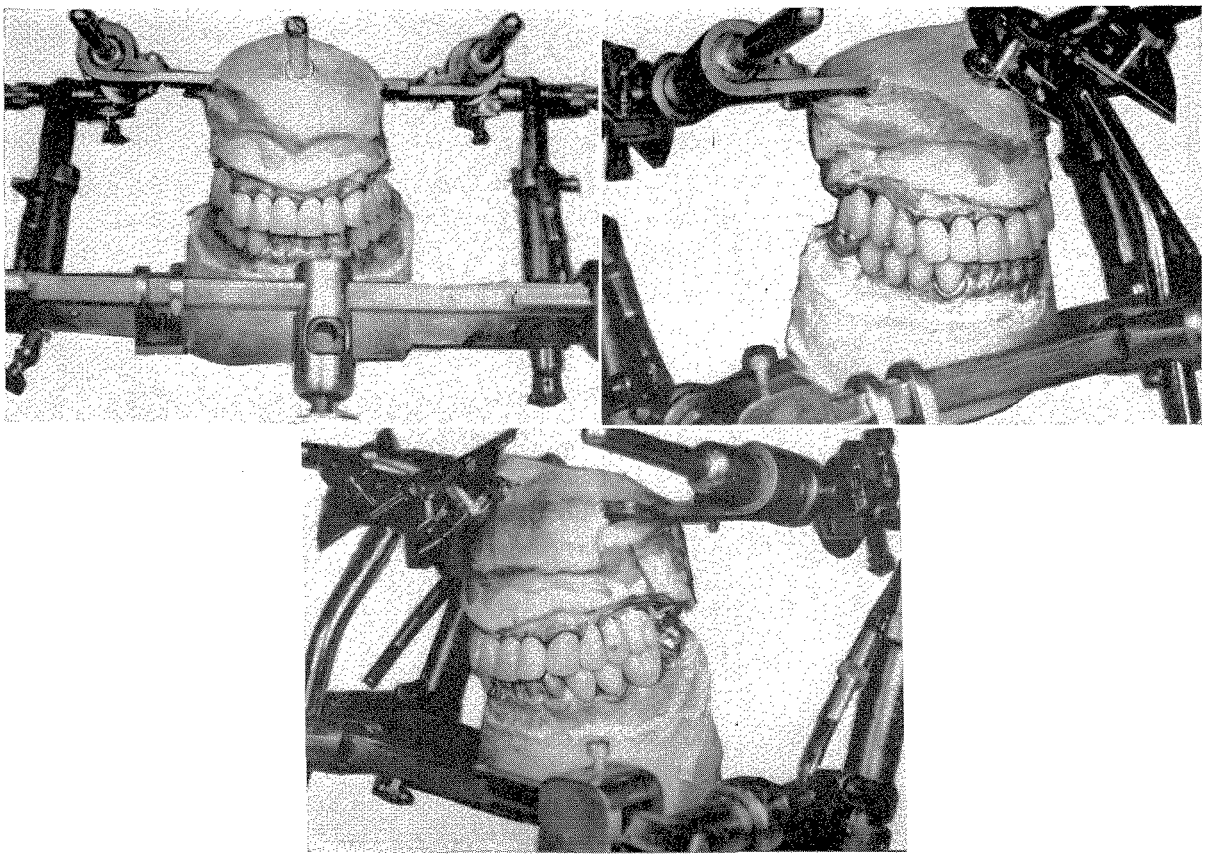

Fig. 545. Front, right, and left views of the completed work on the Transograph.

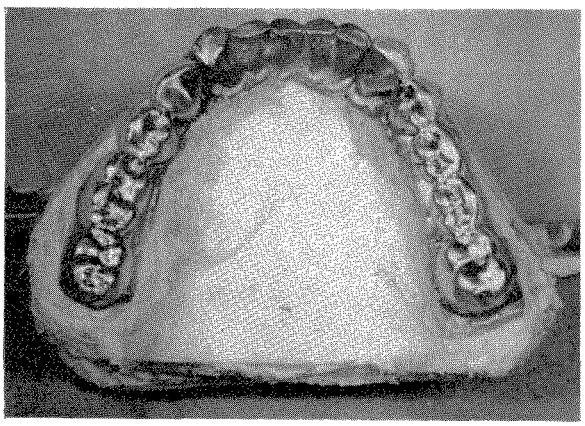

Fig. 546. The occlusal view of the completed lower fixed partial dentures.

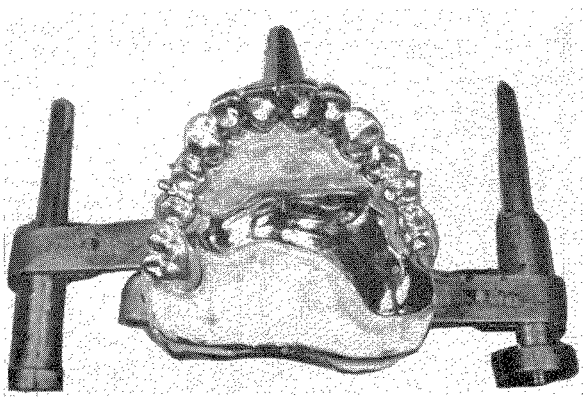

Fig. 547. An occlusal view of the completed upper fixed and removable partial dentures.

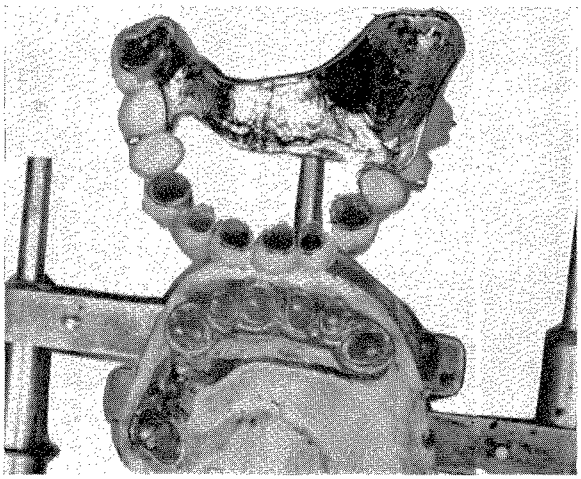

Fig. 548. The final fixed and removable upper partial dentures are shown here off the casts but still related to each other.

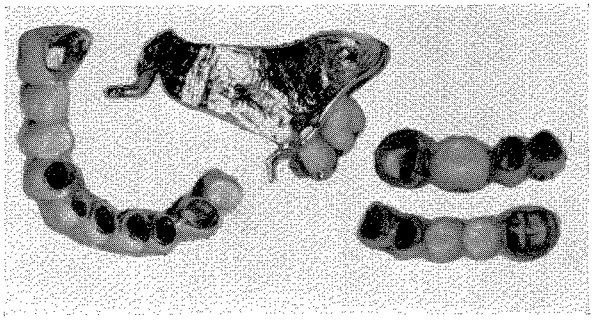

Fig. 549. The upper and lower fixed and removable partial dentures were separated.

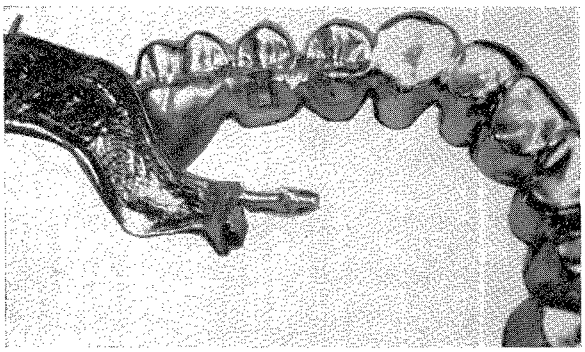

Fig. 550. A close-up view of the right side of the upper denture showing the method of retention and stabilization. The casting going across the occlusal surface between the bicuspids ends in a small projection of gold. This enables the patient to remove the denture with greater facility and to prevent wedging.

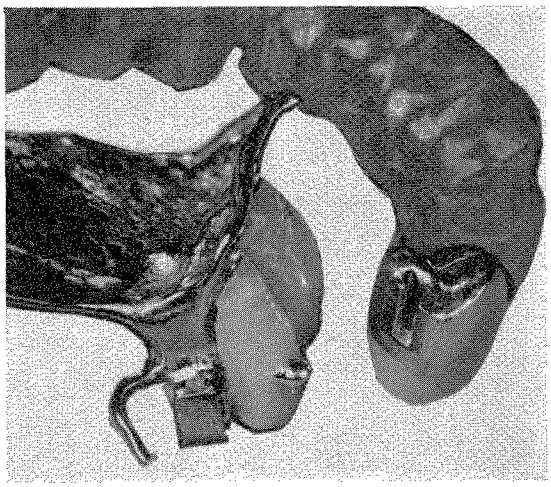

Fig. 551. A close-up view of the left side of the upper denture showing the method of retention and stabilization. The lingual clasp arm is for tightening. The gold spur projecting from the plastic on the buccal surface of the bicuspid is also for ease of removal as in the previous illustration.

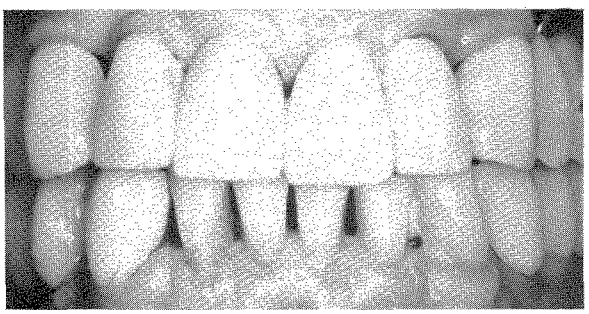

Fig. 552. Front view of the completed work assembled in the mouth. This was completed in June, 1957.

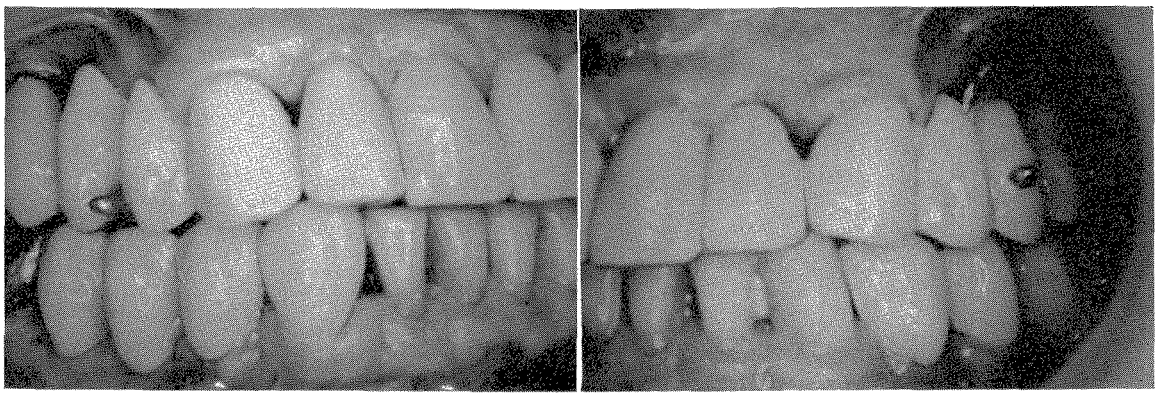

Fig. 553. Right and left views of the completed work.

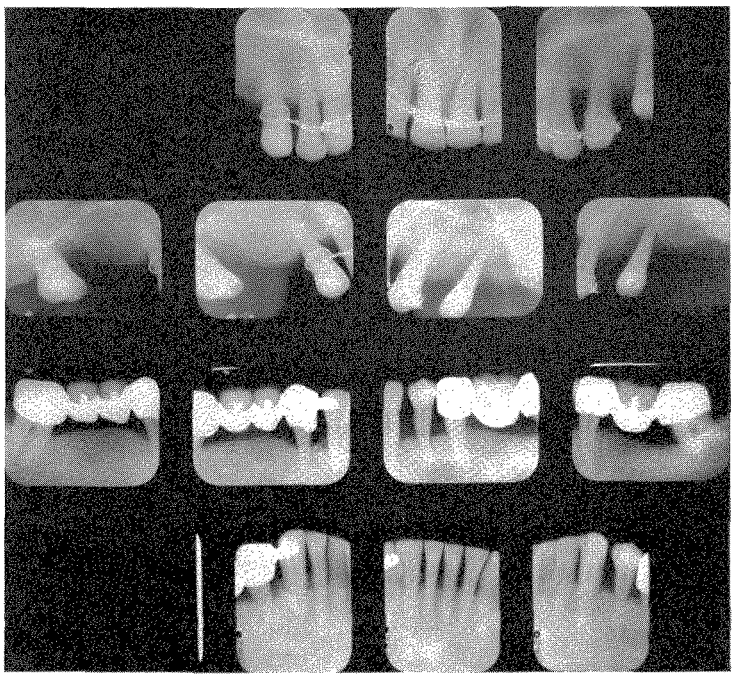

Fig. 554. Roentgenograms taken in October, 1956, before the work was started.

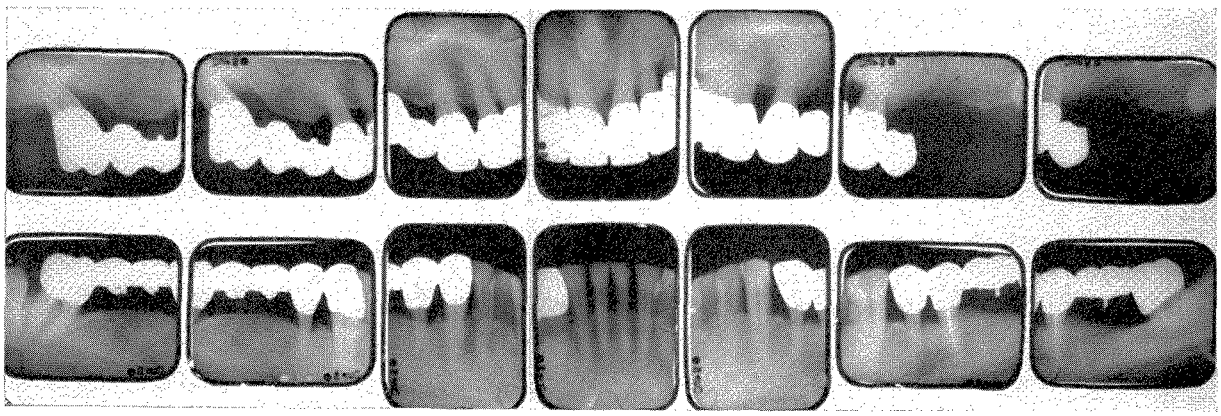

Fig. 555. Roentgenograms taken in July, 1962, five years after completion.

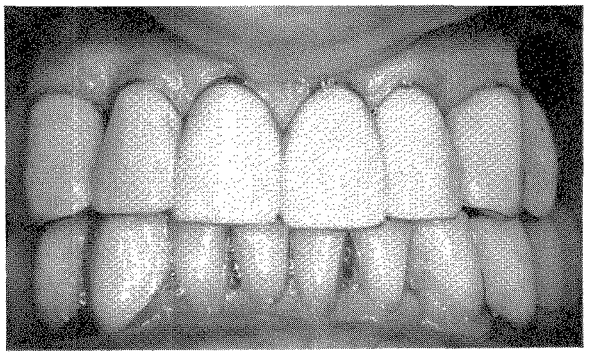

Fig. 556. A photograph taken of the mouth in 1961.

While these cases are not frequent, they do arise and must be evaluated on their own merits. The dentist should not insist that every patient must wear a certain type of prosthesis simply because of his professional reluctance to admit that he cannot supply the correct answers in every one of these complex situations. In Case 9, a systemic factor was again suspected as an important cause of the periodontal breakdown.

Chapter 6

FINAL CEMENTATION AND POSTINSERTION CARE OF EXTENSIVE PROSTHETIC RESTORATIONS, INCLUDING COMPLETE REHABILITATION

Inasmuch as case reports of extensive prosthetic restorations will be presented continuously throughout this text, the postinsertion care of these restorations is an important factor in a consideration of their longevity. This chapter will include many of the necessary procedures. Let us start with final cementation of the fixed partial prosthesis. This may involve single castings or fifteen-unit bridge splint combinations. In the mouth the abutment teeth should be thoroughly cleaned of the temporary zinc oxide transitional cements. Warm water, hydrogen peroxide (U.S.P.), alcohol, oil of eucalyptus, and chloroform may be used to help in this cleansing. Teeth that are sensitive should be coated with a cavity varnish such as copalite.

USE OF VARNISHES

Going and Massler* found that copal resin varnish, polystyren ethyl cellulose liner, and calcium hydroxide liners were effective in preventing penetration of

*Going, R. E., and Massler, M.: Influence of cavity liners under amalgam restorations on penetration by radioactive isotope, J. Pros. Dent. 2:298-311, 1961.

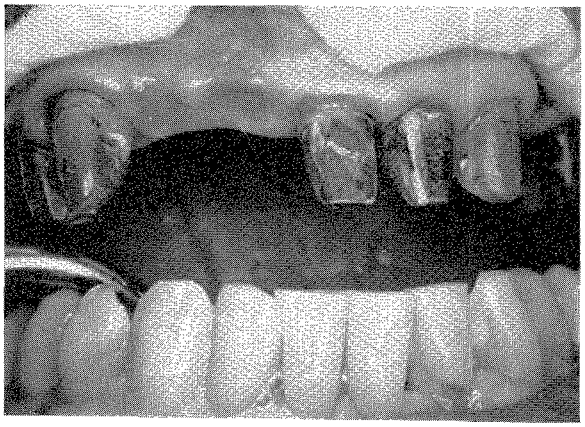

Fig. 557. The upper teeth were treated with silver nitrate. The final upper prosthesis is about to be inserted.

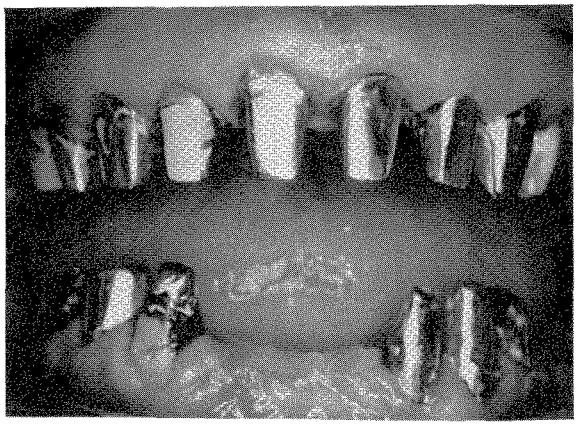

Fig. 558. The teeth have some form of gold casting. Most of them are nonvital. The final work is about to be cemented.

radioactive ions into the dentin and pulp. Zinc oxide-eugenol and zinc phosphate cement bases were not.

Swarz and Phillips found that the use of cavity liners improved the adaptation of the resin restorations.*

USE OF SILVER NITRATE

Where extensive multiple castings are to be inserted, the teeth are dried with cotton. Warm air is used sparingly. Cotton rolls are placed around the teeth. Cotton is placed between the teeth to absorb seepage. (Fig. 558.) In the maxillae, cotton rolls are placed in the area of the ducts of the salivary glands (parotid). This is done even when inserting lower bridgework. Whether to use silver nitrate on the abutment teeth is still debatable. (Fig. 557.) It is hazardous to apply it to anterior teeth because it is apt to cause a sloughing of the gum tissue in the cervical area and expose the root. This may cause embarrassment after cementation. Then, again, with sensitive teeth, silver nitrate may cause further irritation. The operator's experience and judgment will have to help him in this decision.

Massler†‡ condemned the use of silver nitrate because of its irritating qualities even when precipitated with eugenol. Bartels§ stated that only zinc oxide-eugenol cements should be used for sterilization because they alone show microbial specificity and are innocuous to pulpal tissues. Finn‖ did not believe in cavity sterilization at all because of possible pulp damage among other ill effects.

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*Swarz, M. L., and Phillips, R. W.: In vitro studies of the marginal leakage of restoration materials, J.A.D.A. **62:** 141-150, 1961.

†Massler, M.: Sterilization of dentine, J. Tennessee State D. A. **35:**375, 1955.

‡Massler, M.: Pulp protection and preservation, Pract. Dent. Monog., pp. 3-47, January, 1958.

§Bartels, Henry A.: Cavity sterilization, Dental Clinics of North America, Philadelphia, November, 1960, W. B. Saunders Co., pp. 647-659.

‖Finn, Sidney B.: Cavity sterilization, Dental Clinics of North America, Philadelphia, November, 1960, W. B. Saunders Co., pp. 663-669.

CONDITIONING TEETH BEFORE CEMENTATION

To condition the prepared teeth for cementation, Ludwick and Lynn* developed a technique in which the patient rinsed with varying degrees of cold water until he could tolerate a temperature of 65° F. This takes about two minutes. After conditioning is achieved, the area is isolated, and a 3% solution of hydrogen peroxide (U.S.P.) is applied to the prepared teeth by means of cotton. Unwarmed air is used to remove the moisture. Cotton pellets are also used. An attempt is made to dry without desiccating. In this technique timing is important—the prepared teeth must not be given time to regain the body temperature. Cementation must take place before this happens. The authors claimed that pain is greatly reduced by this method.

Teeth can stand wide temperature changes, but a rapid change causes pain. The air blast causes rapid chilling and discomfort. The temperature change to 65° F. is accomplished gradually and painlessly. The conditioned tooth stands moisture, evaporation, and exposure to air much better than before. It also will stand the heat generated by the cement much better. The tooth is dried by cotton pellets and is not desiccated by a warm air blast. The tissue fluid of the dentin comes into direct contact with the cement.

The experiments of Souder and Paffenbarger showed that "minute traces of moisture in a cavity should have no serious effects upon a zinc phosphate or silicate cement. Extreme desiccation of a cavity may cause more injury than could be caused by a trace of moisture left in it."†

Some operators resort to local or conductive anesthesia prior to cementation. Insofar as I know, all the methods mentioned have proved satisfactory if they are not abused.

When the mouth is ready, the operator needs his hands free. Therefore, a chair assistant will be necessary at this stage in maintaining the correct positioning of the cotton rolls, the saliva ejector, and the general well-being of the apprehensive patient. The open mouth may also have to be covered in order not to allow the atmospheric cold air to sensitize the uncovered preparations further. Any open window in the operating room should be closed during this procedure.

TEMPORARY CEMENTS

The idea of using an anodyne cement, such as a zinc oxide, for final cementation is now being explored. Although the nonirritating features of the materials are recommendable, most of us are still reluctant to use them in obtaining experimental data on our large restorations. There is too much at stake should these prostheses loosen because of the dissolving of the cementing medium. Such materials as Temrex have great possibilities as final cements, but until more data are available, the traditional final cements, such as S. S. White oxyphosphate of zinc and cements of a similar nature, will continue to be used.

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*Ludwick, R. W., Jr., and Lynn, L. M.: A method to reduce pain during cementation of restorations, J.A.D.A. **53**:563-566, 1956.

†Souder, W., and Paffenbarger, G. C.: Physical properties of dental materials, Washington, D. C., 1942, U. S. Government Printing Office, p. 105.

Fig. 559. The upper left splint runs from the second bicuspid to the third molar. It was inserted in January, 1948, with Temrex, which is a temporary cement. It was impossible to remove it. This photograph was taken in October, 1960. The splint was removed at that time in order to replace it. It has been in almost thirteen years. (Figs. 559 and 560 are of the same case.)

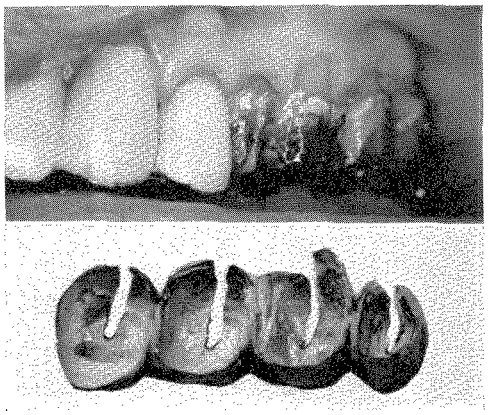


Fig. 560. When the splint shown in Fig. 559 was removed, the temporary cement was found to be intact. The teeth had been treated previously with silver nitrate before the insertion of this splint in 1948.

Horn* and Phillips and Love† recently conducted experiments in an effort to increase the compressive strength, the solubility, the antibacterial activity, and the setting time of the temporary cements. Horn added Triamite to Temrex whereas Phillips and Love added o-ethoxybensoic acid to zinc oxide and eugenol mixtures. They reported success but stated that further study of additives is indicated.

My only experience with longevity of temporary cements came about accidentally while cementing a four-unit posterior splint with Temrex. I was unable to remove it. Ten years later it was removed by cutting the crowns. The cement was still intact and had not dissolved out, even at the margins. (Figs. 559 and 560.)

When temporary cementation is resorted to, it is necessary to write this down on the patient's chart and to tell the patient. This becomes even more important if the bridge is to remain in place for a length of time before it will again be removed. The operator and the patient can forget that the cement was only temporary. This may result in the loss of a pulp or the tooth itself. I have been guilty of this mistake and have also examined patients who have not been made aware of the temporary nature of the cementation by other dentists. To avoid serious embarrassment, exercise caution.

CEMENTATION OF FIXED PARTIAL DENTURES

The bridge to be cemented is washed off in clean water. It is dried well and wiped clean with alcohol. The embrasures are given a coat of thin mineral oil (Albolene). (Fig. 561.) Any lug seat or female attachment is filled with soft red wax. The gold, porcelain, or plastic saddles are wiped with a mineral oil (Albolene). In the mouth,

*Horn, H. R.: Improved cementations, J.A.D.A. **63**:813-820, 1961.

†Phillips, Ralph W., and Love, D. R.: The effect of certain additive agents on the physical properties of zinc oxide eugenol mixtures, J. Dent. Restoration **40**:294-303, 1961.

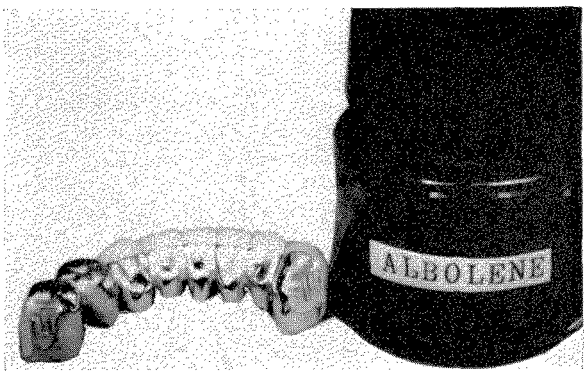


Fig. 561. Before cementation, the embrasures are given a thin coat of mineral oil to facilitate the removal of the cement.

the saddle areas are wiped with Albolene. These precautions are taken so that after the cement has set, it is not difficult to remove it from these important surfaces. It is also necessary to learn the angle of insertion. A broad chisel, a double-ended burnisher, and a soft-nosed mallet are made available for tapping the bridge into place.

The cement should be used in the proportions suggested by the various manufacturers and mixed as they recommend. The slab should be cold. The cement is mixed looser for large restorations than for small ones. In addition, the cement is not mixed as long for multiple-unit bridges as it is for small bridges. In some cases in which the teeth are unusually sensitive, a small amount of eugenol is incorporated in the cement liquid to take advantage of its anodyne effect. When using eugenol in this manner, the cement often sets faster, so that caution should be used. The crowns need not be entirely filled. The liquid cement is needed only around the circumference. Experience has showed that it flows down and fills the entire crown. The crowns with narrow circumferences should be filled first while the cement is softest. If possible, avoid getting cement into the interproximal embrasures.

When all the crowns have the necessary amount of cement, the signal is given to the assistant and to the patient. Any unnecessary cotton is removed at this time, and the bridge is inserted according to the memorized and practiced path. Should anything go wrong and it becomes necessary to remove the bridge, a saturated solution of bicarbonate of soda has been prepared so that the bridge, with the cement, can be plunged into it and the cement softened in order to facilitate its removal. Pellets of cotton saturated with bicarbonate solution are used to wipe the cement from the natural teeth before it has had a chance to set.

Usually, however, the cementation is successful. Then, the bridge is seated by digital pressure and malleted into position by means of the chisel or the double-end burnisher. The chisel must be used with care owing to its tendency to nick the polished gold surface or to cut the plastic. Malleting should be avoided when using fused porcelain bonded to metal for fear of fracturing the porcelain. Excess cement flows out and is removed. (Fig. 562.) The bite is checked by having the patient contact the teeth. A thin sheet of cellophane is used to prevent the cement from contacting the opposing teeth. The patient is sometimes given soft wood sticks to

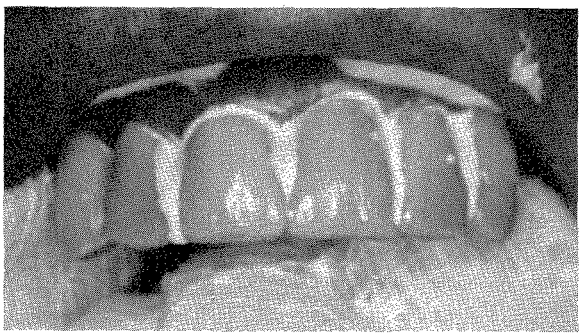


Fig. 562. This bridge had just been cemented. The gauze below it is to catch the soft cement if any drops.

bite on to further ensure correct positioning. The cement is allowed sufficient time to harden and is then removed in pieces. The embrasures are cleaned out with explorers whereas dental floss is used in the saddle areas. The bite, which had been checked out before insertion, is checked once again, and any major discrepancy is adjusted before dismissing the patient. Final roentgenograms must be taken. At that time any surplus cement will be detected and removed.

In cementing large units of fixed prosthesis, there is usually some change that will take place despite our best efforts to prevent it. Some few operators place small round holes in their crowns to provide exits for the trapped cement. These they later plug by means of small gold foil fillings or gold inlays, gold clasp wire, or amalgam fillings. Where the prosthesis extends around the arch, changes in the vertical dimension due to cementation may not be detected because of a uniform change in the entire area. Where smaller bridges are used, the changes are seen more readily. The occlusion must be corrected. This is usually accomplished by carbon paper and small carborundum stones.

METHODS OF INSERTION AND FINAL CEMENTATION OF ABUTMENT CASTINGS FOR REMOVABLE PARTIAL DENTURES

The cementation of the abutment castings and the insertion of a large precision removable partial prosthesis is an important procedure. Various operators have their own methods of doing this, and they may differ radically. With an average of four precision attachments positioned in different areas of the arch, the first step is to seat one attachment at a time and to try-in the removable bridge. (Fig. 563.) By inserting only one abutment casting at a time and then seating the bridge, it is possible to find out which casting is at fault, should this situation arise. When, finally, all the abutments and the removable bridge are in position, a decision must be made regarding the method of cementation. Some operators prefer to have the entire assemblage worn for several days and then to correct the saddle areas as pressures are built up. Only after occlusal and saddle corrections are made are the abutments finally cemented. Other operators prefer to cement the entire assemblage once it has been inserted and the occlusion has been accepted. Still others prefer to cement the

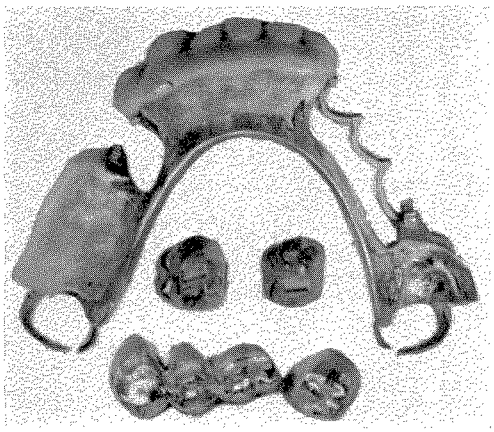


Fig. 563. Where four separate units, each containing precision attachments, are to be cemented, great care is required.

abutments finally on separate days, during which interval they feel the teeth are being moved gradually by the appliance into more favorable positions.

CHANGES THAT TAKE PLACE FOLLOWING CEMENTATION

All three methods seem to be successful judging from questions asked of various operators. Those who cement immediately state that cementation almost always changes to some small degree the position of the castings. Therefore, even if they were to wait several days before final cementation, the same changes would take place and still necessitate correction. But, even for those operators who insert the entire assemblage immediately, there is usually a twenty-four to forty-eight hour wait before being able to remove the removable portion. This is readily understandable when due consideration is given to the possibility of small changes which take place while inserting the abutment castings—slight rotations or vertical displacements or tipping. In fact, because of these changes, some operators cement the abutment castings together with the removable bridge at one and the same time. It is removed later together with the cement which has set around the abutment castings. This procedure is also resorted to by placing all the castings on the removable bridge but cementing only one or two at one time. When these set, the bridge with the uncemented castings is removed, and then these are finally cemented. If the abutment castings are cemented separately, soft wax should be placed in the female attachments to prevent cement from entering the box. If the casting is cemented together with the removable portion, then the male and female attachments should be lubricated with a thin oil.

There are those operators who prefer to wait before final cementation so that they may have the opportunity to remount and refine the occlusion after the assemblage has been worn and subjected to normal functional pressures. They are also able to correct any excessive impingement upon the soft tissues by the saddles of the fixed and removable partial dentures.

Abrupt changes in the vertical dimension may require different periods of

adjustment according to the neuromuscular mechanism of different patients. Where insertion of the final work imposes large changes upon the neuromuscular mechanism, these may be manifest by pains in the masticatory and neighboring musculature. Adjusting to this may take several days, or even weeks. However, if no physiological or biological rules have been violated, the adjustment is made uneventfully. As a rule postinsertion adjustments will be necessary until passivity is finally attained.

INSTRUCTING PATIENTS

Where a precision type of removable partial prosthesis has been inserted, the patient must be instructed in its method of insertion and removal. With some patients this period of instruction will take longer than with others, but with patience this difficulty can be overcome. Elderly patients with poor coordination should not be given intricate pieces of prosthesis. For them, simple methods of insertion and removal should be resorted to. (Figs. 564 and 565.)

Instructions in cleansing fixed and removable partial dentures must be given. This also applies to fixed partial prosthesis where it becomes necessary to insert dental floss beneath the saddle areas. Copper wire is given these patients with

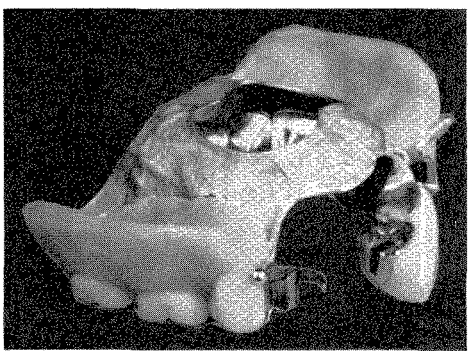


Fig. 564. Sherer spring-lock attachments with lingual arms were used here. The anterior splint contains eight units. The gold spurs extending from the bicuspid on the removable bridge enable the patient to remove it with ease. This is important with elderly people.

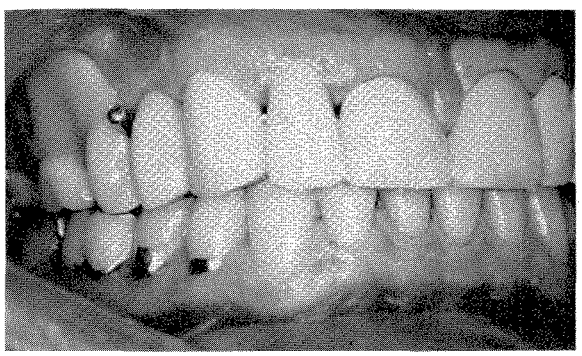


Fig. 565. The bridge shown in Fig. 564 in place in the mouth. The gold spur to facilitate removal is visible.

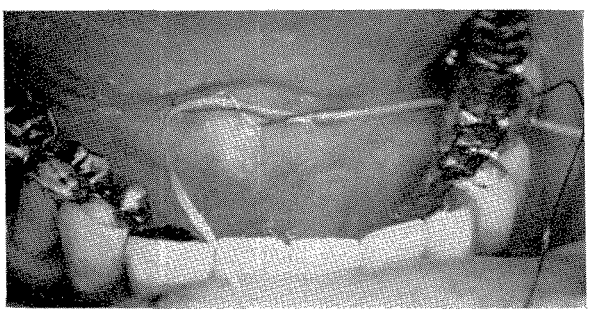


Fig. 566. Flexible copper or brass wire is a great aid in enabling the patient to insert the dental floss beneath the saddle areas in order to maintain adequate hygiene where dental prosthesis has been inserted.

instruction for threading dental floss and drawing it through open embrasures in order to clean beneath the otherwise inaccessible saddle areas. (Fig. 566.) This should be repeated once a day, or at least twice a week, if possible. A simple prophylaxis is then given.

The patients receive instruction once or twice a week for the first two weeks after insertion. Meanwhile final radiographs have been taken and final casts have been made. Most people adjust themselves within two or three weeks after insertion. There are a few, however, who take longer. They require our patience and their perseverance. This is a trying period for some of them, and they need our encouragement.

CORRECTING OCCLUSION

The polished gold occlusal surfaces should be observed carefully for shining facets, which will require relieving either by rubber abrasive wheels or by small abrasive stones. Prematurities usually show up and must be removed. The patient will indicate areas that may feel high, and these should be examined carefully. The saddle areas of the removable partial prosthesis must be corrected where necessary. Finally, all the occlusal surfaces should be recarved and repolished. Usually at the end of the third week after insertion, the patient can be dismissed with instructions to return if he feels discomfort, but otherwise to wait until he receives his regular recall. The recall takes place in three months.

MOUTH AS FINAL ARTICULATOR

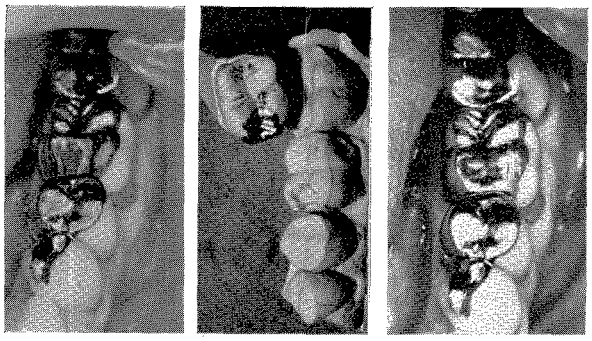
The mouth now acts as the final articulator. The neuromuscular system acts as the control mechanism. The tongue from within and the lips and cheeks from without cause natural and unnatural pressures to be exerted upon the recently introduced prosthesis. The person eats, talks, grinds, clenches, swallows—in short, forces are brought to bear upon our prosthesis which no articulator could ever simulate. Some of these forces are subtile, whereas others are more obvious.

CORRECTION OF FAULTY CONTACTS

When the patient returns in a short time after cementation, many surprises may be in store for us. As the weeks pass, we may find poor contacts that were tight upon insertion. These areas must be examined carefully for opposing wedges. Where found, they must be removed. Faulty contacts must be corrected. This can be accomplished by inserting a gold inlay within a crown (Fig. 567) or by removing a crown and replacing it. Where large bridges are involved, the repair by means of the gold inlay is the practical one. Where rigid splints have been used, the contacts cannot change.

CORRECTION OF SADDLE AREAS

Let us now consider some additional changes that take place as time passes, where teeth have been removed. If the saddle area beneath the dummy teeth continues to shrink after final cementation, the additional space poses an esthetic



A B C

Fig. 567. A, The contact has opened between the second bicuspid and molar crowns. The molar crown has been prepared for a mesial gold inlay shown in this illustration (right). **B,** A rubber impression has been taken and a gold inlay constructed which will close the faulty contact. It is shown on the stone die (center). **C,** The gold inlay has been inserted and the open contact corrected (left).

problem. It also becomes a food trap. Where the dummies are plastic, a new saddle may be processed and cemented in position. In order to do this, an impression is taken in rubber, and the plastic addition is slow cured. It is cemented in with plastic cement. This can be made in all areas of the mouth.

POOR ESTHETICS AS RESULT OF PERIODONTAL SURGERY

Many patients have been left with unsightly oral structures following the removal of gum tissue and alveolar bone to cure periodontal pockets. (Fig. 568.) This not only takes place after surgery but also in cases of gum curettage in the presence of extensive periodontal lesions. With the eradication of the pathological pockets, the bone and gingival tissues recede, leaving the roots of the teeth exposed and the interproximal embrasures enlarged. These embrasures are not only unsightly, but they also act as food traps creating an additional problem of maintaining adequate hygiene in the mouth of a patient already burdened by difficult and time-consuming home care. The dental prosthesis to be described is offered to obtain better esthetics while maintaining improved mouth hygiene.

ARTIFICIAL RESIN MASKS

People wear artificial nails, eyebrows, eyelashes, wigs, eyes, and many other forms of removable prosthesis to hide abnormal or unsightly conditions. Artificial resin masks conceal unsightly oral tissues and cover exposed roots. These gum sections need only be worn when desired. They can be inserted and removed with little effort, provide good esthetics, and close the large interproximal embrasures. They shorten the apparently oversized teeth, cover the exposed roots, prevent the accumulation of food between the teeth, and are inexpensive to process. Above all, they give the patient a tremendous mental and moral lift.

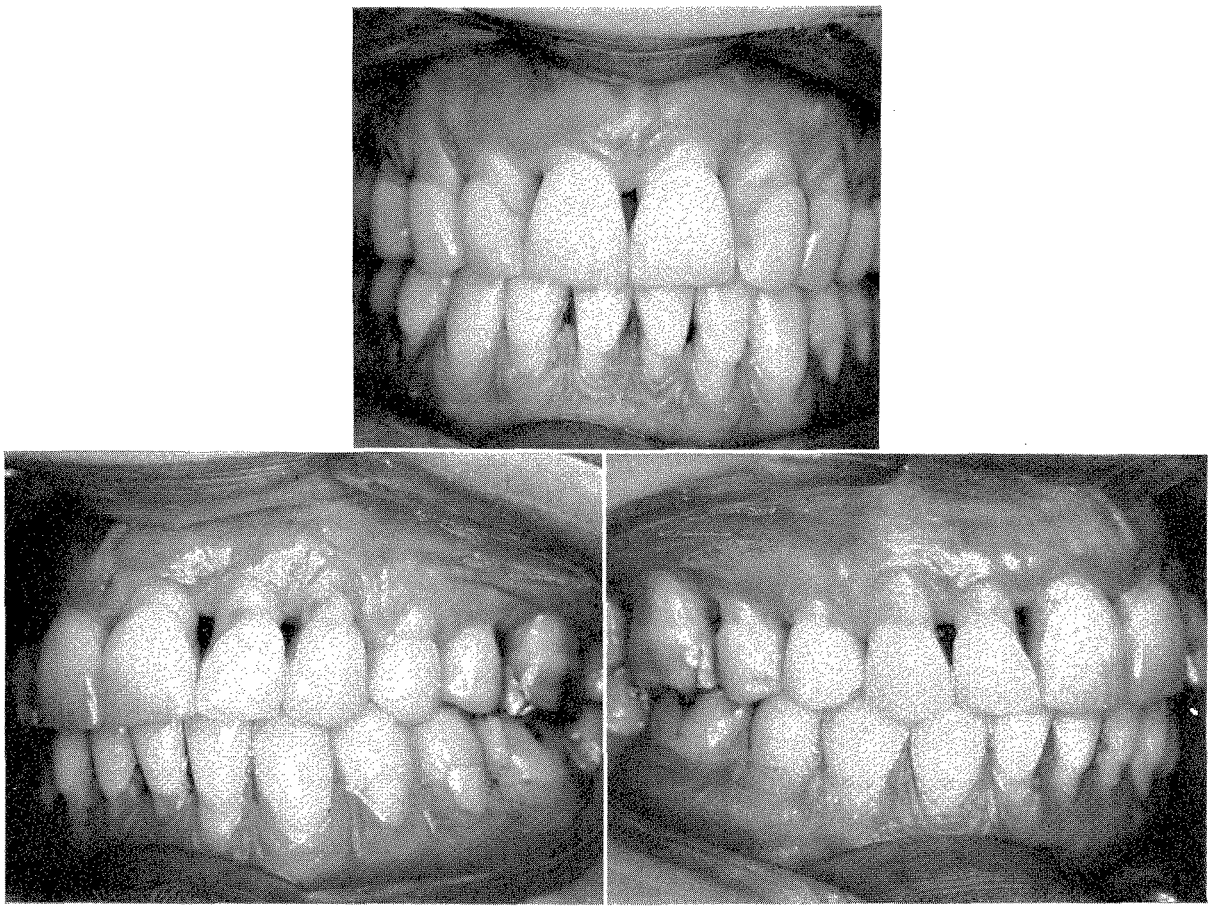


Fig. 568. This unesthetic effect in the mouth of a young woman was the result of gum resections which were performed in an effort to eradicate periodontal pathology. (Figs. 568 to 573 are of the same case.)

Technique of construction

Acrylic resin gum masks are made in the following manner. An accurate alginate impression is made of the upper teeth, including the labial and buccal gingival tissue, and a stone cast is poured. Modeling compound is adapted to the palate of the cast to form a core. The palatal modeling compound has extensions which just enter the interproximal embrasures from the lingual side of the teeth. This core is used to prevent the impression material from running into the embrasures from the labial and buccal tissues when the final impressions are made. A cold-cure acrylic resin tray is made for the labial and buccal surfaces. This tray will carry the final impression material so that a detailed impression can be obtained of the teeth, interproximal embrasures, and gingival tissue.

The palatal core is placed into position, and the final impression is made with rubber base or silicone impression material in the special tray. (Fig. 569.) A correct impression records all the detail of the labial and buccal gingivae and frenum as well as the labial surfaces of the teeth, including their incisal edges. The interproximal embrasures must be especially detailed because they must be filled accurately and covered with the plastic mask. (Fig. 570.)

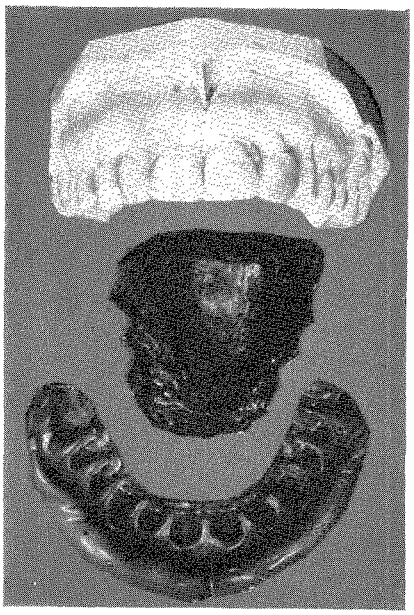


Fig. 569. A rubber impression made with a specially prepared acrylic tray. A palatal core of modeling compound is used to prevent the rubber from flowing too far palatally and then becoming difficult to remove.

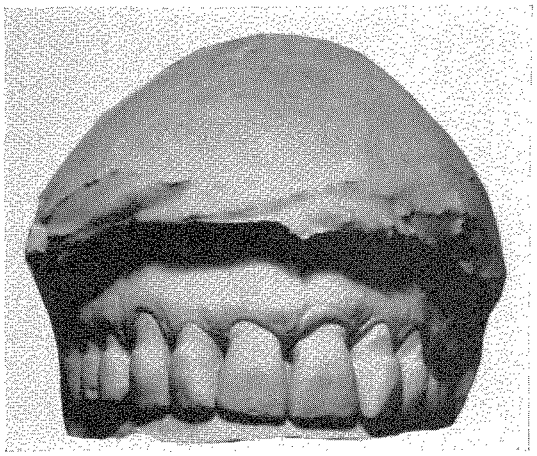


Fig. 570. The interproximal embrasures must be especially detailed because they must be filled accurately and covered with the plastic mask.

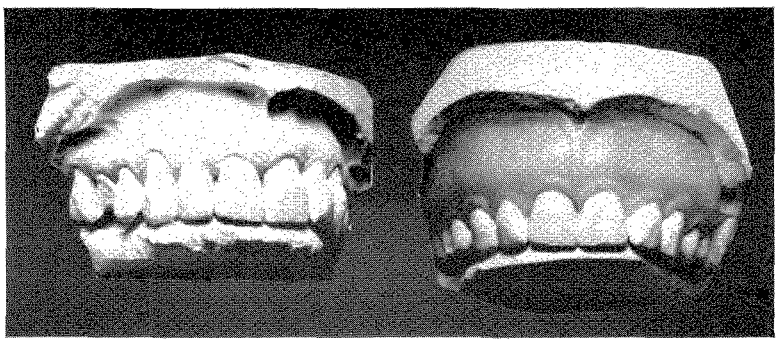


Fig. 571. The mask is waxed and carved and processed on the cast in slow-cured acrylic.

The mask is waxed and carved and processed on the cast in slow-cured acrylic resin. (Fig. 571.) The processed mask is not refitted on a duplicate cast if there are any distinct undercuts. If it were, it is then that it would most likely break while attempting to spring it over the hard, unyielding stone. If it is constructed accurately, it will spring into position in the mouth once the method of insertion has been established. The oral tissues have a slight give. In addition, this very undercut helps retain the appliance. It bears repeating that it is *not* usually returned to a duplicate model in order to check the fit before insertion. The plastic projections extending from the mask into the interproximal embrasures may need slight trimming in order to seat the mask correctly. These same fingers serve to hold the mask in position while also keeping food from entering the otherwise wide-open interproximal embrasures. No other form of retention is necessary. (Fig. 572.)

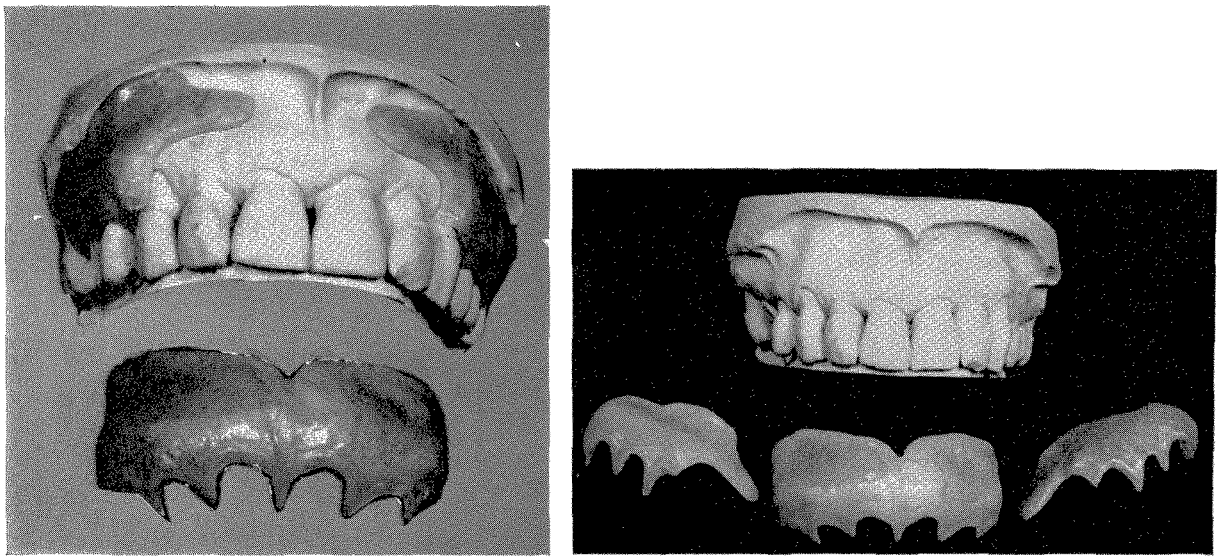


Fig. 572. If the bicuspids and molars are involved, the mask may have to be made in two or three sections, as shown here, to permit its insertion because of the severe undercuts. On the left the two lateral phlanges are in place on the cast. The anterior section is shown off the cast below. It is inserted last and will help to retain the two lateral sections. On the right the three sections of the appliance are shown off the cast.

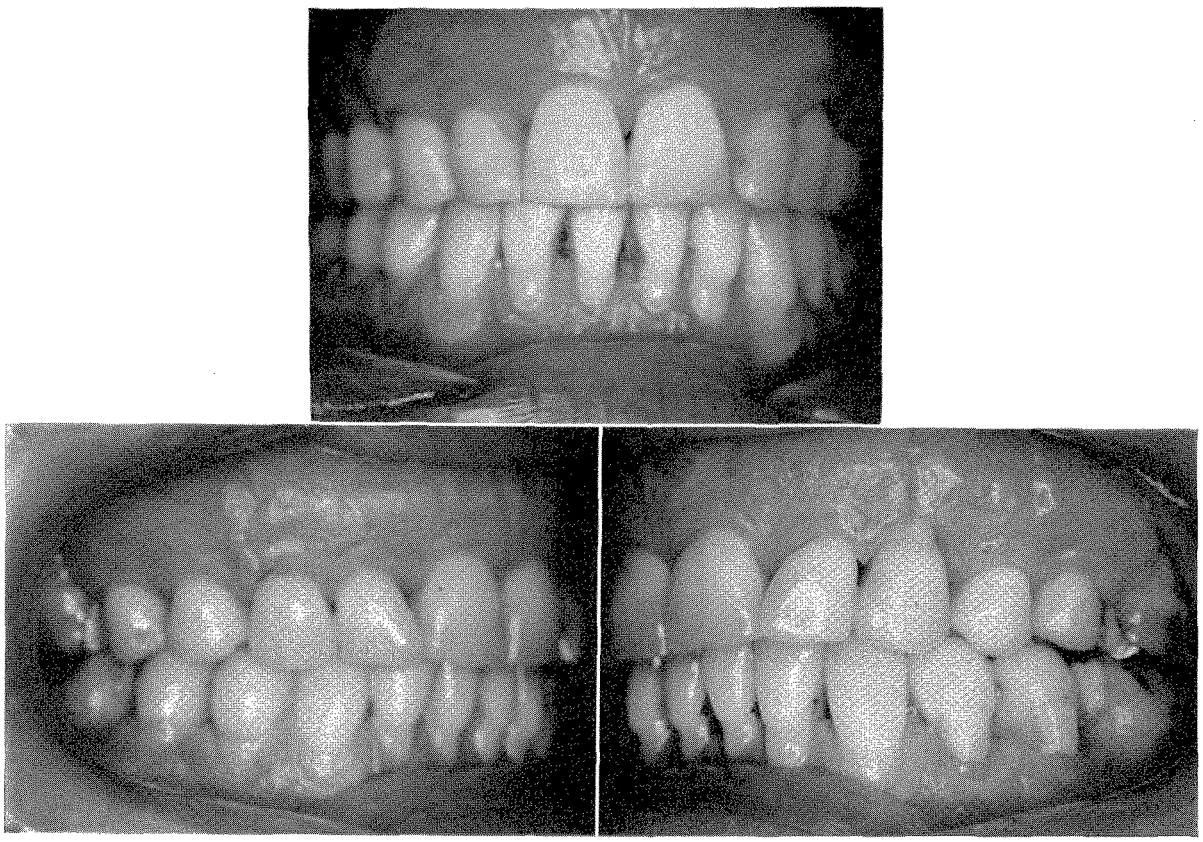


Fig. 573. Front, right, and left views of the acrylic masks shown in Figs. 570 to 572 in position in the mouth.

Various types of plastic masks

If the bicuspids and molars are involved, the mask may have to be made in two or three sections to permit its insertion because of the severe undercuts. (Figs. 568 to 573.) The mask may be made for any section of either the upper or the lower jaws and may also be used to plump out sunken-in facial tissues. It may be used to fill in the soft tissue when a saddle has shrunken beneath an extensive fixed restoration without having to remove the entire restoration. (Figs. 574 to 576.)

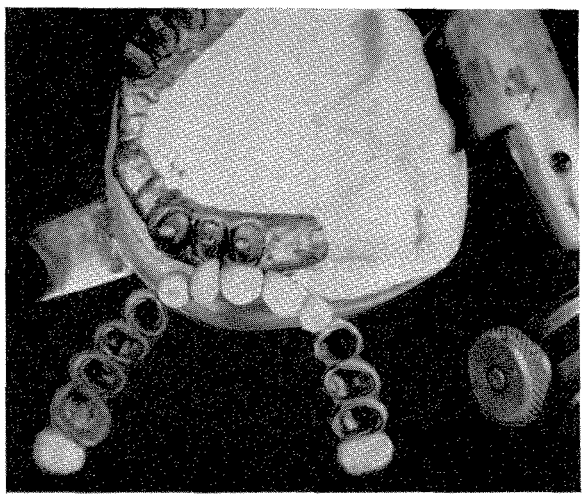


Fig. 574. In June, 1956, the fourteen-unit splint shown in this photograph was inserted in the mouth of a middle-aged woman. (Figs. 574 to 576 are of the same case.)

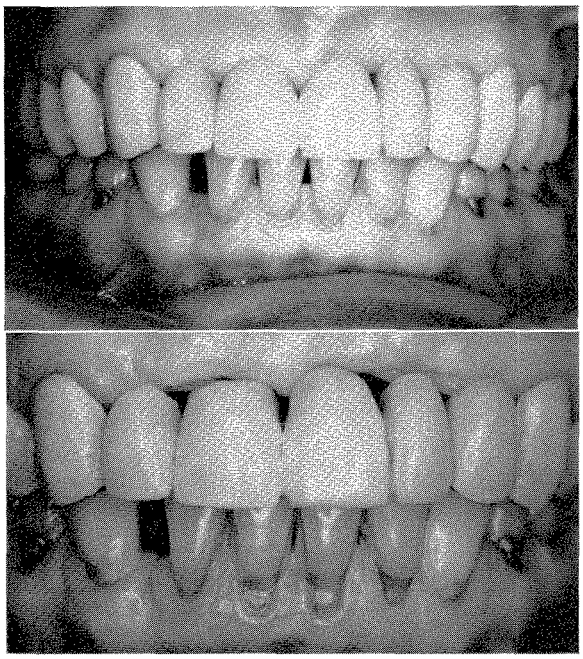
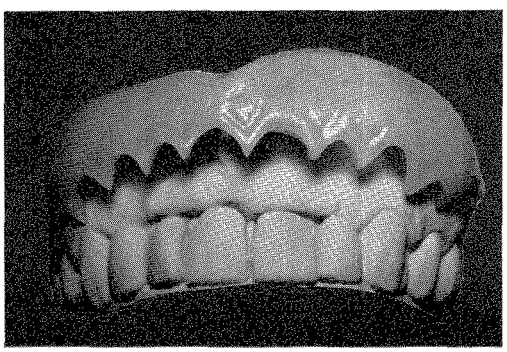


Fig. 575. A, The fourteen-unit upper splint shown in Fig. 574 is in place. **B,** In October, 1960, the anterior view was unsightly due to alveolar resorption. Quick-cure acrylic had already been painted on the saddles of the individual dummies, but it was unsatisfactory.



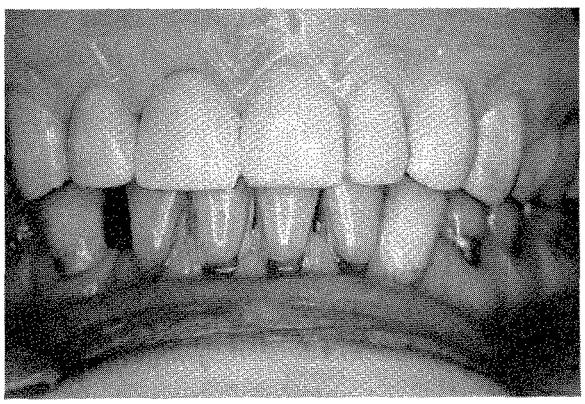


Fig. 576. A, A plastic mask was made in the manner described in the text. **B,** It is shown here inserted in the mouth. It was a very satisfactory solution to an otherwise difficult problem.

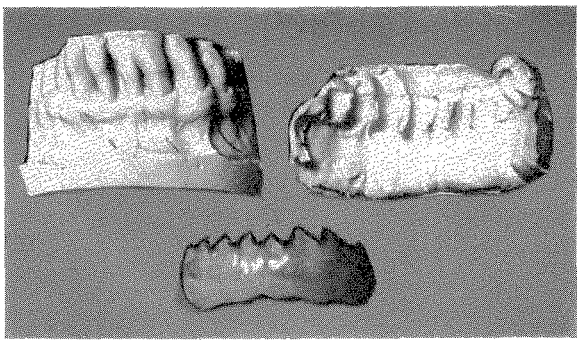


Fig. 577. A lower plastic mask was made using the same technique which was described for the upper ones. The acrylic tray and the rubber material are shown above on the right. The cast is shown on the left, whereas the plastic mask may be seen in the foreground. (Figs. 577 and 578 are of the same case.)

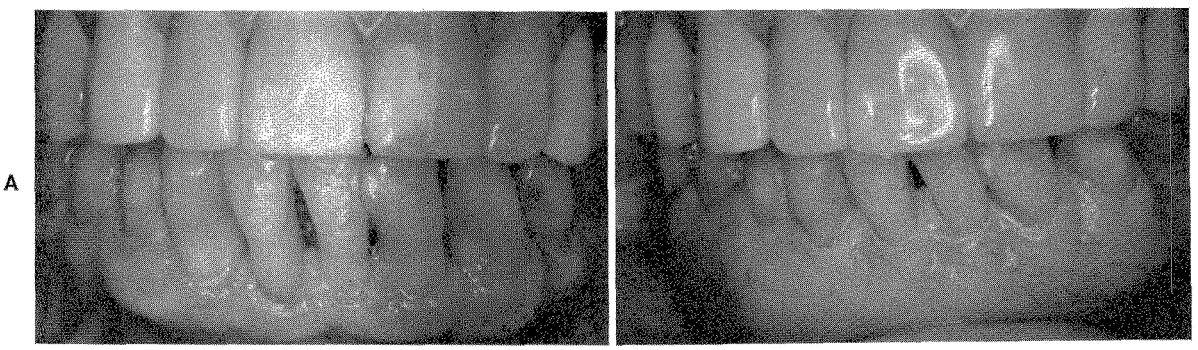


Fig. 578. A, The lower teeth are shown here with their roots exposed as a result of periodontal pathology and subsequent treatment. **B,** The plastic mask shown in Fig. 577 is in position. It not only provides for better esthetics but also stabilizes to a small degree.

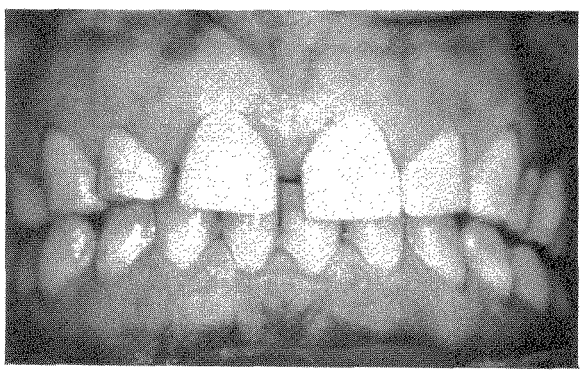


Fig. 579. This is the mouth of a young woman whose teeth are unsightly because of their size and spacing. (Figs. 579 to 581 are of the same case.)

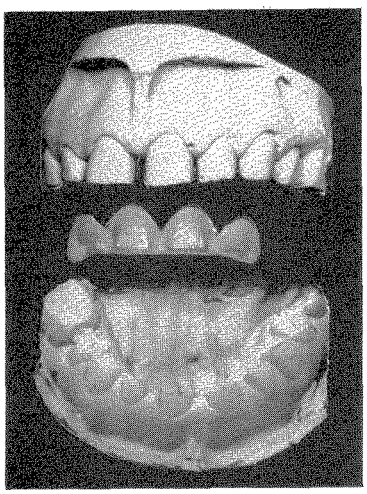


Fig. 580. An accurate cast was made from a rubber impression taken in a specially prepared tray. An acrylic veneer consisting of four units was made to cover the four incisors.

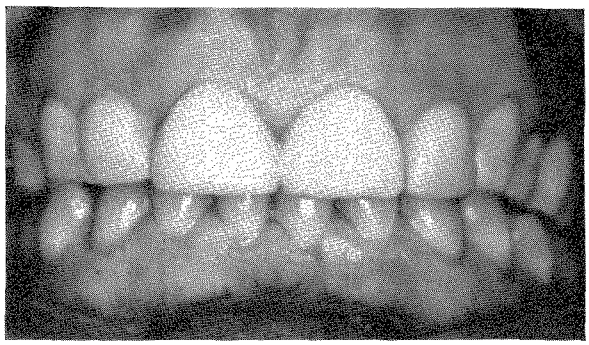


Fig. 581. When this acrylic overlay splint is inserted, it closes the spaces and elongates the teeth. The esthetics was improved so much that the patient was unwilling to be without this splint. This is inserted and removed by the patient at will.

The mask may be used equally as well to cover unsightly lower anterior teeth. (Figs. 577 and 578.) Although it is used more frequently to shorten elongated teeth, it may also be used very effectively to elongate very short teeth. (Figs. 579 to 581) or even to help close a space between the upper anterior teeth by having an incisor processed directly into the mask. The mask may be colored and contoured to represent the natural gums. It may be worn on all occasions or only on special occasions. Masks are readily removed and cleaned. They are also easy to replace if broken or lost.

PORCELAIN BONDED TO METAL

With the advent of porcelain bonded to metal, our fixed partial prosthesis is subject to the fracture of these porcelain veneers. These areas may be repaired with full gold castings veneered with plastic and cemented over the fixed gold abutment casting. In cases of this nature, as much material as possible is removed from the old casting in order to permit sufficient room for the superstructure. Where facings of porcelain bonded to metal have fractured, it is possible to repair them with new plastic slow-cured facings. (Figs. 582 to 584.) Here, again, the impression is taken in a rubber material with a specially made plastic tray. Stainless steel or platinum pins may be resorted to in combination with these.

REPAIRING PLASTIC VENEERS

Where original plastic veneers have discolored or worn, they may also be repaired by removing all of the old plastic and replacing the veneers with slow-cured new plastic veneers. The accuracy of the impression and the model is important. For good retention, the adjoining facings may be undercut and acrylic cement used. (Figs. 585 to 589.) Carbon tetrachloride is used as a cleansing medium, and the metal surfaces are roughened as much as possible. To obtain the best esthetic result, the various masking materials must first be experimented with and applied to the exposed gold surfaces before the new acrylic facings are inserted. Although it is possible to paint in quick-cure acrylic to restore old, worn facings, still the resulting color is far from satisfactory and usually turns yellow.

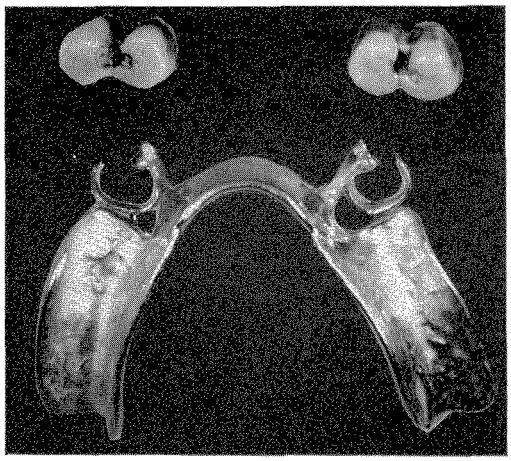


Fig. 582. Lower lingual bar. The abutment castings are made of porcelain bonded to metal. The cuspids and first bicuspids are being used as double abutments. (Figs. 582 to 584 are of the same case.)

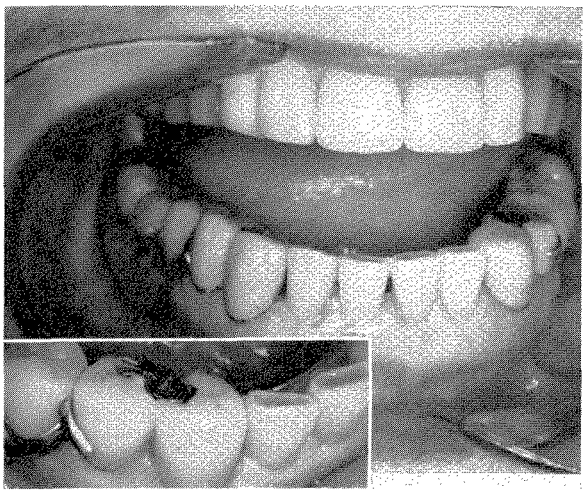


Fig. 583. The completed work in the mouth. The occlusal surfaces are made of porcelain. This was inserted in April, 1956. A close-up of the right side is shown at the lower left of this photograph.

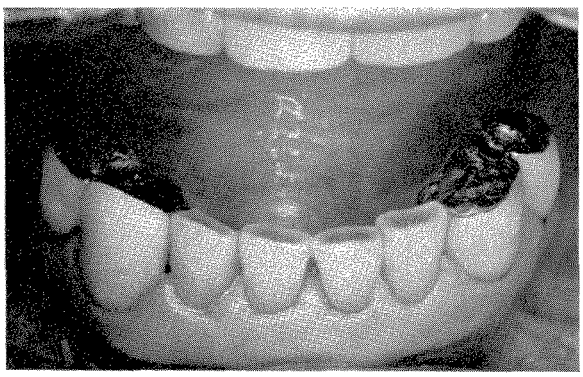


Fig. 584. By 1960 the porcelain occlusal surfaces had fractured away from the metal. Gold veneer crowns were inserted in their place as shown here. The old lingual bar is still being used.

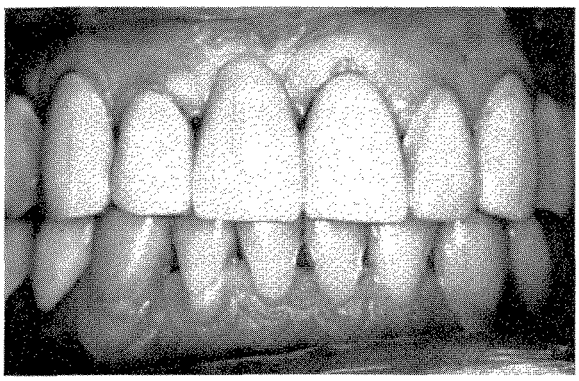


Fig. 585. The patient whose teeth are shown here had the rehabilitation completed in 1955. The upper splint consists of twelve units. (Figs. 585 to 589 are of the same case.)

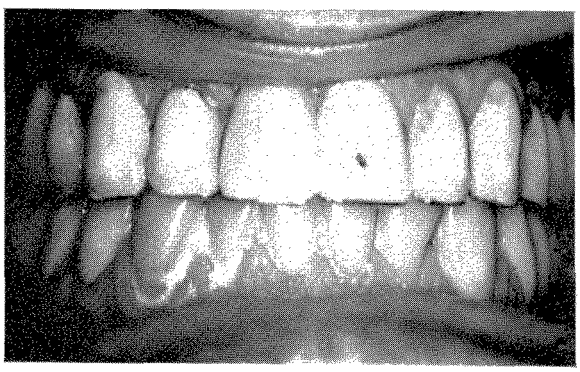


Fig. 586. In November, 1958, the plastic veneers were becoming unsightly.

Fig. 587. In October, 1959, the plastic was removed from the central and lateral incisors, and an impression was taken with rubber in a specially made tray.

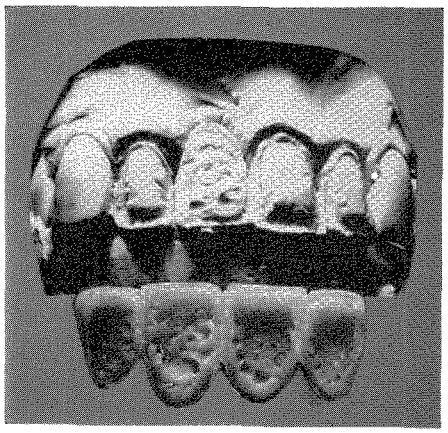


Fig. 588. An accurate stone cast was poured. The new acrylic facings were waxed up and processed by slow curing in a flask. The completed facings are shown in the foreground.

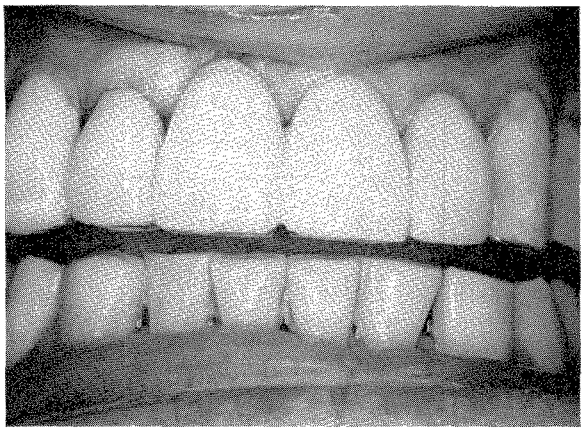


Fig. 589. The new facings cover the central and lateral incisors. They were cemented with an acrylic cement. Different shades of masking material were used in obtaining the correct color.

CARIES AS RESULT OF COLLECTION OF DEBRIS

Where recession has taken place at the cervical margins of abutment castings, root surfaces are exposed. Food collects, and often caries is the result. These cavities may be filled either with metal or with quick-cure plastic depending upon the areas exposed and the esthetics involved. Although plastic is not as effective as gold or silver, still it will increase the longevity of the restorations.

CARIES AND DEVITALIZATION

It is necessary, in the case of multiple abutments and extensive splints, to take roentgenograms once or twice a year and to check clinically at regular intervals in order to detect caries before it is too late and the pulp becomes involved. Where a pulp is involved, it is possible to fill the root canal without removing the splint. (Fig. 590.) The danger here lies in not being able to locate the pulp chamber until most of the remaining clinical crown has been removed by the drill. If this happens, even if the canal is filled successfully, the crown may separate from the root and not lend its strength in supporting the splint. Where the root canal is not able to be filled, an amalgam filling may be inserted in the tip of the root. (Fig. 591.)

REMOVAL OF A ROOT WITHOUT DISTURBING THE SPLINT

There are times when it becomes necessary to remove a root from an abutment tooth without disturbing the splint. This can happen as a result of caries having been overlooked until the root separated from the crown, making pulp therapy ineffective. The surgery does not pose a serious problem. After healing takes place and the ridge has resorbed, the gold crown is prepared from above to receive a filling. A buccal or labial window may be prepared in order to give a clearer view

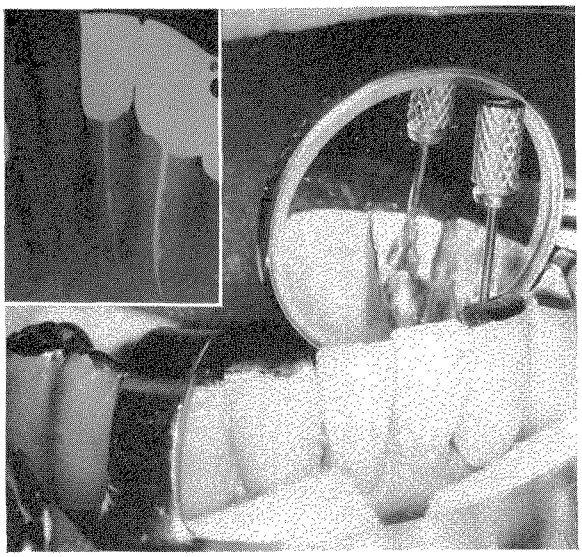


Fig. 590. A four-unit splint extends from the lower left lateral incisor to the second bicuspid. The lateral incisor became nonvital. Its pulp was removed, and the root canal was filled without removing the splint, as shown here. The roentgenogram of the root filling is shown on the upper left of this photograph.

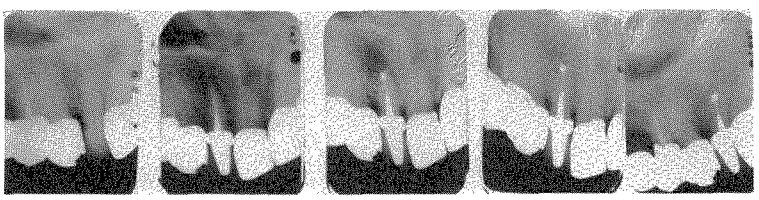


Fig. 591. An infected upper lateral incisor had an amalgam filling placed in its root apex. The pivot was not disturbed. The infection has cleared up. This sequence runs from left to right.

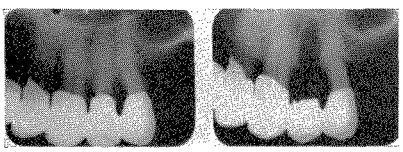


Fig. 592. An upper twelve-unit splint was inserted in 1950. In 1955 (upper left) cervical caries had attacked the first left bicuspid. The root was removed from beneath the splint as shown in the roentgenograms (upper right). (Figs. 592 and 593 are of the same case.)

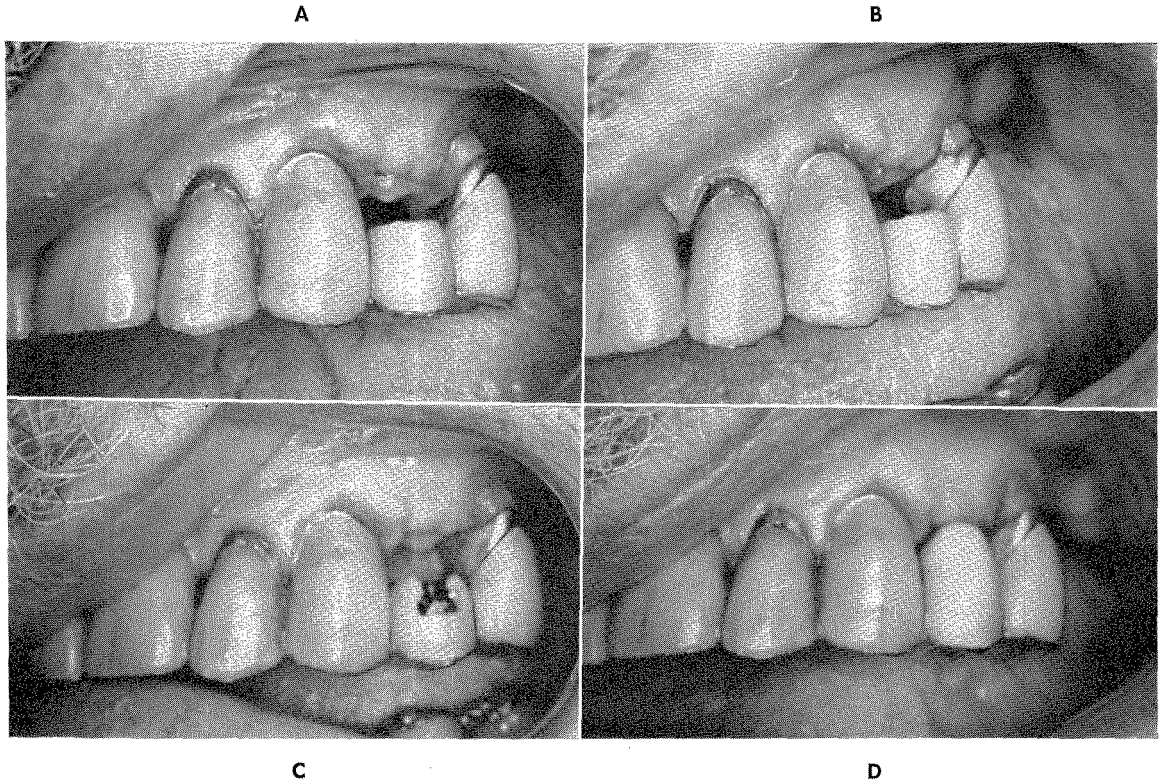


Fig. 593. **A,** The root was removed. Mesial caries was also disclosed in the left second bicuspid. **B,** The mesial caries in the second bicuspid was filled with amalgam. **C,** A dovetail cavity was prepared in the acrylic crown of the first bicuspid. **D,** A plastic root tip was inserted after healing had taken place.

of the inside of the crown. The filling can be made of plastic in the form of a slow-cured processed root tip, or quick-cure plastic. (Figs. 592 and 593.) Synthetic porcelain or amalgam may also be used. These fillings should be polished carefully to avoid gum irritation.

FULL CROWNS EMPLOYED IN EXTENSIVE SPLINTING ACTING AS IRRITANTS TO THE GINGIVAL TISSUES

In cases of extensive splinting where it is impossible to create proper interproximal embrasures, the gum tissues become congested and unhealthy. This is especially so in mouths with poor hygiene. Where esthetics is unimportant, a gum resection may be performed. (Figs. 594 to 596.) This eliminates the congestion and creates larger embrasures. Occasionally the exposure of the cervical gold collar cannot be seen, and, therefore, creates no esthetic problem. In fact, where gold collars of cast crowns are placed too far beneath the gum margin, they tear the periodontal attachments that connect the cementum to the alveolar bone. Acting as an irritation, the gum often resorbs, and the gold collar becomes exposed. This can be embarrassing. The gold collars should be placed just below the free margins of the gum and not impinge upon the attached periodontal membrane.

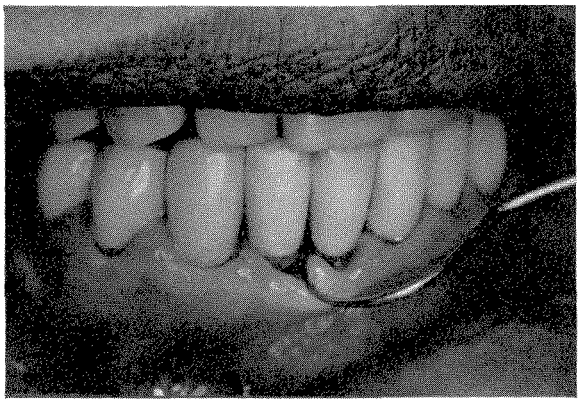


Fig. 594. An extensive lower splint (ten units). This was worn for several years. The gums had deep pockets and were congested and swollen. The explorer is pushing aside the loose unattached gum tissue. This was due to the impossibility of creating embrasures which were wide enough to permit proper mouth hygiene. (Figs. 594 to 596 are of the same case.)

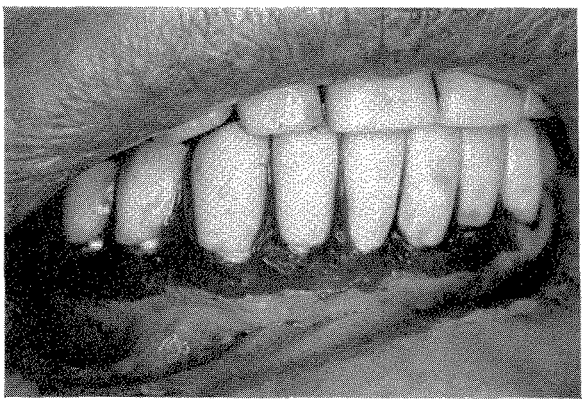


Fig. 595. A gum resection was performed, and the loose gum tissue was removed as shown here. This is then protected with a packing until it heals. The gold collars are seen in this photograph.

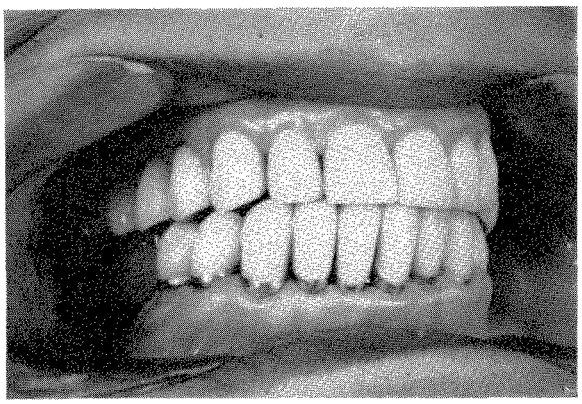


Fig. 596. This is the same case as shown in Figs. 594 and 595 several weeks later. The periodontal tissues are firm and healthy. The gold collars do not show since they are hidden by the lower lip.

PATIENT'S RESPONSIBILITY IN POSTINSERTION CARE

Part of the postinsertion care becomes the responsibility of the patient. Extensive fixed prosthetic restorations require much more care than natural uncovered and unconnected teeth. Extensive restorations are abnormal for the teeth and tissues. Anyone who has had the experience of removing a great many fixed partial dentures will agree that our best efforts toward creating good hygienic appliances end in failure in a greater proportion of the cases. (Figs. 597 and 598.) Food nearly always packs between the embrasures and beneath the saddles. The gum tissue is usually found inflamed, and the odor from decayed food found beneath fixed restorations is for from desirable. (Fig. 599.) The patient must be made to realize this and to atempt to overcome it by methods which we show him.

Fig. 597. A fixed partial denture runs from the first bicuspid to the second molar. It was inserted several years previous to the time this photograph was taken. It impinges severely upon the soft tissues of the ridge. This bridge had to be removed. (Figs. 597 to 599 are of the same case.)

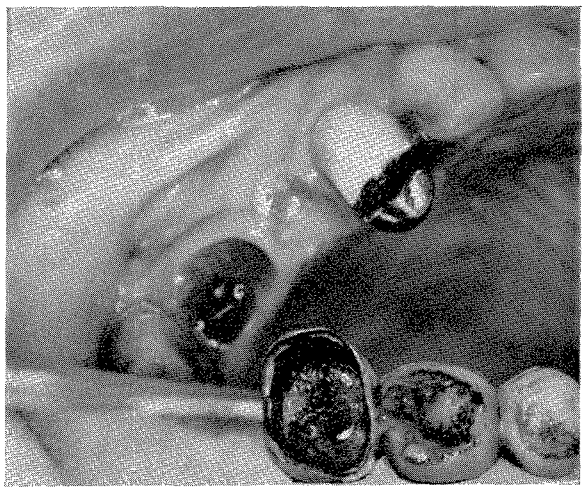


Fig. 598. The bridge shown in Fig. 597 was removed distal to the first bicuspid. The severe tissue inflammation of the molar dummy is evident. The bridge is shown on the lower right side of the photograph. A large amount of debris was present beneath the acrylic dummies. The dummies must be tested carefully for pressures, and good mouth hygiene must be taught.

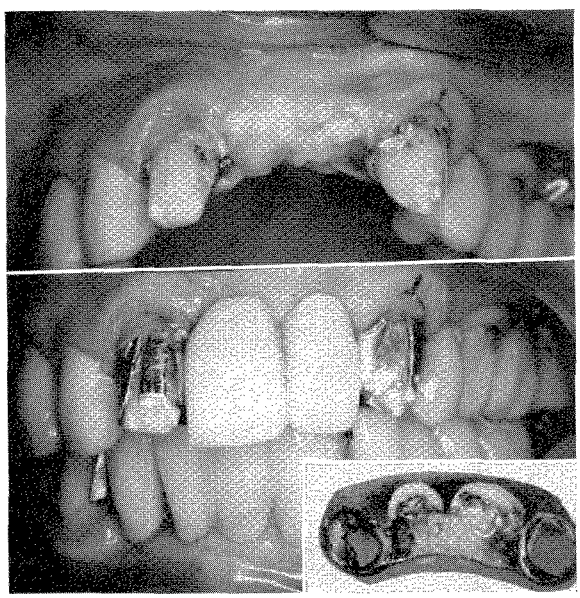


Fig. 599. An upper porcelain coping bridge was removed. It is shown on the lower right. The platinum saddle is filled with debris. It was impossible for the patient to clean this bridge properly because of its faulty contours and the cervical positioning of its soldered joints.

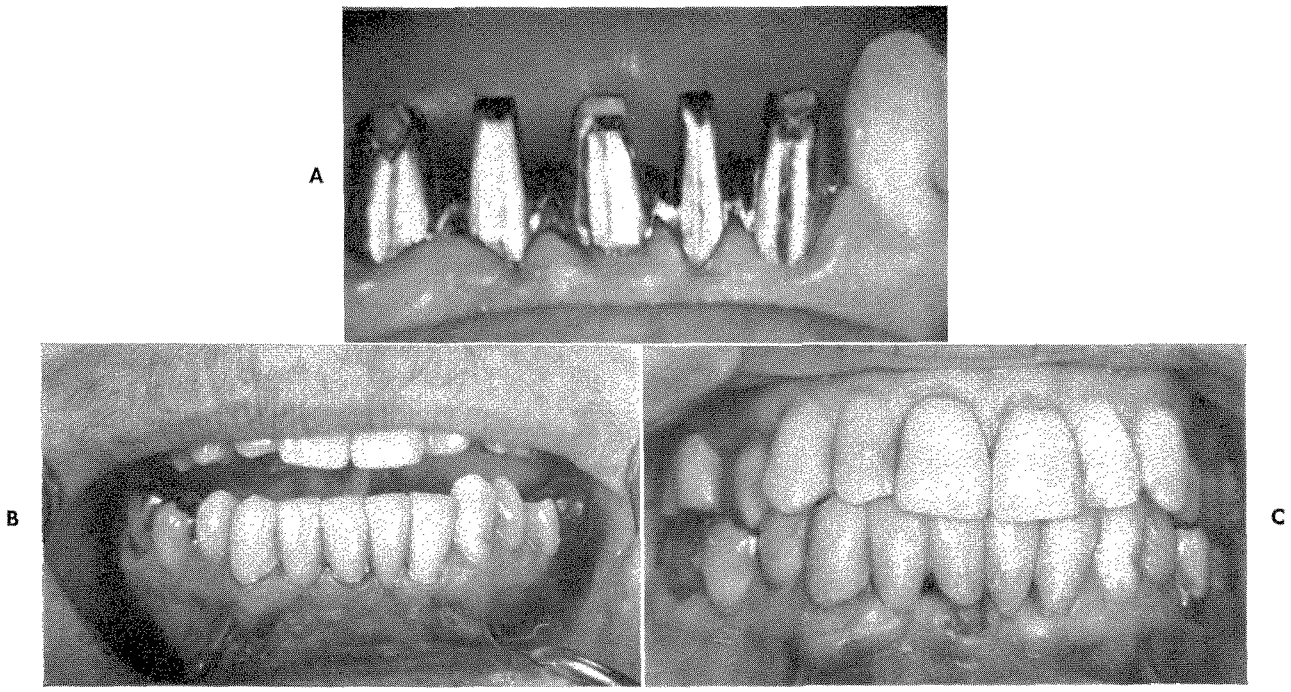


Fig. 600. A, The frame of a porcelain coping bridge must be so constructed that its soldered joints are at the cervical margin as shown here in this lower anterior porcelain coping bridge. This makes proper hygiene an impossibility. **B,** This bridge was inserted in April, 1951. The gums were inflamed. **C,** Proper massage over the years maintained healthy periodontal tissues, although there was considerable recession. This photograph was taken in 1962.

PROBLEM CREATED BY SOFTNESS OF ACRYLIC RESIN

Where the gum tissue is puffy, toothbrush massage must be inaugurated. Regular and efficient massage will often overcome this puffiness and clear up the inflammation. (Fig. 600.) When we are dealing with acrylic resin, the paradox lies in the desire to avoid abrading the plastic veneers while at the same time providing the necessary gum massage.

In a recent study of this problem, Vieira and Phillips* came to the following conclusions after examining two hundred sixty-eight acrylic specimens:

1. Resins cured at higher temperatures were harder and more resistant to abrasion.

2. Brushing produced a significant weight loss in all specimens, but those that were cured at higher temperatures over longer periods experienced less weight loss. Furthermore, the "hard" brush caused greater weight loss than the "soft" brush.

3. Regarding the cleansing agents, distilled water was least abrasive, followed by tooth paste, calcium carbonate, and tooth powder on an ascending scale.

4. With respect to surface luster, all agents with the exception of distilled water dulled the polished surface of the acrylic specimens. Distilled water increased the luster slightly.

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*Vieira, D. F., and Phillips, R. W.: Technique trends, D. Times **5**:5, 1962.

The use of dental floss beneath the saddle areas will remove a great deal of the debris present when these restorations are removed. The dentist or the hygienist is the teacher—the patient is the pupil. Patients have both physical and financial investments in their oral health, and they should protect such investments.

TEMPORARY CEMENTS

In oral reintegration, we are dealing with many problematic teeth with questionable prognoses. Although it becomes desirable to retain some of these teeth, nevertheless we realize that this can be hazardous, especially where large fixed restorations are involved. The ideal situation would be to use a temporary cement. This is not yet practical because we are not certain of its lasting properties, in addition to the problem of having to remove the bridges at regular intervals. Leakage would lead to caries.

Cements, such as Temrex, make removal of metal bridges difficult under ideal conditions. Under conditions in which the bridges are in place several months at a time, removal would be impossible in the majority of cases. Most authorities agree upon the use of a final cement, leaving the problem of these teeth with questionable prognosis remaining with us. In multiple splinting, where the problematic tooth is the end one, the removal of its root would create a cantilever but still leave a functionable splint.

METHODS OF CREATING GREATER LONGEVITY WHEN USING TEETH WITH GUARDED PROGNOSES

In cases in which the problematic teeth are the lower or upper second molars and the adjoining teeth are missing, but all the anterior teeth carry a multiple splint, precision attachments should be used on the distal surface of the cuspids or bicuspids. (Figs. 601 and 602.) These attachments should be paralleled to each other. If the molars must be sacrified at some future time, it will then be possible to insert a removable partial prosthesis without disturbing the anterior splint. This procedure has many different applications, but the idea is practical and should be thought out carefully by the dentist in evaluating a case.

When a large fixed partial denture is made in sections, such as was just described, so that in case the posterior teeth are lost the anterior section can still be used to support a removable partial denture, there are certain precautions which must be taken in some cases. The fact that the posterior molars are weak and mobile sometimes permits a movement of the male and female parts of the precision attachment. This, in turn, allows for a pumping action to take place which further weakens the posterior abutment tooth. Normal wear of the metal parts further accentuates this pumping action.

For these reasons, in cases in which the operator observes this mobility of the posterior segment, the joint between the anterior and posterior fixed splints should be made more rigid by the addition of a metal pin placed in the buccal plastic veneers as shown in Figs. 601 to 605 or by whatever means he finds at his disposal.

Where a second bicuspid is questionable, precision attachments may be placed

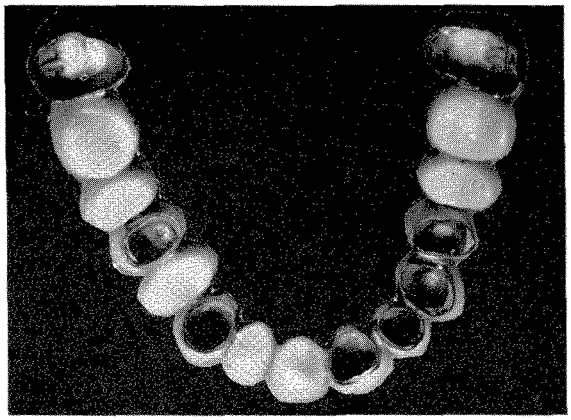


Fig. 601. A fifteen-unit upper fixed splint. This splint was actually constructed in three parts. Both right and left second bicuspids had distal precision attachments. The male part is on the mesial surface of the first molar acrylic dummies. The molars have questionable prognoses. Therefore, an attempt was made to provide for their future loss. (Figs. 601 to 605 are of the same case.)

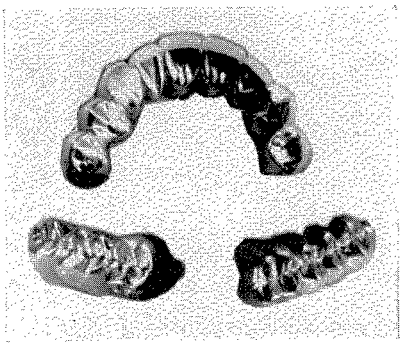


Fig. 602. The three parts of the upper reconstruction are shown here disassembled.

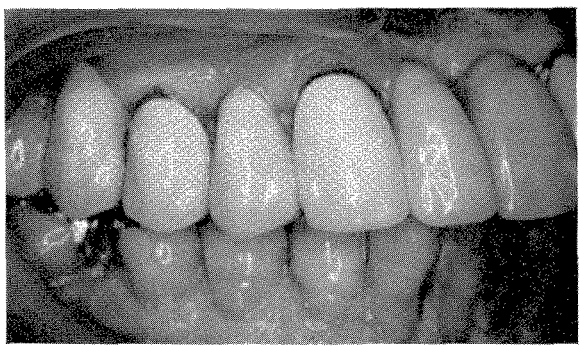


Fig. 603. The upper splint had been worn for two years. The precision attachment joint between the anterior and posterior segments allows for a pumping motion of this part, which is dangerous to the health of the molar abutments.

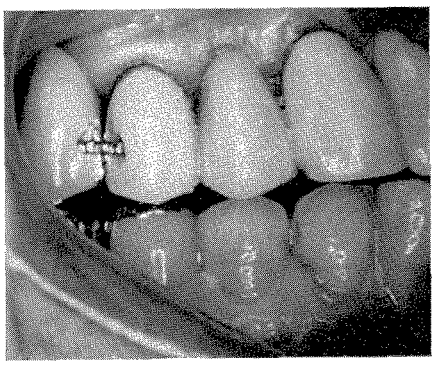


Fig. 604. Adjoining cavities were cut in the bicuspid acrylic veneer and in the acrylic material of the molar dummy. A serrated stainless steel pin was inserted as shown here. This will now be covered with quick-cure acrylic, and in this manner the posterior segment will be made rigid and the pumping action eliminated. If necessary, this joint can be opened and the female part still used for a removable partial denture should the molar abutment require removal.

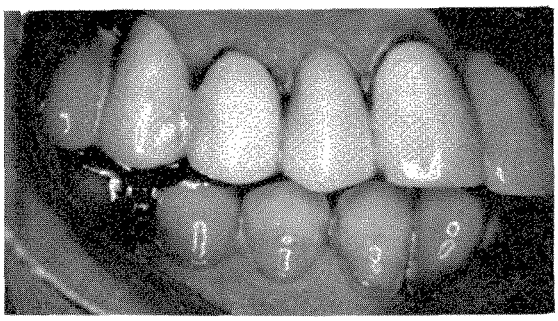


Fig. 605. The completed buccal joint uniting the bicuspid and the molar. Quick-cure acrylic has been applied to cover the pin shown in Fig. 604.

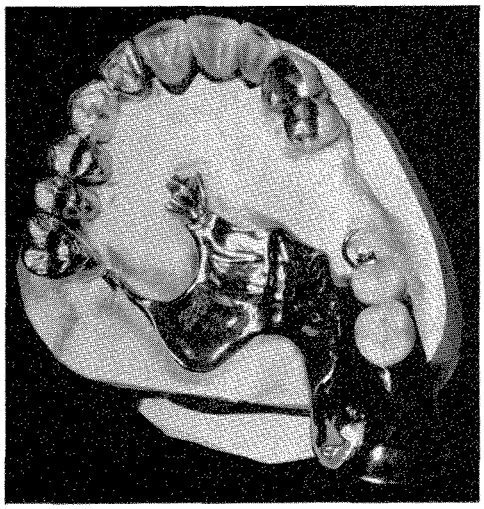


Fig. 606. In the upper reconstruction shown here, the right second bicuspid is a devitalized tooth with questionable prognosis. In the construction, a female precision attachment was placed in the distal surface of the first bicuspid veneer crown and in the male part of the mesial surface of the second bicuspid. This work was inserted in 1948. (Figs. 606 and 607 are of the same case.)

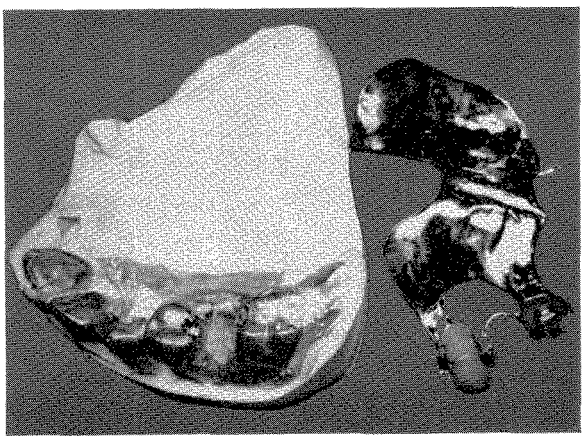


Fig. 607. In 1956 the second bicuspid became infected and was removed. When the socket was healed sufficiently, the crown with its attachment was added to the bridge as shown here. (See Fig. 606.)

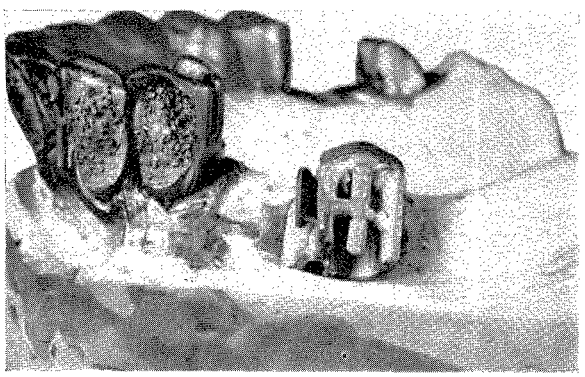


Fig. 608. In this case the upper right first bicuspid was periodontally involved. It had been subjected to periodontal surgery and had a questionable future. The upper left second molar was similarly involved. A distal female attachment was placed in the right first bicuspid. A small dummy was thrown off to form the end of a twelve-unit splint. This dummy carried the male attachment as shown in this illustration. It was soldered on the lingual surface only. If the first bicuspid root had to be removed, the dummy could be removed by cutting the lingual soldered joint. The first bicuspid would then become the throw-off. If a removable partial denture was constructed, the female attachment could be used as the retainer. The female part was made parallel with the female part in the right second bicuspid, should the occasion arise in which they might have to be used together. (Figs. 608 and 609 are of the same case.)

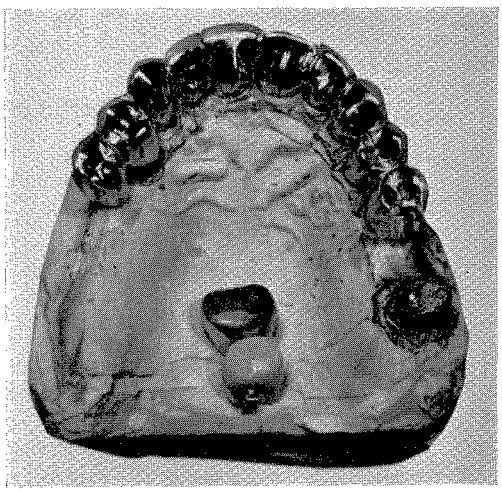


Fig. 609. The completed upper fixed partial denture. The left section is shown in the foreground. (See Fig. 608.)

on the distal surface of the first and second bicuspids. Should the second bicuspid have to be removed, then the first bicuspid is available for the support of the removable partial denture. (Figs. 606 and 607.) If the crowns of both bicuspids are short and the splinting effect is weakened because of the lack of complete rigidity, the two precision attachments can be inserted in the bicuspids, but the crowns can also be soldered together on the lingual surface (Figs. 608 and 609.) This will not interfere with the attachments. Should the problematic end bicuspid have to be removed, the lingual connection can be severed. The first bicuspid is now available for the removable partial denture.

METHODS OF REPAIRING LARGE FIXED PARTIAL DENTURES WITHOUT REMOVING THEM

Another problem that needs solving is the one that occurs when a crown which serves as an abutment for a bridge becomes loose from its cement. This may take place in the case of a large or small fixed partial denture. The crown which is next to a dummy should be cut free while removing as little as is possible from the adjoining surface of the dummy. The crown is then removed, and the abutment tooth is reprepared in order to free it from caries and debris. It may even have to be devitalized and its root treated and filled. The newly prepared tooth should be given a retentive form so that the newly constructed crown is not able to become separated from it as was the original one.

A new crown is then constructed, and a vertical groove is cut into the dummy extending mesiodistally and vertically as far as possible. It is made sufficiently large buccolingually to permit for rigidity and strength in the male part which will be cast to fit into it. An impression is taken with rubber of the prepared groove in the dummy, or a direct pattern is made. The male insert is cast and fitted with the new crown. When correctly related, the male casting is soldered to the new crown.

A hole is drilled in the buccal surface of the dummy through the plastic veneer and through any gold that may be present. This hole is also drilled into the male insert a sufficient distance so that, when a pin is inserted into the dummy, it en-

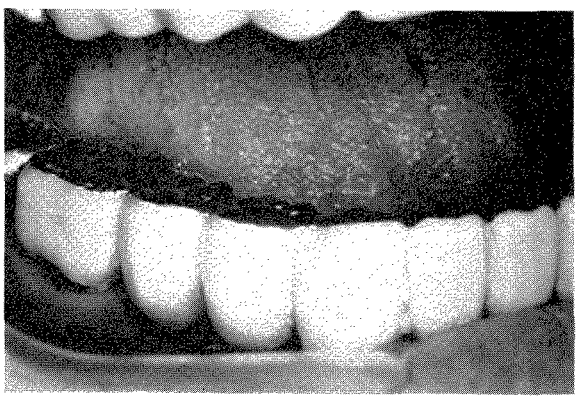


Fig. 610. A nine-unit fixed lower partial denture was inserted ten years previously. There were three abutments, the two canines and the right first molar. The right first molar crown became loose from its cement. (Figs. 610 to 614 are of the same case.)

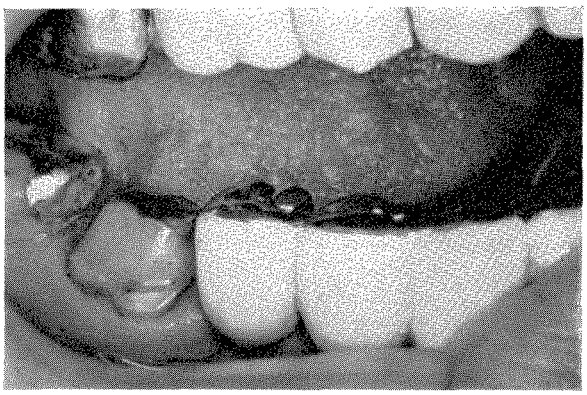
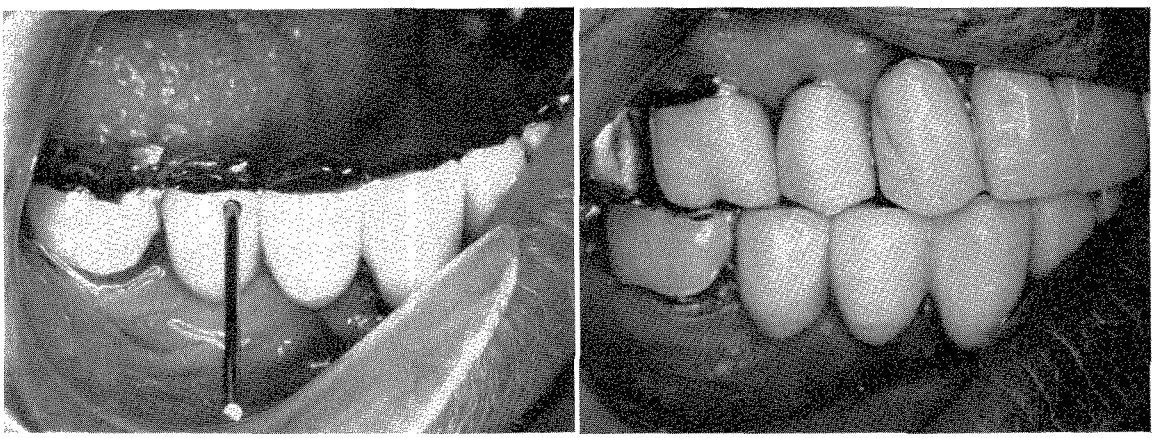


Fig. 611. The loose crown was cut off from the splint distal to the dummy bicuspid as shown here.

Fig. 612. A new cast crown was constructed for the molar. After it was fitted in the mouth, a vertical groove was cut in the second bicuspid dummy from the distal to the mesial surface but not through the mesial surface. A rubber impression was taken with the new crown in position. The male casting which was to fit into the vertical groove was made. The new crown and the casting were placed in position. The sprue was left on the male part to assure accurate placing in the plaster impression which was taken to relate the parts. The cast is shown here together with the crown and the vertical gold insert which had been soldered to it. The mesial countersink lends stability to it.

A



B

Fig. 613. A, The new section was inserted in the mouth. The sprue had been removed. A hole had been drilled through the buccal surface of the dummy and into the vertical gold insert. The stainless steel pin shown in this photograph will be cemented into this hole and will serve to connect the two parts. Then the excess pin will be removed and a cavity prepared and filled with quick-cure plastic. **B,** The completed repair. This made possible the continued retention of the large splint.

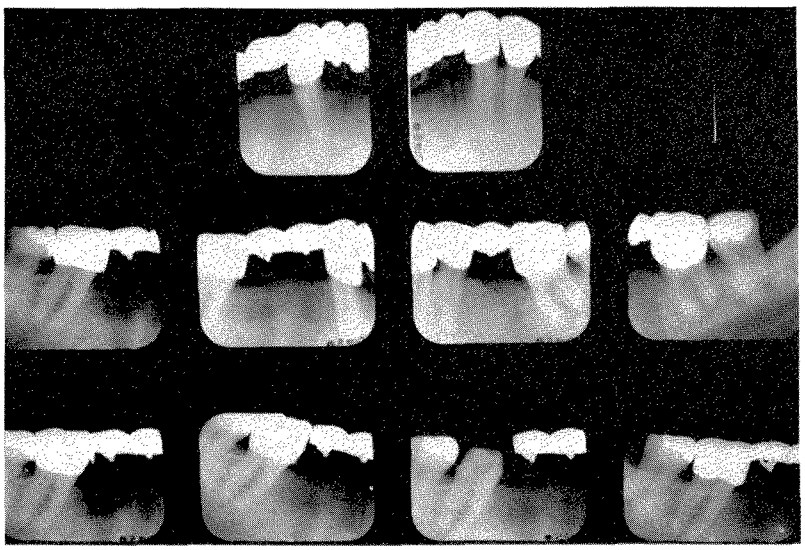


Fig. 614. Roentgenograms of the work shown in Figs. 610 to 613. The upper and middle series show the lower splint before the repair. The lower four films show the method of repair from right to left.

gages the vertical insert and locks it in place. In this manner it is impossible to dislodge or unseat the joint.

The crown with the vertical insert is now cemented in position. Then, a stainless steel pin is cemented into the buccal hole and engages the new vertical male casting. The excess of the pin is removed after the cement has set and a small cavity prepared in the buccal acrylic surface by removing a small amount of the pin. This is filled with acrylic resin.

There are many applications of the technique just described. It provides the dentist with the means of retaining extensive bridges which otherwise would have to be sacrificed. (Figs. 610 to 614.)

HOW LONG WILL THE RESTORATIONS LAST?

The longevity of our completed cases depends upon several factors. Was the caries index high to begin with? Was there a systemic factor to contend with? Were the periodontal tissues a serious threat? How many questionable teeth were retained? How many missing teeth needed replacement? What was the age of the patient? Where a majority of unfavorable factors are met, great longevity cannot be expected. There is no miracle that can be performed for these patients. A range between five and ten years is all that can be predicted. Even then, continual care is necessary.

In cases in which the patient is elderly and the breakdown continues at a rapid rate, the end result, in spite of our efforts, will be full dentures. However, if the patient is not uncomfortable and no serious pathology is present, the road to full dentures need not be an abrupt one. Units may be removed from splints. Additional teeth may be added to already existing partial removable dentures. Caries may be treated. This procedure may carry an elderly person along for several years before full dentures become necessary—and without serious financial burden.

A METHOD OF REPAIRING EXTENSIVE RESTORATIONS WHERE THROW-OFFS HAVE BEEN EMPLOYED

Throw-offs in the form of a cantilever attached to large fixed partial dentures must be subjected to further research in an effort to find out what extra pressures are brought to bear upon the abutment teeth, causing some of them to fracture. This takes place too frequently to believe that it is a mere accident.

Case report

In 1955 the mouth of a middle-aged man was rehabilitated. Part of the preliminary treatment consisted of specialized periodontal care. The completed upper work was made up of an anterior fixed partial denture containing eight units, which included one throw-off on either side and a posterior removable partial denture which was retained by precision attachments. This upper work is shown in Figs. 564 and 565.

In 1962 the upper left cuspid fractured at the gum line. The anterior splint was cut in two between the central incisors, and the upper prosthesis was repaired in the following manner:

1. The left cuspid had its pulp removed and the root canal filled. A gold casting was inserted to build up its crown.
2. New crowns were constructed for the central and lateral incisors and cuspid. These were united, and a new throw-off was added.
3. A new left section was added to the removable partial denture.
4. The new section was then united to the old right section, in the mouth, by means of horizontal pin ledging, as is shown in Fig. 615.

Prosthesis which is repaired in this manner is given additional longevity without impairing function.

Where the structures are good and a majority of favorable factors are present, our cases hold up from ten to twenty years or even longer. Nothing is permanent. This applies to our reconstructions. Tissue changes take place. Bridges must be replaced. Foundational stability must be re-established. The periodontal structures need constant attention. This is necessary regardless of how well the occlusion has been coordinated or how perfectly the mechanics has been carried out. In this presentation, it has been assumed that good dentistry prevailed in our completed work.

Time has its effect upon all of our work, no matter how well it has been executed. After ten to twenty years, the original reconstructions have been subjected to the same wear and tear that takes place with other organs in the body. In addition, the materials tend to wear, and this wear or abrasion, attrition, and erosion create an esthetic problem. When the dentist feels that the time has arrived for a second reconstruction to be performed, he should not neglect to explain this to the patient. The patient is entitled to be given the facts and to make his own decision. In cases in which there are a sufficient number of abutment teeth remaining in good condition after supporting an original reconstruction for ten years or more, and in which the operator knows that redoing the entire case will add years to the longevity of what remains, it is his duty to suggest this to the patient. Those who have had experiences of this nature will testify as to the correctness of this procedure.

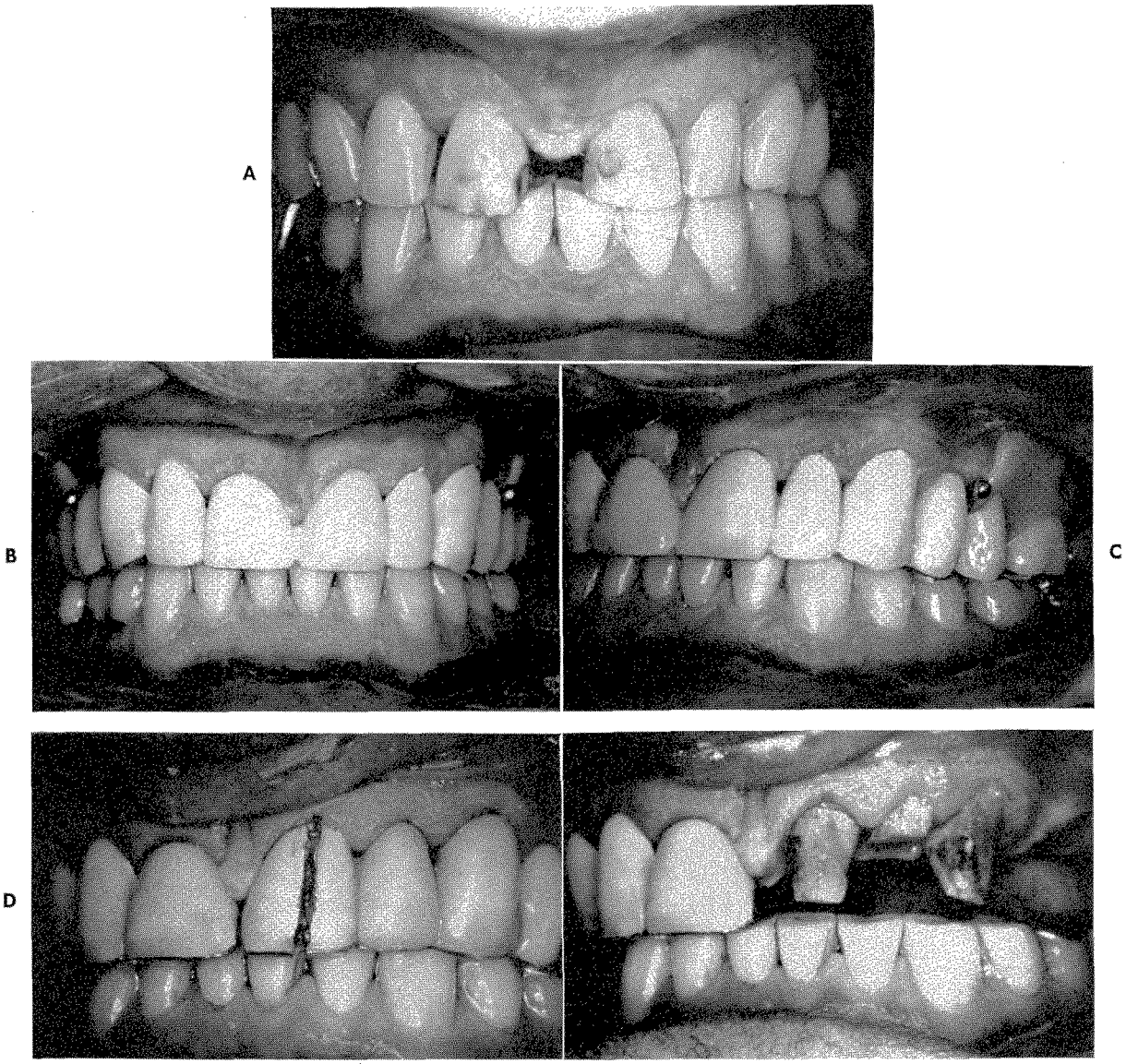


Fig. 615. **A,** Anterior view of the mouth of a middle-aged man before rehabilitation was undertaken. This photograph was taken in 1955. **B,** Front view of the completed work. The upper fixed splint contained eight units which included two throw-offs, one on each side. The removable partial denture was retained by precision attachments. **C,** Left side of the completed work in the mouth. The prosthesis was inserted in 1955. **D,** In 1962 the splint became loose on the left side. It was cut between the central incisors and then removed. The left lateral incisor crown had fractured at the gum line. **E,** A new section was constructed to replace the old one. A new plastic saddle was added to the removable partial denture on that side, and a new precision attachment was used. **F,** The new fixed section was splinted to the old one by means of two horizontal pins shown in this photograph. Strength was obtained by cutting into the mesial surface of the cast gold crowns. The pins were first united by quick-cure plastic shown in this illustration on the lingual surface. The pins were withdrawn from the lingual surface, and the pattern was cast in a hard gold. **G,** The gold casting is shown in the lower left insert. The casting is being fitted from the lingual side. It will then be trimmed to fit and finally cemented. Where the labial pins show, two small acrylic fillings will be inserted. **H,** The completed work is shown here.

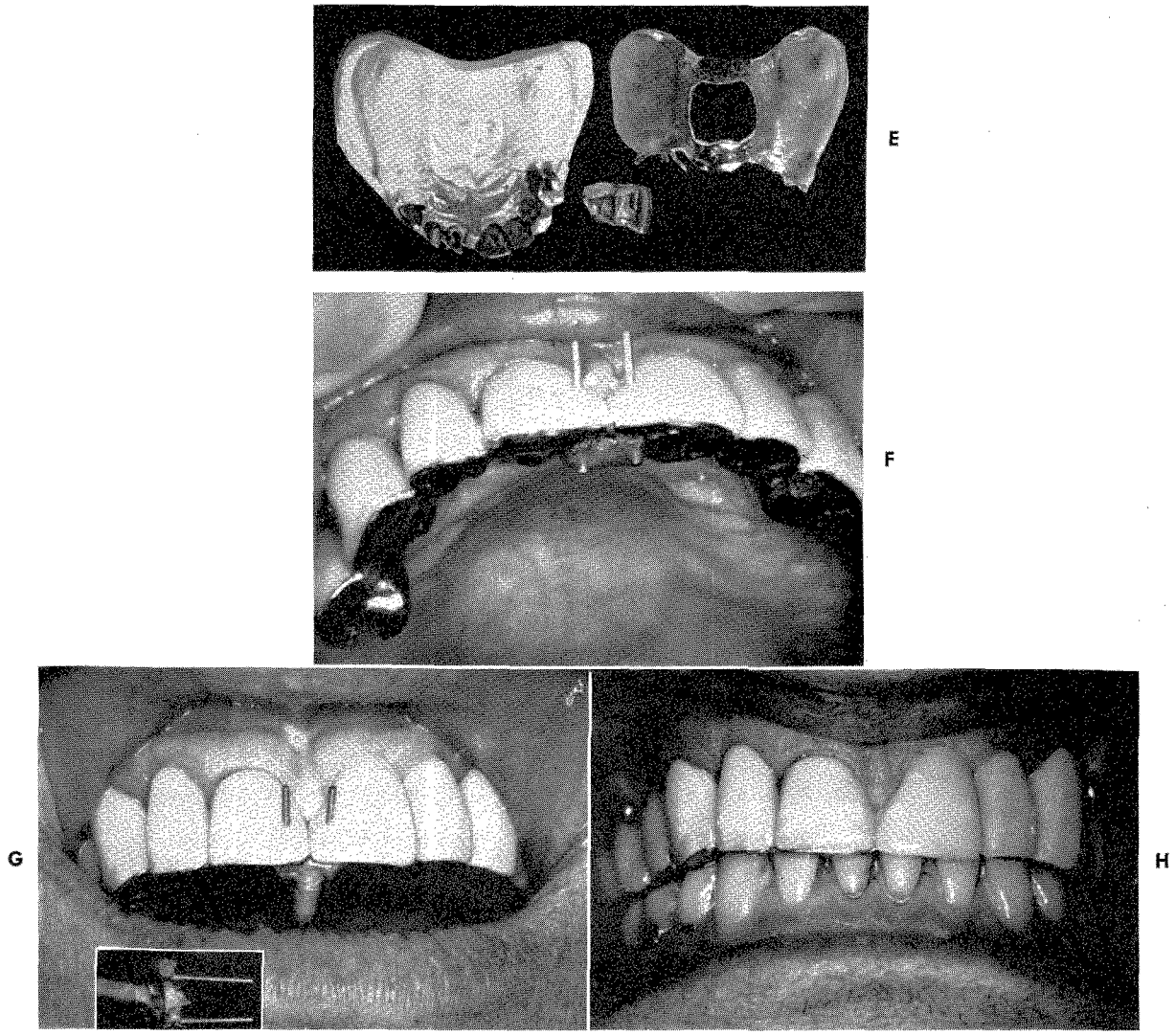


Fig. 615—cont'd. For legend see opposite page.

CONCLUSIONS

Occlusal reintegration is a difficult procedure. Our responsibility is to carry out the details in the best way we know how, so that the end result is the most successful considering the handicaps which were present when the case was started. Our responsibility continues after the work has been inserted, in order to prolong good health and normal function for the greatest length of time. In this the patient shares the responsibility with us. His share involves home care, financing the servicing which is necessary as time goes by, and understanding that in the present state of our art and skill, the best we can do is still a limited remedy and the greater the patient's confidence in us, the greater our responsibility. Knowledge is our greatest asset in evaluating these cases, and only with knowledge put to good use comes the skilled judgment that is so necessary in order to combat these problems.

Chapter 7

DEEP OVERBITE

Earlier in the text, two cases of excessive anterior vertical overbite were presented in patients between 65 and 80 years old. Their oral structures had survived the test of time and were in excellent condition in spite of apparently abnormal bites. (See p. 31, Figs. 36 to 40 and p. 36, Figs. 48 to 51.) Excessive overbites may be found in Angle's three divisions of malocclusion. They may have a horizontal component, a vertical component, or a combination of both. Unless these deep overbite cases are treated at an early age, preferably in adolescence, it is not wise to subject patients to alterations of their occlusion providing there is no direct evidence of deterioration. The deep overbite has been described in detail in *Oral rehabilitation.**

GREATER PART OF FUNCTIONAL CHEWING TAKES PLACE IN SAGITTAL PLANE

Many of these cases of deep vertical anterior overbites seem to be in malocclusion and to present a traumatic interocclusal relationship, yet the oral structures give clinical and roentgenographic evidence of excellent health and good function. According to traditional concepts, normal functional chewing takes place mainly on the horizontal plane at interocclusal level and by means of lateral and protrusive gliding movements of the mandible. Basic research on chewing indicated that the greater majority of subjects performed their functional chewing predominantly in the sagittal plane with only occasional glides in the horizontal plane.†‡ This would account for the excellent condition of the oral structures in the following cases.

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*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., chap. 34 and 35, pp. 771-858.

†Schweitzer, J. M.: Masticatory function in man, J. Pros. Dent. **11**:625-647, 1961.

‡Schweitzer, J. M.: Masticatory function in man, J. Pros. Dent. **12**:262-291, 1962.

Case 1

A man, 70 years of age, is the first patient to be presented. Because of his excessive anterior vertical overbite, had he chewed mainly on the horizontal plane for all of his years, either his cusps would have been ground flat or his teeth and

Fig. 616. Four views of a 70-year-old man with deep vertical overlap. The oral structures are in excellent condition. These photographs were taken in 1962. (Figs. 616 and 617 are of the same case.)

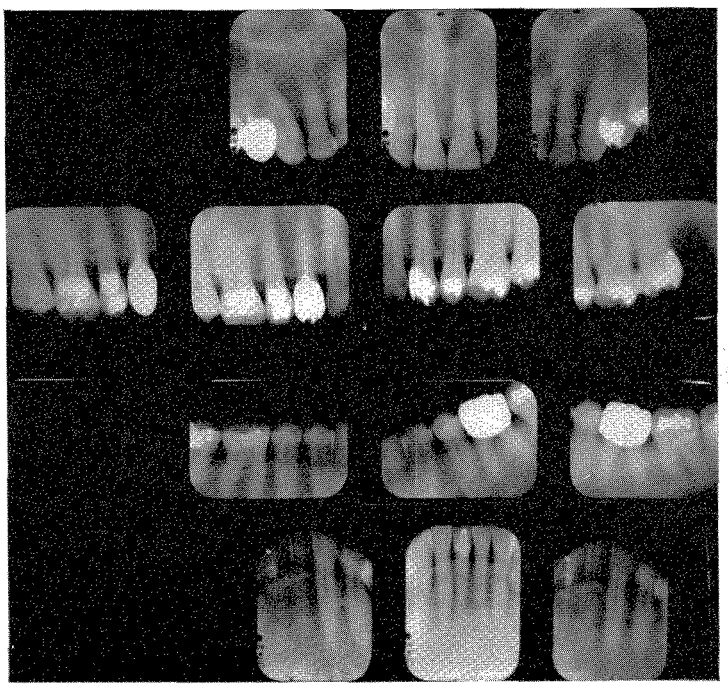

Fig. 617. Roentgenograms taken in November, 1961, of the teeth shown in Fig. 616.

his periodontal tissues would have been severely traumatized. Neither of these conditions prevailed in his mouth. Instead, his cusps retained their convex surfaces, and his oral structures were in excellent condition. (Figs. 616 and 617.)

Case 2

This patient was a 59-year-old woman. In addition to the severe vertical overlap of her anterior teeth, there was also a cross-bite relationship on the left side.

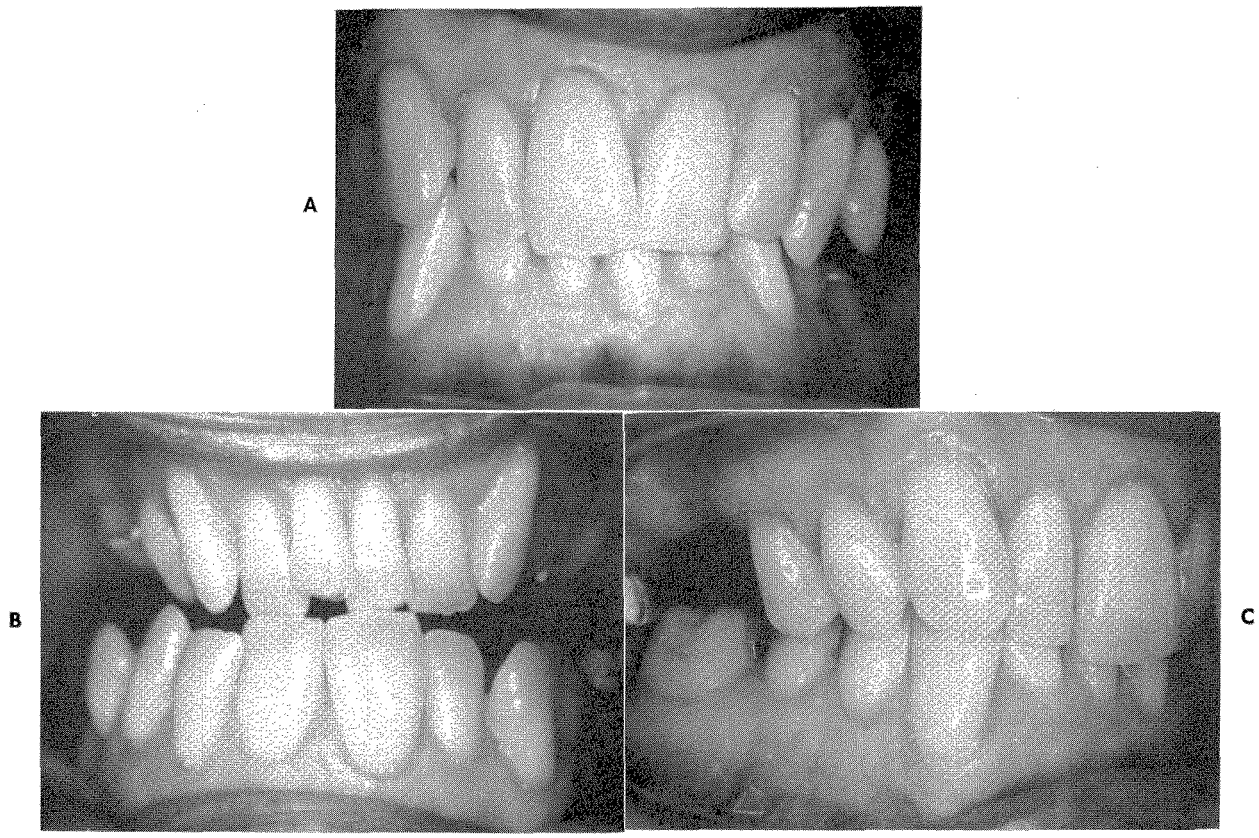

Fig. 618. Woman 59 years old (1962) with deep vertical overbite and malocclusion teeth. **A,** Front view. **B,** Mouth open to show extent of overbite. **C,** Right side showing missing first molar. (Figs. 618 to 621 are of the same case.)

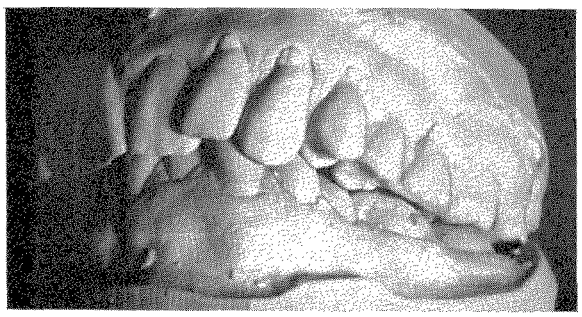

Fig. 619. Casts of the mouth taken in 1958 showing left side. The bicuspids are in cross-bite.

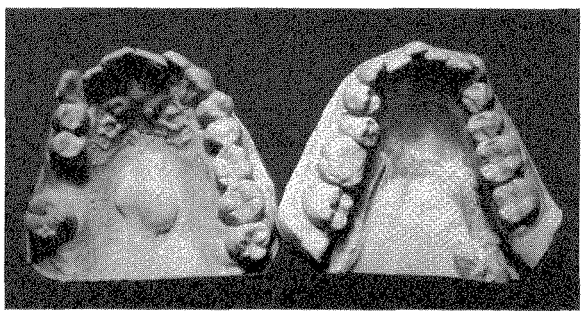

Fig. 620. Casts of the mouth showing arch irregularity of the contour.

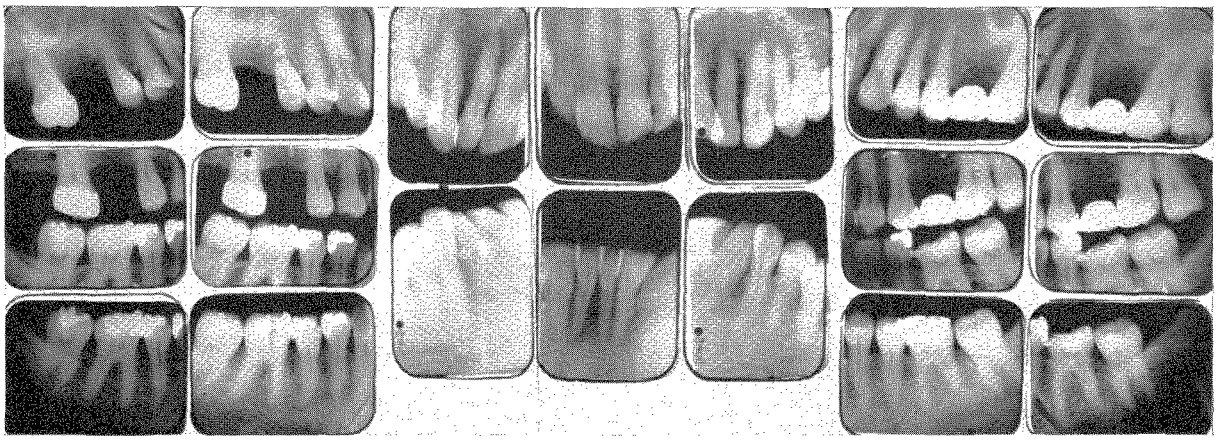

Fig. 621. Roentgenograms taken in 1958 when the patient was 55 years of age, showing excellent structures in spite of deep vertical overlap, missing teeth, and malocclusion.

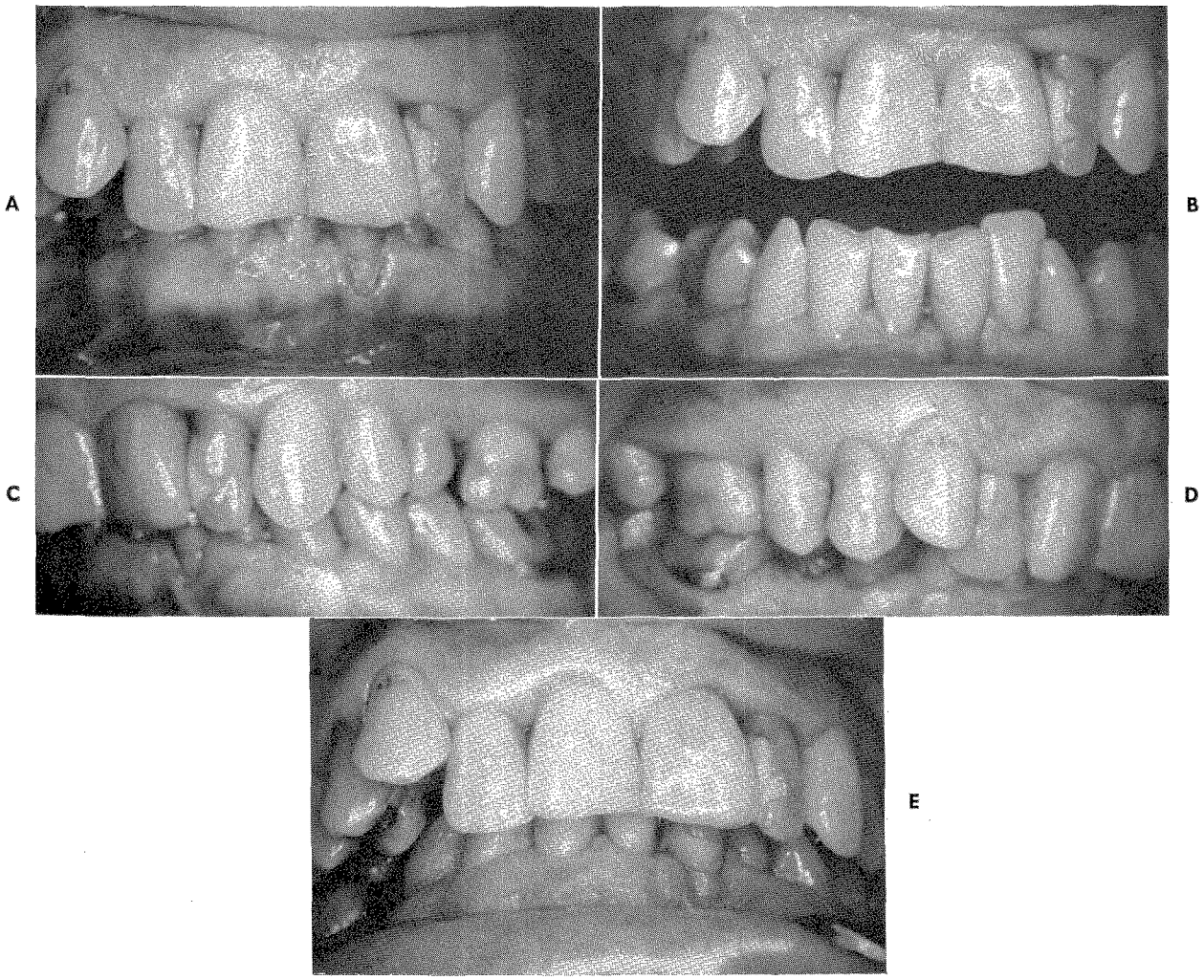

Fig. 622. Various views of the mouth of a 67-year-old woman with a deep vertical overbite and a severe malocclusion. **A,** Front view. **B,** Teeth separated to show extent of overbite. **C,** Left side. **D,** Right side. **E,** Head tipped back to show bicuspid cross-bite on the right side. (Figs. 622 and 623 are of the same case.)

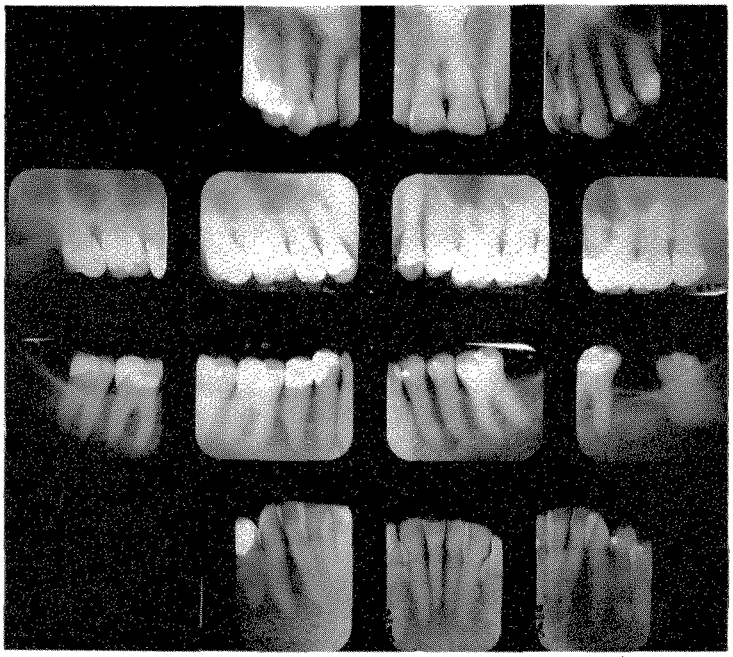

Fig. 623. Roentgenograms taken in June, 1961, showing excellent structures in spite of the deep overbite, malocclusion, and missing teeth. The teeth of this patient are shown in Fig. 622.

The upper and lower arch outlines were very irregular. The upper right first molar had never been replaced. There were no working or balancing bites in accordance with the traditional concepts of normal static and dynamic articulation, yet no experienced dentist would have attempted to disturb these occlusion patterns other than to maintain good oral hygiene. (Figs. 618 to 621.)

Case 3

This case was somewhat similar to the previous one. It depicted a severe vertical overbite in a 67-year-old woman. There was also a cross-bite in the area of the right bicuspids, and the dental arch outlines were irregular. A lower left second molar was absent. In spite of all these handicaps, her functional masticatory strokes must have been essentially nontraumatic and vertically directed. The angle of her closing stroke must have been such as to avoid any traumatic contacts until she reached her terminal functional orbit. If this were not the case, her periodontal structures would have succumbed long ago or her teeth would have been ground to the level of her soft tissues. Instead, the soft tissues and bone were healthy, and her teeth maintained their convex occlusal surfaces. (Figs. 622 and 623.)

ARTIFICIAL LATERAL MOVEMENTS AS MUTILATORS OF CUSPAL SURFACES

In August, 1952, Page submitted an article to *Dental Digest* which was published in May, 1953. In it he stated, "The artificial lateral movements now universally

taught have been shown to produce fictitious occlusal curves and to be mutilators of cuspal surfaces. They should be abandoned."* He has since written many other articles which stress the predominance of the vertical element in functional chewing. He was among the first to call attention to this concept and to provide an articulator, the Transograph, with which he claims functional chewing may be correctly executed.

GNATHOLOGISTS ABANDONING THEIR BELIEF IN MULTITUDINOUS SIMULTANEOUS CONTACTS

The gnathologists under the leadership of McCollum always stressed multitudinous simultaneous contacts during functional chewing at intercuspal level.

More recently, however, in spite of these traditional concepts, some of the old school gnathologists are beginning to stress also the vertical element of chewing rather than the horizontal and are attempting to adjust it to their scheme of occlusion. Stallard and Stuart stated:

"A natural dentition with balanced occlusion may include no teeth that guide the mandible and yet have features quite as restrictive to chewing freedom. The concept that as many teeth as possible should make occlusal contacts in all possible closures is absurd. It is ridiculous to require all teeth to occlude when just two incisors bite off a thin fiber, and it is awkward for teeth on the balancing side to occlude when a thin bolus of food is chewed on the other side. Having the inclines of the buccal cusps of posterior teeth incising at the same time as the cuspids and incisors is a useless arrangement. Posterior teeth are not prehensile teeth. In a balanced dentition, the buccal cusps may bite the cheeks and the lingual cusps may bite the tongue, thus hindering the free chewing habits of the specialized grouping of teeth. A balanced occlusion is a strange occlusion for a mouth to accept all at once.

"A person who has to chew with horizontal jaw motions has malocclusion. . . . balanced occlusion paves the way for easy horizontal gnashing.

"A dentist may find three or four adults with this occlusion who have maintained fully cuspid, little worn teeth, even to the age of sixty-five or seventy years. Such a dentition discourages horizontal occlusal movements and tends to induce vertical chewing.

"No rubbing of the teeth should occur in cyclic chewing."†

LATERAL MOVEMENTS PLAY NO PART IN FUNCTIONAL ARTICULATION

In 1952 Page wrote, "The fields of lateral movements and of function are thus divided from each other. Consequently, laterals can play no part in functional articulation. An occasional patient may be able to move in lateral with reasonable

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*Page, Harry L.: Natural articulator movements, D. Digest **59**:202-206, 1953.

†Stallard, Harvey, and Stuart, Charles E.: Eliminating tooth guidance in natural dentition, J. Pros. Dent. **11**:474-479, 1961.

freedom, but this is a nonfunctional movement and, as a rule indicates a malarticulation."*

In 1954 he wrote, "Anyone who has a full complement of well articulated natural teeth not mutilated by grinding can readily test for balance. If he will protrude until his incisors are in contact edge to edge, he will find that his molars are completely and, as a rule, widely separated. He will find too that his cuspids on the working side or his molars on the nonworking side will force his remaining teeth completely out of contact when he engages in lateral excursions.

"*Cuspal interference not encountered:* The same person will discover that he has not the slightest difficulty in snapping his teeth into simultaneous and full occlusion from any opening in any direction without encountering even the most minute cuspal interference. This indicates that his functional stroke does not consist of cusps 'gliding across the opposing marginal [transverse?] ridges and sulci.'

"*Balance a myth:* Rather than gliding, 'with the teeth in contact,' across the opposing ridges and sulci, the cusps skim by each other and on past the transverse ridges and sulci with no preocclusal contacts. The foregoing being general conditions, it is safe to conclude that 'balance' in normal natural dentition is a myth."†

BRUXISM BEING ELEVATED TO STATUS OF A VIRTUE

And, finally, in 1955 he wrote, "As it becomes more generally understood that lateral motions are outside of functional range and that condyle paths are unimportant, many who have put years of faith in an assumed functional value of these lateral paths have not abandoned them, but have only changed their reason for using them. Essentially, this new rationalization agrees that laterals are worthless functionally, but elevates bruxism and bruxomania to the status of virtues where once they were injurious and factors to be eliminated by every possible means."‡

VALUE OF GLIDE, CONDYLE PATHS, AND BALANCE PREVIOUSLY QUESTIONED

Other investigators before Page also questioned the value of the glide, condyle path inclinations, and balance—Kurth§ in 1942, Craddock‖ in 1949, and Jankelson and Hoffman¶ in 1953.

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*Page, Harry L.: The hinge bow, D. Digest **58**:534-537, 1952.

†Page, Harry L.: An appraisal of balance, D. Digest **60**:200-204, 1954.

‡Page, Harry L.: Occlusal movements and obstructions, The Bennett movement, D. Digest (Part 1) **61**:344-349, 1955.

§Kurth, L. E.: Mandibular movements in mastication, J.A.D.A. **29**:1769-1790, 1942.

‖Craddock, F. W.: The accuracy and practical value of records of condyle path inclination, J.A.D.A. **38**:697-710, 1949.

¶Jankelson, Bernard, and Hoffman, George N.: The physiology of the stomatognathic system, J.A.D.A. **46**:375-386, 1953.

NEED FOR GREAT CAUTION BEFORE ALTERATION OF OCCLUSION

Whether it be in cases of deep overbites or where individuals present healthy structures and good function, their occlusions should not be disturbed other than to ensure cleanliness and repair of caries. When occlusions are tampered with, unfavorable results may be expected. It is pathetic to have some of these patients with altered occlusions plead with us to try to restore their former occlusion. Therefore, it is imperative that there be as valid a reason for attempting to disturb the delicately balanced stomatological system, or irreparable harm may result.

Case 4

In 1933 a 20-year-old woman presented an extremely deep anterior vertical overjet. Her lower incisors were mobile. This patient had received regular routine

Fig. 624. Front, right, left, and open views, taken in 1961, of the teeth of a 49-year-old woman. (Figs. 624 to 627 are of the same case.)

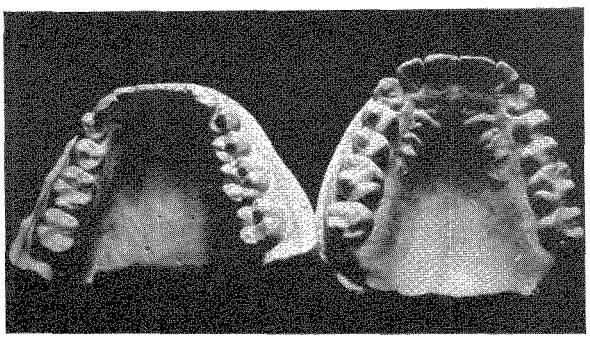

Fig. 625. The casts of her teeth. These were made in 1959. Observe the anatomical detail.

Fig. 626. Roentgenograms taken in 1933 at the age of 20.

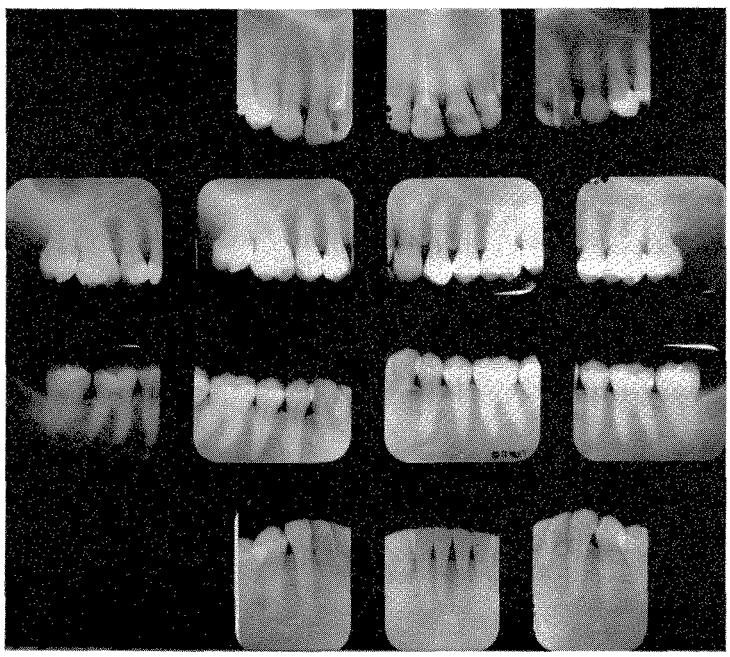

Fig. 627. Roentgenograms taken in 1959 at the age of 46.

dental care for several years. Orthodontic treatment had been suggested at an earlier age. This advice was not taken. The patient married and left the practice. Some years later it became possible to again examine her and obtain roentgenograms of her teeth. The structures were healthy, and function was normal. The degree of mobility of the lower incisors seemed to be less than in 1933 when she was 20. This patient in 1961 was 49 years old. Her mother's history is reported on p. 29, Figs. 42 to 44. Heredity may also play its part in this case. (Figs. 624 to 627.)

ANGLE CLASS II, DIVISION 1 MALOCCLUSION

There are cases which present a deep vertical overbite plus a large horizontal overjet. These are the Angle Class II, Division 1 malocclusions. They also can be found in Angle Class I malocclusions. A case such as this was reported in *Oral rehabilitation.** This patient was a 36-year-old woman who was first examined in 1947. All the third molars and an upper left first molar were missing. The third molars had been removed because they were thought to have caused anterior pressures and to have aggravated the deep overbite. At the age of 16 the patient wore orthodontic appliances for one year. The results were unfavorable. Again, at the

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 805-807.

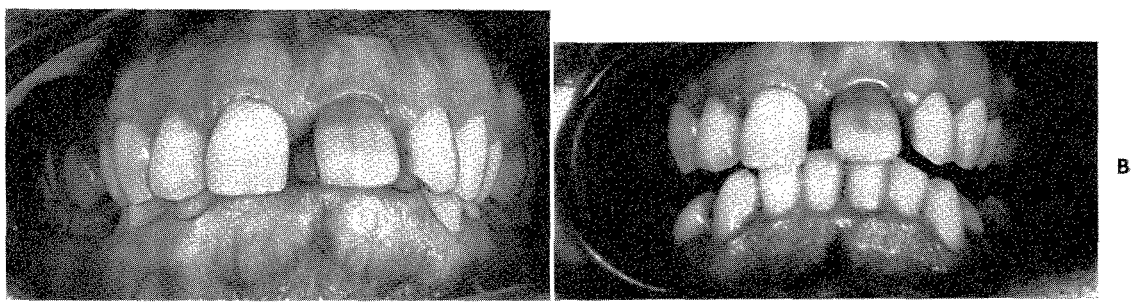

Fig. 628. A, Front view of the teeth of a young woman showing extreme vertical overbite. These photographs were taken in 1949. **B,** The teeth have been parted to show the amount of overbite. The lower teeth strike the lingual gum pad. (Figs. 628 to 633 are of the same case.)

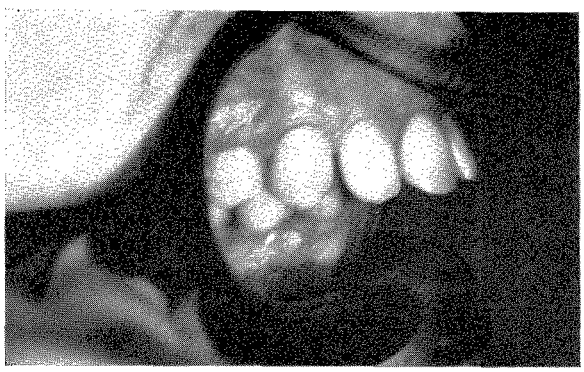

Fig. 629. Right-side view to show the large horizontal overjet as well as the large vertical overbite.

Fig. 630. The oral structures were excellent. The third molars were removed for orthodontic reasons. These are the casts which were made in 1949.

age of 34, it was suggested that the upper anterior teeth could be retruded by an orthodontic appliance. The patient underwent treatment for five months with the result that the left central incisor was devitalized. She refused further treatment. This patient was not seen from 1949 until 1959.

Meanwhile, the upper left central incisor had been removed and replaced by an ill-fitting removable partial denture. The lower right and left second bicuspids and first molars had also been removed. These teeth had not been replaced. The patient

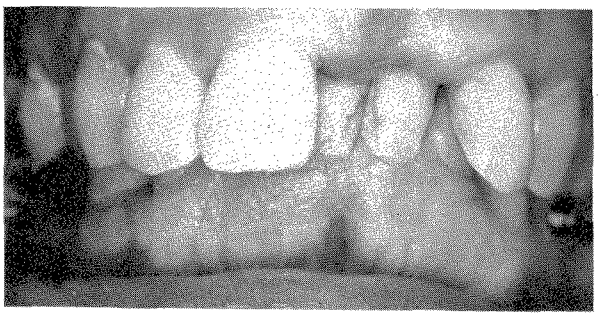

Fig. 631. Front view taken in 1959 at the age of 48 years. This mouth had been neglected. The patient had not been seen from 1949 until 1959.

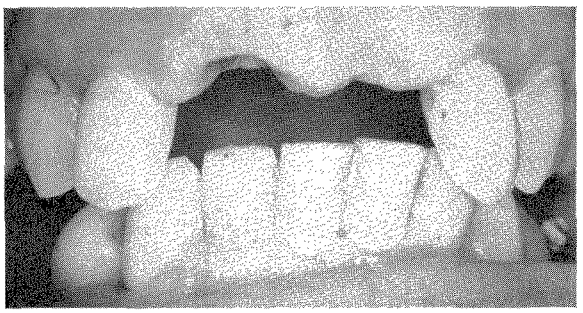

Fig. 632. The right central incisor was removed in 1960 because of periodontal pathology, which developed because of the pressure of a temporary upper removable partial denture which had been worn for many years. This photograph was taken in 1960. At the time of writing there were nine teeth missing. A lower bicuspid and the lower first molars were removed because of caries and neglect. Fortunately, the lower second molars still contact the upper molars and prevent the bite from collapsing.

Fig. 633. Roentgenograms taken in December, 1959. Since then, the upper right central incisor has been removed.

gave caries as the cause. She was then 50 years old. Neglect and not malocclusion had deteriorated this mouth. The teeth that remained were still strong, and the surrounding bone was still in a healthy state. Were not the records available, the cause of breakdown would have been incorrectly attributed to the malocclusion. (Figs. 628 to 633.)

Case 5

This patient was the sister of the last patient reported. Her bite was similar, and her teeth were also destroyed by neglect. When she first came for treatment in 1956, her occlusal breakdown had progressed much further than her sister's. The posterior teeth had been removed. This permitted her bite to collapse, whereas in the previous case the presence of the second molars served to hold the bite and to prevent a closure of the vertical dimension. An ill-fitting lingual bar was being worn with short plastic posterior teeth that were severely abraded.

Even with this malocclusion and obvious neglect, the remaining teeth were surrounded by healthy periodontal structures. One can only surmise that with proper care this mouth could have been kept healthy and in good functional condition for a great length of time. It is interesting to observe the part played by heredity in the similarity of bites in some siblings. (Figs. 634 to 637.)

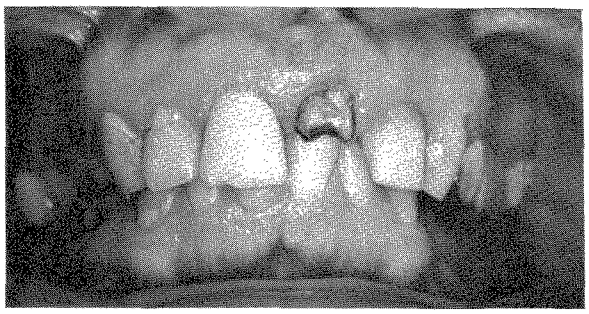

Fig. 634. Front view of the teeth of the sister of the patient whose mouth is shown in Figs. 628 to 633. She also had a deep vertical overbite. The neglect is apparent. Eleven teeth were missing in 1956 when she was first examined. Her bite had collapsed. (Figs. 634 to 637 are of the same case.)

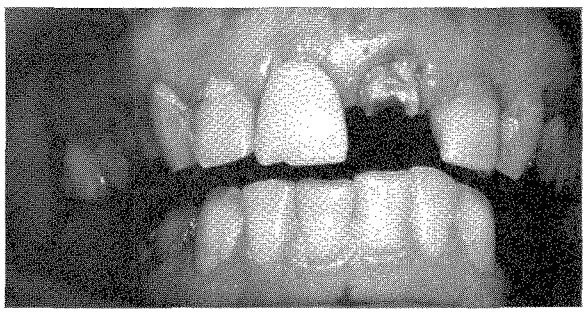

Fig. 635. The teeth are separated to show the extent of the vertical overlap.

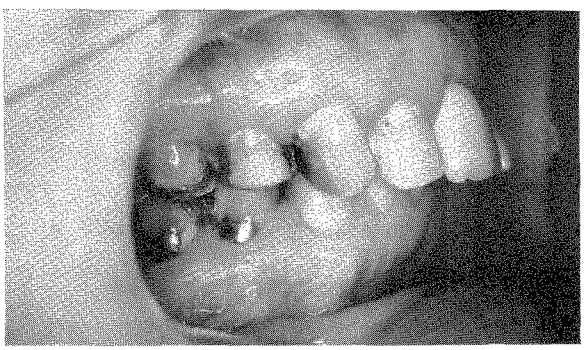

Fig. 636. A right-side view to show the large horizontal and vertical overbites.

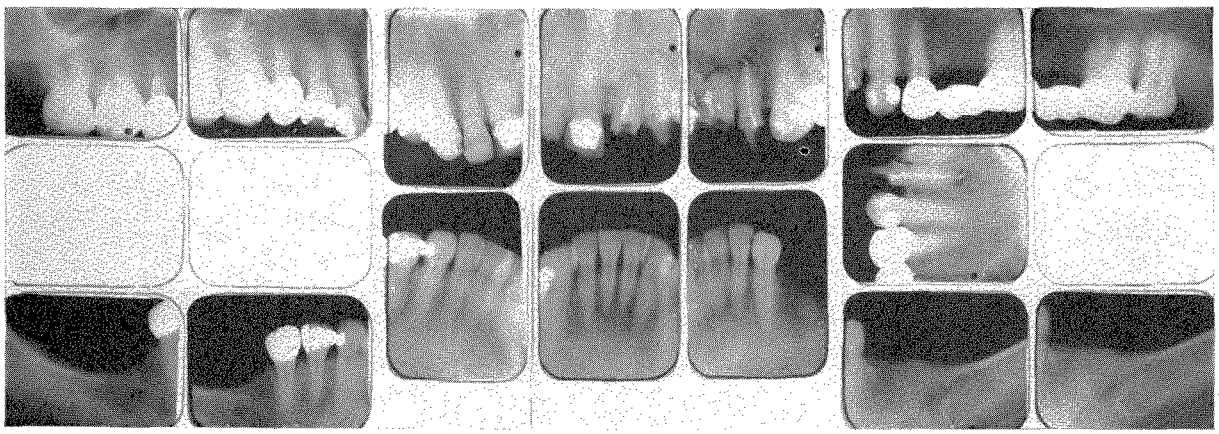

Fig. 637. Roentgenograms taken in 1956 reveal strong oral structures in spite of gross negligence in taking care of her mouth.

Case 6

Two cases similar to the preceding were reported in 1951.* In the roentgenograms which were taken in January, 1940, only the upper right third molar was missing. When the patient was in her teens she had been treated by an orthodontist for five years. The treatment was unsuccessful. During the next twenty-two years, from 1940 to 1962, three additional teeth had been removed. Two of these had been replaced by fixed partial dentures. This mouth had always been under regular supervision. The patient was in the same age group as the previous ones. In this case the upper right central incisor sustained a traumatic injury and had to be covered with a porcelain jacket crown. In 1941 the lower left first molar was nonvital. Her oral structures had always been in excellent condition. This patient was in her mid-fifties. (Figs. 638 to 641.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., p. 804.

Fig. 638. These photographs were taken in 1948. They disclose a deep vertical and horizontal overbite in the mouth of a 40-year-old woman. (Figs. 638 to 641 are of the same case.)

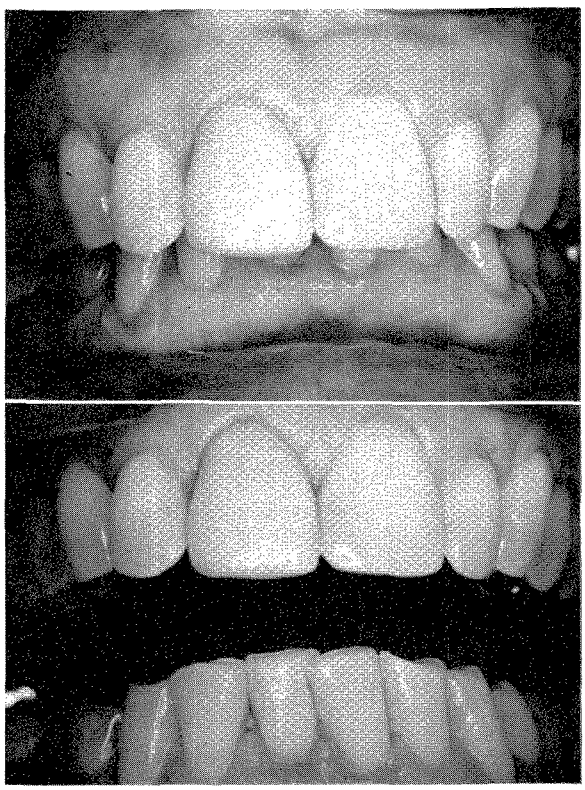

Fig. 639. Front views of the teeth taken in 1961. The patient is now in her mid-fifties.

Fig. 640. Roentgenograms of the case shown in Figs. 638 and 639 taken in 1940. There is only a right third molar missing.

Fig. 641. Roentgenograms of the case shown in Figs. 638 to 640 taken in June, 1962. The oral structures were excellent in spite of the malocclusion. The patient was 54 years of age.

Case 7

The second of the two similar patients referred to in the previous paragraphs was first examined in 1942 at the age of 32.* A full complement of teeth was present. Twenty years later only two upper third molars had been removed. Otherwise there had been very little deterioration in spite of the deep vertical overbite. He also had been under regular dental attention for this entire period and was 52 years of age at the time of writing. (Figs. 642 to 646.)

Although this type of bite presents occlusal hazards and is susceptible to traumatic injuries, especially when the upper incisors protrude, still it is risky to intervene unless there is definite evidence of deterioration, attributable to the excessive overbite.

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 811-813.

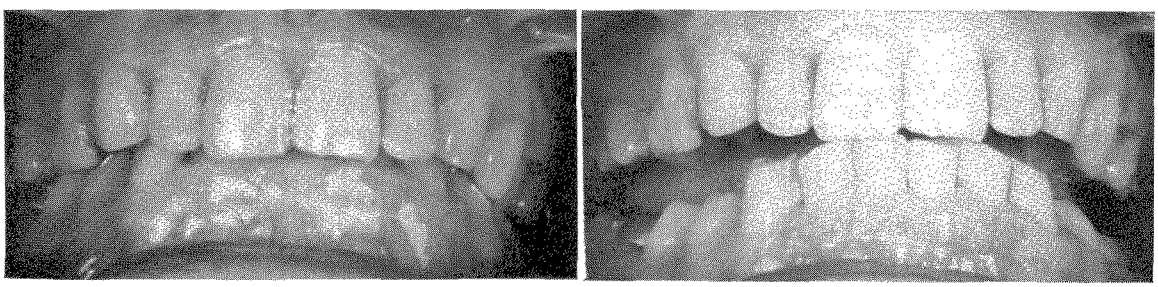

Fig. 642. Photographs taken in 1942 at the age of 32 showing deep vertical overbite. (Figs. 642 to 648 are of the same case.)

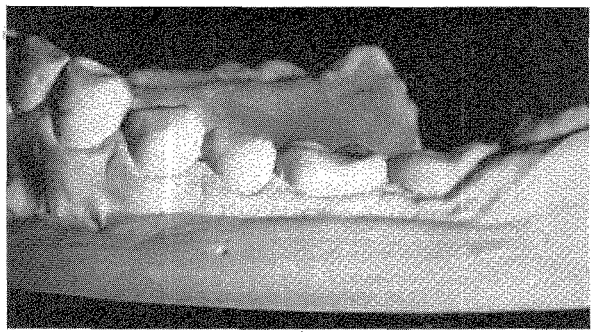

Fig. 643. Extreme curve of Spee which is often typical of Angle Class II cases of malocclusion. This is a cast of the mouth of the patient shown in Fig. 642.

Fig. 644. Roentgenograms taken in 1942. There were no missing teeth.

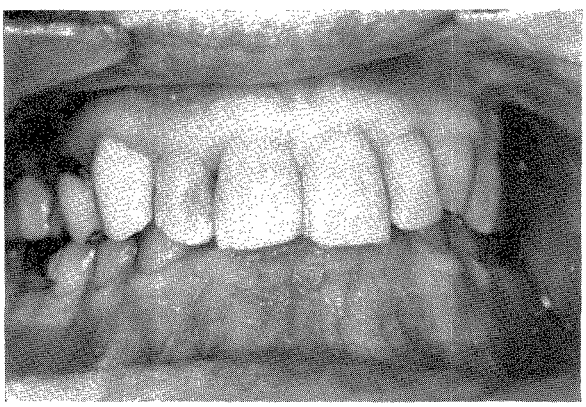

Fig. 645. Photograph of the teeth taken in 1961. The patient at that time was 51 years of age. The structures show no marked deterioration.

Fig. 646. Roentgenograms taken in 1962. Only the upper third molars were removed during the twenty years since 1942. The patient was 52 years old when the roentgenograms were taken.

VARIABILITY OF FUNCTIONAL MASTICATION; IMPORTANCE OF DENSITY OF BONY FOUNDATION

Four of the patients presented had received an injury to one or more of their upper incisors. We must bear in mind, however, that functional mastication is extremely variable and that the individual may accommodate his reflex chewing to his particular type of occlusion. If this accommodation is made, the teeth are protected from injury and, all other factors being normal, their useful life may be extended to a patient's old age. Another observation is that it is not always the amount of alveolar bone but the type of bone surrounding a tooth that is important. Radiographically, the amount of bone may seem inadequate, whereas if the trabeculae are close together and dense, the tooth may be clinically stable and healthy.

DEEP OVERBITES AND ORTHODONTIC CORRECTION

Case 8

At the beginning of this chapter the suggestion was made that correction of these bites should be made in the patient's teens and that the method of choice should be orthodontic treatment. Treatment is desirable. A large percentage of the results are successful. The son of the patient described in Case 7 was treated for the same type of malocclusion that his father presented. Treatment was begun at the age of 9 in 1950. It was completed successfully in 1955. At the time of writing, at the age of 21, he had a normal overbite. We think best results are

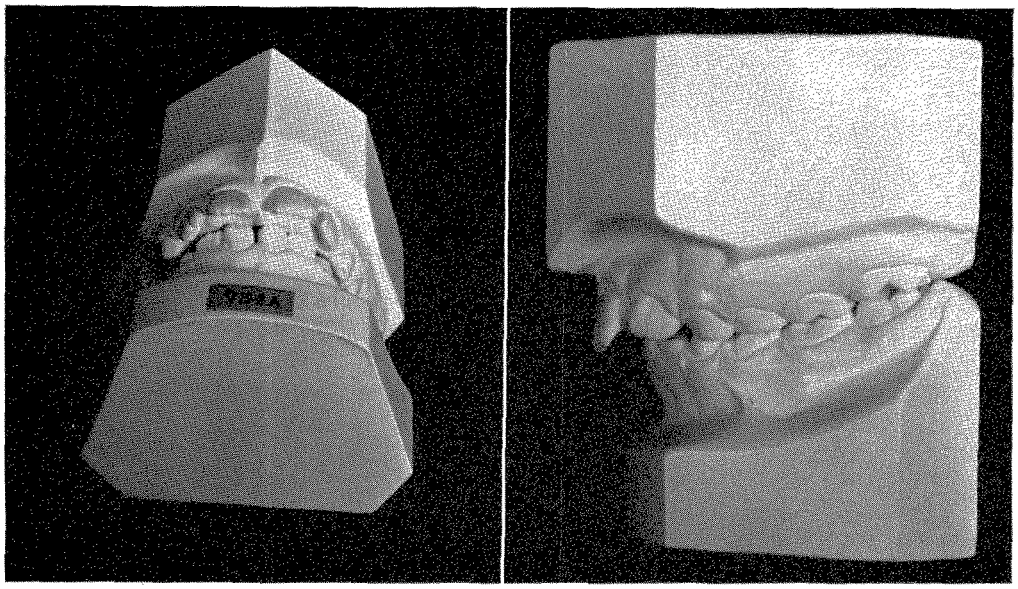

Fig. 647. Two views of the casts of the teeth of the son of the patient whose teeth are shown in Figs. 642 to 646. These were taken in 1950 when he was 9 years old. They indicate a deep vertical and horizontal overbite and a decided malocclusion.

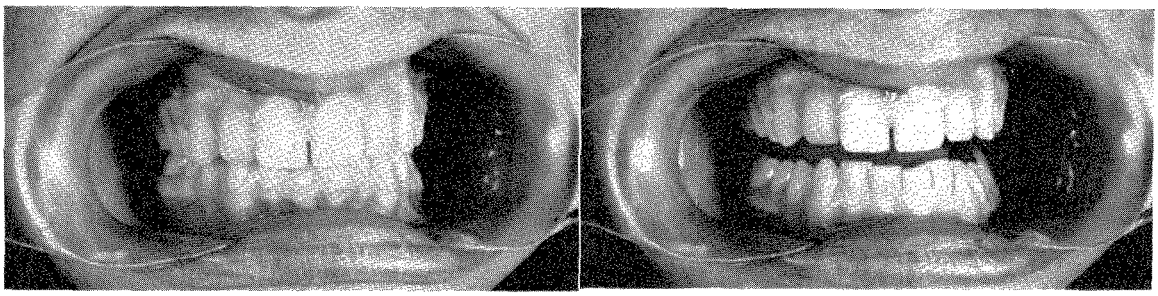

Fig. 648. Front view, teeth closed and opened, of the patient shown in Fig. 647. The orthodontic treatment was successful. The vertical and horizontal overbites were corrected. These photographs were taken in 1960 at the age of 19 years.

obtained with these cases when they are treated in this manner. (Figs. 647 and 648.)

Case 9—dual bite

Patients with an Angle Class II, Division 1 malocclusion often try to bring the mandible forward to give the impression of having a more pleasing facial contour. They do this even in childhood. If patients presenting this type of bite are untreated in childhood, a dual bite may result in adulthood. A case of this type was reported in 1951.* Treatment was instituted in 1949 at the age of 11. Although it was completed in two years, it was not until 1955 that normal intercuspation took place. At the time of writing, when the patient was 24 years old, the occlusion was

*Schweitzer, J. M.: Oral rehabilitation, St. Louis 1951, The C. V. Mosby Co., pp. 802-803.

Text continued on p. 300.

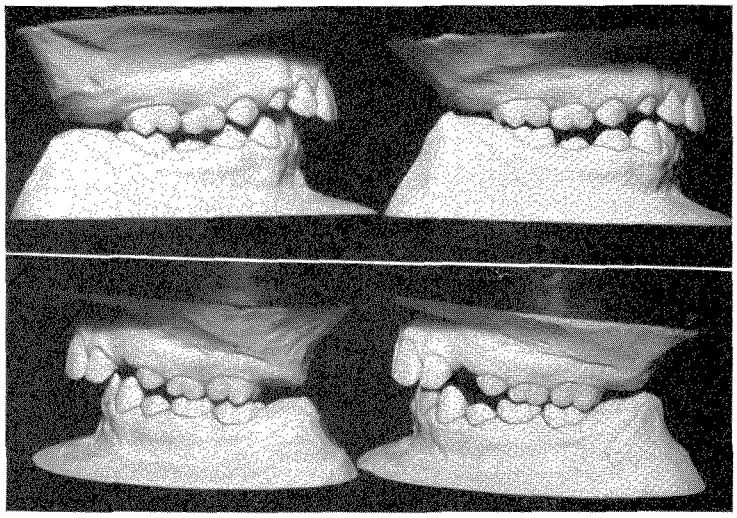

Fig. 649. Right-side and left-side views of the models of an 11-year-old girl with a true Angle Class II, Division 1 malocclusion. These photographs were taken in 1949. In **A** (right side), the casts on the left indicate true centric relation whereas those on the right are in an assumed false forward position. In **B** (left side), the casts on the left are in true centric relation whereas those on the right are in an assumed false position. This is commonly known as a dual bite. (Figs. 649 to 654 are of the same case.)

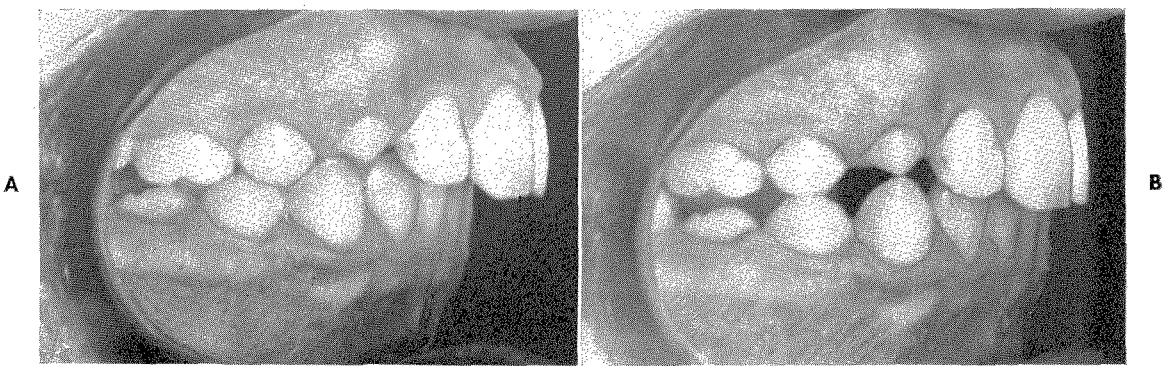

Fig. 650. A, Same case as shown in Fig. 649 demonstrating true centric relation on the left and, **B,** false centric relation on the right. The patient tries to assume this position because it looks better, but she is unable to maintain it.

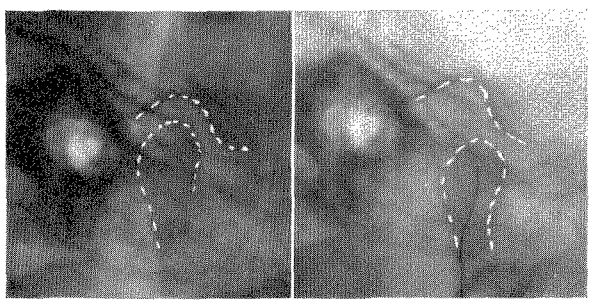

Fig. 651. Radiographs of the temporomandibular joint of the patient shown in Figs. 649 and 650, taken in 1949. The one on the left shows the position of the condyle when the mandible is in its apparent centric relation, whereas the one on the right indicates a forward positioning of the mandible with the condyle well out of the fossa. In the right radiograph the position of the condyle was untenable.

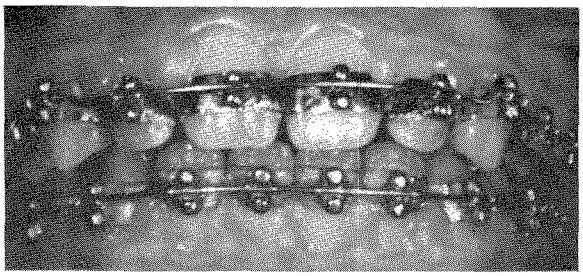

Fig. 652. Orthodontic treatment was started in 1950 as shown here.

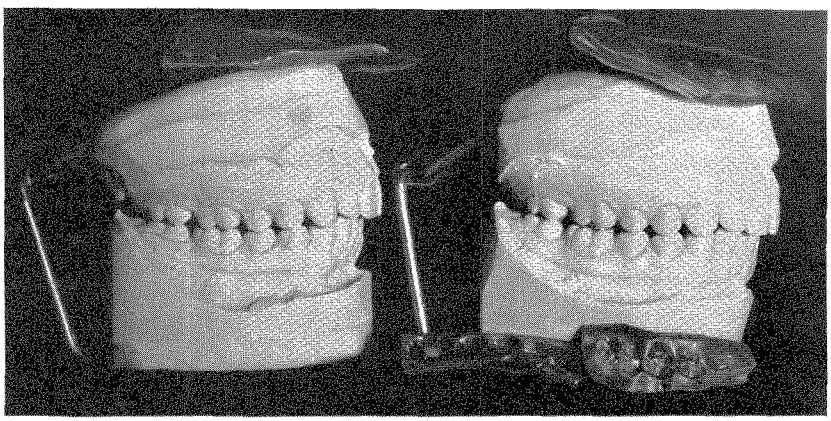

Fig. 653. After two years of orthodontic treatment, the cusps were still incorrectly left in a tip-to-tip relationship. Treatment was completed in two years.

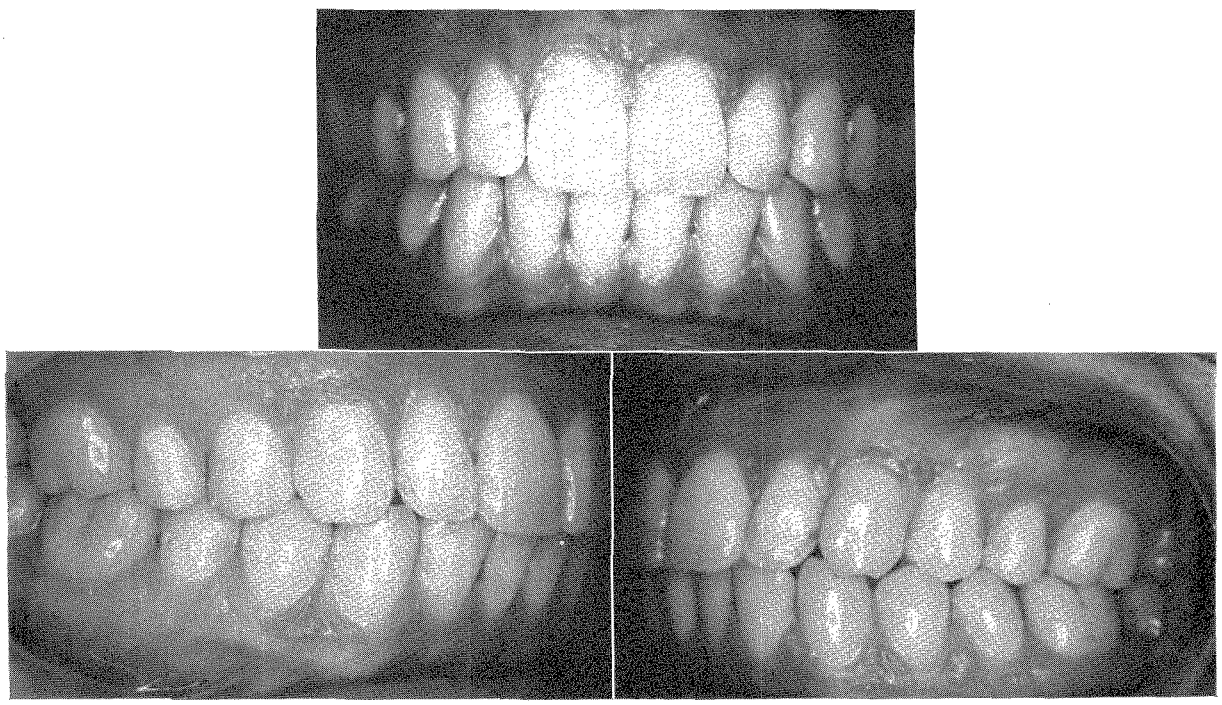

Fig. 654. In 1962, at the age of 24, there was a correct interocclusal relationship as shown in these front, right, and left views. It was not until 1955 that a correct interocclusal relationship was noticed.

excellent. Without treatment, or with ineffective treatment, a dual bite may have occurred. (Figs. 649 to 654.)

UNDESIRABLE RESULTS OF ORTHODONTIC TREATMENT

Lack of knowledge of how to proceed with this type of case, lack of tissue response to the proper treatment, or a combination of both often results in ineffective treatment. Deep vertical and horizontal overbites can be difficult for both the orthodontist and the prosthodontist. Some of the results of improper orthodontic therapy include temporomandibular joint disorders. Where the extraction of permanent teeth is included in the orthodontic treatment, relapses frequently take place, resulting in a continuation of the deep vertical or horizontal overbite.

Case 10

This patient was an 11-year-old girl who had completed several years of orthodontic treatment. In 1949, at the age of 12, her deep vertical overbite and dual bite remained. She underwent several methods of treatment including bite plane therapy and intermaxillary elastics. The first molars to which the bands were attached were being traumatized so severely that the appliances and the bands had to be removed.

ORTHODONTIC THERAPY INVOLVING EXTRACTION OF BICUSPIDS

In 1952 two upper bicuspids were extracted, and different orthodontic therapy was instituted in the form of a headgear to move the upper teeth posteriorly. This

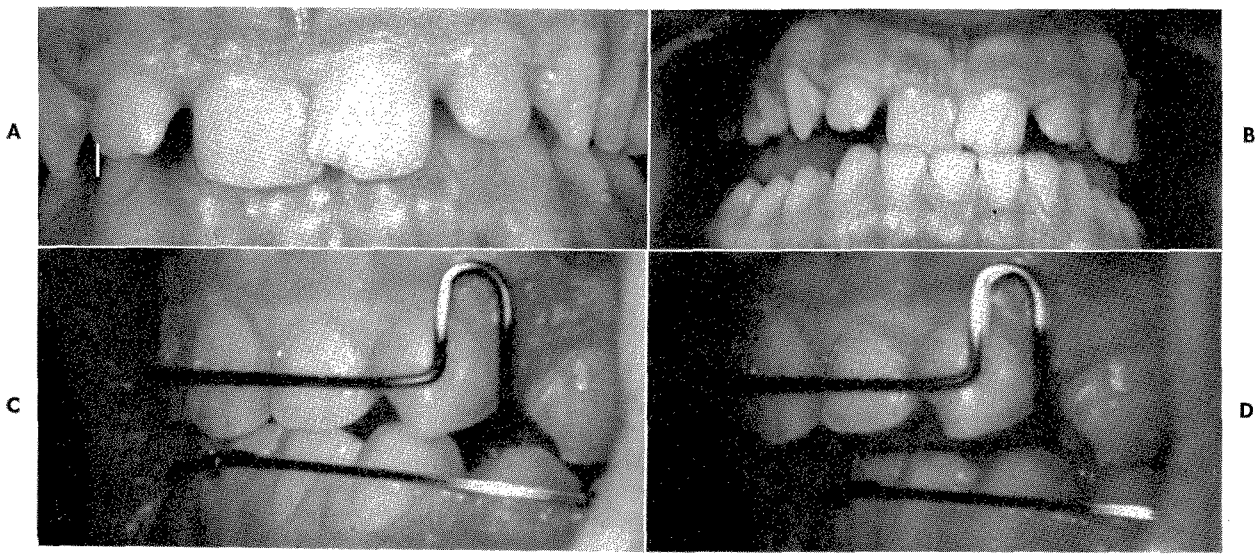

Fig. 655. **A** and **B**, Photographs taken in 1948 at the age of 11. This patient had already had five years of orthodontic treatment with no success, as is shown here. **C**, This bite plate was used for two years in an attempt to bring the mandible forward. It was unsuccessful because in **D** the patient could position her mandible posteriorly at will. In **C** the mandible is positioned forward, but it does not remain there. (Figs. 655 to 658 are of the same case.)

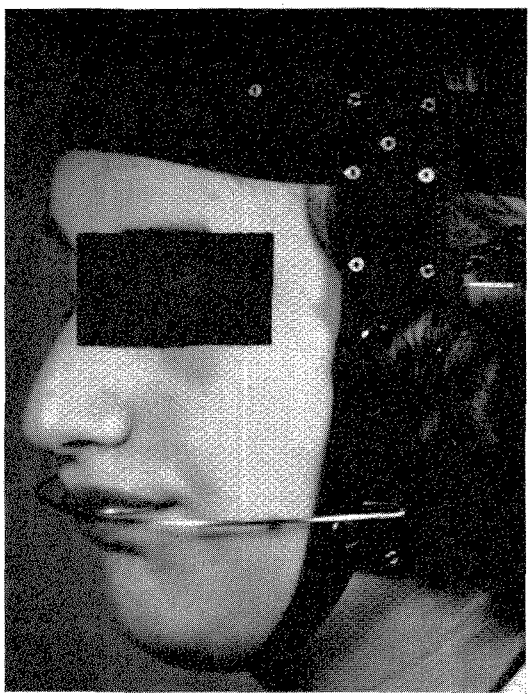

Fig. 656. In 1952, two upper bicuspids were removed, and a new appliance was used in the form of a headgear. The idea was to retrude the maxillary teeth rather than attempt to bring the mandible forward.

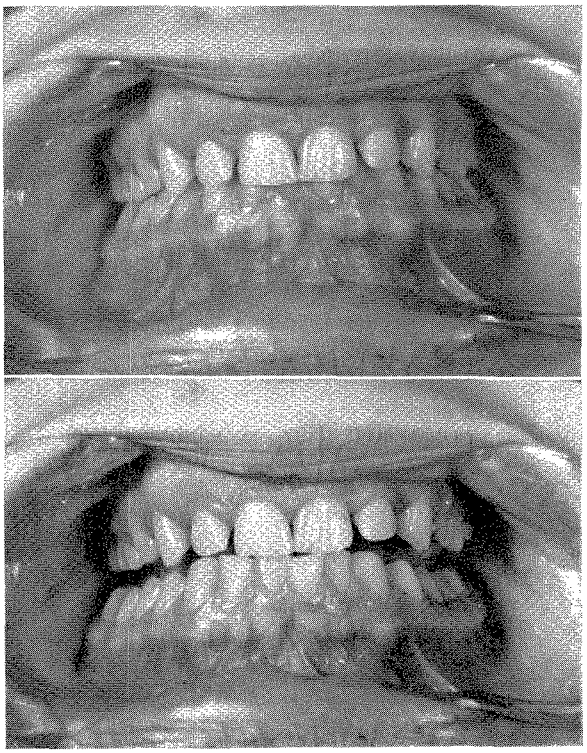

Fig. 657. The orthodontic treatment was completed in April, 1953. These photographs were taken just after the removal of the braces. Observe the vertical overbite.

Fig. 658. These photographs were taken in April, 1962. The patient had not been seen since 1958. Although the oral hygiene was poor, it was evident that the vertical overbite was much more pronounced than in Fig. 657. Cases of this sort are difficult. There seems to be a definite limitation to treatment. This patient at the time of writing was 25 years old.

accomplished its purpose in eliminating the dual bite, but the vertical overbite was increased. In 1953 all the upper teeth were banded, and a reduction of the vertical overbite was undertaken. In March, 1954, the case was declared completed. A deep vertical overbite remained, but there was no longer a dual bite. This patient at the time of writing was 25 years old. She had been helped considerably by the orthodontic treatment, although it was ineffective during the first few years. The limitations of treatment must be recognized no matter what the form of therapy. (Figs. 655 to 658.)

BITE PLATE THERAPY

Case 11

If an Angle Class II, Division 2 malocclusion is treated by means of bite plate therapy during the late teens or early twenties, the bite plate must be worn throughout life if a relapse is to be prevented.

In 1956 a 40-year-old woman presented herself for treatment. Her upper lateral incisors had been congenitally absent. She had received orthodontic treatment at the age of 24. Her previous records had been destroyed, but the original condition may be inferred by deduction. With the upper lateral incisors congenitally missing, the orthodontist had moved the upper central incisors forward and upward. He had then inserted a combination Hawley bite plate and removable partial denture which replaced the upper lateral incisors. The patient was instructed always to wear this to prevent a return of the original bite. If her orthodontic treatment was performed about 1940, she had been wearing the removable partial prosthesis for over twenty years. She was in her mid-forties at the time of writing. The bridge was seldom removed because of the spaces created by the missing lateral incisors.

In 1956 two small fixed bridges attached only to the upper cuspids were inserted. Lingual platforms were constructed on the abutment castings in order to permit the lower cuspids and first bicuspids to contact in centric occlusion. This was necessary both to prevent the cuspids from changing position, now that the future bite plate would not include them, and to provide additional contacts in the area

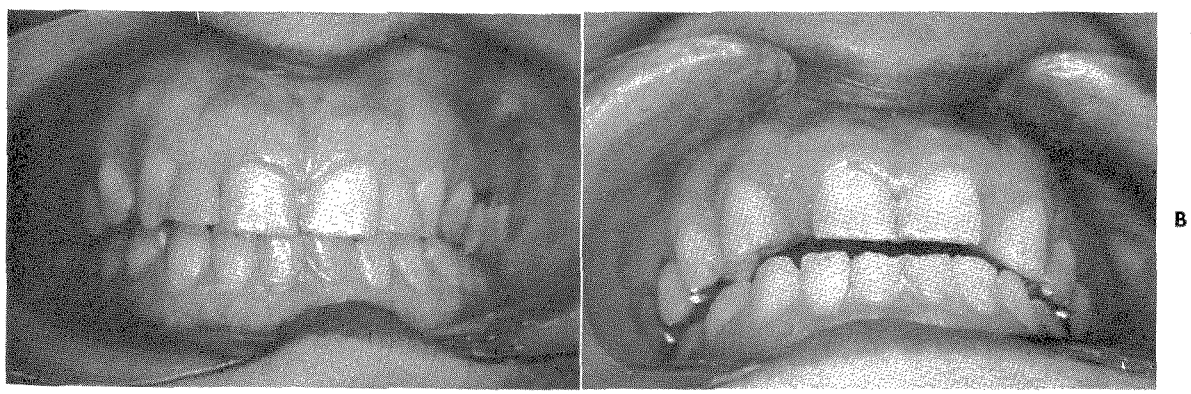

Fig. 659. A, Anterior view of the teeth of a 40-year-old woman shown wearing a bite plate, which also supplies the missing upper lateral incisors. This photograph was taken in 1956. The bite plate had been worn for over twenty years. In **B,** the bite plate had been removed. (Figs. 659 to 661 are of the same case.)

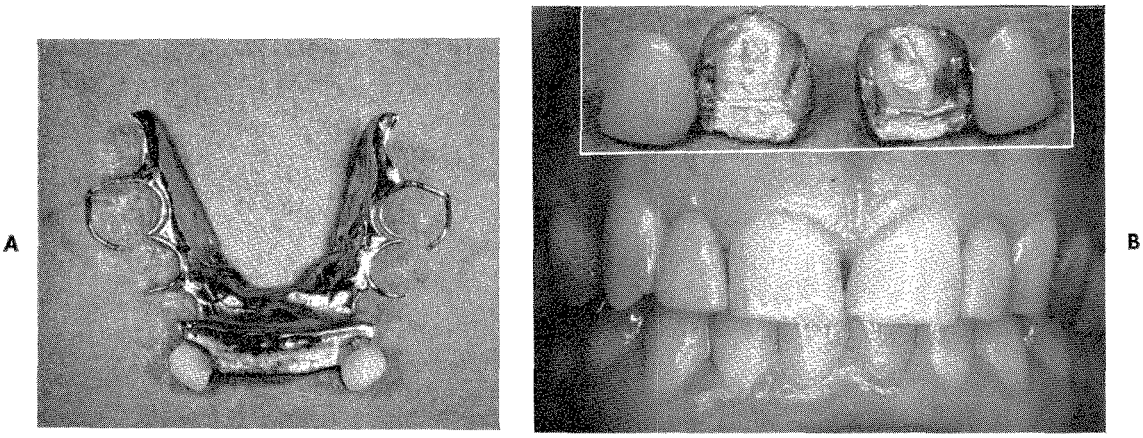

Fig. 660. **A,** The bite plate which the patient shown in Fig. 659 was wearing. The lateral incisors were congenitally absent. **B,** The lingual surfaces of the cuspids were exposed by cautery and surgery. Two small fixed bridges were inserted to replace the missing lateral incisors. Now, the bite plate would only have to be worn at night. The photograph shows the teeth with the fixed bridges inserted. The inset shows the actual bridges.

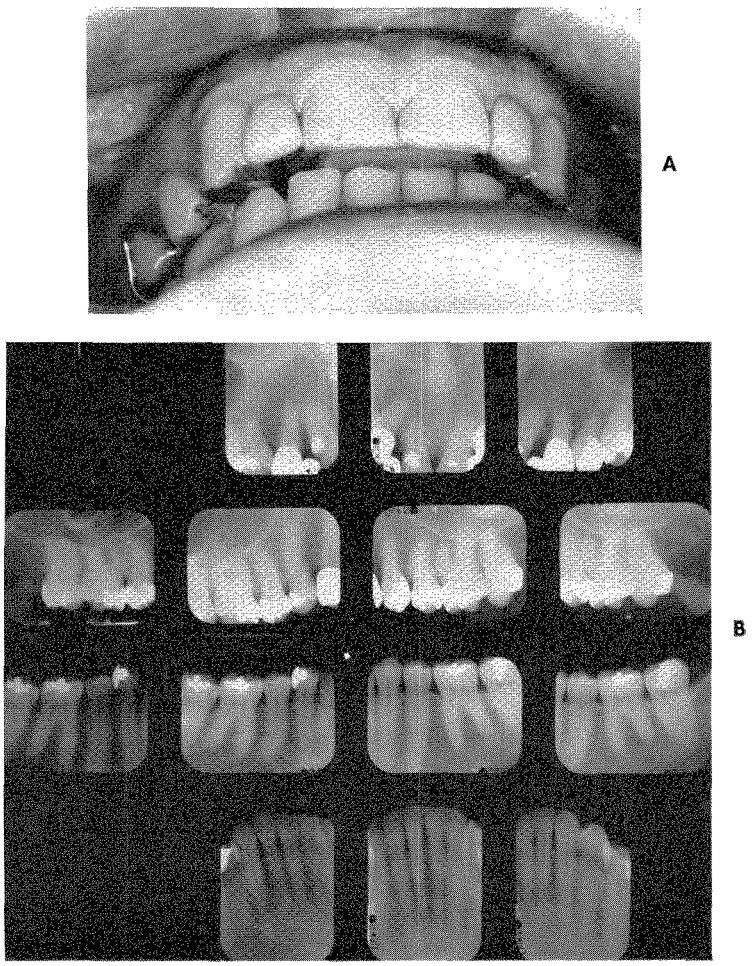

Fig. 661. **A,** The new bite plate in position. The old one was lost. This is worn at night only. **B,** Roentgenograms of the teeth taken in 1962. These reveal normal structures in spite of the orthodontic treatment and the necessity of wearing a removable appliance. The patient was 46 years old.

for better function. Whereas formerly the bite plate had to be worn continually, it was now worn only at night. Her roentgenograms disclosed healthy structures. (Figs. 659 to 661.)

Case 12

Controls difficult to obtain

The difficulty with almost all of our reconstruction cases is that there are no controls, so that our various concepts have to be proved by the length of time the stomatological system remains healthy and functions well after reintegration has been attained. To treat the same mouth using an entirely different approach is not possible. Different procedures may be attempted, but here again they can only be proved by the time factor. Even then we cannot be sure that the same patients would not be served equally as well by using an entirely different approach.

The control

I have been very fortunate in being able to examine the mouth of the sister of the patient just reported in Case 11. The sister was 58 years old (1963) and had the same type of bite. The anterior vertical overbite was excessive. Although it is evident that many errors may be introduced in using her case as a control, still it is unusual to be able to compare two siblings whose interocclusal relationships were so similar to start with and whose oral structures were treated in such totally different ways.

Comparison of two siblings

The 58-year-old sister never was treated by an orthodontist. She claimed that she always took good care of her teeth but that her gums always bothered her. Many years previously she had been referred to a periodontist, but she rejected specialized periodontal treatment. Her soft tissues were unhealthy. The majority of her posterior teeth were mobile. Several posterior teeth had been removed. A lower posterior four-unit inlay splint served to stabilize her weak left bicuspids and molars. Severe abrasion and attrition had affected her anterior teeth so that at least 50% of their clinical crowns had been sacrificed. A three-unit fixed partial denture replaced a lower right missing tooth. The abutment teeth were mobile, and their supporting bone was no longer adequate. The bite had closed. The patient bruxed excessively day and night. A dentist seen previously gave her a soft rubber night guard in an effort to protect her teeth against the noxious habit. This soft rubber guard only made her more nervous and augmented her bruxing habits instead of relieving them. I have given the reasons why the soft rubber night guards are ineffective elsewhere in this text (p. 185).

Discussion

Regardless of what form of therapy will be prescribed and undertaken for this patient, a comparison of these two sisters is interesting. In spite of having to wear

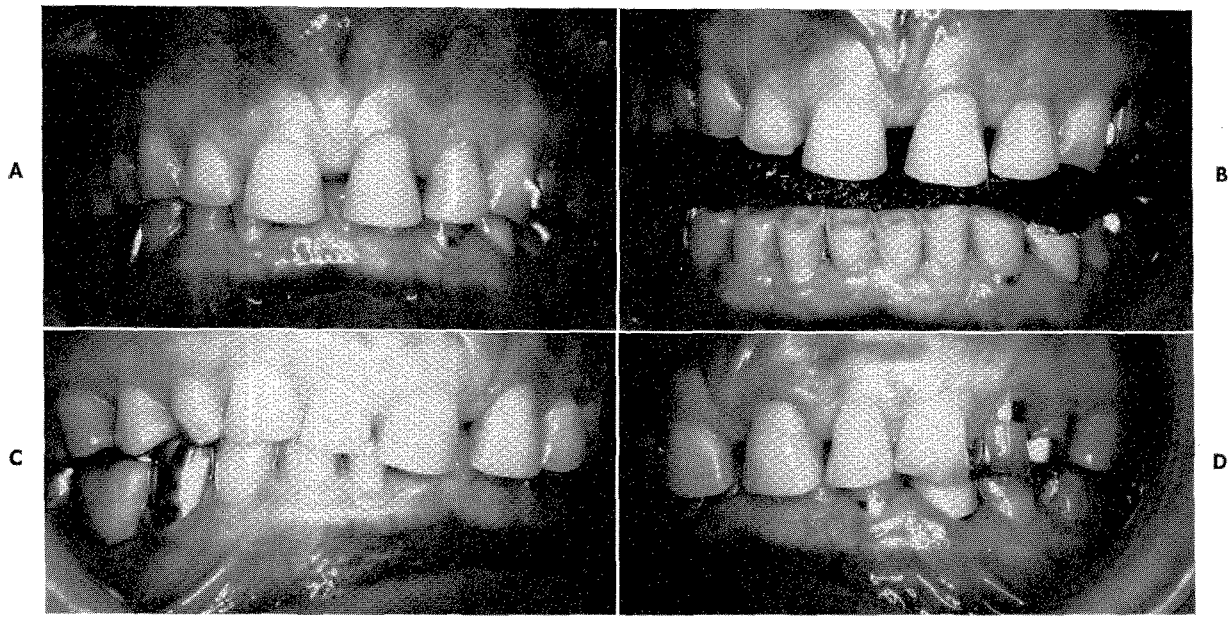

Fig. 662. Four views of the teeth of the sister of the patient whose teeth are shown in Figs. 659 to 661. This patient did not receive the benefit of orthodontic treatment. Her oral structures have disintegrated (age, 58). **A,** Anterior view, contact position. **B,** Anterior view, teeth apart. Observe the advanced attrition and abrasion. **C,** Contact position, right side. **D,** Contact position, left side. (Figs. 662 and 663 are of the same case.)

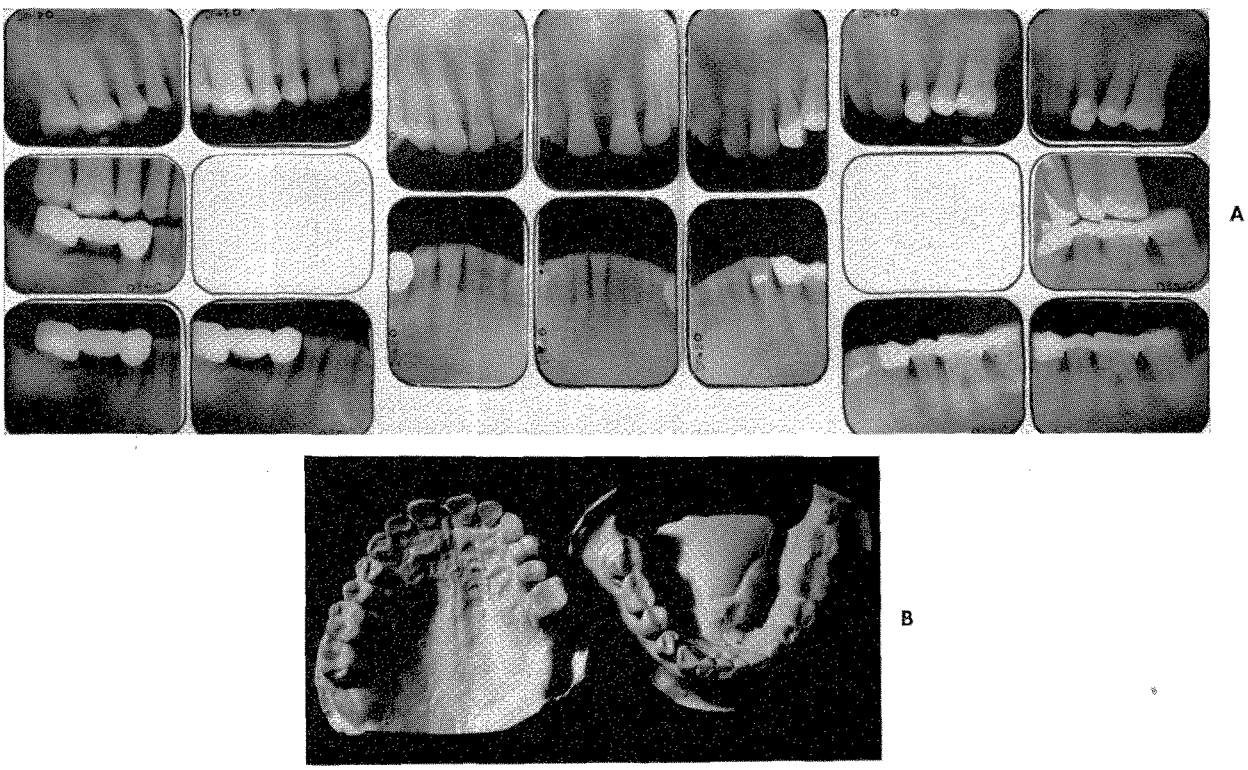

Fig. 663. A, Roentgenograms of the patient whose teeth are shown in Fig. 662. The periodontal and osseous tissues are in a state of deterioration. **B,** Casts of the teeth of the patient. The abrasion and attrition are evident.

a bite plate every night, the younger sister profited greatly by the orthodontic therapy that was instituted at an early age. Her oral structures were still in excellent condition, whereas those of her sister were in an advanced state of deterioration. However, we must not declare this as a general rule, namely, that all patients with deep overbite should be treated in their teens by orthodontics. I have shown that many of these cases are best left alone. It is only when there is evidence of some pathology that outside therapy need be considered. Here again clinical judgment based upon knowledge and experience is our best aid. Variation continues to be the theme, but cases such as these should continue to alert us that some forms of therapy, when used with intelligence, can often improve upon nature. (Figs. 662 and 663.)

REDUCTION OF STEEP ANTEROPOSTERIOR OCCLUSAL CURVE

Where the free-way space is large or the growth potential is still present as in youth, the orthodontists employ bite plates to permit the posterior teeth to reach a more favorable occlusal level. It is generally agreed that a very steep anteroposterior occlusal curve is unfavorable. These are often associated with deep vertical overbite cases. (Refer to pp. 294 and 296, Figs. 642 to 646.) By the insertion of a Hawley bite plate, the orthodontist has been able to decrease this steep occlusal curve and at the same time to reduce the vertical component of the overbite.

Case 13

A case of a 25-year-old man was reported in 1951.* The bite had been raised by orthodontic therapy. His bite height remained relatively stable for over twenty

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 1015 and 1016; case submitted by Dr. Paul F. Titus, New York, N. Y.

Fig. 664. A 25-year-old man. The original case, before the orthodontic treatment, is shown on the left. By means of a lingual bite plate and labial arch wires, etc., the bite was raised in two years to the condition shown on the right. The photograph of the result was taken four years later, when the patient was 29 years old. The bite has remained open. The patient had to lose some posterior teeth, but this was due to an old infection present, associated with the devitalized roots of the posterior molar. A lower lingual bar removable denture was inserted, and the model of the case was taken some seven years after the original treatment shown in Fig. 665. (Courtesy Dr. Paul F. Titus, New York, N. Y.) (Figs. 664 to 667 are of the same case.)

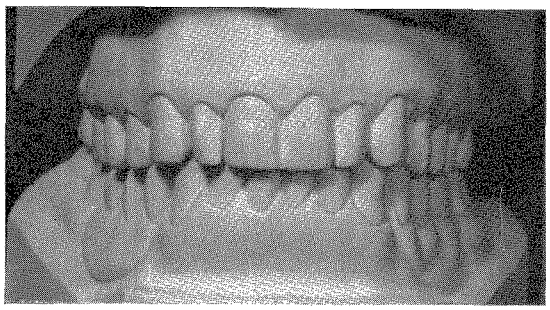

Fig. 665. Some closure had taken place by this time, but not a great deal. This is seven years posttreatment. (Courtesy Dr. Paul F. Titus, New York, N. Y.)

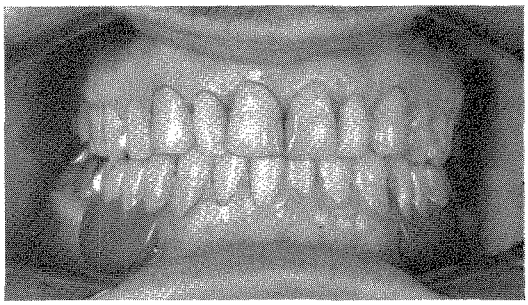

Fig. 666. The tone of the gums is good. (Courtesy Dr. Paul F. Titus, New York, N. Y.)

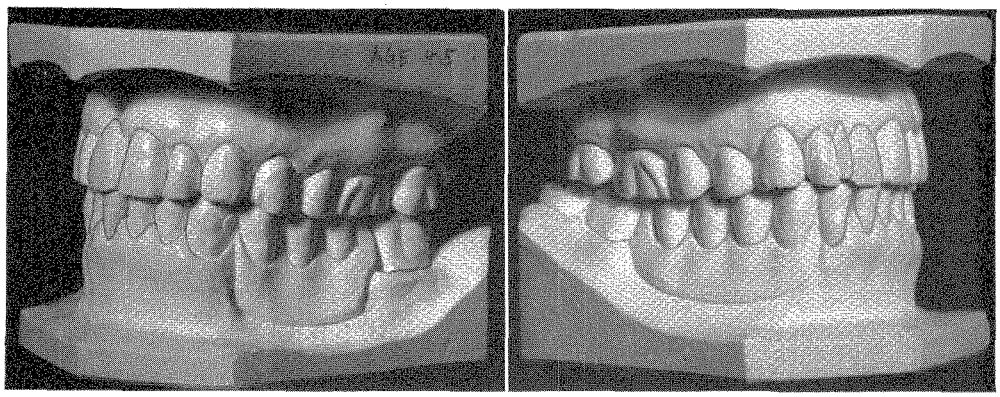

Fig. 667. Models of the case shown in Figs. 664 to 667, twenty years after completion. (Courtesy Dr. Paul F. Titus, New York, N. Y.)

years. There had been very little change in the vertical overbite. (Figs. 664 to 667.)

What probably took place was a combination of further eruption in the posterior areas plus some amount of depression in the incisor area. Although all the beneficial effect is not retained, still enough remains to make the practice of using the Hawley bite plate, or one similar to it, routine procedure with some orthodontists.

Cases 14 and 15

Two other cases were reported at the same time. One was treated by an orthodontist, the other by a periodontist. In both, the bite plate therapy was used in an effort to reduce the vertical component of the incisor overbite. Howes' (orthodontist) case in 1951 had been twenty years out of treatment, and Gratzinger's (periodontist) case had been seventeen years out of treatment. The unsatisfactory feature of both cases is that the patient was compelled to wear his bite plates for the rest of his life. Neglecting to do this would result in the teeth returning to their original positions even after all the years of retention.

Case 14—Howes' case report

"Male, age thirty-two, presented an excessive overbite and considerable crowding of the mandibular anterior teeth. The removal on the right side of an upper

second bicuspid allowed mesial migration of the three molars on that side. At the age of twenty, he had a traumatic accident, after which he had difficulty in mastication. The jaws tended to lock. The temporomandibular joint always cracked badly on opening. The diagnosis was as follows:

"1. The maxillary incisors were in supraversion (below their normal level of occlusion).

"2. The posterior teeth were in slight infraversion.

"3. If this were true the vertical dimension of the face would have to be increased to correct these conditions.

"In treatment, it was assumed that if the anterior teeth were moved to a more nearly functional relationship, the original forces which produced the deformity would no longer predominate. Extremely mild orthodontic force was used to accomplish the necessary movements. The maxillary central incisors were depressed and moved outward, and both upper and lower incisors were moved forward. At the end of nine months a removable vulcanite bite plate was placed in the maxillary arch to open the bite. The entire active treatment extended over a three-year period. Three new bite plates were used during the treatment. At the

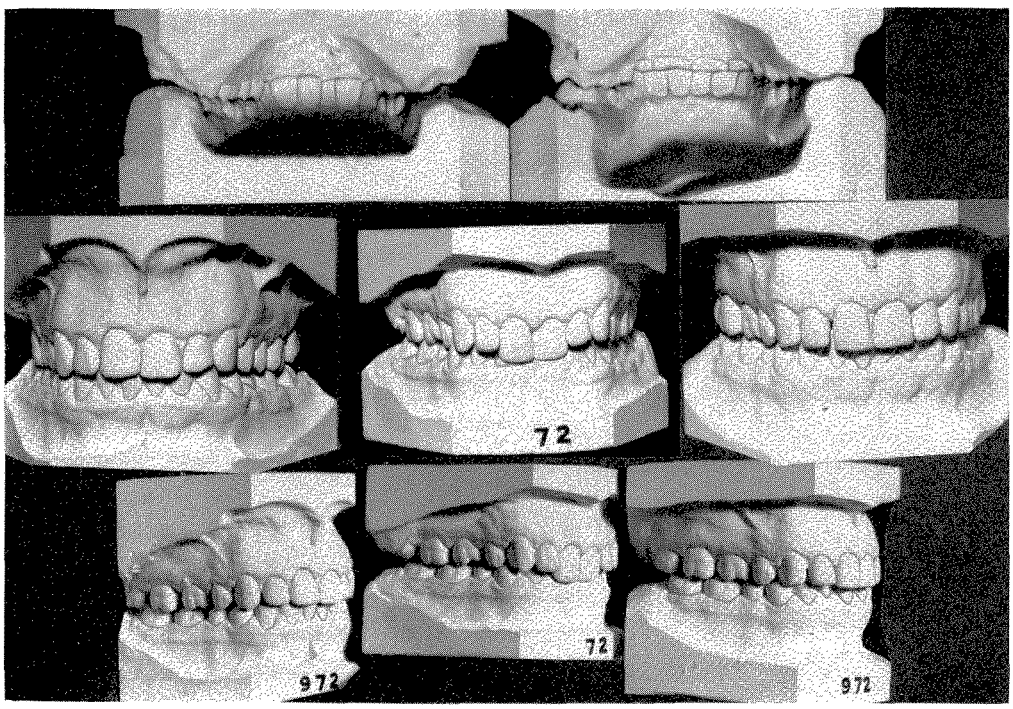

Fig. 668. Top row: Left side, lingual view looking from behind forward at the start of treatment. The lower incisors strike the lingual gum pad behind the upper incisors. Right side, the completed work. The upper incisors are now visible. **Middle row:** Center, models of the case at the start of treatment. The upper central incisors strike the labial gum pad, completely covering the lower incisors. Left side, models of the case at the end of treatment in 1939. The lower incisors are now visible. Right side, models of the case in 1950. There is not much visible change in the eleven years following the completion of the work. There is some spacing between the right lateral incisor and the cuspid. **Bottom row:** Right-side view of the models shown above. Observe the depression of the upper incisors. (Courtesy Dr. Ashley E. Howes, New York, N. Y.) (Figs. 668 to 671 are of the same case.)

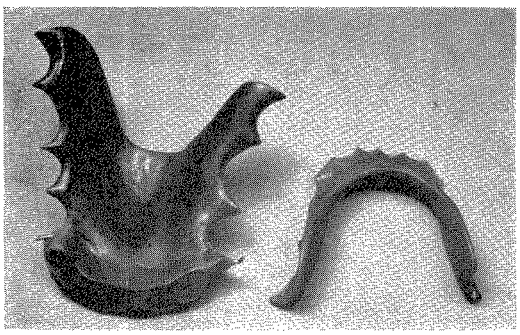

Fig. 669. These are the vulcanite bite plates which the patient has worn every night for twenty-three years (1962).

Fig. 670. Front, right side, and teeth apart views of patient whose case is shown in Figs. 668 and 669. The bite plates are not in the mouth. These photographs were taken in June, 1960.

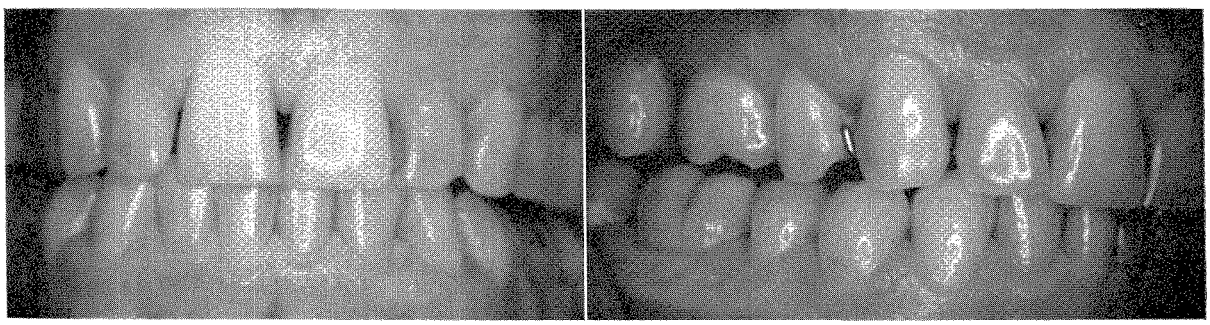

Fig. 671. The bite plates have been inserted. Front and right-side views showing amount of vertical increase. (Compare with Fig. 670.)

end of treatment, the jaw still cracked, although the patient said he was much more comfortable than before treatment."*†

I examined the patient in January, 1950, and again, in June, 1960. At the time of writing he was 53 years old. He wore the bite plate every night. In 1962 he had been wearing these bite plates for twenty-three years. (Figs. 668 to 671.)

Case 15—Gratzinger's case report

"A woman, 24 years of age, in good health, had been suffering from gingival irritation and progressive loosening of the four upper incisors for the past two years. The condition was diagnosed as periodontosis, and various treatments had been administered without evidence of success.

"Examination—The patient had a complete dentition. There was little formation of subgingival calculus in the molar region. Class I malocclusion was present. The upper and lower incisors, which were rotated, were crowded, and deep overbite with tight incisal contact was present. The cusps in the molar and bicuspid regions showed little wear. The gums did not show any acute symptoms of inflammation, but were lacking in firmness. Only in the upper incisor region were the gums slightly swollen, particularly around both central incisors, where pockets three millimeters deep at the labial side and five millimeters deep at the lingual side were found. The central incisors presented considerable mobility, and the lateral incisors showed little mobility. The roentgenograms revealed alveolar resorption around the central incisors, where the bone was reduced to almost a third of its original height. Light resorption of the alveolar crest was present in the molar region.

"This case represents the typical picture in which the 'physiological forward movement of the mandible is blocked by the deep overbite. The brunt of the force developed in this way is exerted against the upper incisor teeth,' since the lower incisors holding the inner line are in a much better position. Treatment—After treatment of all symptoms as outlined and the institution of proper mouth hygiene, the following treatment was introduced. Cusp interference in the molar and bicuspid regions was eliminated by selective grinding. In order to remove the dynamic irritation caused by the close contact of the upper and lower anterior teeth, a bite plane was constructed. The patient wore this appliance day and night, except during meals and during cleaning of the teeth, for a period of five months. Within this time, the molars and bicuspids elevated to such an extent that the bite was opened three millimeters in the incisor region. Consequently, the lateral forces which had caused the irritation of the supporting structures in this region were eliminated. After a five month period had elapsed, the patient was told to wear the appliance only at night.

"At the time when the proper relation in the anterior region was established, the condition of all teeth was greatly improved. Both upper lateral incisors were solidly in place, and the upper central incisors showed a slight degree of mo-

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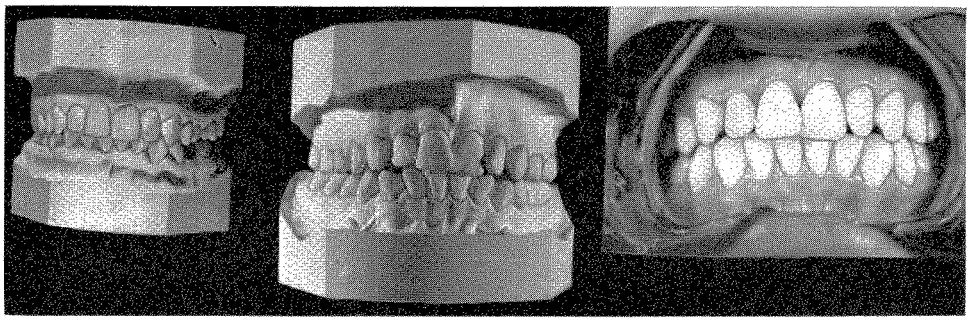
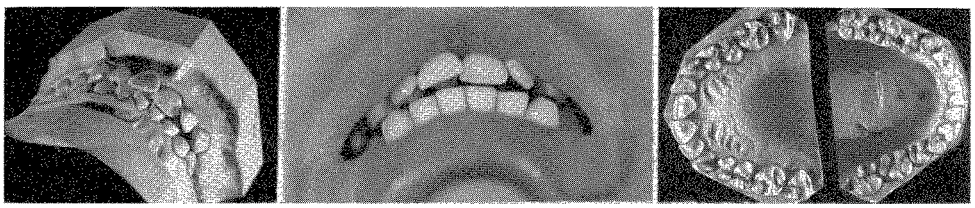
*Howes, A. E.: Altering the overbite, Am. J. Orthodont. **28**:173, 1942.

†Howes, A. E.: In Schweitzer, J. M.: Oral rehabilitation St. Louis, 1951, The C. V. Mosby Co., p. 846.



A B C

Fig. 672. **A,** Before treatment. **B,** One year after treatment was begun. **C,** Five years, eight months after treatment was begun. (From Gratzinger, M.: Dynamic irritation as a cause of periodontal disease and the means for its elimination, J.A.D.A. **37**:302, 1948.) (Figs. 672 to 676 are of the same case.)



A B C

Fig. 673. **A,** Incisal relation before treatment. **B,** Incisal relation five years, eight months after treatment was begun. **C,** Occlusal view before treatment. (From Gratzinger, M.: Dynamic irritation as a cause of periodontal disease and the means for its elimination, J.A.D.A. **37**:302, 1948.)

bility. Further treatment was restricted to regular scaling to remove a minimum amount of subgingival calculus that formed within six months in the molar and bicuspid regions. Full mouth roentgenograms were taken at intervals of eight to ten months.

"After five years and eight months of treatment, the gum tissues are firm and the surface shows well hornified epithelium. The extent of the bite opening is the same as it was five years ago. 'All teeth are firm with the exception of both central incisors, which are slightly mobile.' This mobility is much less than would be indicated by the roentgenographic findings. The patient has no complaints. Roentgenograms taken before treatment show that resorption was active in the alveolar bone in the upper incisor region and the roentgenograms most recently taken reveal that the alveolar bone in the same region is well consolidated and sharply outlined."*†

One can only conclude that the oral environment is unstable and the structures not in equilibrium. However, if therapy of this nature had not been resorted to, the dentitions may not have attained the degree of good health and function they now enjoy. (Figs. 672 to 676.)

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*Gratzinger, M.: Dynamic irritation as a cause of periodontal disease and the means for its elimination, J.A.D.A. **37**:302, 1948.

†Gratzinger, M.: In Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 847-850.

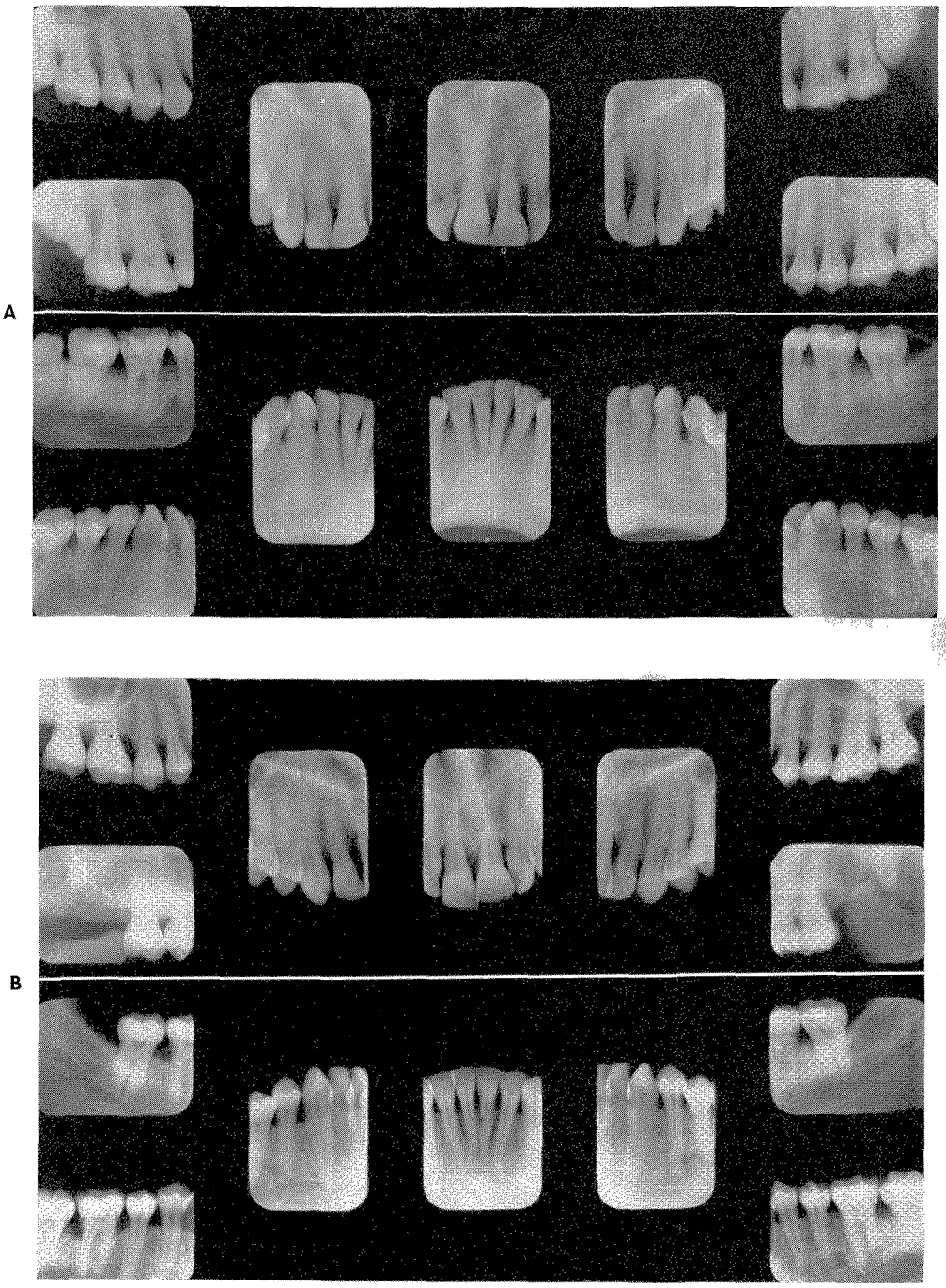


Fig. 674. **A,** Roentgenograms taken before treatment. **B,** Roentgenograms taken five years, eight months after treatment was begun. (From Gratzinger, M.: Dynamic irritation as a cause of periodontal disease and the means for its elimination, J.A.D.A. **37**:302, 1948.)

Fig. 675. Roentgenograms of the case reported in Figs. 672 to 674. These were taken in September, 1960. This is about seventeen years after treatment was instituted. (Courtesy Dr. Max Gratzinger, Chicago, Ill.)

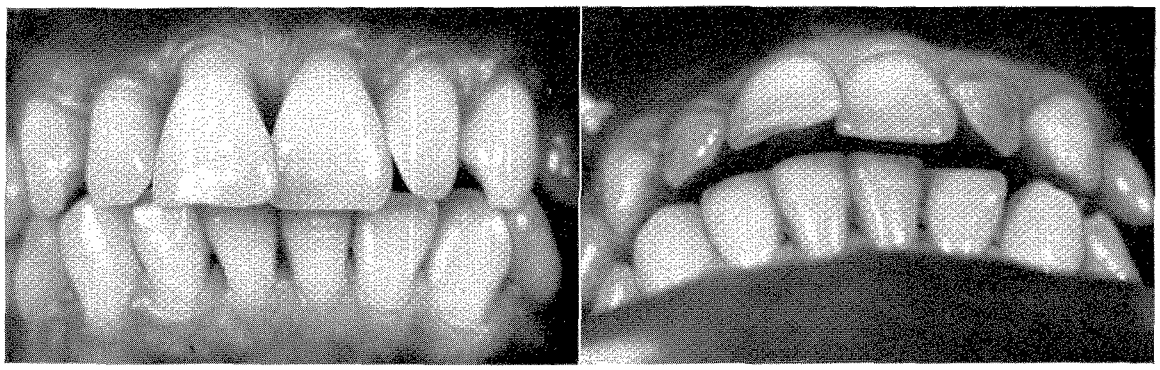


Fig. 676. The teeth of the patient whose teeth are shown in Figs. 672 to 675. These photographs were taken in 1960. (Courtesy Dr. Max Gratzinger, Chicago, Ill.)

RETENTION

Orthodontist, periodontist, and prosthodontist should strive for interocclusal and vertical stabilization without it being necessary for the patients to wear removable retainers for the duration of their lives. If appliances must be worn continually, the hard and soft tissues of the mouth are admittedly never in a condition of rest except by artificial bracing of the retainers. Malocclusions of this nature are difficult to evaluate and even harder to treat.

NECESSITY OF CAREFUL PLANNING

These cases should not be undertaken without careful planning. The outcome may be dangerous. Reports of successful results may be misleading, and they may beguile unwary and uncritical young dentists into undertaking similar cases. These often result in failure because of the inability of young dentists to select suitable cases and because of their lack of experience in executing them. As an example of an unsuccessful result, the following case is reported.

Case 16

A young woman had been treated since the early 1930's. She had a deep vertical overbite and evidence of poor periodontal structures even at an early age. In 1940 a functional bite plate was introduced as an experiment. As time went on the periodontal tissues became more aggravated. In 1946 she was referred to an orthodontist. He advised reducing the anterior overbite and inserted upper and lower acrylic bite plates to accomplish this. He believed that this would also stimulate the posterior teeth to elongate. This case was reported in 1951.* In one year's time the alveolar bone suffered severe breakdown, and several teeth had to be removed. It is hoped that more cases of this nature will be reported so that both sides of the story can be reviewed in proper perspective. (Figs. 677 to 687.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 821-824.

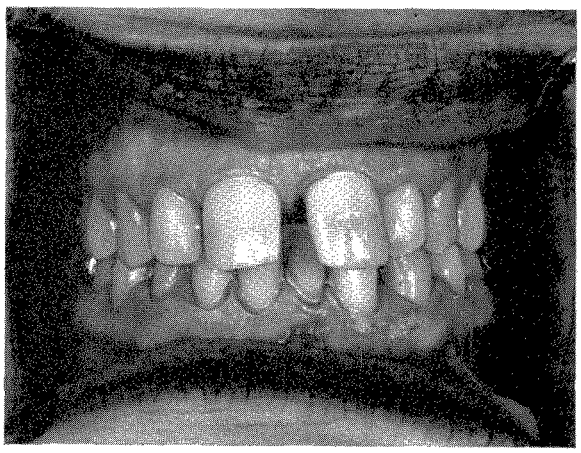


Fig. 677. Anterior view of the teeth of a woman in her thirties, with a deep overbite and periodontoclasia (March, 1946). (Figs. 677 to 687 are of the same case.)

Fig. 678. These acrylic bite plates covered the upper and lower six anterior teeth.

Fig. 679. Anterior and right-side views of the bite plates in position. The posterior teeth do not occlude and are given an opportunity to elongate (April, 1946).

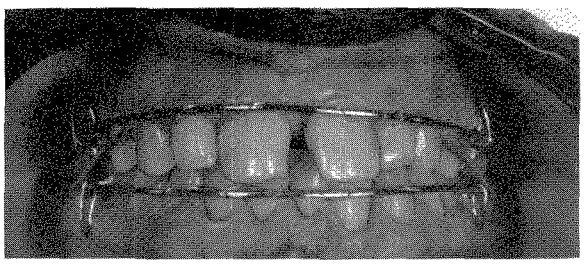
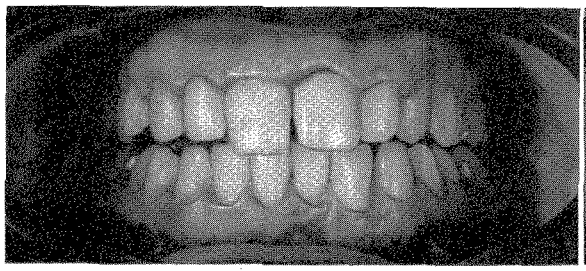


Fig. 680

Fig. 681



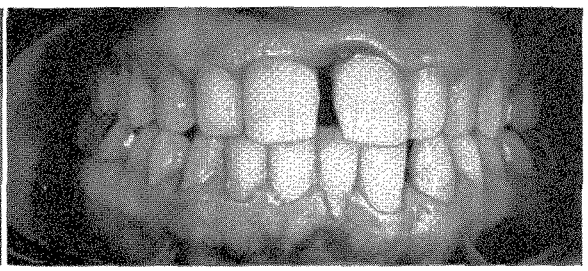
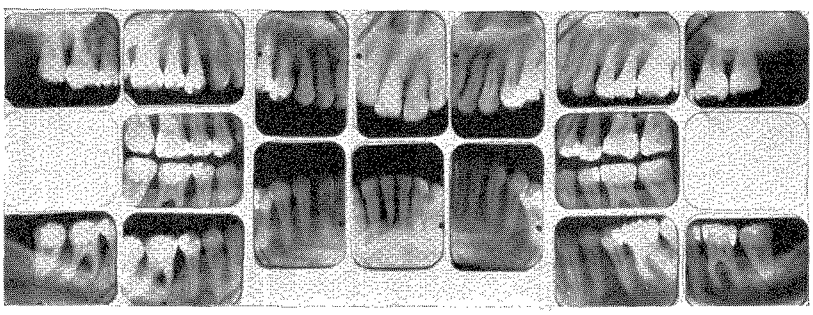


Fig. 682

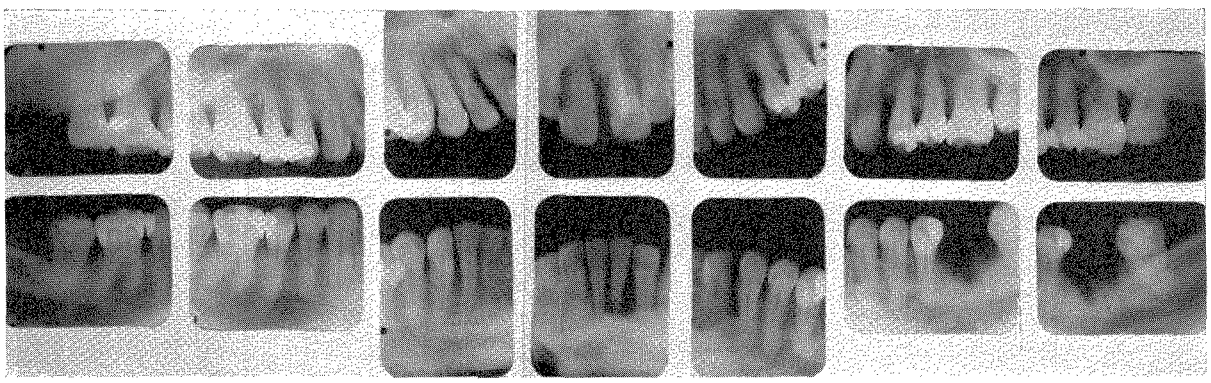
Fig. 680. The same mouth, six months later. Labial arch wires were inserted to close the anterior space quickly before the bite had a chance to close (October, 1946).

Fig. 681. Six months later, view shows the extent of the bite opening and the anterior space closed (April, 1947).

Fig. 682. Eight months later, view shows a return of the space between the two central incisors and a more severe periodontoclasia than before (December, 1947).



A



B

Fig. 683. A, Radiographs of the teeth and bone shown in Figs. 680 to 682 indicate a severe breakdown of several teeth (March, 1947.) Adult cases in which bite plates are to be used should be selected carefully. It is a radical and sudden change and does cause excessive strain upon the structures concerned. In this case periodontoclasia was present at the onset of treatment, and the bite plate seemed to aggravate it. **B,** Radiographs taken in November, 1948. The periodontal pathology is much further advanced.

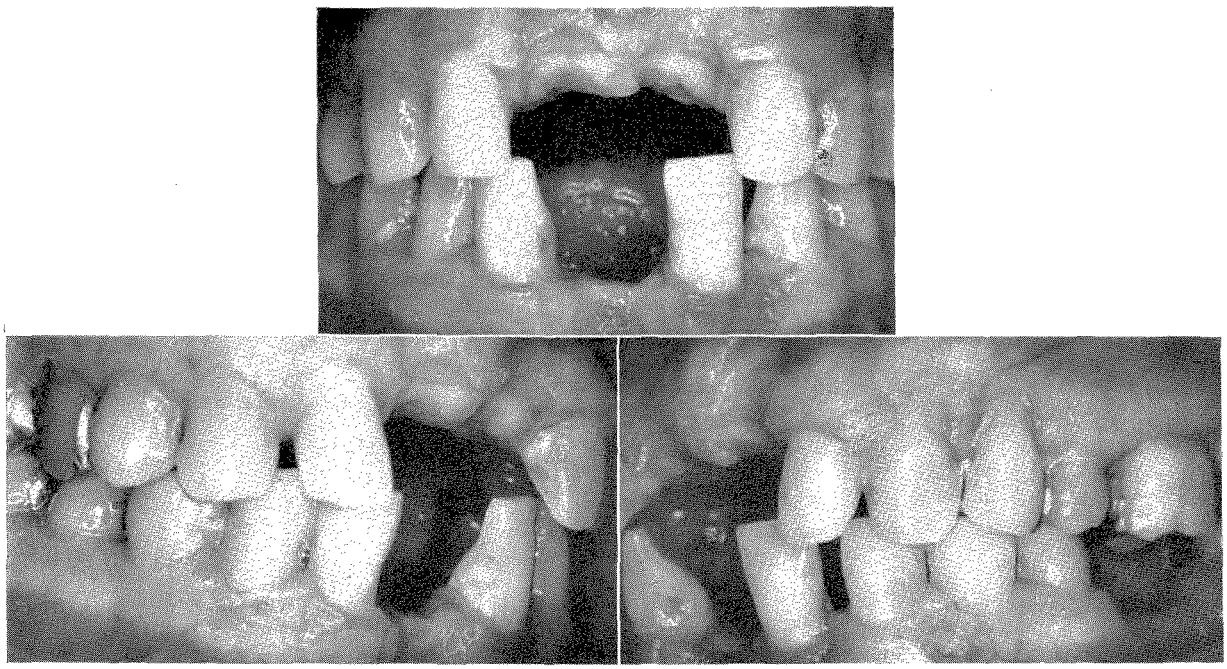


Fig. 684. The patient moved away and was not seen again for fifteen years. These photographs were taken in 1962 at the age of 55 years. Front, right, and left views of the teeth of the case shown in Figs. 677 to 683. Four incisors and one molar were lost in the interim between 1947 and 1962.

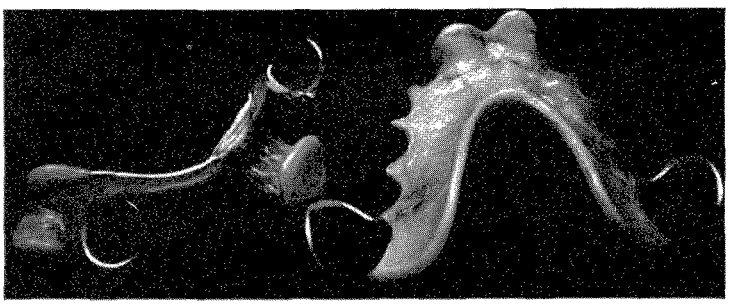


Fig. 685. These removable partial dentures had been worn for many years. They seemed totally inadequate, yet the structures do not show the further deterioration that was expected. These partial dentures are not well constructed, nor are they retentive. They do not stabilize the natural teeth.

Fig. 686. The mouth as it appears today with the removable partial dentures shown in Fig. 685 in place.

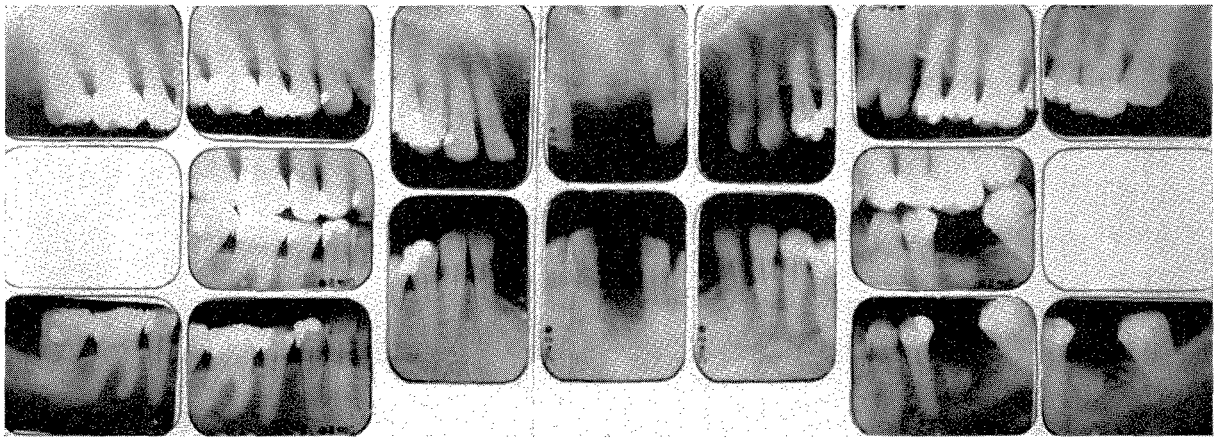


Fig. 687. Roentgenograms taken in 1962 at the age of 55.

RAISING THE BITE—RESTORING VERTICAL DIMENSION

Inasmuch as bite plate therapy is under discussion, the familiar phrase "raising the bite" will now be considered. A differentiation is made between "raising the bite" and "restoring the bite." Restoring the bite is considered to be a normal operation, whereas raising the bite is looked upon as being abnormal. With such a distinction in mind, a very broad field opens up for consideration. This includes vertical dimension, centric relation, static and dynamic occlusion, muscular tonicity, the temporomandibular joint, and a great many other interrelated subjects that are both complicated and difficult to separate. In the book *Oral rehabilitation*, several hundred pages were devoted to these subjects and their ramifications.*

VERTICAL DIMENSION

Many individuals are extremely sensitive to any changes in their vertical dimension. To tamper with their bite height can be a difficult and decidedly dangerous procedure.

REGARDING FUNCTIONAL BITE PLATES

Case 17

There was a period around the 1940's when bites were being indiscriminately raised by means of onlays attached to a lower lingual bar and placed over the lower posterior teeth. They were also called functional splints and bite-raising appliances. A middle-aged physician who had been wearing such an appliance was examined in May, 1945. There had been no attempt at any coordination of his occlusion. His dynamic articulation and static occlusion were equally traumatic to his oral tissues. Splints of this type are insidious destroyers of the teeth and

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co.

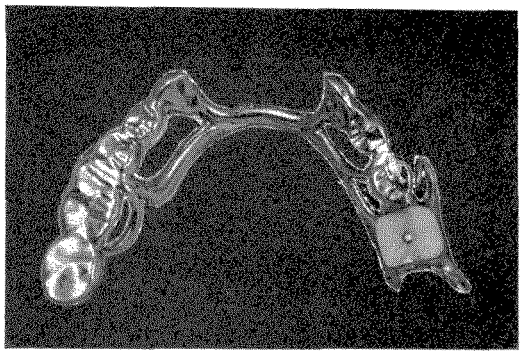


Fig. 688. A so-called functional splint which was used to open the bite in a man. This was made of stainless steel. (Figs. 688 and 689 are of the same case.)

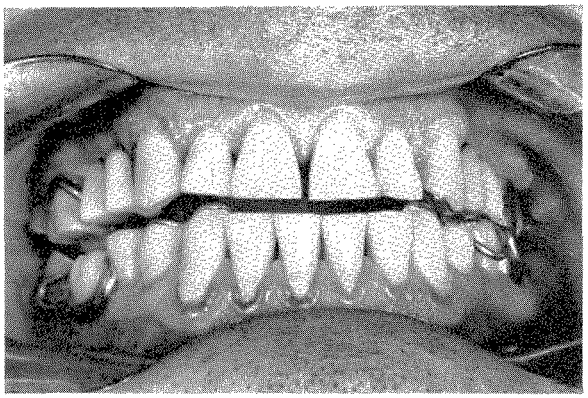


Fig. 689. The splint shown in Fig. 688 is shown here in the mouth. There had been very little attempt to coordinate the occlusion. Splints of this type are undesirable and can do a great deal of harm.

should be regarded with great distrust. Although there are occasions in which they have been successful, the great number of failures caused by their use are rarely reported. (Figs. 688 and 689.)

Case 18

The use of a functional splint of a similar nature was reported in 1951.* A middle-aged woman who had an original deep vertical overbite was treated for this so-called malocclusion by the introduction of a functional splint. The immediate effect was to raise the bite only on the posterior teeth and to remove the anterior teeth from their original contact. Three weeks after the appliance was inserted, a closing of the anterior vertical overbite was observed. The patient had become adjusted to the splint and wore it with comfort. The realization came quickly that if this bite raiser remained in position for several months the anterior vertical overbite would revert back to the original bite, with the resulting depression of the posterior teeth or the elevation of the anterior teeth and/or a combination of both. The functional splint was discarded.

The patient, in her late sixties at the time of writing, still enjoyed good function. Her oral structures were healthy and strong. The continued wearing of the "functional splint" would have caused a deterioration of the entire stomatological system. (Figs. 690 to 695.)

Case 19

In 1943 a 21-year-old woman came for consultation. A deep anterior vertical overbite was present. According to her history report, a dentist raised her bite by placing gold inlays on several of her lower posterior teeth one year previously. Her anterior teeth had been taken out of contact to the extent of the thickness of the posterior gold inlays. Within one year these teeth again made contact. The posterior teeth had been intruded one fourth of an inch whereas the anterior teeth

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 1048-1054.

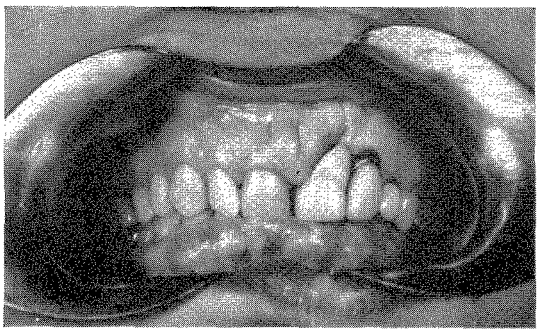


Fig. 690. Patient with a deep anterior vertical overbite. A lower functional bite splint was constructed for this patient. (Figs. 690 to 695 are of the same case.)

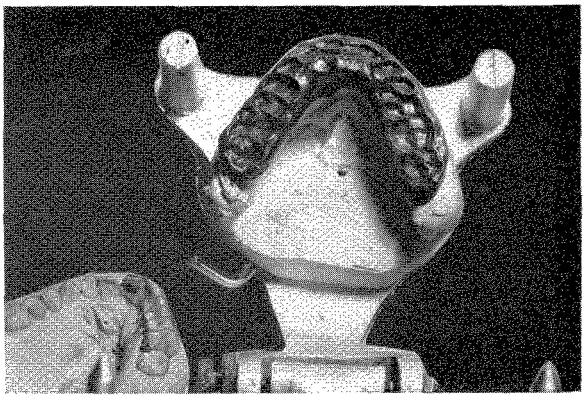


Fig. 691. This is the functional bite which was taken in the mouth. It had been removed from the mouth and transferred to the lower cast.

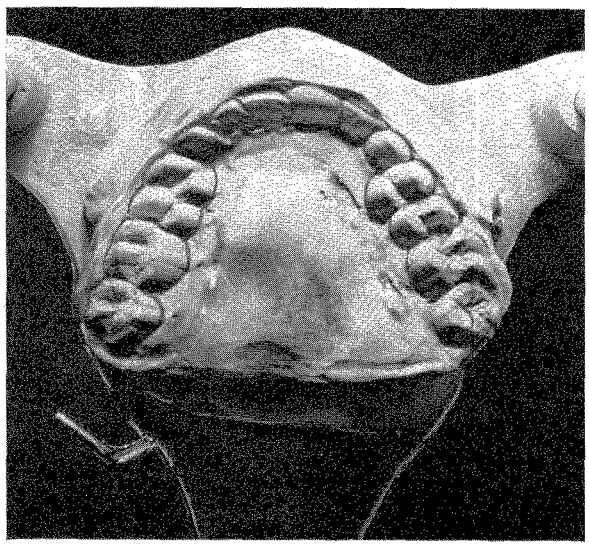


Fig. 692. The functional counterbite is shown here. In it are incorporated all the centric and excentric bites of the particular patient for whom it had been made.

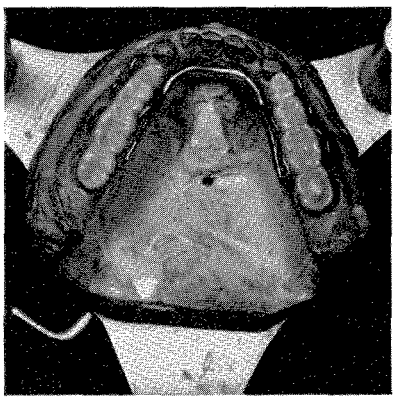


Fig. 693. This is the completed lower acrylic functional splint shown on the lower cast.

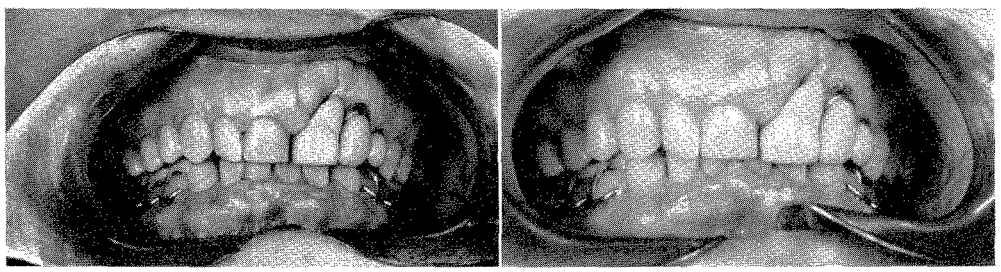


Fig. 694. **A,** The splint had been inserted into the mouth. Here it is shown in its centric position. Compare this with Fig. 690 to see the amount of the opening. **B,** Within three weeks, the bite had closed to the position shown in this photograph. Compare it with **A.** This was done in the early 1940's.

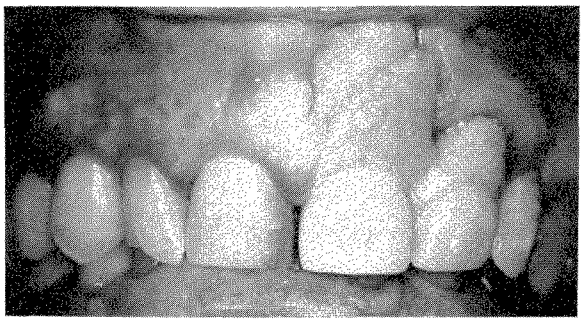


Fig. 695. The mouth of the patient shown in Figs. 690 to 694. This photograph was taken in 1962. Only the upper left bridge had been changed. The structures are healthy.

had extruded, or a combination of both may have taken place. Although this patient had not been teated, her case was hard to forget. It was reported in 1951.*

Discussion

There can be little doubt that this young woman presented a small free-way space which had been flagrantly violated. To open a bite only by using inlays on six lower posterior teeth, leaving entirely out of contact twelve anterior teeth that had previously contacted, was to invite trouble. She remarked that her dentist was only experimenting. Unfortunately, the experiment was rapidly destroying her teeth. This case resembles that in which the lower removable functional splint was used. However, here, fixed gold inlays took the place of the removable prosthesis. (Figs. 696 and 697.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 828-829.

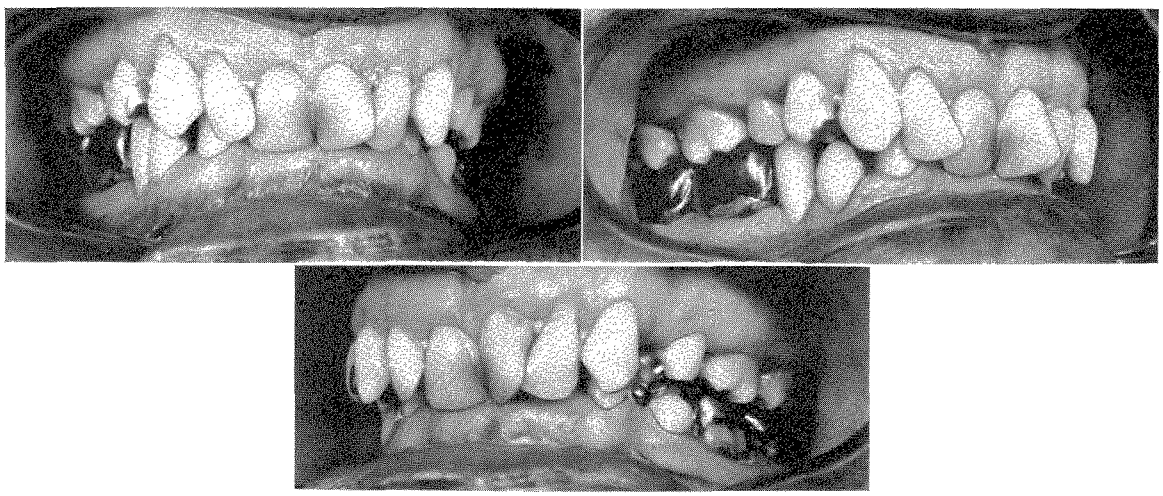


Fig. 696. Front, right, and left views of the mouth of a 21-year-old woman whose bite had been raised, one year previous to the time these photographs were taken, by means of gold inlays in the six lower posterior teeth. The bite was opened considerably, but it collapsed within one year. When the bite was opened, she could not contact her anterior teeth. The deep overbite is again manifest in these illustrations. (Figs. 696 and 697 are of the same case.)

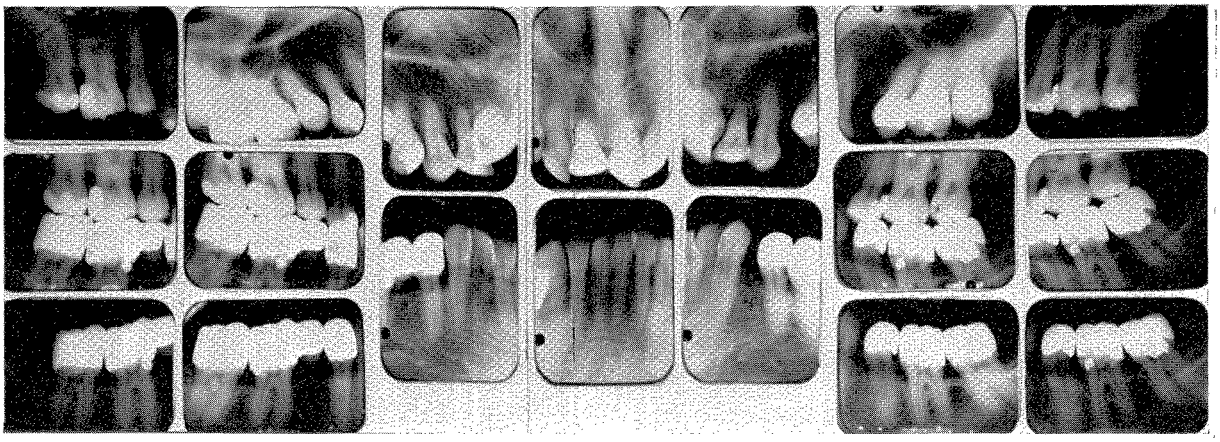


Fig. 697. Roentgenograms of the case shown in Fig. 696 showing the teeth and structures one year after the introduction of the lower prosthesis.

Case 20

This patient, a 33-year-old woman, presented herself for consultation in 1954. Contrary to what one would expect, she had a long face but a very short interocclusal dimension and a small free-way space. She was wearing a functional bite plate, the typical lower lingual bar with attached inlays of metal. These covered her lower posterior teeth. This removable appliance had been inserted at the age of 16 to correct her deep vertical overbite and overjet and had been worn ever since. When I saw her it had been worn for fourteen years. According to her history, she started orthodontic treatment in Europe at the age of 12. This was completed in 1939 at the age of 16. In 1940 the bite plate was inserted. She had no temporomandibular symptoms. There was a very small free-way space (1 mm.). In closure the mandible moved upward and backward.

The clinical picture was similar to the cases previously presented. With the

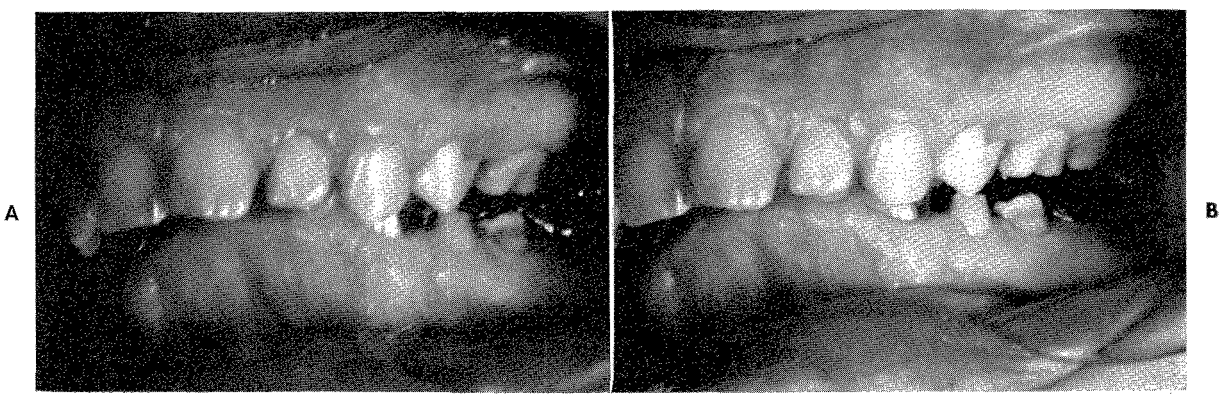


Fig. 698. A 33-year-old woman with deep vertical and horizontal overbites. In **A** the functional bite plate covers her lower left posterior teeth. This was inserted fourteen years previously and worn ever since. The posterior teeth had been depressed, and the original anterior deep overbite is again present. **B,** The posterior bite plate was removed to show the space between the upper and lower teeth due to the intrusion of the teeth. The same condition is present on the right side. (Figs. 698 to 700 are of the same case.)

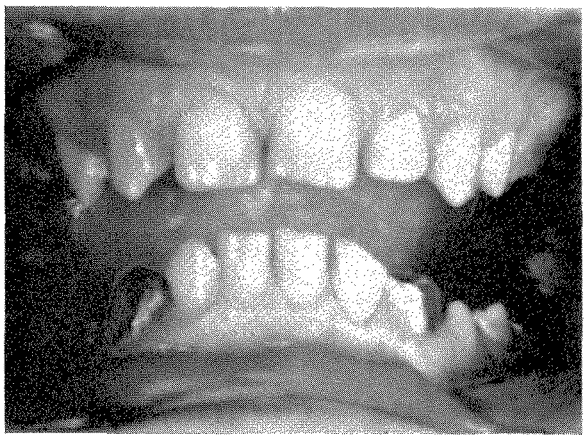


Fig. 699. The teeth were separated to show the extent of the vertical overbite.

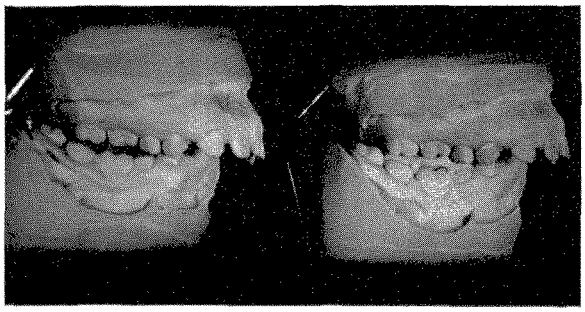


Fig. 700. Casts of the teeth shown in Figs. 698 and 699 to show the bite plate in place on the right casts and removed on the left casts. The lower teeth contact the lingual gum pad about one half inch behind the upper incisors.

prosthesis removed, the posterior teeth were depressed below the plane of occlusion to a degree equivalent to the thickness of the inlays minus the amount of elevation of the anterior teeth. To actually demonstrate the amount of depression, casts were made with and without the appliance. With the lingual bar removed, the anteroposterior occlusal curve, viewed from a sagittal projection, was extremely steep. This patient moved out of the state and was last examined in December, 1954. Her roentgenograms disclosed faulty operative dentistry, but the osseous structures were normal. (Figs. 698 to 700.)

DEPRESSION AND ELEVATION OF TEETH

Case 21

Much can be learned by mistakes. If teeth are able to be depressed and alveolar bone resorbed by excessive continuous pressure and by infringing upon the freeway space, then why not use it advantageously instead of otherwise. This has been done, and the case was reported eleven years ago.* There was insufficient vertical height in the lower right posterior area. Three molars were absent, and a lower lingual bar was needed to restore function.

Treatment

A treatment lingual bar was constructed. It had a plain acrylic saddle with a flat biting surface contacting the upper right posterior teeth. The saddle was excessively high. By its continual wear, excluding mealtimes, the necessary vertical height was gained in two months. The final lingual bar was then constructed. It has been in constant use since the previous report. The vertical height gained was probably the result of the resorption of the lower soft and hard tis-

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 829-831.

Text continued on p. 325.

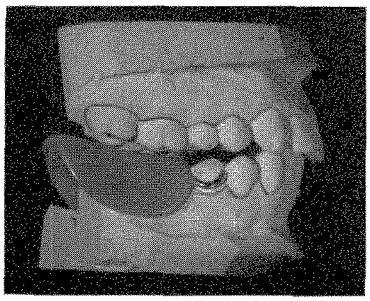


Fig. 701. Right-side view of the models of the teeth of a 40-year-old woman. The space for the replaced molars was too short vertically to replace them. A bite plate was made in the form of a lingual bar with an acrylic saddle which was supported by the right second bicuspid and the left second bicuspid and molar. The occlusal surface of the right saddle was flat and engaged only the upper two molars. The rest of the teeth were not in contact. This bite plate was worn at night and during the day, if possible, but not during meals. (Figs. 701 to 707 are of the same case.)

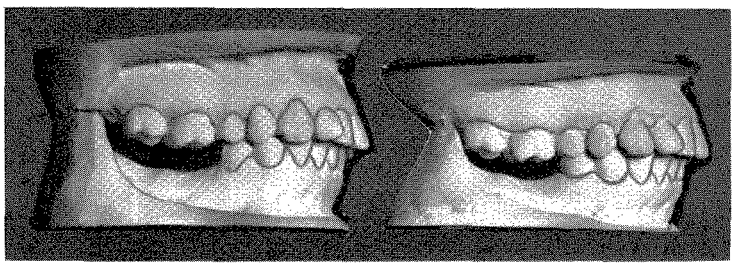


Fig. 702. In two months' time the amount of tooth and tissue depression is indicated in these two models at the start (right) and two months later (left).

Fig. 703

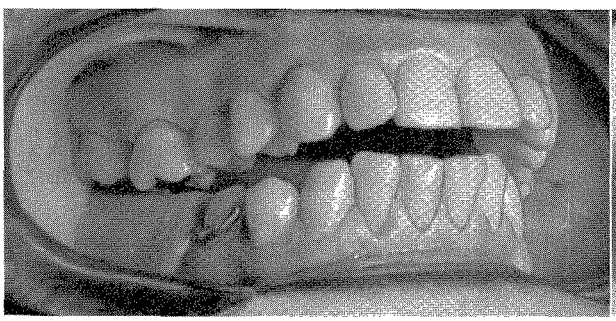


Fig. 704

Fig. 703. Here the lingual bar is shown in the mouth only contacting the upper right molars. By sloping its surface the direction of the molars can be guided.

Fig. 704. A lower precision removable partial denture was then inserted. The upper molars did not have to be ground back.

Fig. 705. Radiographs of the mouth two years after the completion of the work.

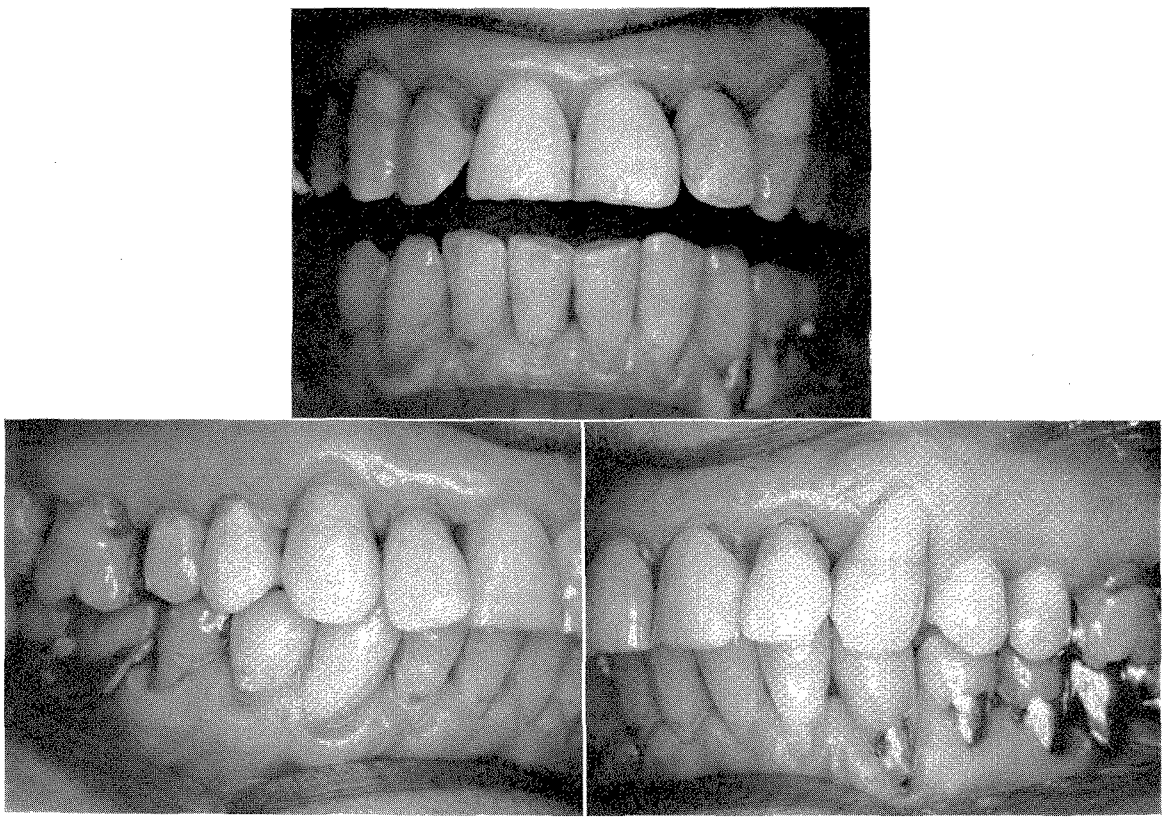


Fig. 706. Front, right, and left views of the patient whose case is shown in Figs. 701 to 705. The photographs shown here were taken in 1962. This is fifteen years after treatment was concluded.

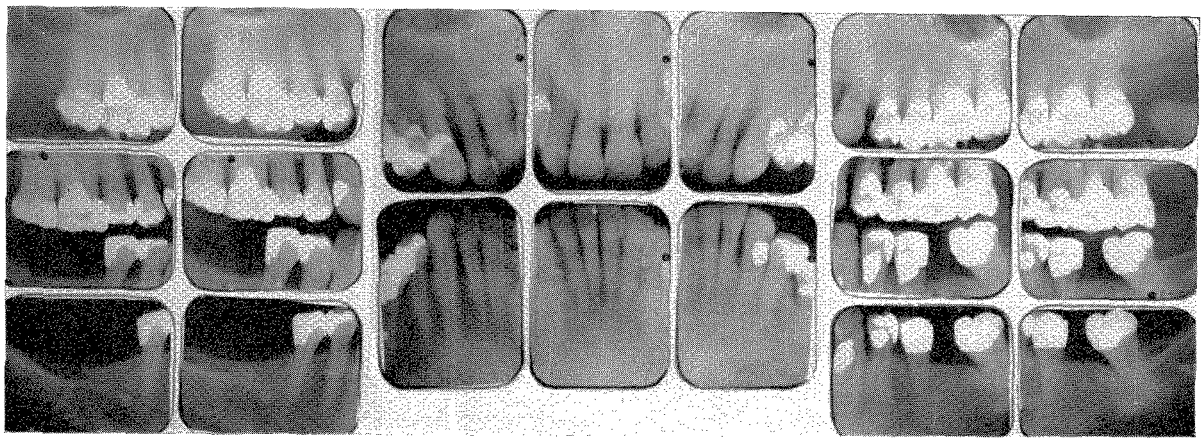


Fig. 707. Roentgenograms taken in 1962. The alveolar and basal bone structures are in excellent condition. The large amount of caries manifest in these radiographs is due to the excessive use of lozenges. The patient continually sucked those tablets to counteract a dry mouth. This in turn was due to medication to combat a neurosis. This has been explained elsewhere in this text (Case 6, pp. 636 to 639, and Case 11, pp. 660 to 667).

sues, as well as the depression of the upper teeth. Although this treatment cannot be recommended as having unlimited application, it was effective in this case and may be considered as an additional method of treatment. (Figs. 701 to 707.)

Discussion

The cases in which functional splints or bite-raising appliances have been inserted on the lower posterior teeth, leaving the anterior teeth out of contact, provide the operator with invaluable information. First, splints of this type should be used only in exceptional cases. In a few years most of them cause rapid disorganization of the occlusion. Long experience teaches us that deep overbites in adults should not be disturbed unless the teeth show signs of deterioration. These occlusions should not be altered without sound justification. The assumption that something will happen in the future is not valid. Too many deep bites have been observed in individuals of middle and old age whose oral tissues remained functionally and structurally excellent. Several of these were already reviewed in this text.

Case 22

The second lesson to be learned is concerned with the treatment of those patients who have been placed in unfortunate positions after incorrect therapy had already been attempted. In October, 1950, a 33-year-old woman presented herself for consultation. Her bite had been raised previously by means of two lower temporary acrylic posterior splints. These were removable, but they were not attached to a lingual bar. This work was inserted in 1948 when she was 30 years old. Fortunately, the original casts had not been destroyed. By placing the acrylic bite-raising splints upon these casts, the extent of the vertical increase was able to be measured. These acrylic splints were worn for one month. According

to the history related by the patient, they were then replaced by a metal removable lingual bar with previously described posterior onlays.

The patient stated that her dentist left town and that she had not received treatment for two years. When she was examined in 1950, the removable functional splint was still being worn. However, her anterior upper and lower teeth were again in contact. By removing the lingual bar, it was observed that the posterior teeth had been depressed the thickness of the splint on both right and left sides minus the elevation of the anterior teeth. This depression and elevation had probably affected both upper and lower teeth. By comparing the new casts with the original, it was clearly discernible that her anterior teeth were now almost in the same position that they occupied before treatment and that her posterior teeth had been intruded until the muscles attained their original origin and insertion distances.

Discussion

Not having the roentgenograms previous to the original work, it is unfair to state whether or not bone loss accompanied the intrusion of the teeth. This patient was unable to remain in New York. A method of treatment was suggested which will be discussed after the report. She returned to her former home in November of 1950 and consulted two other dentists. One of them wrote the following about her case to the referring dentist:

"If the case were reconstructed and the vertical dimension increased in order to free the elongated anterior teeth out of a locked centric occlusion, the same thing would happen as before; that is, further depressing of the molars and bicuspids. Inasmuch as it is not desirable to increase the vertical dimension, then nothing would be gained by the reconstruction. Mr. and Mrs._____ asked my opinion about replacing the upper right molar. I explained, naturally, that it would be desirable to replace this tooth, but in view of the fact that it is not going to be too long before she will have to have full dentures, I doubt if the service and the expense would be justified.

"If she continues to have bone loss, I suggested that she have her teeth removed and dentures made. Due to the physical discomfort and the expense of reconstruction, I believe that the removal of teeth and dentures would be justified. Any compromise that I see is the necessary repair work and treatment of her gums in order to minimize the absorption from infection."

These recommendations, namely, to have all the teeth removed and full dentures inserted, seemed very drastic and unwarranted. Here was a young woman who suffered irreparable damage simply because someone unwisely decided to increase her vertical dimension.

METHODS OF CORRECTING FAULTY THERAPY

The method of treatment should be a reversal of the causative factors providing that the teeth had not been depressed for too long a period. In the case just reported, an attempt could have been made to permit the depressed teeth to extrude by removing a single onlay from the rear end of the removable splint. In this manner, the tooth it covered would be permitted to erupt to its original position. Theo-

retically it should continue to erupt until it reached the opposing upper tooth, after which each adjoining onlay would be removed, one by one, gradually permitting the remaining posterior teeth to contact. Finally, the removable splint could be discarded. Although there has been no opportunity to put this remedy into practice, there is every reason to believe that it would be successful providing the intrusion was of short duration.

Following the method just discussed, the vertical height and the degree of the anterior overbite would not be altered. If this prescription could not be followed, then the posterior occlusion could be rebuilt to its former level by means of gold inlays, full crowns, and fixed or removable partial dentures. In this latter method, the posterior vertical height should be divided equally between the upper and lower teeth so that neither have disproportionate crown-to-root lengths. The anterior teeth may be covered by some form of esthetic jacket crowns. The excessive vertical overbite may be decreased by shortening these jackets. To again raise the bite in order to reduce the anterior overlap invites further collapse of the anterior and posterior teeth.

It was fortunate in this case that the patient was again contacted in 1961. In 1950 she was missing four teeth. She had now lost eleven teeth and had a serious illness. Her present dentist placed fixed restorations on her mandibular teeth to build up the intruded bicuspids and molars when the removable functional splint was discarded. He also inserted an upper removable partial denture, with no vertical occlusal stops, to replace the upper missing teeth. Owing to her serious illness, which had included major surgery, her dental restorations had been somewhat neglected. (Figs. 708 to 714.)

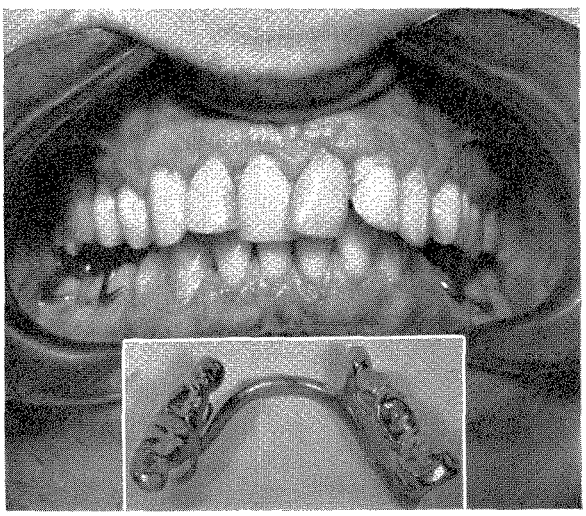


Fig. 708. Front views of the teeth of a 33-year-old woman as she presented herself in 1950. The bite plate which is shown in the inset was being worn. This had been inserted slightly over a year previous to this photograph. (Figs. 708 to 714 are of the same case.)

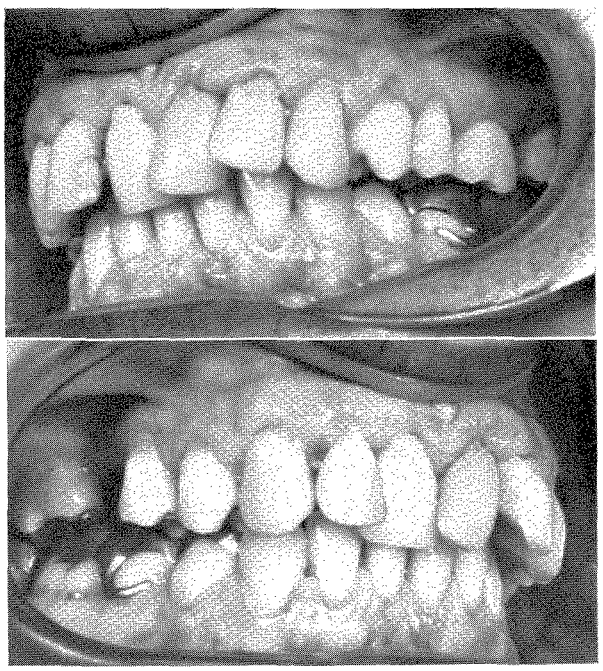


Fig. 709. Left and right views of the mouth of the patient shown in Fig. 708. The lower bite plate is in place.

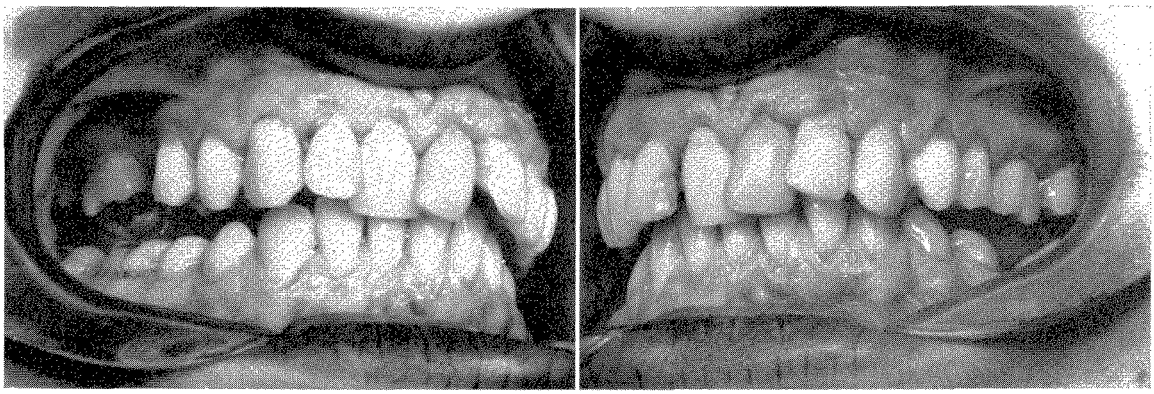


Fig. 710. Right and left views with the bite plate removed showing the amount of depression of the posterior teeth.

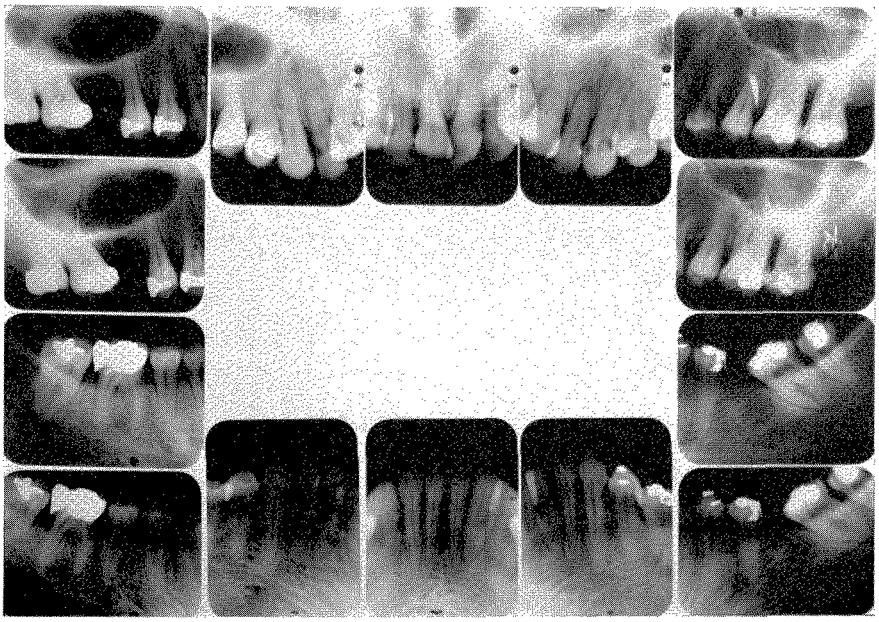


Fig. 711. Roentgenograms taken in 1950. These were taken two years after the bite plate was inserted.

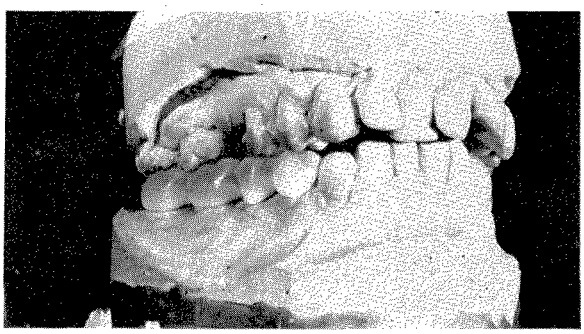


Fig. 712. The original casts with the first acrylic splint in place. This was inserted in 1948 and shows the extent to which the bite was raised at that time.

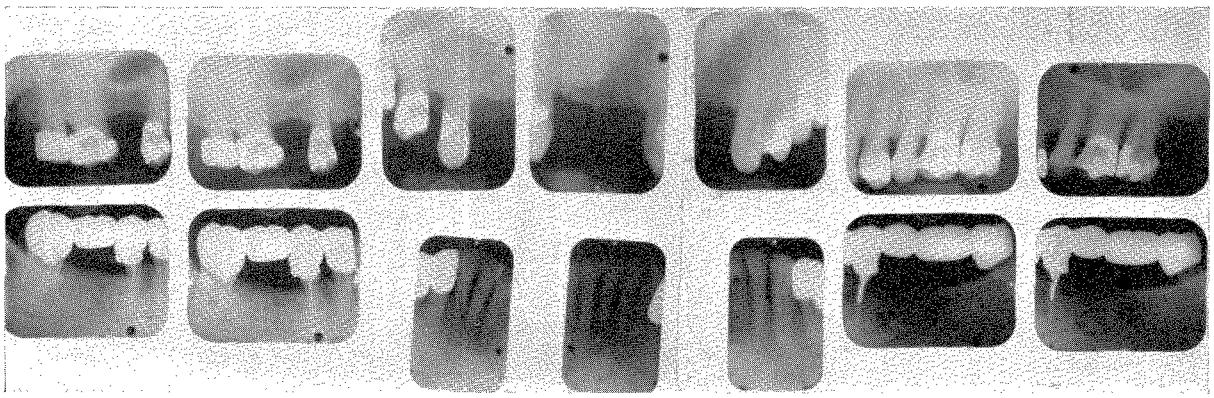


Fig. 713. Roentgenograms taken in 1961 showing the loss of eleven teeth. In 1950 she was missing only four teeth. The patient, at the time of writing, was 46 years old.

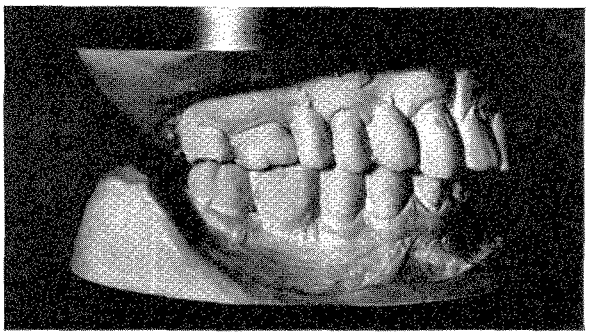


Fig. 714. These casts were made in October, 1961. The lower removable splint was removed several years previously, and the depressed teeth were built up to establish occlusion.

DIFFERENCES IN INCREASING VERTICAL DIMENSION BETWEEN DENTULOUS AND EDENTULOUS CASES

In edentulous cases, when the vertical dimension is increased, only the soft tissues and alveolar bone are involved. Therefore, if the bite has been raised and the free-way space encroached upon, these tissues are more readily resorbed until a correct free-way space has again been established.

The statement was made regarding the violation of the free-way space in the preceding paragraph, that in cases in which the bite has closed and the interocclusal relationship has been distorted, it becomes necessary in the treatment planning and subsequent final restorations to infringe upon the free-way space in order to restore some degree of occlusal coordination. When dealing with a full denture, this increase of the habitual vertical dimension, although nonphysiological, is more readily acceptable. The reason given for this was the absorption of soft tissue and alveolar bone which took place in the process of the adjustment which the tissues make in response to this noxious stimulus. However, where natural teeth are present, this adjustment is necessarily made more difficult because of the resistance which these teeth offer to intrusion and supporting tissue resorption.

Case 23

The case which will now be presented is that of a middle-aged woman with completely broken-down oral structures. It took at least fifteen years for this deterioration to take place. Many teeth had already been lost, and those that remained had migrated and rotated. Caries also had taken its toll. The anterior teeth were fanned out. The vertical and horizontal overbites were extreme. The upper tuberosities touched the lower posterior ridges. Although there was no vertical room for the replacement of teeth, the face was long, and the free-way space was very small.

Treatment

These cases, on first sight, appear as though their solution is not possible, if conventional theories relative to the inviolability of the free-way space are to be accepted and respected. Briefly, the outline of treatment took the following form:

1. The tuberosities were removed surgically to permit sufficient room for the thickness of a denture base. An immediate denture base was inserted to prevent any proliferation of the soft tissues during the healing.
2. The lower teeth were shortened as much as possible.
3. When the immediate upper and the transitional lower prostheses were inserted, the vertical dimension was increased an amount which made it possible to insert upper and lower posterior teeth. Even though these teeth were very short, the free-way space was definitely infringed upon. The patient was made aware of the problem, and her cooperation was invited. This was given readily, and her understanding of her problem made the work less difficult. Temporomandibular joint roentgenograms were taken before and after the raising of the vertical dimension to make sure that the condyles still remained in the mandibular fossa.
4. The transitional work was worn for several months to permit the tissue to adjust to the new bite level. This adjustment took place in several different ways. There was tissue reaction in the form of resorption. This affected both hard and soft tissues. There was a neuromuscular reaction. This was manifest in the patient's desire to look better. The transitional prosthesis provided for excellent esthetics and gave the patient an incentive to cooperate fully in solving this problem. Adjustments were necessary, and a sympathetic understanding on the part of the dentist helps considerably during this critical period.
5. Once the interocclusal relationship had been stabilized at a definite level, the final work was constructed using a conventional technique.

VARIATION IN RESPONSE TO TREATMENT

It is unfair to state that all patients will respond favorably to problems of this nature. The intelligent operator will consider each patient on his own merits and will treat him accordingly. Group normals are often useless, and individual normals must be resorted to, but the challenge of solving this type of problem case must and is being met by our profession. Actually, the free-way space is only temporarily violated. The final result is an adjustment which includes sufficient tissue, bone, muscle, and neural reactions to again establish a functional free-way space which is physiological, but by this time the important room necessary to insert teeth has been obtained. (Figs. 715 to 730.)

Text continued on p. 335.

Fig. 715. Anterior, right, and left views of a middle-aged woman with a mutilated occlusion and a severely closed bite. The extreme vertical and horizontal overbites may be seen. Periodontal disease is very evident. (Figs. 715 to 730 are of the same case.)

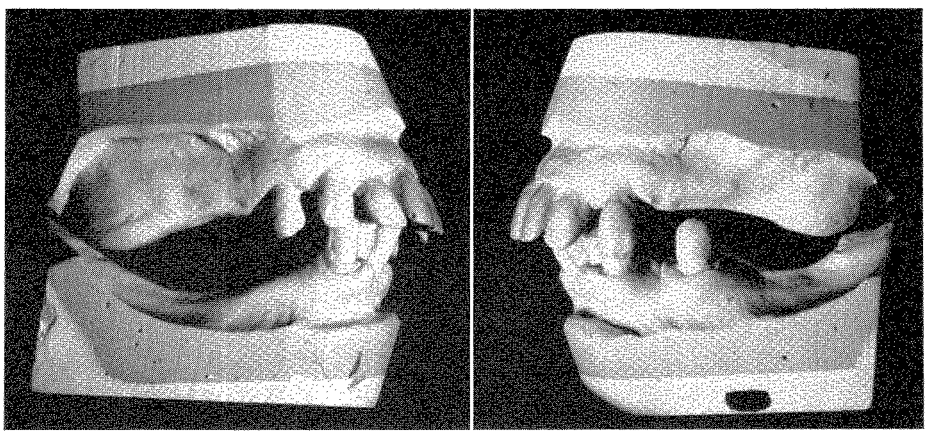


Fig. 716. These photographs were taken in 1958. The study casts demonstrate the extreme closure of the bite.

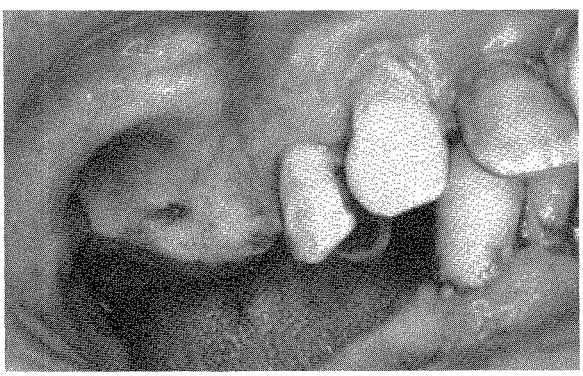


Fig. 717. The right and left tuberosities were treated surgically by removing the dense fibrous tissue and some bone in order to obtain room for the thickness of a plastic denture base. The right side is shown here after the fibrous tissue covering the tuberosity had been removed.

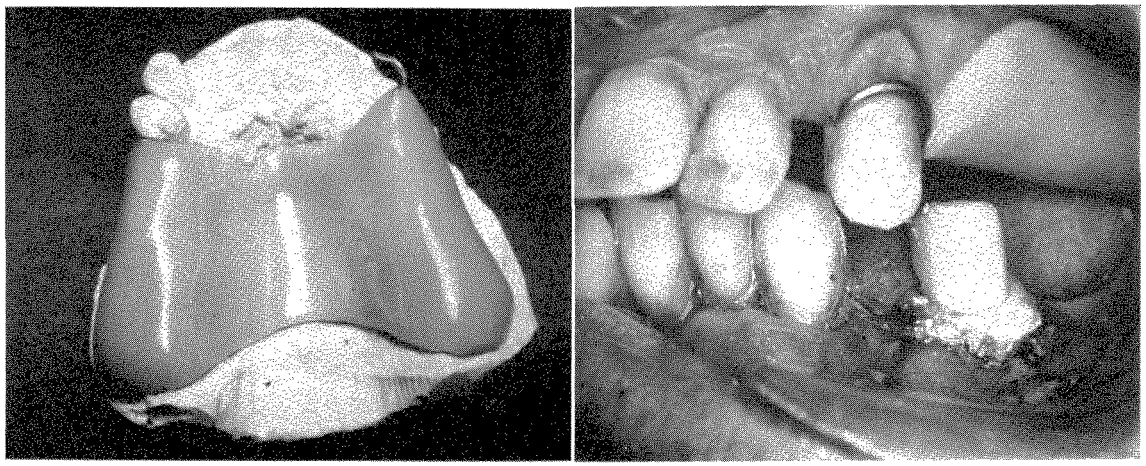


Fig. 718. A, A base of acrylic resin was made to cover these operated areas and to prevent the tissue from proliferating until healing took place. It is shown in place in **B** on the left side. The lower bicuspid had its gum resected and its vertical length reduced as much as possible without devitalization. These are two methods of obtaining vertical room. See bottom photograph in Figs. 715 and 716 to observe closeness of the bite on this side before treatment was begun.

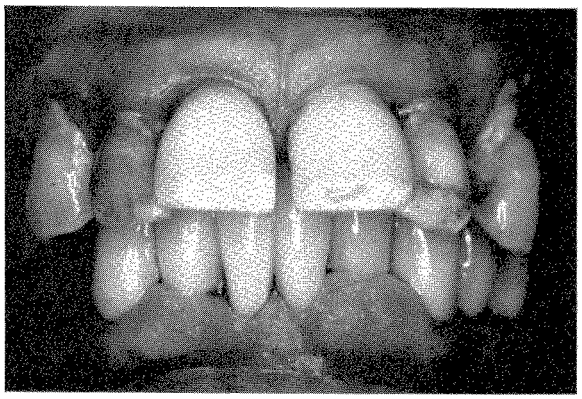


Fig. 719. An eight-unit lower plastic splint was first made. This opened the bite to some degree. Then, impressions were taken and a posterior occlusion worked out which again opened the bite and provided some semblance of balance.

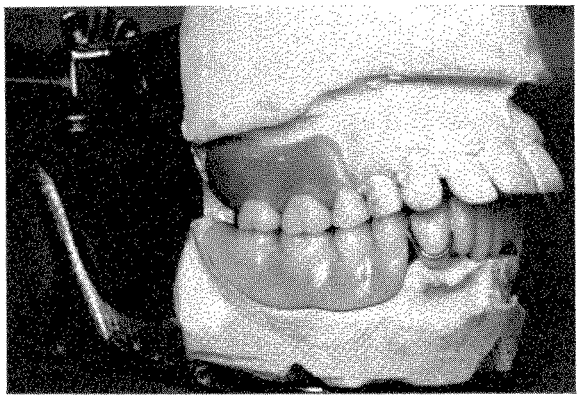


Fig. 720. This is the anterior fixed acrylic resin splint and the completed lower lingual bar. The upper posterior removable partial denture has its base still in wax.

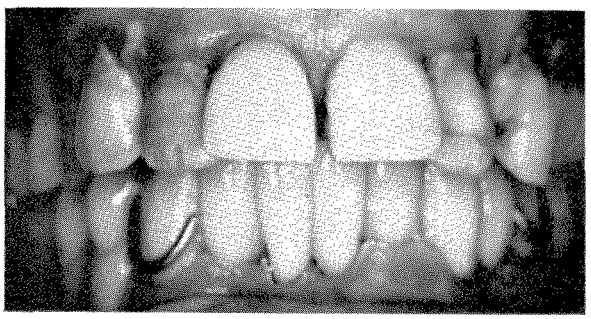


Fig. 721. With the prostheses shown in Fig. 720 inserted in the mouth, the extent of the bite-raising may be seen by comparing this illustration with Fig. 715.

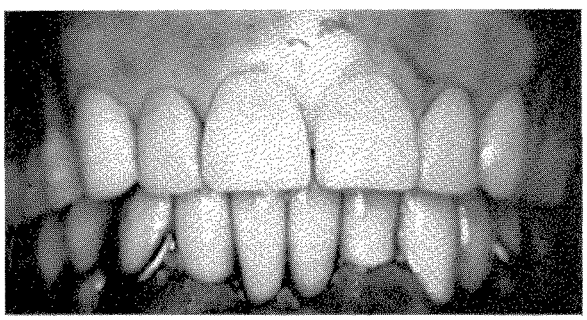


Fig. 722. The upper anterior teeth were removed, and the immediate denture, together with the lower prosthesis, was inserted.

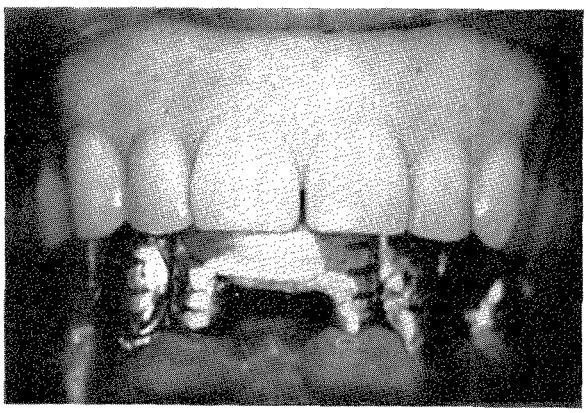


Fig. 723. Using the transitional work as a guide, the final work was started. The lower anterior fixed partial denture was made of low-fusing metal. The bite was registered with this and the immediate upper denture. The case was begun in September, 1961. This phase was started in April, 1962, after the tissues had sufficient time for healing and after the vertical dimension was acceptable to the patient both mechanically and physiologically.

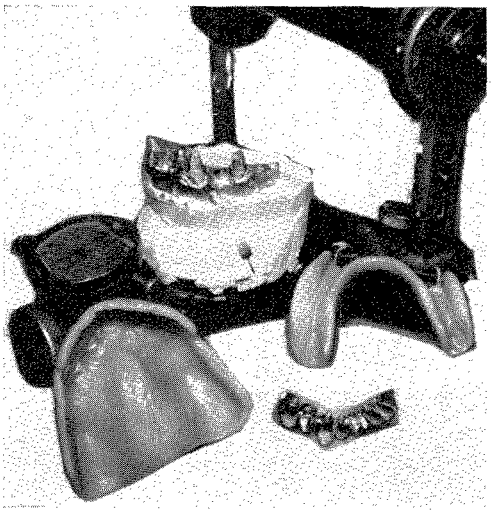


Fig. 724. The lower anterior eight-unit splint was completed. Lower and upper acrylic resin bases provided the means for establishing the centric bite and the same vertical dimension as the transitional prosthesis which had now been worn for almost four months.

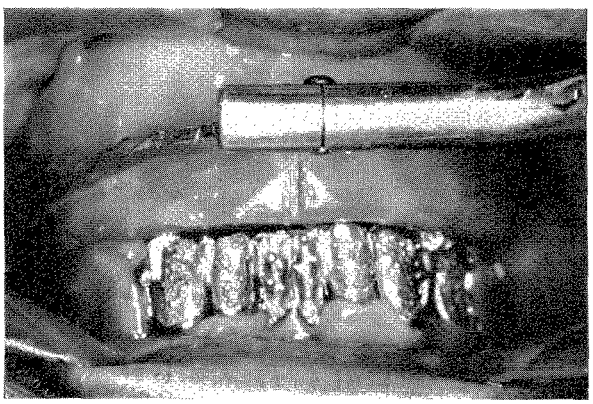


Fig. 725. Centric relation was established by means of the bite plates shown in the preceding illustration. A face-bow record was taken. The casts were mounted in accordance with conventional techniques.

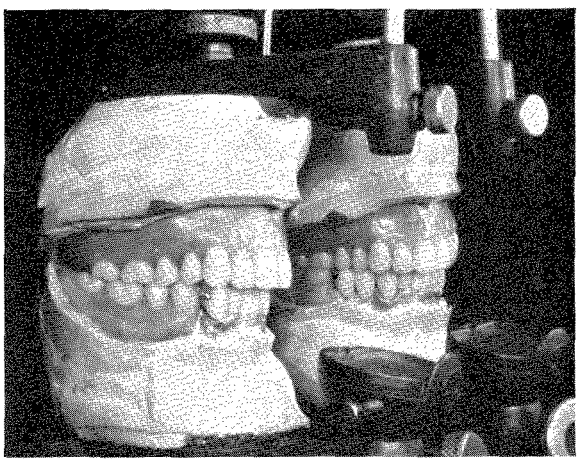


Fig. 726. The occlusion was coordinated. The upper and lower prostheses are shown here ready for a final try-in.

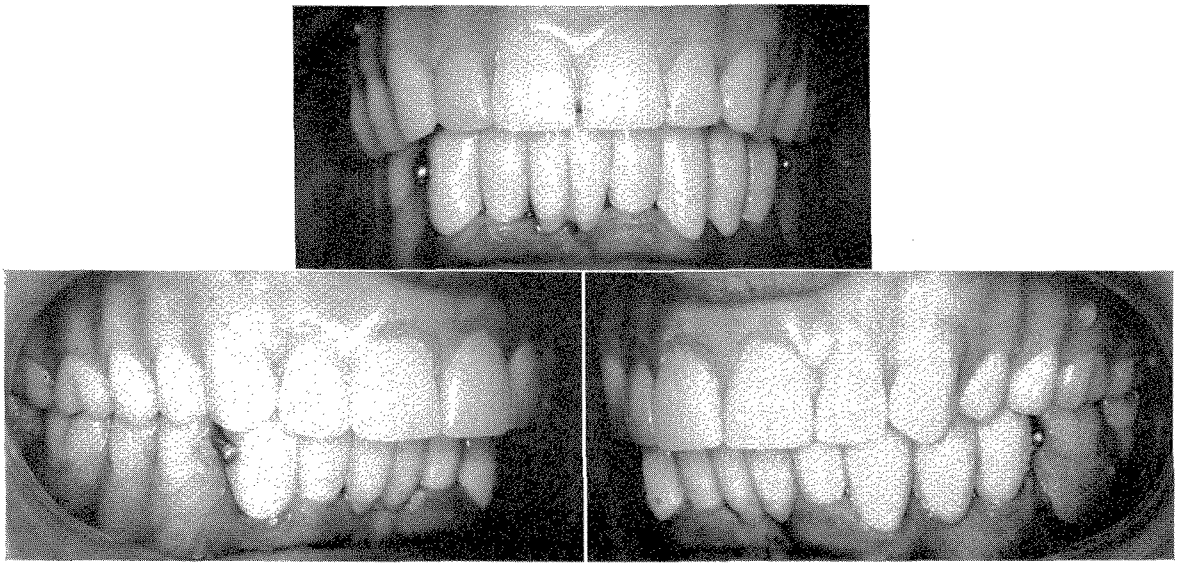


Fig. 727. Three views of the completed work. Compare this with the mouth at the start (Fig. 715). It is more difficult to violate the free-way space when upper and lower natural teeth are in place than in this case in which an upper full denture was constructed.

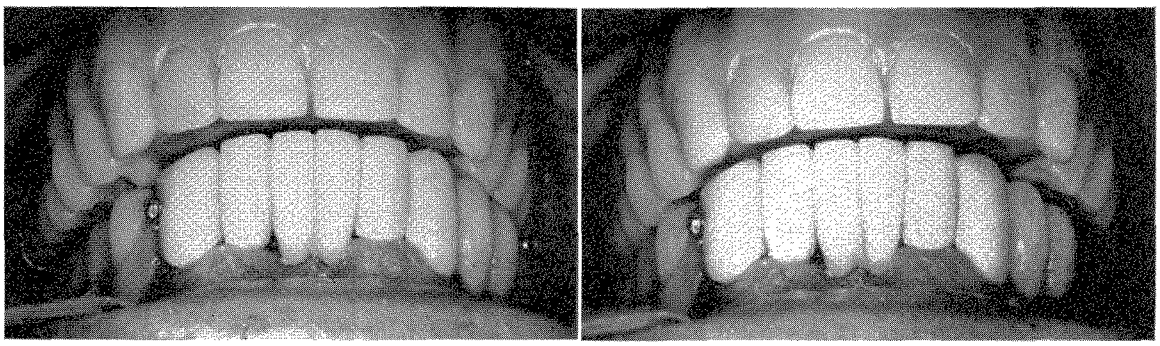


Fig. 728. Right and left working and balancing bites. An upper lingual acrylic platform provides anterior contact for the lower incisors. This gives more stability to the upper denture and was resorted to because of the large horizontal overjet. The head has been tipped back to show these features.

Fig. 729. Roentgenograms of the case shown in Figs. 715 to 728 before starting the work.

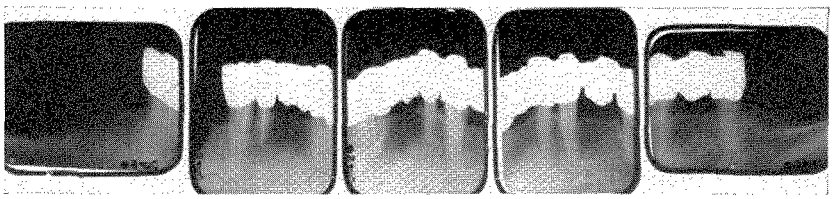


Fig. 730. Final roentgenograms of the lower teeth. These were taken in August, 1962, which was ten months after the case was started.

Case 24

This young man had his bite raised by means of a functional splint, similar to the preceding cases. This case was reported in 1951,* and it is of special interest because of the subsequent treatment used in order to remedy the severely depressed posterior teeth.

Past history

The original bite-raising appliance was inserted in 1943 when the patient was 41 years old. According to the records which were supplied by his dentist, his anterior vertical overbite returned to its original dimension in one year. Records were first taken in 1947. In 1954 his mouth was reconstructed maintaining the vertical dimension presented at that time. The anterior teeth were jacketed with porcelain. These teeth were shortened in order to decrease the vertical overbite mechanically. Upper and lower posterior fixed partial dentures were inserted. The posterior crowns were veneered with acrylic. A lower left molar was removed. All the remaining posterior teeth were included in the occlusal reintegration.

Records were taken in 1955. The patient was not seen again until March, 1960. He was then 58 years old. In 1954 the bite had probably been raised a small amount because if the 1960 and 1955 records are compared, there is evidence of a larger vertical overbite.

Present condition

The patient thought that once his mouth was reconstructed there was no need to return for regular checkups. When he was examined in 1960 he had not been to a dentist in three and one half years. An upper left first molar had already been removed. A lower left second bicuspid was carious and infected. The plastic veneers were badly discolored. His gums were inflamed and unhealthy. He had completely neglected his hygiene. He was advised to return to his dentist immediately. He was last examined in 1962.

In reviewing these cases, it becomes apparent that there is no physiological, anatomical, or functional justification for increasing the vertical dimension in the manner just described. (Figs. 731 to 738.)

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*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 825-827.

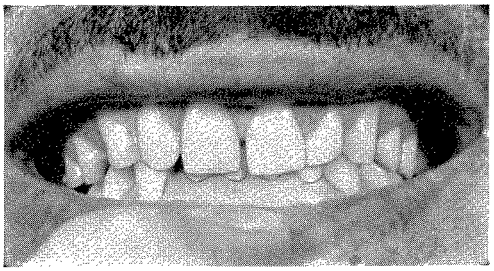

Fig. 731. Anterior view of the mouth of a man about 35 years old before the introduction of a functional splint in the form of a lingual bar which was to serve as a bite-raising appliance. Observe the deep anterior overbite (1945). (Figs. 731 to 738 are of the same case.)

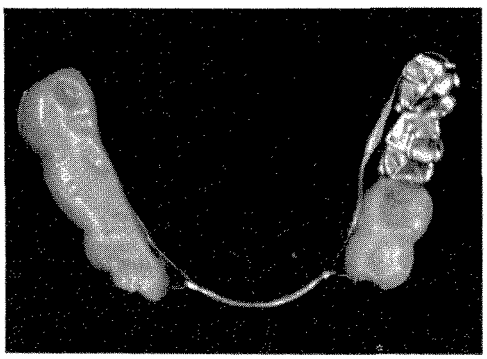

Fig. 732. By means of the splint shown here the bite was raised at least 4 mm.

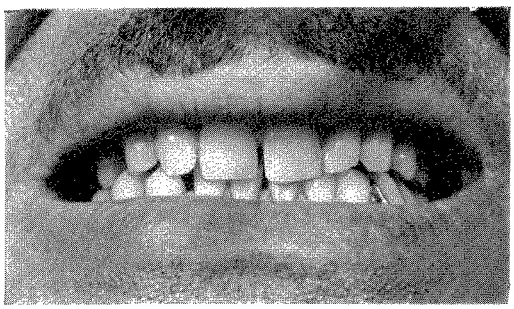

Fig. 733. The splint in position in the mouth, raising the bite. Compare with Fig. 731 to observe the amount of bite raising.

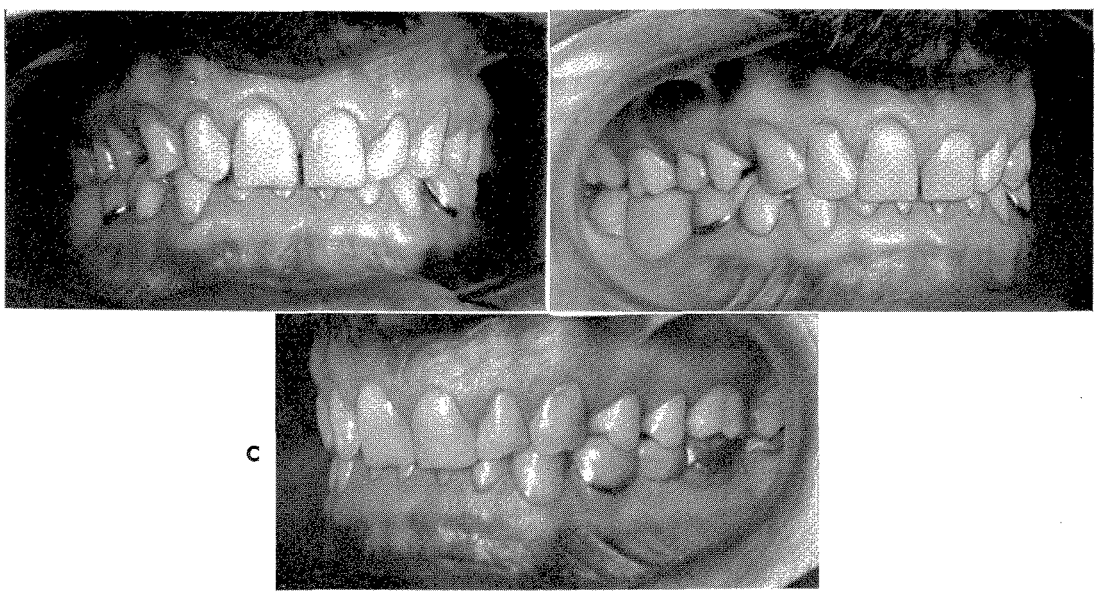

Fig. 734. **A,** Anterior view of the mouth with the splint in position one year later. Observe the closure of the bite in the anterior region (1946). **B,** Right-side view of the splint in position. The posterior teeth were depressed in their sockets, while the anterior teeth probably extruded as the bite closed. **C,** Left-side view with the splint in position.

Fig. 735. The splint was removed to show the amount which the posterior teeth had been depressed in one year. In this mouth the bone and teeth did not give way. They accommodated themselves to the changed condition. It is difficult to state with certainty either that the posterior teeth had been depressed or that the anterior teeth had extruded or that the change had taken place in the bone itself. Perhaps all three had been altered.

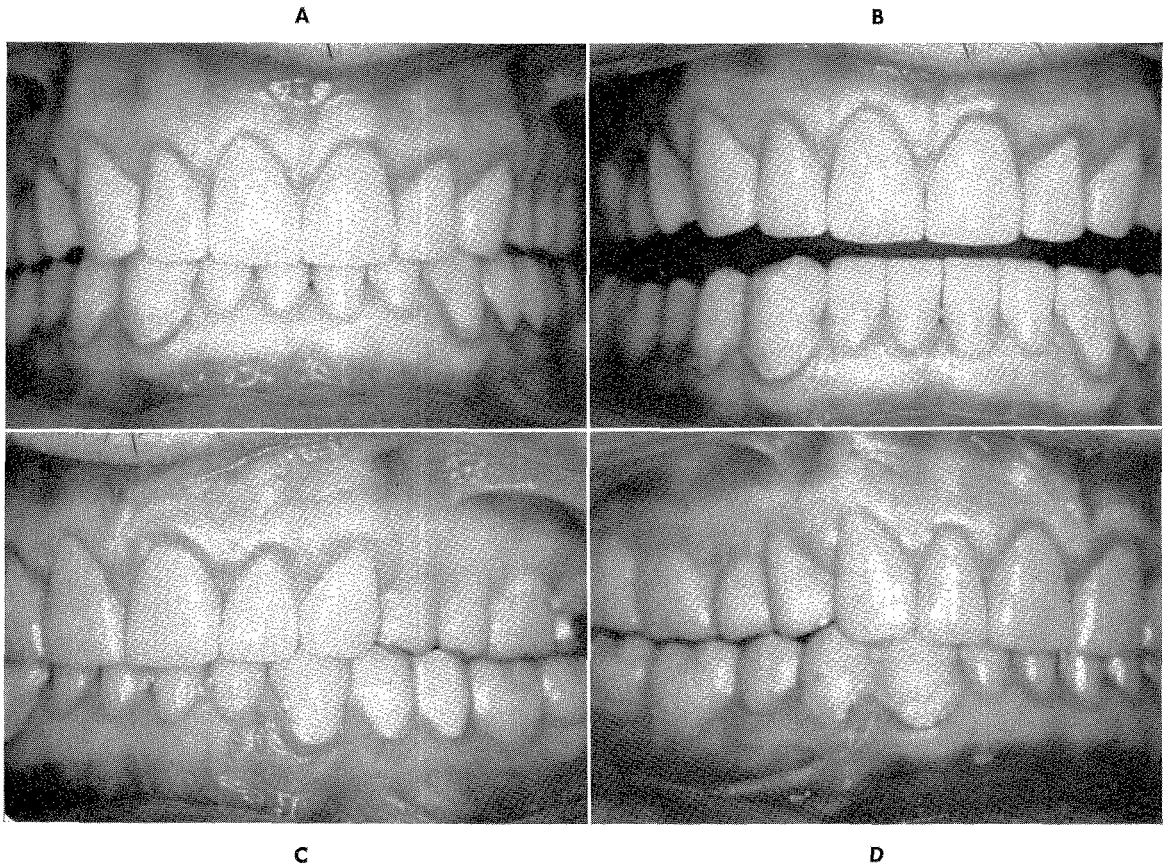

Fig. 736. The mouth of the patient whose case is shown in Figs. 731 to 735 was reconstructed in 1954. The anterior teeth were covered with porcelain jacket crowns. The posterior teeth were covered with veneer crowns above and fixed bridges replacing the first molars below. The bite level shown in **A, C,** and **D** was increased a slight amount. The teeth are separated in **B** to show the vertical overbite. The results are shown here. The oral hygiene was very poor when these photographs were taken.

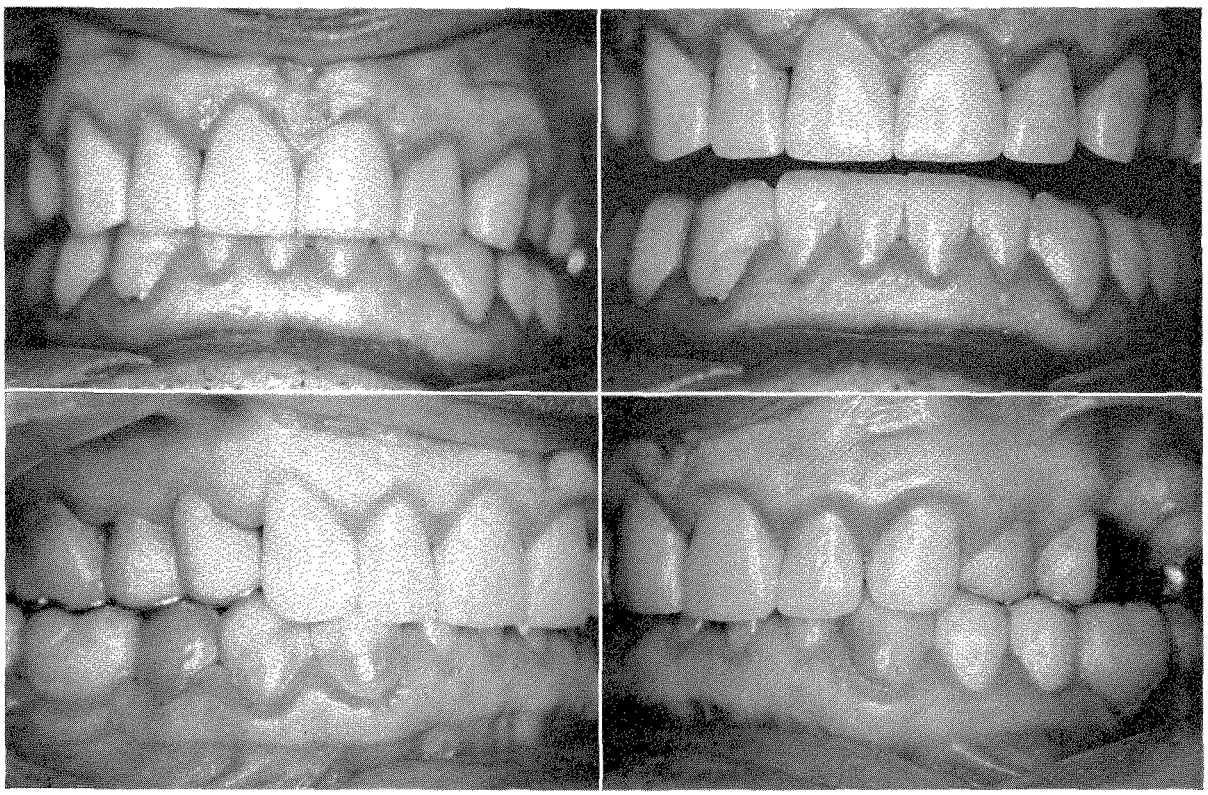

Fig. 737. Four views of the mouth in 1962, at the age of 60 years. The hygiene was completely neglected. The bite had closed since the 1954 photographs shown in Fig. 736. The upper left first molar had been lost. The lower left bicuspid was infected.

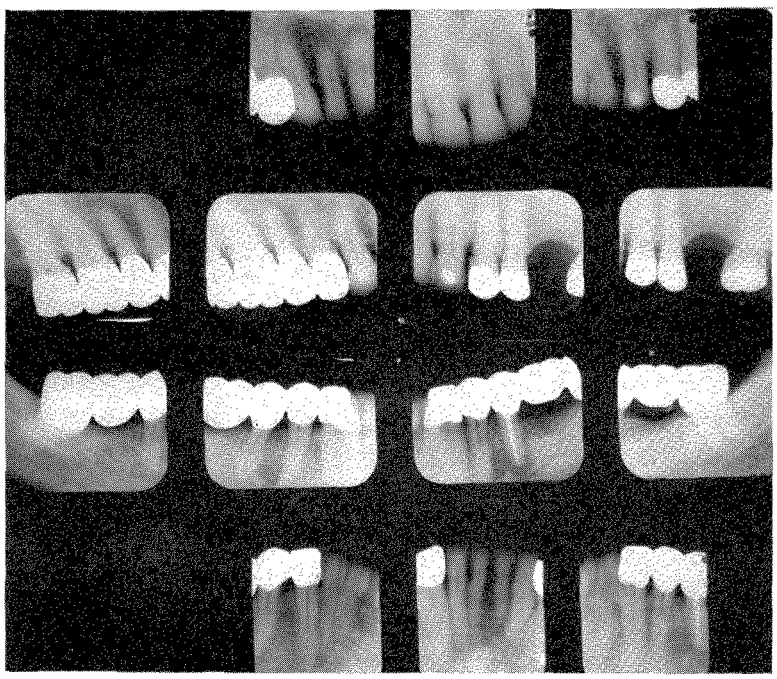

Fig. 738. Roentgenograms taken in 1962 of the case shown in Figs. 731 to 737.

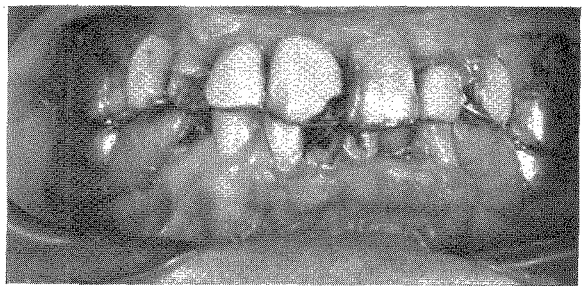

Fig. 739. A 45-year-old man whose mouth had been rehabilitated fifteen years previously. This photograph was taken in 1950. He had never returned for post-insertion checkups. His dental structures had disintegrated. (Figs. 739 and 740 are of the same case.)

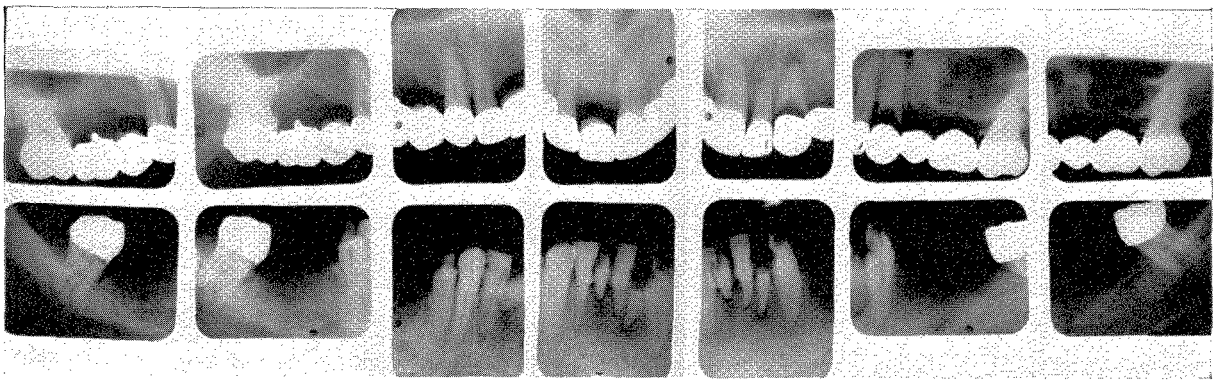

Fig. 740. Roentgenograms showing the neglect which could have been prevented had regular checkups been instituted. The photograph of the mouth is shown in Fig. 739.

PATIENTS MUST BE MADE AWARE OF IMPORTANCE OF POSTINSERTION CARE

When extensive restorative procedures are resorted to, some patients may believe that no further work is necessary. This can lead to serious trouble. It is necessary to take nothing for granted and to explain carefully the great importance of regular postinsertion checkups. These include roentgenograms at regular intervals periodontal treatment, and careful examinations.

In 1950 the mouth of a 45-year-old man was examined. He had his mouth rehabilitated fifteen years previously. It had taken a year to complete the rehabilitation. He had not been to see a dentist since. Although it is true that financial difficulty may have been partly to blame for this neglect, he should have been made aware that the continuous upkeep may have been a lot cheaper in the long run than the treatment he must submit to now—and at an early age. (Figs. 739 and 740.)

SOME INDIVIDUALS HAVE LIMITED POWERS OF ADAPTATION

Raising the bite can be a hazardous and troublesome procedure. Although there are people who can adjust to this change in mandibular position, there are others

for whom it is impossible. One is unaware at the onset of the case that it will present difficulties. Once the vertical dimension is increased and the prosthesis inserted, unforeseen results may follow.

Case 25

In 1951 a 60-year-old woman presented herself for dental consultation. A dentist in Europe had raised her bite, and she was very uncomfortable. She divided her time between Europe and the United States.

A careful analysis which was made of her problems was sent to her dentist abroad. The following is a copy of the correspondence. The photographs of her oral condition upon presentation were included. During the previous seven years she lost several teeth. A large upper fixed partial denture was inserted in 1954.

Author's letter to patient's dentist

June 2, 1952

Dear Dr._____

Mrs._____ will soon be on her way back to Europe and to . . . . . She has had no end of discomfort since last summer. This winter she has been to . . . . and while there, she had to see a dentist. What he told her about her mouth I can only guess—but, I'm sure it was not good because when she arrived in New York, she came to see me immediately. I have taken the trouble to make a thorough examination of her dental problem. I have taken full mouth roentgenograms, temporomandibular reoentgenograms and photographs. I have made study casts and related these to each other in her various occlusal positions. I have also obtained from her a fairly accurate history of her dental condition as far back as when she was 30 years old. I would like to give you a résumé of my findings and conclusions. I hope you will consider this in a friendly spirit. I have not discussed this with Mrs._____. She is unaware of anything that is in this letter. I simply informed her that I would write to you my findings, which incidentally, she asked me to do.

Mrs._____ states that even at the age of 30, her own teeth were well worn down. She distinctly recalls this. Undoubtedly, she suffered from grinding her teeth either by day or night or perhaps, both. Her musculature and nervous tension caused a closing of her bite, and wearing away of her tooth structure. This was a physiological manifestation aided and, perhaps, abetted by her nervous system. During the following thirty years (for she is now 60 years old), her condition could only have gotten worse. Nature manifests herself with some people that way and in these cases opening the bite can be disastrous.

Last summer, you undertook to reconstruct her mouth and in doing so, you raised her vertical dimension considerably. The method you used is not important since you could have obtained the same result by means of many diverse methods. What is important is the alarming fact that you impinged severely upon the free-way space and completely obliterated it. With the lower splint in position, her teeth are always in contact. Her nervous system is always being jarred. She is constantly under tension and continues to grind her teeth because of it. With her bridge in, she wakes up in the morning with her teeth sore from being clenched together. She told me that, at times, she wakes up at night and removes her lower bridge to obtain relief.

Another very important fact is that her centric relation is incorrect. If the lower bridge is removed and her mandible rested, Mrs._____ will adopt a centric position in which her mandible is in a posterior relation. With the lower bridge inserted, when she attempts to assume this correct centric position, only her posterior teeth touch and the remaining teeth from the

right bicuspids to the left bicuspids are in an open bite relationship with a horizontal overjet of more than six millimeters. This posterior position, because of its poor contact relationship and its lack of correct vertical height becomes untenable; therefore, she slides forward into a functional voluntary forward position where she obtains better contact. She cannot maintain this anterior position because it is not true centric relation and she consciously or unconsciously slides back into true centric relation. She can move about twelve millimeters backward or forward, but you may be sure that her posterior position is correct.

Her teeth are loose. The fact that they are being seriously traumatized does not help them. She does not know where to bite. If you question her, you cannot fail to interpret her remarks although she is hardly aware of what I am telling you.

I can only tell you that you should attempt to:

1. Restore correct centric relation by making it possible for her to attain a correct tooth relationship when she is in her posterior position.

2. Restore a normal free-way space by lowering her bite so that she is not constantly under tension.

If you attain these two objectives, you will do all that is in your power to make her comfortable.

I can assure you that I am only trying to help. I have spent a great deal of time on this study.

I have only rendered a modest fee. I do not envy you your job but it would hardly be fair to permit Mrs._____ to continue in her present condition. My kindest regards to you.

Cordially
(Signed)_____

Patient's dentist's answer

June 24, 1952

Dear Dr. Schweitzer:

I am conscious of what has happened.

We have raised the bite and so increased the height of the leverage acting on the anchored part of the roots, which, of course, is not to be generally desired. We are doing this anyhow to liberate the lateral movements in the region of the incisors and the canines which proves generally to be a great relief to those people who are grinding.

If we would not have made at the same time a protrusion of the lower jaw, it would probably have been easier for her to adapt herself to this new relation.

In very severe cases by patients grinding for years, we have obtained during those last thirty years, really splendid results.

Patients can adapt themselves in two weeks, sometimes with a great relief; others take more time and we help them with some modifications of the bite until we reach the point being in their possibility of adaptation.

Some *very seldom cases* cannot adapt themselves at all to this protruding of the mandible; so we go again backward for them, and sometimes we lower again slightly the bite. It is probably what we have to do for Mrs._____.

If we have chosen the removable bridge with the old Peso method, it is because it gives us a total fixation of the abutments which even with a very well-done splint is not attained and, of course, indispensable for a case of raising of the occlusion.

The interradicular spaces cannot be always made free enough; but the patient removed his bridge every evening, at least once a day, and can brush his gums to keep the pockets clean. Very severe cases of pyorrhea were cured and kept for years already in a perfect state in this way.

These cases are not the easy ones, but this question of restoration of loose teeth and fight against pyorrhea with splints and bridges is the most interesting part of our profession.

And, if we have sometimes to try some improvement hardly impossible for giving to our patient something better, and if we fail temporarily sometimes, and have to go backwards, there is happily most of the cases in which we can give them something of greater value.

It is not always the easiest way which is the best, and the recognized professional laws must direct us but not be a limit to our researches.

The way you have proceeded to studying so thoroughly the conditions of the patient is certainly of the greatest importance, before we are trying to impose him something of difficult adaptation. In the case of Mrs._____ not giving the necessary time for it, it would have been perhaps preferable to undertake less.

The job is strenuous, but worth while to be resolved.

Certainly, I will never leave a patient half way of the solution.

Thanking you once again for all the trouble that you took,

I am very truly,
(Signed)_____

Discussion

Her dentist in Europe indicated that although he realized what he was doing was unorthodox, still he felt that nature would accommodate and that eventually the musculature, the teeth, and the temporomandibular joints would attain an equilibrium. He stated that "it is not always the easiest way which is the best, and the recognized professional laws must direct us but not be a limit to our researches." There was profound thought in these simple remarks worth careful consideration. They came from a dentist of vast experience and honest convictions. He was stating that in cases of severe difficulty one should not be bound by conventional thinking but should engage in diverse ways to provide comfort and better function for his patients even if a certain percentage of these so-called unorthodox procedures fail. This is undoubtedly true, to the point of comparing the number of successes with the number of failures when these unconventional and sometimes unphysiological methods are used. If the number of failures far outnumber the number of successes, then too many mouths are being destroyed, and unconventional thinking becomes too risky, especially in inexperienced hands.

The patient was last examined in January, 1959. She was then 67 years old. There is no doubt that after the correspondence, her European dentist lowered her bite a small amount. No other changes were made in her interocclusal relationship during the eight years in which she received part of her dental treatment in New York City. She continued to return to Switzerland every six months and also received dental treatment there. It seems likely that the teeth were depressed en masse. That gave her some relief. She also adapted to some degree, but essen-

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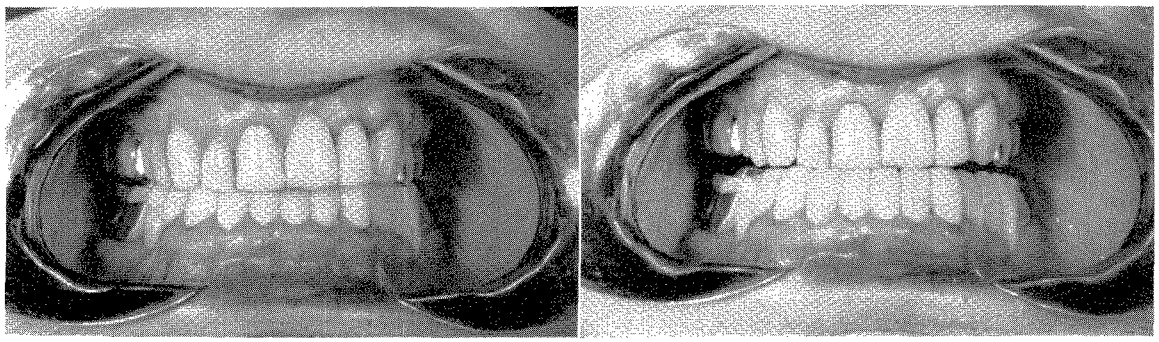

Fig. 741. Mouth of a 60-year-old woman upon presentation in 1951. **A,** Closed. **B,** Teeth apart. (Figs. 741 to 749 are of the same case.)

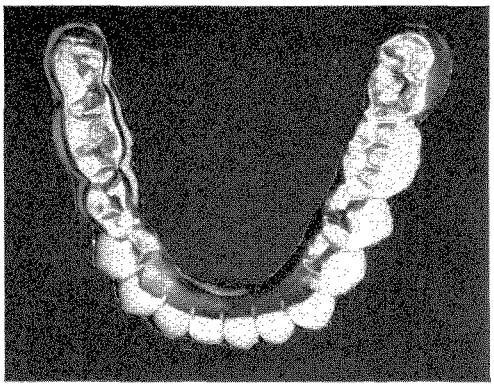

Fig. 742. Lower removable bridge splint which raised the bite and attempted to bring the mandible forward. It is shown in position in Fig. 741.

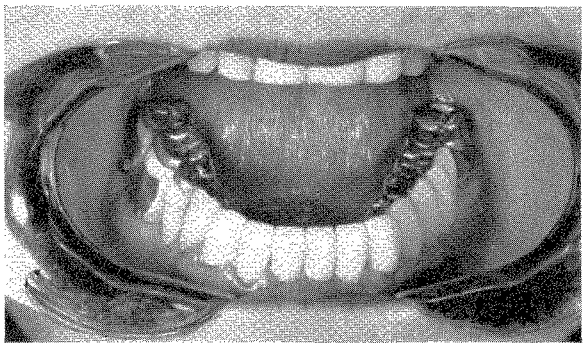

Fig. 743. The lower splint shown in Fig. 742 is in position.

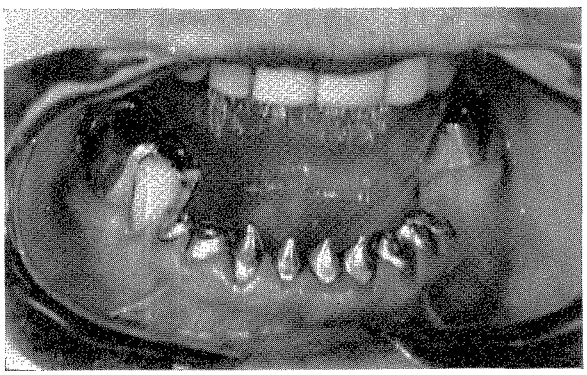

Fig. 744. The lower splint has been removed. Gold castings cover the devitalized teeth. All the lower teeth are nonvital.

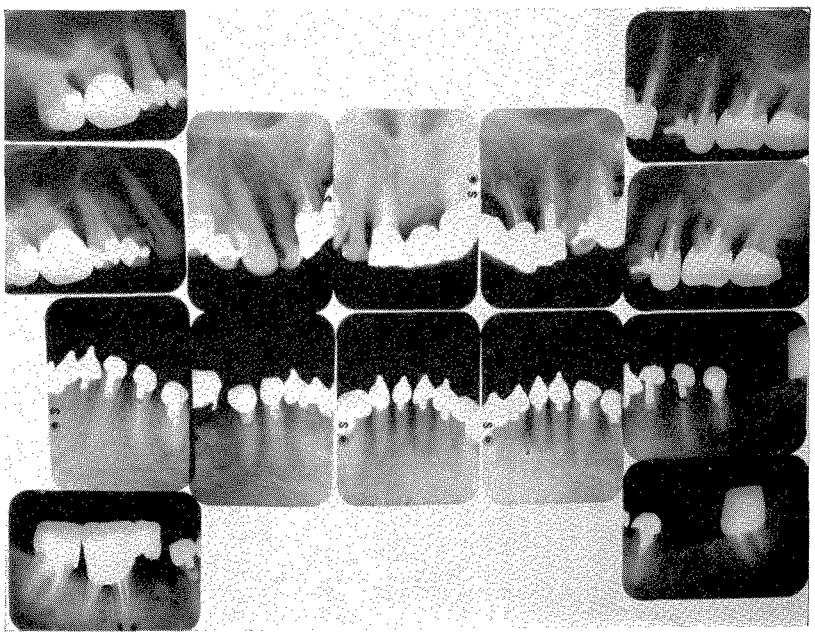

Fig. 745. Roentgenograms taken in 1952 showing the condition of the oral structures upon presentation.

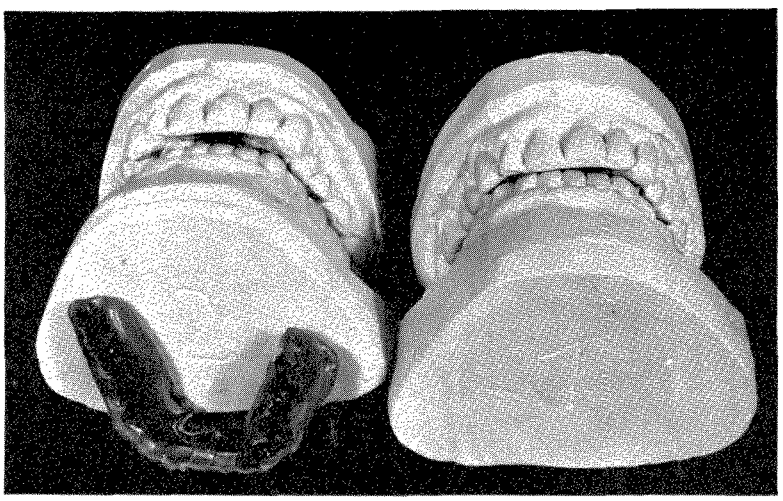

Fig. 746. A centric relational wax record demonstrates that the correct mandibular centric position is much further posteriorly (left casts) than the functional position it assumes (right casts).

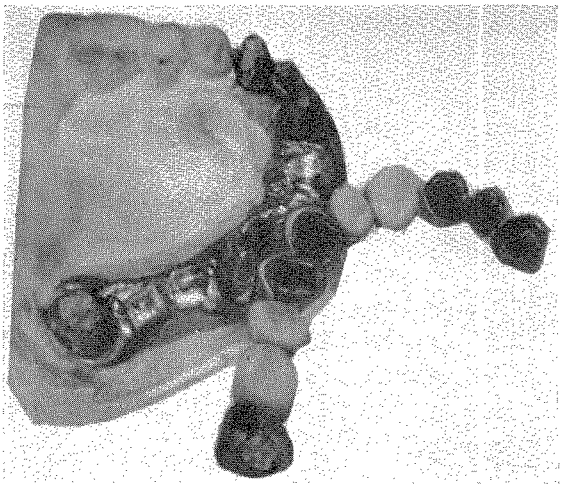

Fig. 747. This ten-unit fixed partial denture was inserted in December, 1954. No attempt was made to change the vertical dimension or the mandibular position.

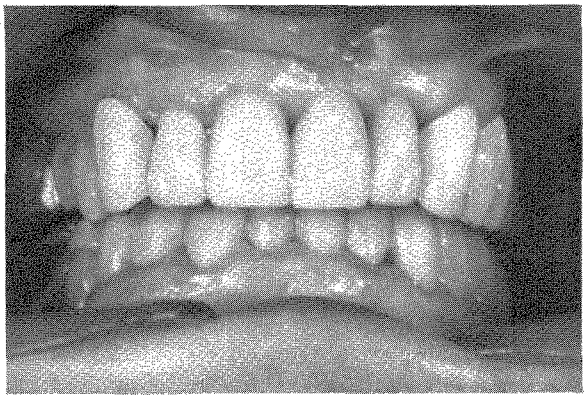

Fig. 748. The mouth in 1955 at the age of 64. The lower splint shown in Fig. 743 is still being used.

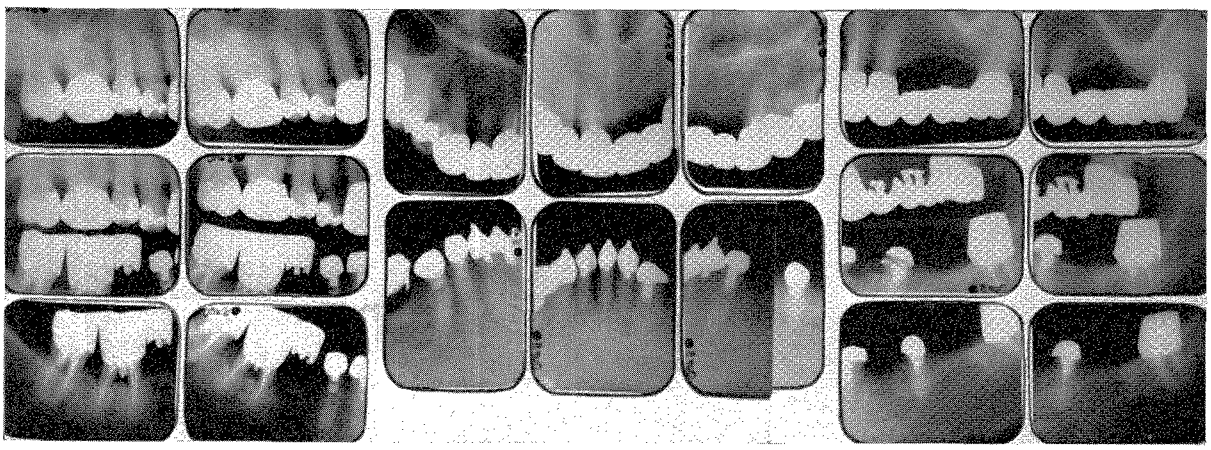

Fig. 749. Roentgenograms taken in December, 1958, at the age of 67. Four teeth were lost since the 1952 roentgenograms.

tially no drastic changes were made. The last dental roentgenograms were taken in December, 1958. (Figs. 741 to 749.)

MANDIBULAR REPOSITIONING

From various unhappy experiences, it is the consensus that it is difficult to violate the free-way space successfully. It is also conceded that the mandible cannot be indiscriminately advanced forward, sidewise, or vertically without the possibility of its returning to its original position. This is due to many causes, among which are the following: (1) the difficulty of changing the length of the attached muscles; (2) the ability of the condyles in lateral chewing to return, on the working side, to their most distal position in the mandibular fossa and in so doing to plow the original distal path to furthermost retrusion; (3) the habit of constantly retruding the mandible in swallowing food or saliva; (4) the habit of retruding the

mandible in power chewing when tough fibrous foods are masticated; (5) the ability of the mandible when not chewing food, which, incidentally, is for the greater part of the day and night, to return to its normal previous rest position.

The relational position of the mandible to the maxillae is a reflex neuromuscular position and, as such, has maximum stability. Where this position at the start of treatment does not coincide with the centric occlusion or contact position, the teeth can be so intercuspated that there is maximum occlusal contact in centric relation at the finish of treatment.

That is to say, after reconstruction, centric occlusion and centric relation coincide. This is both possible and desirable. It becomes extremely difficult, however, to change the centric relation position of the mandible if at the start of treatment that position is correct. In order to do this the entire reflex neuromuscular system would have to undergo change. For most patients, this is highly improbable. It is much easier and safer to change the interocclusal contact position to coincide with the relational position. Chapter 8 will deal further with mandibular repositioning.

Chapter 8

DEEP OVERBITE (cont'd)— MANDIBULAR REPOSITIONING

The mandible has often been repositioned vertically, but evidence substantiating its ability to maintain the new vertical position is difficult to obtain. Too often the musculature reverts to its previous position by intruding the teeth, the bony structures, the soft tissues, or a combination of all. To produce evidence of repositioning the mandible in a lateral direction is also difficult, if not impossible, because of the projection in which it must be measured, namely, the frontal or horizontal plane. Both of these projections make accurate measurement questionable.

In cases of disease, such as acromegaly, it is recognized that the mandible changes its position. This is due to bone growth and positional changes produced by dimensional changes.

EARLY REPORTS OF MANDIBULAR REPOSITIONING

In 1887 both Colignon* and Barrett† described a case of mandibular repositioning. The subjects were 14-year-old girls. Barrett maintained that what actually happened was that after the bite plate was introduced and the posterior teeth were taken out of occlusion, the masseter muscle caused the gonial angle to become more obtuse, and therefore the shape of the jaw elongated to give the desired results. (Figs. 750 and 751.)

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*Colignon, Jules, as reported to Bogue, E. A.: Case of prominence of the upper jaw, D. Cosmos **29**:318-325, 1887.

†Barrett, W. H.: Modified occlusion, D. Cosmos **29**:477-479, 1887.

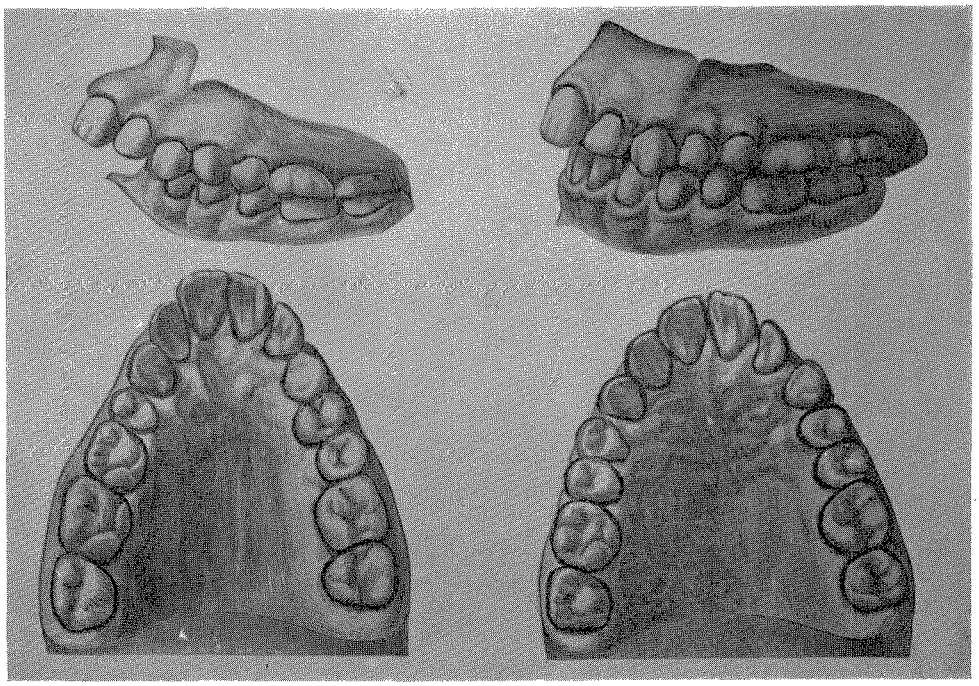

Fig. 750. Case described by Colignon in 1887. The left-side illustrations were taken before orthodontic treatment. The right-side illustrations were taken after orthodontic treatment. (From Colignon, Jules: D. Cosmos **29**:318-325, 1887.)

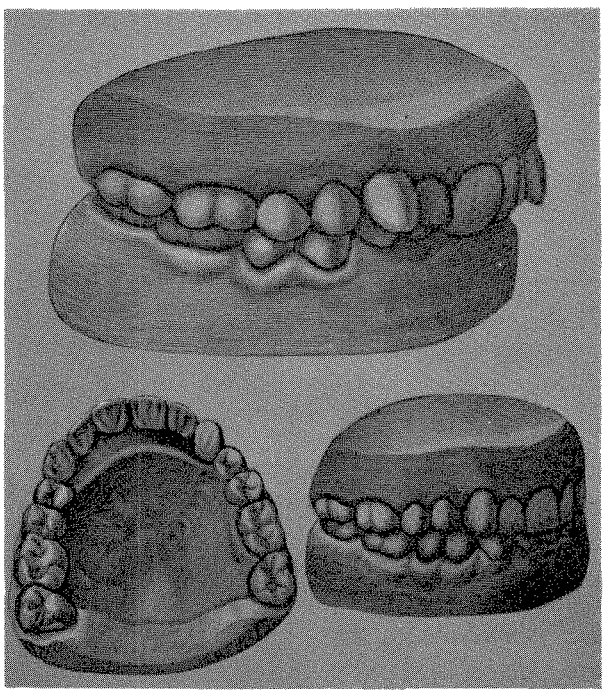

Fig. 751. Case described by Barrett in 1887. The upper illustration represents the cast at the start of the work. The two lower illustrations represent the appliances and the completed work. (From Barrett, W. H.: D. Cosmos **29**:477-479, 1887.)

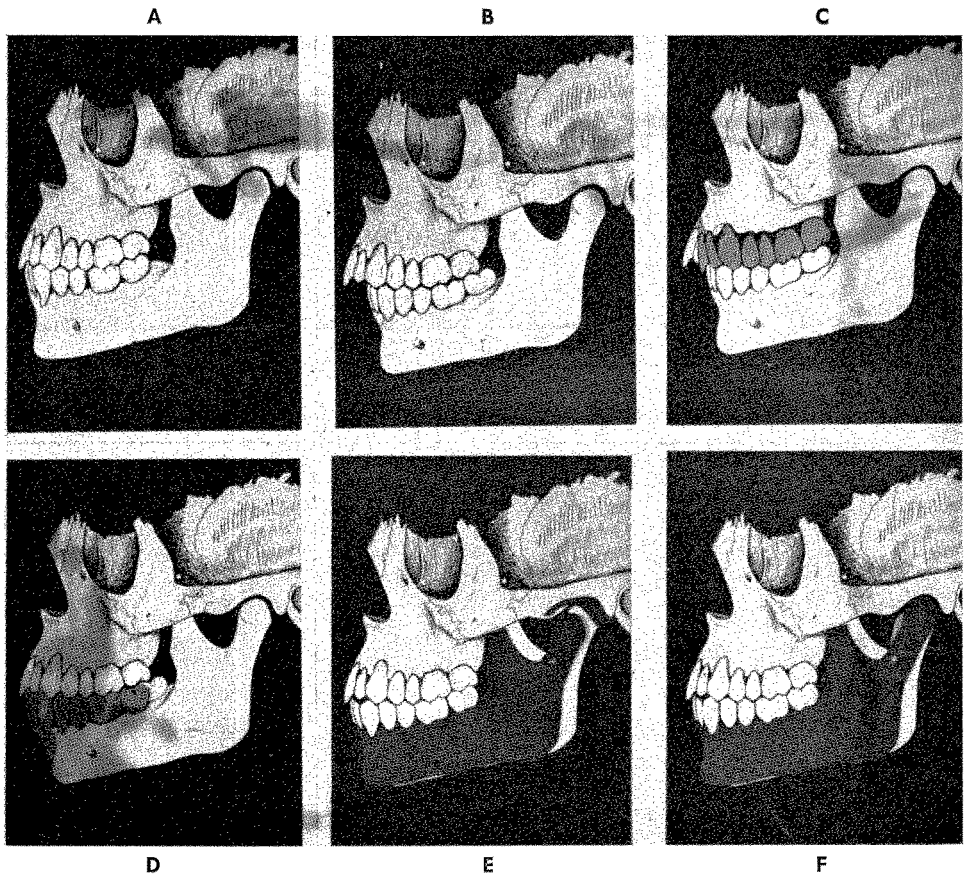

Fig. 752. Photographs of a demonstration model. **A**, In normal occlusion. **B**, In Class II malocclusion. **C**, Corrected occlusion by movement of maxillary teeth from their alveoli. **D**, Corrected occlusion by movement of mandibular teeth from their alveoli. **E**, Corrected occlusion by reorientation of the glenoid fossa, without change in the shape of the mandible. **F**, Corrected occlusion by reorientation of the condyle. (The described changes take place simultaneously.) (Courtesy Dr. Carl Breitner.)

Breitner* described three methods by means of which mandibular repositioning could take place. They are as follows: (1) by tooth movement, (2) by reorientation of the glenoid fossa, and (3) by growth of the condyle. There could be a combination of all three methods. He made a special model for demonstration. (Fig. 752.)

CHANGES IN GONIAL ANGLE

We are all aware of the forward positioning of the mandible in patients wearing full dentures. The subjects are usually elderly people who have worn their dentures over a long period of time. In the majority of these cases there seems to be a widening of the gonial angle. Merkeley† called attention to mandibular changes due to increased gonial angle in 1959 and 1960.

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*Breitner, Carl: Alteration of occlusal relations induced by experimental procedure, Am. J. Orthodontics & Oral Surg. **29**:277-288, 1943.

†Merkeley, H. G.: T.M.J. disturbances as related to increased angle of the jaw, J. Pros. Dent. **9**:336, 1959.

Sears* described a method of mandibular repositioning by means of molar pivots. He claimed to have changed the position of the condyles in the glenoid fossa in as short a period as two days.

As far back as 1942 I stated that with altered function and age changes it is possible for the rest position and other of the so-called unalterable mandibular positions to change permanently. Therefore these possible changes must be considered in our treatment.†

TWO FORMS OF MANDIBULAR REPOSITIONING

There are two forms of repositioning. In one the patient presents a mandible in a position which is not its true relational position with reference to the maxilla. Its centric relation does not coincide with its centric occlusion. At the completion of treatment, centric relation and centric occlusion coincide. Most of the so-called repositioning falls in this category. In the second form of repositioning, centric relation coincides with centric occlusion at the very onset, but because of a desire for better esthetics, or a more advantageous maxillomandibular relationship, an attempt is made to change an existing centric relation. In this form of repositioning, the musculature and the temporomandibular joint, as well as the osseous structures and the neural reflexes, must undergo a change.

Whereas most prosthodontists will concede the first form of repositioning, there is grave doubt in their minds, as well as in the minds of many orthodontists, as to the possibility of the second form of repositioning.

Impossible to reposition mandible

Twenty years ago, Stuart stated that "we are fully cognizant of the claims made by many dentists, that the mandible can be set forward into a more favorable position in Class II cases of malocclusion, but it has never been our pleasure to see any such cases so operated that the teeth were articulated. The cusps were ground off and there was little semblance of tooth form on any of the occlusal surfaces of the restorations. Patients who desire to improve their profiles will sometimes tolerate the false position of the mandible, but the harm done to the teeth is generally evident. . . . We believe the condition we have termed protrusive occlusion to be pathological, in spite of any evidence that the patient is not uncomfortable or conscious of the condition."‡

Possible to reposition mandible

On the other hand there are those who believe that the mandible can be repositioned permanently. Among them is Sved, who stated that "it is shown that the gonial angle changes during life to accommodate the mandible to changing conditions of the dentition. . . . The prosthodontists endeavor to construct pros-

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*Sears, V. H.: Mandibular condyle migrations as influenced by tooth occlusion, J.A.D.A. **45**:179-192, 1952.

†Schweitzer, J. M.: The vertical dimension, J.A.D.A. **29**:419-422, 1942.

‡Stuart, C. E.: Articulation of human teeth, D. Items Int. **61**:1029-1037, 1147-1154, 1939; **62**:8-17, 106-112, 1940.

thetic appliances to the usual and most comfortable positions of the teeth and the position of the mandible to establish normal occlusion. . . . It is very fortunate that there is an adequate compensating mechanism to alter the dimensions of the mandible to meet the requirements which at times may be severe.

"We have repositioned the mandible very many times in the past, notwithstanding statements to the contrary. . . . Everything known about the adaptability of the mandible points to the possibility of the permanent repositioning of the mandible. I, personally, believe that the mandible adjusts itself to major changes in occlusion and I cannot reconcile myself to the idea that the position of the lower jaw is fixed permanently and cannot be changed by orthodontic means."*

Case 1

Chief complaint

In February, 1960, a 35-year-old woman came for consultation. She was displeased with an anterior fixed acrylic bridge and was referred to see whether the construction and the esthetics could be improved. This was her chief complaint. This part of the history is mentioned because of its importance.

Present condition

She was not sent to have her bite analyzed. When she was asked to occlude her teeth, her intercuspation was very poor, but her mandible was in its position of maximum interocclusal contact. When she made lateral jaw movement, there was no evidence of balance, but the mandible seemed to perform normally.

When we asked her to retrude her mandible, she had to be coaxed to do it. It was obviously an uncomfortable position when the mandible was retruded—only the second molars occluded. In this position she lacked functional contact with her remaining teeth, and her vertical dimension was greatly increased. Upon careful questioning the following history was obtained.

Past history

She had a severe distoclusion (Angle Class II, Division 1 malocclusion) which detracted greatly from her looks. She was interested in the theater and at that time was teaching. In 1957 she visited a dentist and was told that her mandible could be brought forward and her bite raised. If this were accomplished her looks would be improved greatly. For a long time she had been very anxious to have this work carried out as she continually brought her jaw forward in an effort to bring out her chin. She readily agreed to the prescribed treatment. The procedure took over a year and was completed in 1958.

Discussion

Fortunately she was able to obtain her old casts and roentgenograms before the work was undertaken. These records told the entire dramatic story. From what

*Sved, Alex: The mesial drift of teeth during growth, Am. J. Orthodontics **41**:539-553, 1955.

one was able to see her bite had been raised arbitrarily one half inch posteriorly. The mandible had been brought forward until there was almost the tip-to-tip occlusal relationship which she displayed when she was examined in February, 1960. She stated that her temporomandibular joints did not trouble her at all. The roentgenograms of the mandibular joints revealed an anterior-inferior displacement of the condyles. They were well out of the fossa when the occlusal position of maximum contact was attained.

From her position of maximum occlusal contact, her protrusive range was extremely limited. This was the logical sequence because the remaining portion of her protrusive range had already been used up in the forward repositioning of the mandible. There was little or no free-way space. The fact that she had any at all is probably owing to the effort of her muscles to avoid constant contact as her free-way space had been grossly violated. This is similar to taking the vertical dimension with and without dentures in position in the case of edentulous subjects. The rest vertical dimension will always be greater with the dentures in position.

It is remarkable that (1) there were no temporomandibular symptoms, (2) there was no muscular trismus, (3) the patient was very desirous of maintaining this forward position of her mandible, and (4) she had been able to maintain this excessive vertical opening for almost two years.

She was cognizant of the disadvantages of maintaining her existing occlusion. However, (1) it gave her face a decided esthetic improvement, therefore increasing her professional opportunities, and (2) her current financial condition would not permit her having the work redone at this time. Her desire was to maintain the existing interocclusal relationship. Undoubtedly, her teeth had already been intruded. The intrusion had been divided between the upper and lower teeth, and there was no way of measuring the amount. Temporomandibular symptoms could develop. Inasmuch as she had already lost five lower posterior teeth, it was possible that the continued traumatic occlusion would further weaken and perhaps loosen her remaining teeth. There was a continuous clash between her desire to keep her mandible forward and the proprioceptive muscular influences which constantly tended to retrude her mandible. However, when her mandible was in its distal position, she had only very limited functional interocclusal contacts. In lateral functional chewing her former retrusive condylar positions were attained in spite of her conscious voluntary efforts to the contrary. For all these reasons, her present occlusion appeared untenable, and the advice given to her was to have her interocclusal contact position changed to one in which it would coincide with her mandibular relational position, that is to say, to permit her mandible to again reach its distal position and at the same time to have maximum interocclusal contact in this position. This advice was rejected.

Because of her refusal, a human experiment in true mandibular repositioning in an adult was underway. For this mandible to remain forward in comfort, there must be a remolding of the temporomandibular joint in addition to a change in the origin and insertion length of the musculature responsible for the position of the mandible. The neural mechanism must also adopt different afferent and efferent pathways to the cerebral centers responsible for mandibular movement. This was a tremendous task. Much material on this study was published in *Oral rehabilitation.**

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co.

It was demonstrated long ago that the gonial angle may change due to stresses placed upon it. It was also established that condylar growth and remolding could continue throughout life. With this in mind it should be possible for true repositioning to take place. In January, 1961, Baume and Dericksweiler demonstrated on three rhesus monkeys that the endochondral growth apparatus of the mandibular condyles reacts positively to mechanical stimulation.* However, this is extremely difficult to prove clinically in the reconstruction of human mouths. It is far from being proved in the case under consideration. The deeply embedded desire to improve her looks drove the patient, in spite of her suspicion that she could not maintain this position without damage to her structures.

She permitted some experiments to be performed in her methods of chewing.† To do this, styluses were placed upon her teeth, and her functional and empty chewing strokes were recorded by means of motion picture film. The frames of the film were analyzed. Plastic casts were also made of her teeth. These were attached to the outside of her mouth by means of stainless steel rods. While the subject performed various types of chewing, the casts were photographed. These records have so far substantiated the belief that her mandible had not been repositioned. (Figs. 753 to 760.)

This patient died suddenly in December, 1961, at the age of 36 years. She promised to permit me to examine her mouth early in 1961. The following is a letter which was received.

April 19, 1961

Dear Dr. Schweitzer:

It was my intention to have you re-examine my mouth, but I am simply unable to undergo the mental and emotional stress at this time. The bite relationship is now half as far forward as it was last year; I am comfortable, and unless the symptoms which you predicted develop, I think I must preserve my sense of well-being by letting well enough alone.

I am sincerely sorry that this decision denies you an examination which you consider helpful in your research. Thank you so much for your interest and most kind offer.

Very truly yours,

(Signed)_____

Many people will submit to great physical and mental inconveniences for the sake of improved esthetics. This is especially so with people in public life. Dentists should attempt to rationalize with these patients when their demands are far in excess of our profession's ability to satisfy them. Although their desires are readily understood, dentistry will be held in ill repute if false promises are made. When known anatomical and physiological laws are violated, the outcome is usually failure.

At the beginning of this chapter two forms of repositioning were discussed. In one centric relation did not coincide with centric occlusion. If these cases are

*Abstracts in Science, Response of condylar growth cartilage to induced stresses, vol. 134, no. 3471, Geneva Switzerland, July, 1961, Institute of Dental Medicine, University of Geneva, pp. 53 and 54.

†Schweitzer, J. M.: Masticatory function in man, Second Progress Report, J. Pros. Dent. **12**:262, 1962.

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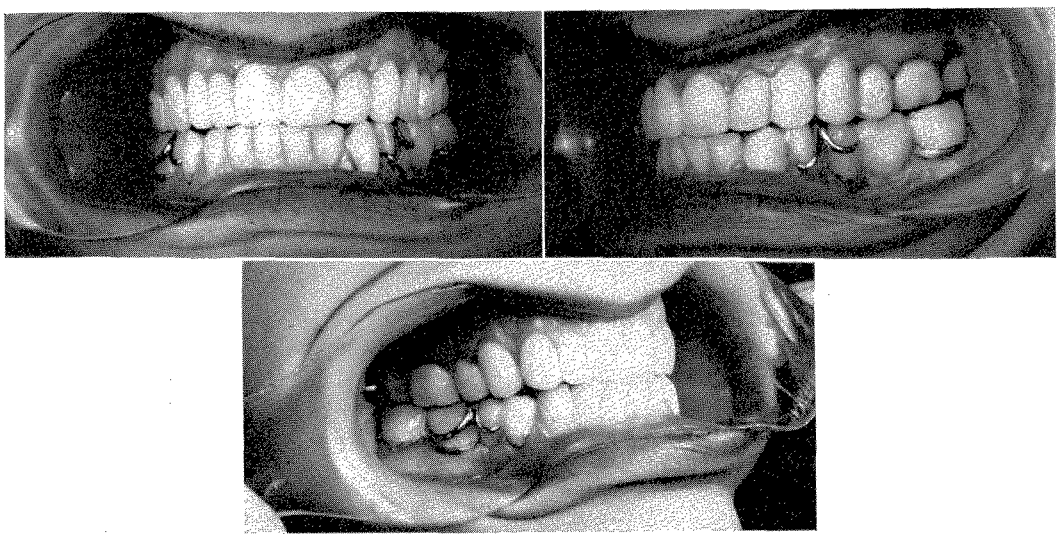

Fig. 753. Young woman whose bite was raised in 1958 at the age of 33 years. These are three views of the mouth when she was examined in 1960. The mandible was kept forward in an anterior functional position for esthetic reasons. The interocclusal coordination was also lacking. (Figs. 753 to 760 are of the same case.)

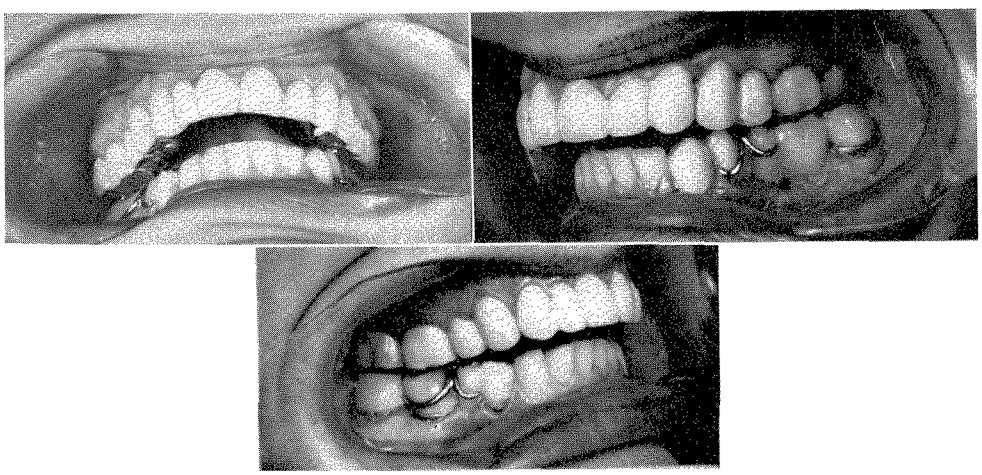

Fig. 754. The patient was able to retrude the mandible as is shown in these three views, but the interocclusal relationship was so poor that she brought her mandible forward to attain the functional contacts shown in Fig. 753 and to improve the esthetics.

Fig. 755. On the left are the original casts showing the extreme closed bite, whereas on the right are the casts made after the bite was opened and the mandible held in its forward position.

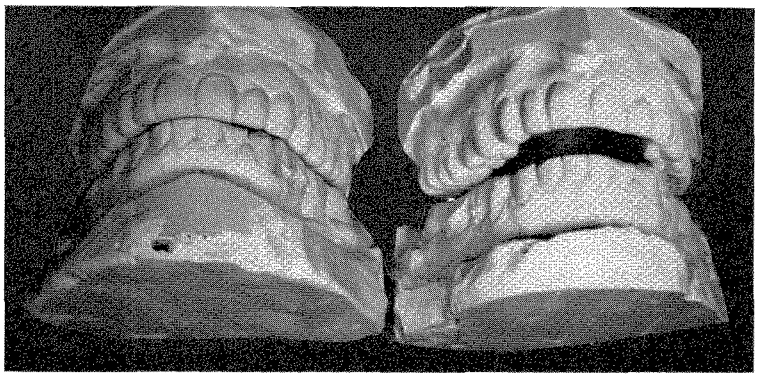

Fig. 756. The ability of the patient to retrude the mandible a large distance is shown in these casts mounted on wire frame articulators by means of wax records, with the mandible in its anterior and posterior positions.

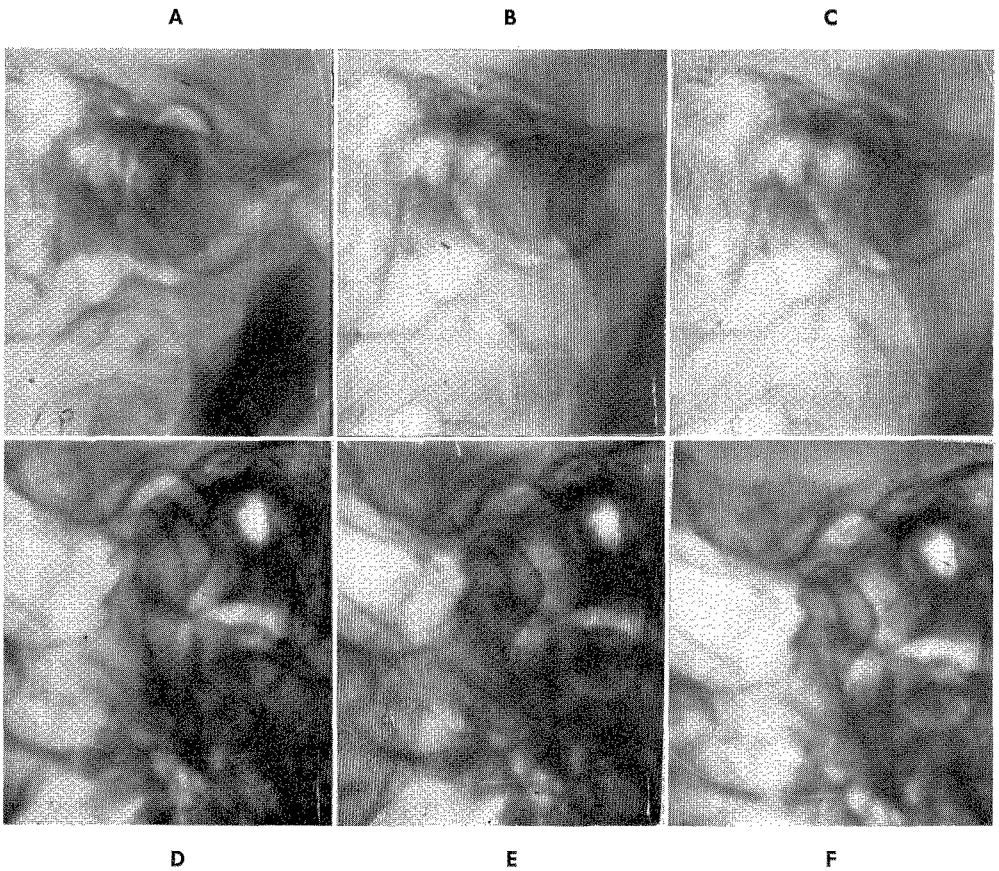

Fig. 757. Roentgenograms of the temporomandibular joints showing the different positions of the condyles when the mandible is in its retruded, protruded, and forward contact positions. **A**, Left retrusion. **B**, Left protrusion. **C**, Left anterior position of maximum contact. **D**, Right retrusion. **E**, Right protrusion. **F**, Right anterior position of maximum contact.

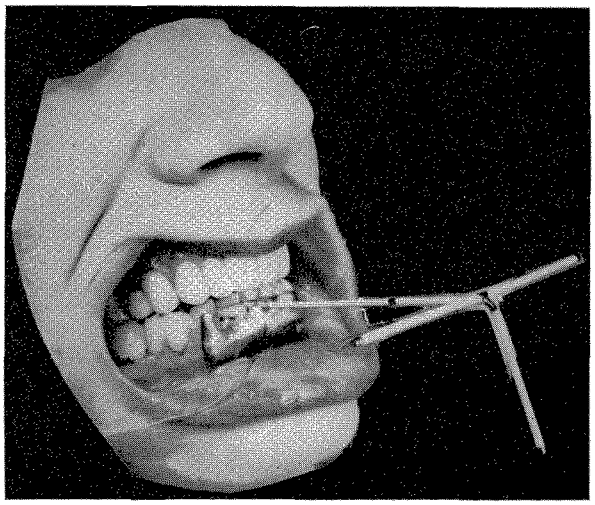

Fig. 758. Research was carried on to observe the movements of the mandible. This and the following illustration show the apparatus used in the study.

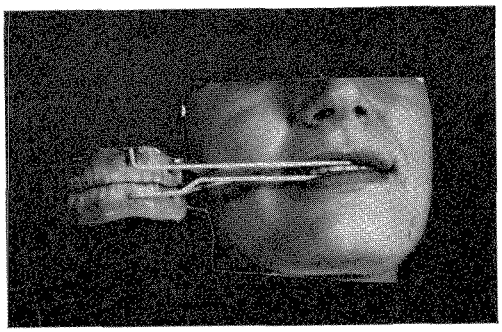

Fig. 759. These acrylic resin replicas of the teeth are attached to the natural teeth by means of metal rods and castings wired in place.

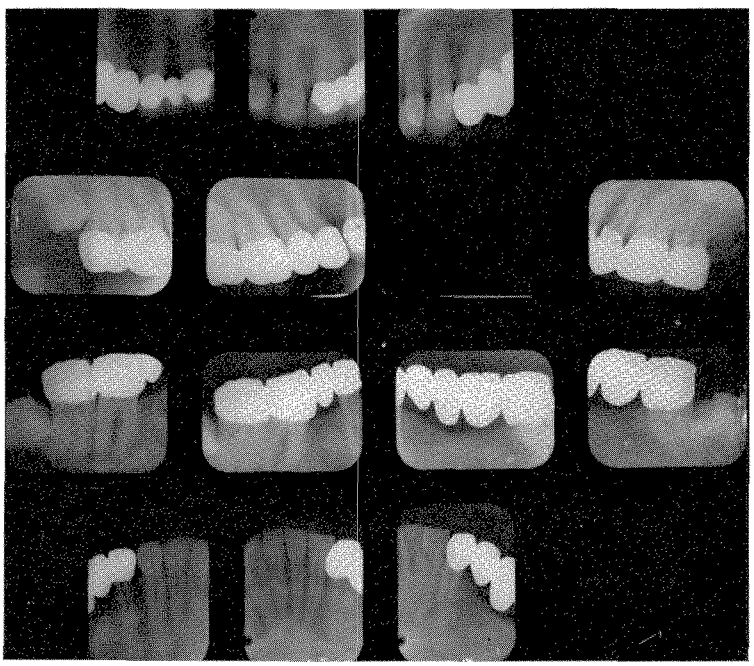

Fig. 760. These are the last roentgenograms I was permitted to see. They were taken in March, 1961.

rehabilitated and the mandible is unlocked from its false interocclusal contact position, it often will assume its true relational position. In oral reconstruction the two positions can be made to harmonize.

Case 2

Chief complaint—present condition

In April, 1959, a young female patient was examined in order to determine what could be done for her anterior teeth. These were severely abraded and unsightly when she spoke. A deep vertical overbite was present. Clinical examination and study casts demonstrated the impossibility of using porcelain jacket crowns because of lack of sufficient room. Roentgenograms of her temporomandibular joints indicated a shallow fossa and a hinge movement of the condyles from rest position to closure. The posterior teeth were in an advanced state of deterioration due to neglect, and they required complete rehabilitation.

Treatment—bite plate therapy

In July, 1959, a Hawley bite plate was inserted. It had a flat lingual platform. By contacting the lower anterior teeth, the posterior teeth were taken out of occlusion. By the end of August, 1959, the mandible had deviated to the right. This repositioning was observed by the position of the midline and also by the posterior intercuspal relationship, when new casts were mounted upon an articulator for study. The assumption was that the mandible had previously been locked in a false interocclusal position. Once it was released from this position by means of the Hawley bite plate, it returned to its true relational position. Because of this new tip-to-tip contact instead of an interdentating one, the vertical dimension was now greater than the one presented at the start of treatment.

The posterior teeth were prepared for bridges, crowns, and inlays. Wax centric and excentric records were taken. By means of these records the new working casts were attached to the Hanau kinoscope. The transitional work was constructed on this articulator. Four posterior slow-cured acrylic splints were made at the new increased vertical dimension and with the mandible in its correct new positional relationship. These were inserted on Dec. 16, 1959. With the additional vertical distance, it was now possible to prepare the upper four incisors and the lower right central incisor for porcelain jacket crowns. These were inserted on Jan. 25, 1960.

Since the posterior acrylic bridges provided the prescription, it was now possible to reconstruct the posterior occlusion in separate quarterly segments. The entire reconstruction was completed using this method. The roentgenograms of the temporomandibular joints did not reveal any significant change when compared with those taken at the start of treatment. This was very plausible owing to the comparatively small amount of lateral shift and the difficulty in recognizing it in a sagittal view of the mandibular joint. This case should not be considered as true repositioning of the mandible but rather a return to its correct position. Whether the incorrect positioning was responsible for the severe abrasion observed on the incisors is debatable. (Figs. 761 to 775.)

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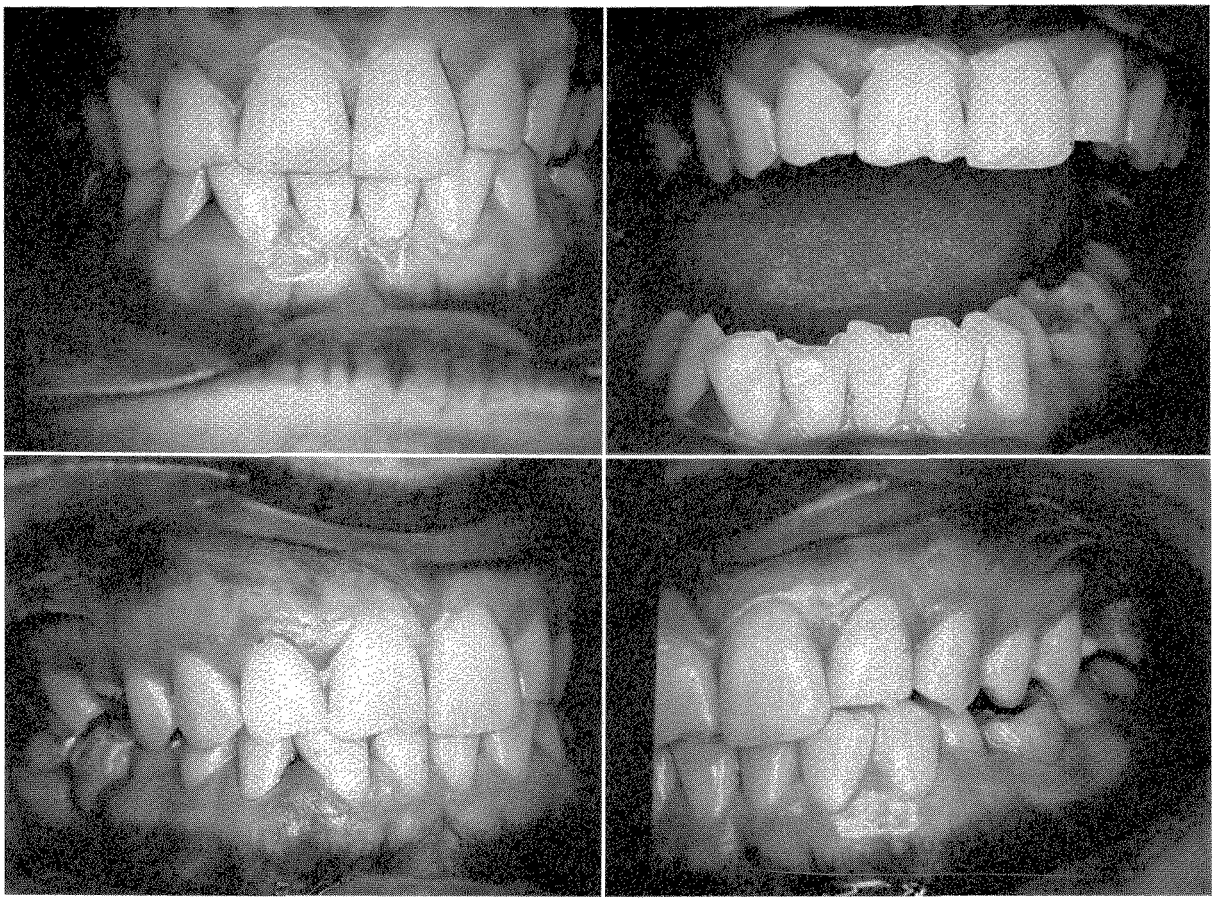
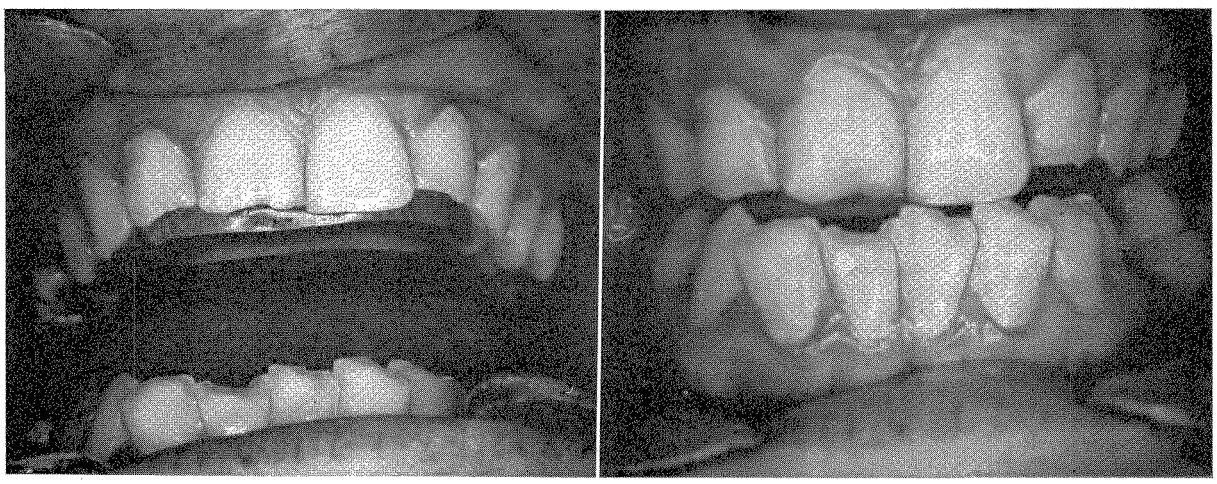


Fig. 761. Four views of the mouth of a young woman. These photographs were taken in April, 1959, at the start of treatment. The anterior abrasion is visible. The tips are frayed and broken because of the thinness due to their closeness together when they contact. (Figs. 761 to 775 are of the same case.)



A **B**

Fig. 762. A, Hawley bite plate is in position. **B**, In two months, the mandible had deviated to the right. Compare the photograph in **B** with Fig. 761, top left, and Fig. 763.

Fig. 763. The mandible assumed a new lateral position to the right of its original one. The bite plate had been removed when this photograph was taken. Compare with Figs. 761, top left, and 762, **B.**

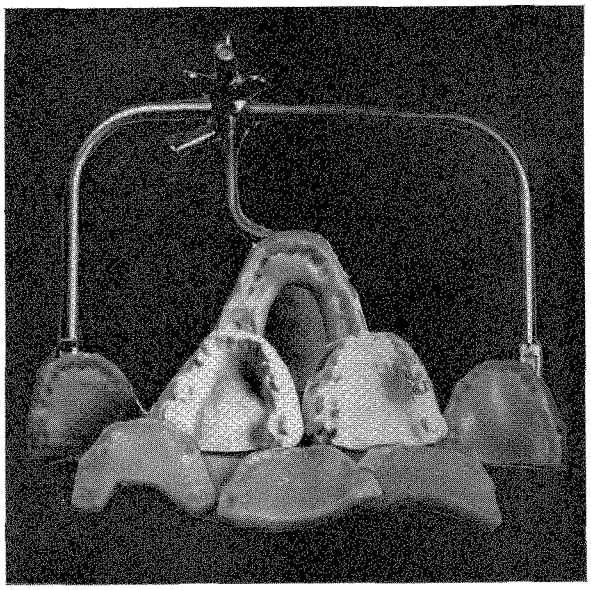


Fig. 764. The Hawley bite plate was worn for several months. In December, 1959, the posterior teeth were prepared for fixed partial dentures. Wax records were taken, as well as a face-bow.

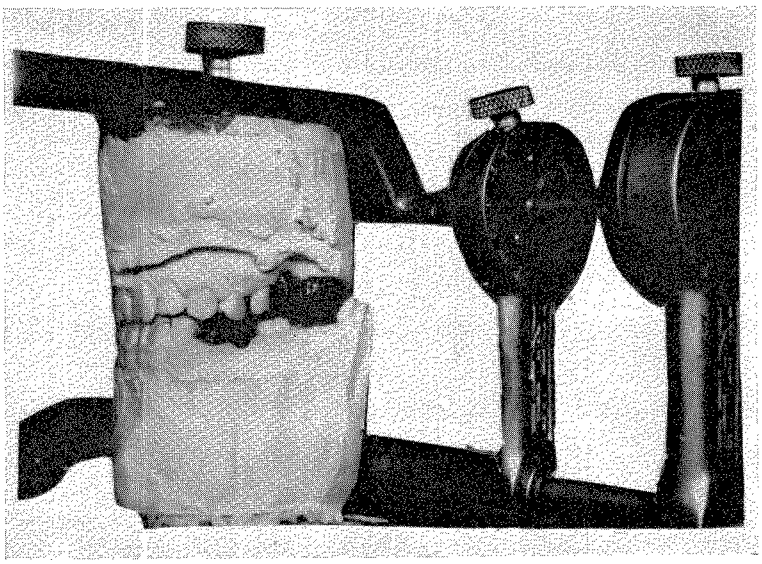


Fig. 765. The work casts were placed upon a Hanau kinoscope, and the entire posterior wax-up was coordinated at one time. The left side is shown here.

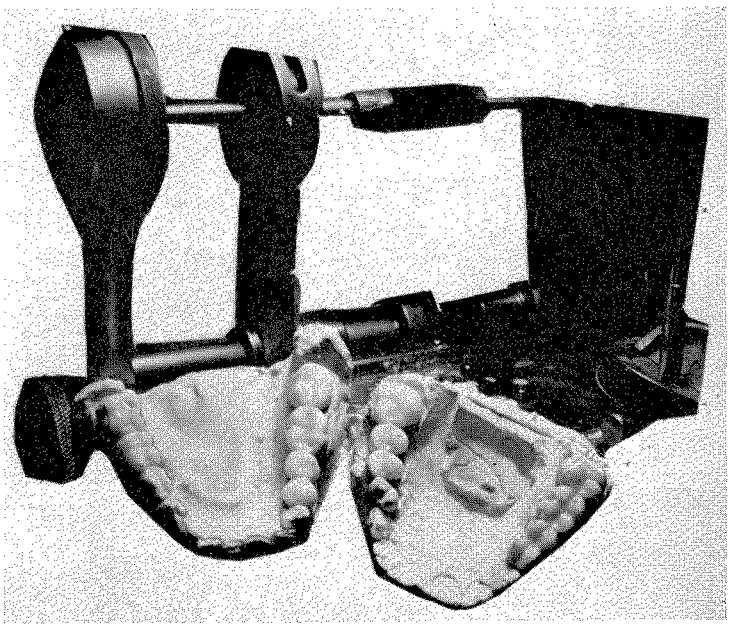


Fig. 766. Four plastic transitional fixed partial dentures were constructed as shown here. They provided the final prescription. After their insertion in the mouth, they were duplicated in final work, only now the final bridges were constructed one at a time on simple unilateral articulators, as Fig. 770 shows.

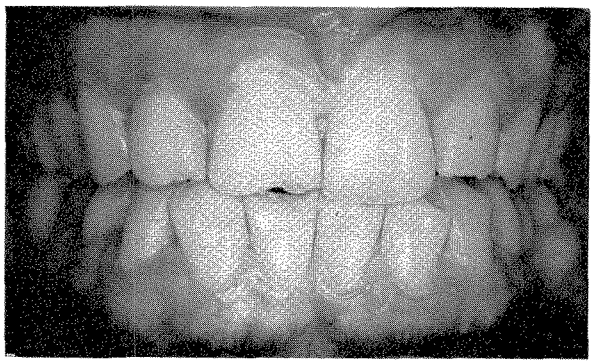


Fig. 767. The posterior plastic fixed bridges were inserted on Dec. 15, 1959. Compare this with Fig. 761, top left, to see the change in the vertical dimension and the lateral positioning of the mandible.

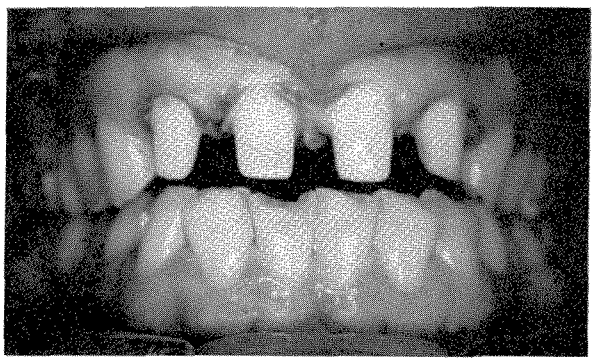


Fig. 768. The upper central and lateral incisors and the lower right central incisors were prepared for porcelain jacket crowns.

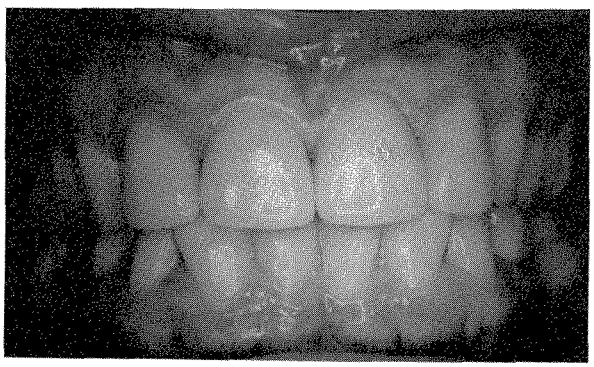


Fig. 769. These were inserted in January, 1960.

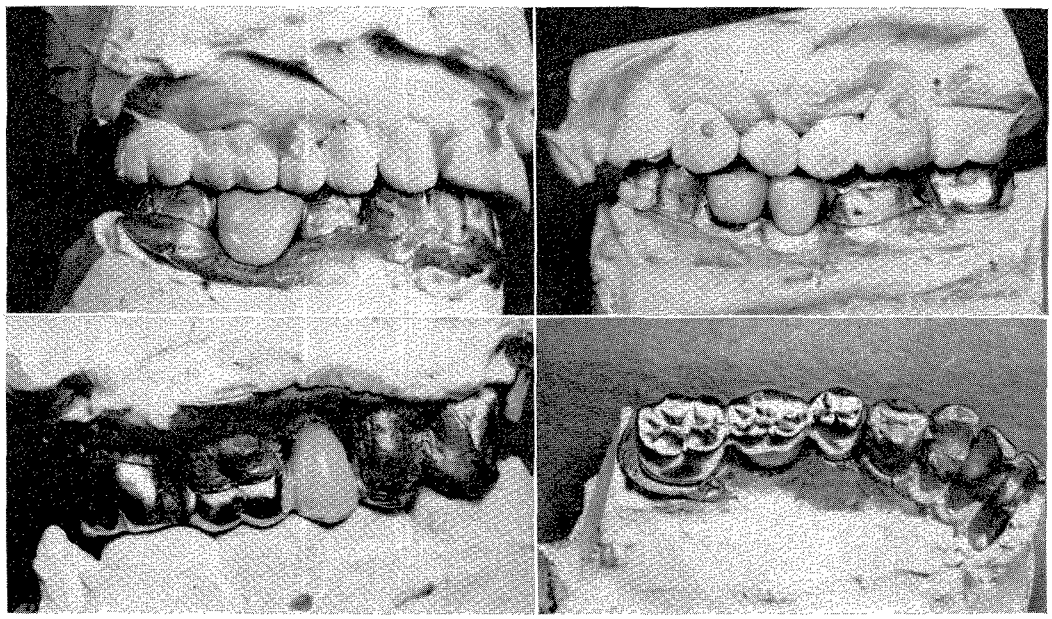


Fig. 770. The four posterior bridges were then completed on small unilateral articulators. They were inserted separately. This phase was completed by July, 1960.

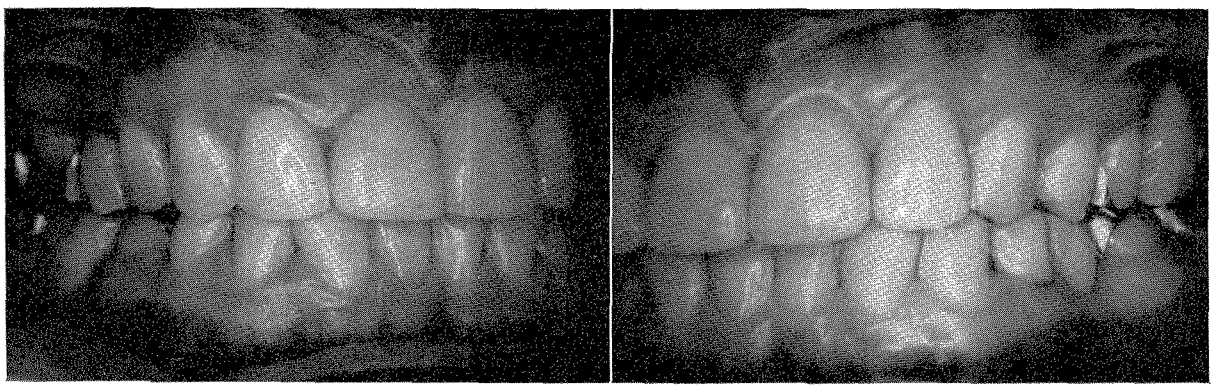


Fig. 771. The entire work was completed in July, 1960. This shows the right and left views.

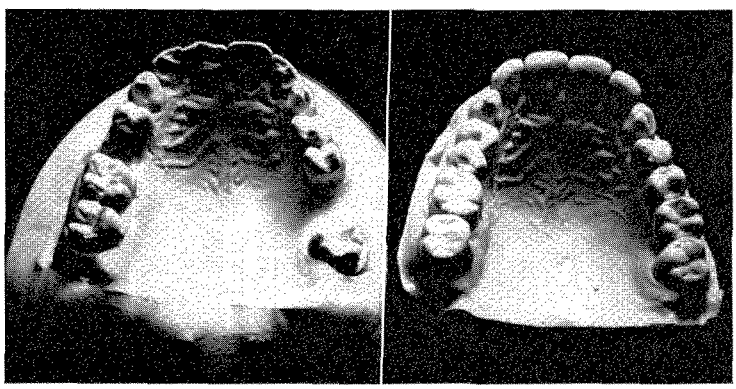


Fig. 772. A comparison between the upper cast at the start and completion of treatment. At the start the bite was so close and the incisors so thin labiolingually that it would not have been possible to construct porcelain jacket crowns.

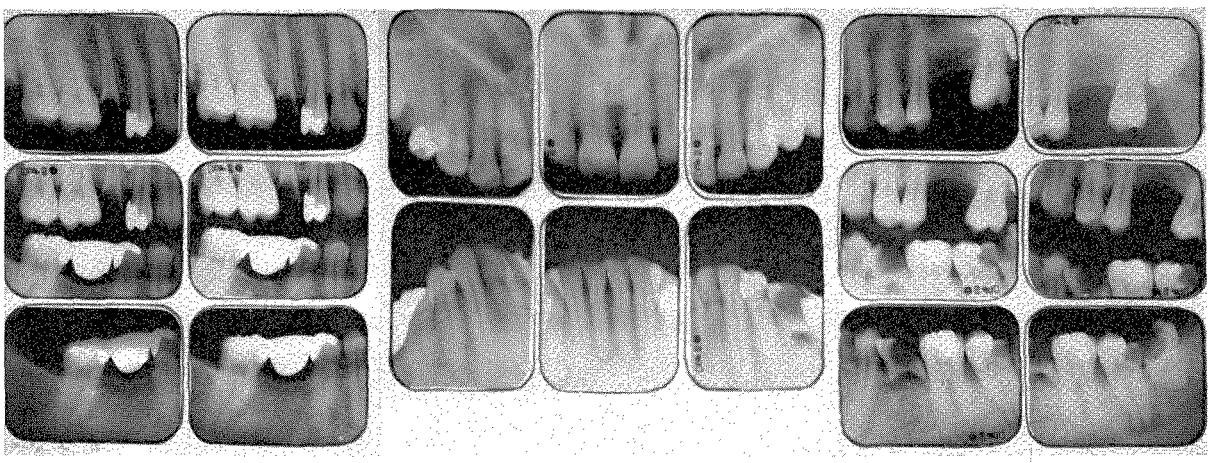


Fig. 773. Roentgenograms of the teeth at the start. These were taken in April, 1959.

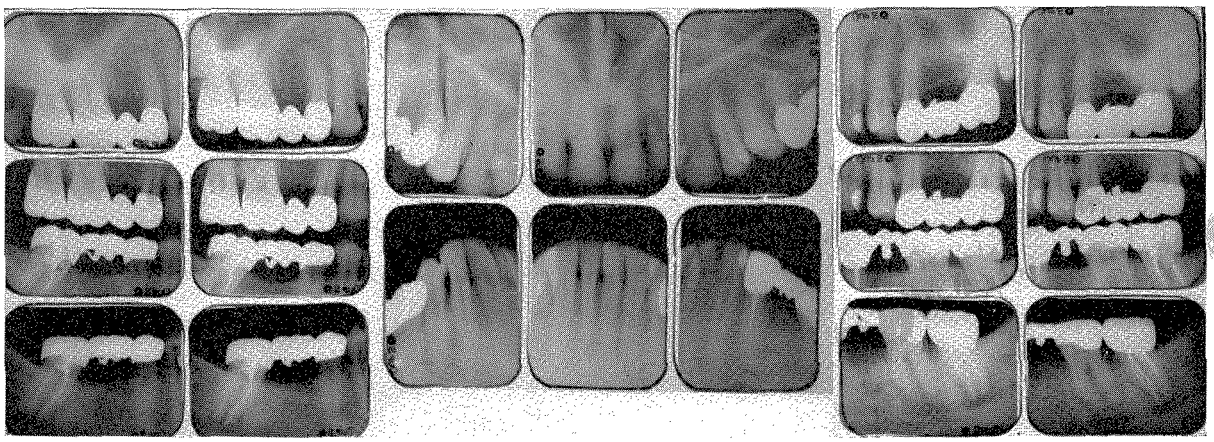


Fig. 774. Roentgenograms taken when the work was completed in July, 1960.

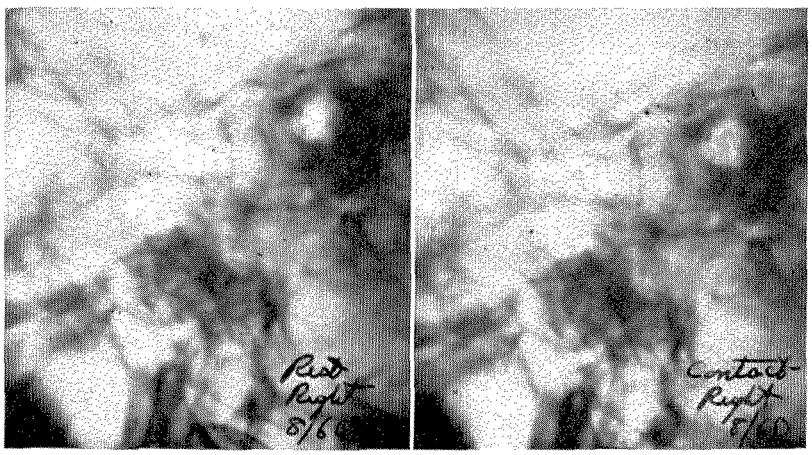


Fig. 775. Right and left temporomandibular joints after completion of treatment.

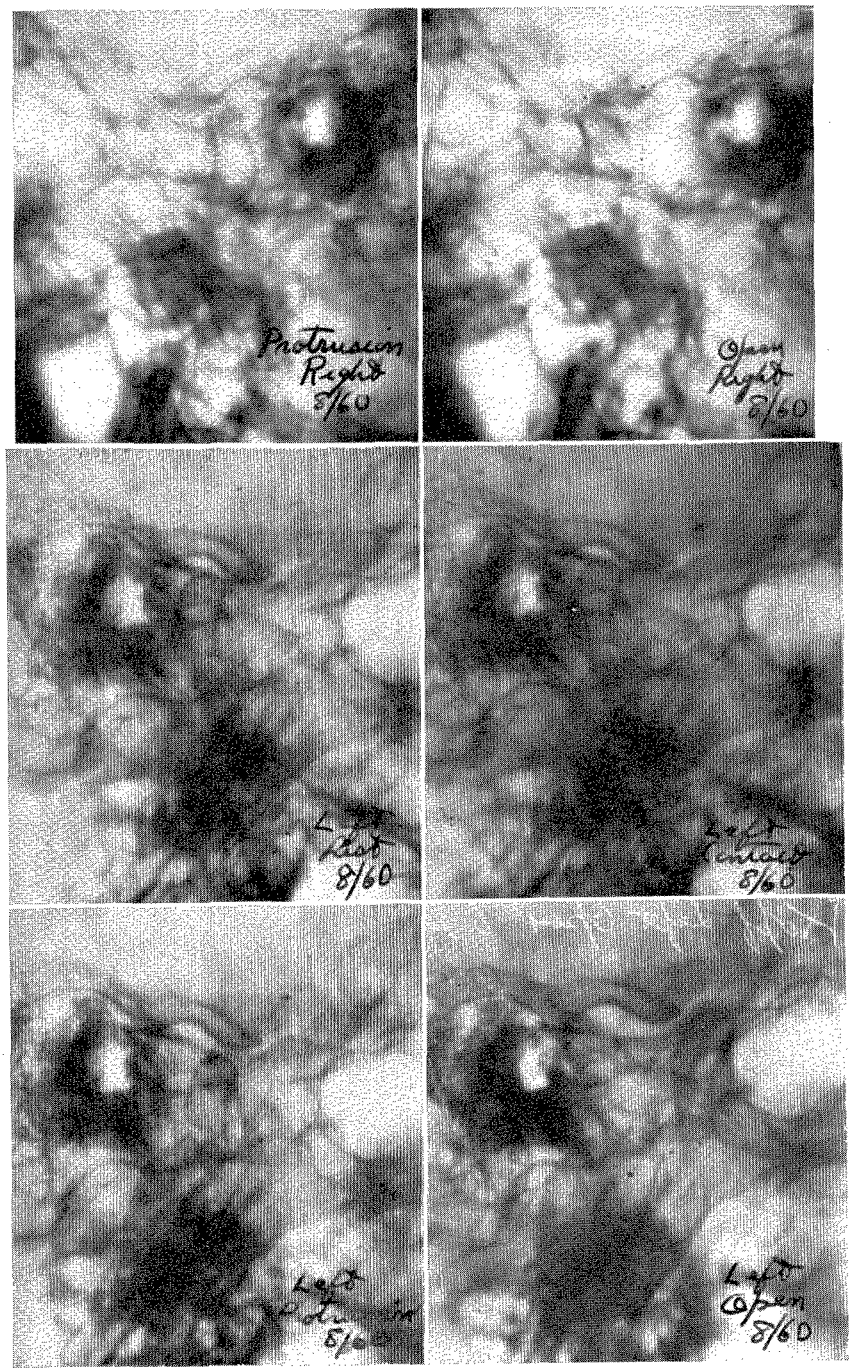


Fig. 775—cont'd. For legend see opposite page. Individual positions are written on each separate roentgenogram.

INJURY OF TEMPOROMANDIBULAR JOINT

There are occasions when the temporomandibular joint has been injured. In these a change within the joint itself and within the surrounding structures is possible.

Case 3

In November, 1949, a woman in her early twenties came for examination. The bite was open from the second molars forward. The upper and lower anterior teeth were upward of one fourth inch apart.

Past history

The history revealed that in 1946 four impacted third molars had been removed under general anesthesia. Extensive swelling had followed the surgery. There was a ten-day hospitalization period. In 1947 her temporomandibular joint roentgenograms disclosed no pathology. The history also revealed that in October, 1947, shock treatments had been instituted for a mental illness. This therapy lasted until mid-November, 1947. As she became delirious after eight treatments, they were discontinued. The over-all effect was to make the patient forget a great deal of her past history.

Present condition

It was difficult to obtain clearly discernible temporomandibular joint roentgenograms. From an examination of the bite-wing films which the referring dentist took in 1947, a normal molar interocclusal relationship was present. Her dentist did not recall her having an open bite in 1947. For some reason, the mandible seemed to have moved posteriorly. In so doing, it had moved below a wider portion of the maxilla. This had created an improper bicuspid and molar interocclusal relationship in which only the buccal cusps of the lower molars articulated with only the lingual cusps of the upper molars. As an additional result of this positioning, the lower third of her face had been elongated. There was a constant feeling of fatigue in her jaws. The left temporomandibular joint was painful to touch. There was no definite interocclusal position. Chewing food, swallowing, and speaking became conscious and difficult.

There was a definite temporomandibular change which was probably due to injury. It could have been initiated by the removal of the four impacted third molars which had been extracted under general anesthesia. The injury may have been augmented by the shock treatment. Muscular trismus also complicated the picture, although there was no way of telling whether this trismus had subsided during the preceding year. A very large horizontal overbite was present.

Diagnosis and treatment planning

Stone casts were made of the teeth. They were related by means of a face-bow upon a Hanau Model H articulator. Without placing the casts on the articulator by means of a centric relation wax record, but by simply relating the upper and lower cusps in the hand, a normal Angle Class I relationship was observed. This was probably her normal interocclusal position before the mandibular joints sustained their injury. It definitely appeared as though there was a condylar fossa change. The mandible had been permanently retruded, or appeared so. The patient had great difficulty in bringing her incisors into protrusive contact. The movement initiated joint pains.

Two interchangeable sets of casts were made in order to be able to operate on one set while keeping the second set intact for comparison. By means of a fine saw, first the molars were removed, followed by the bicuspids, taking care not to disturb the occlusal surfaces of the stone teeth. Even though the vertical dimension was finally closed and some form of functional interocclusal relationship was attained, the mandible was still retruded, and the anterior teeth did not meet. In spite of the drastic reduction of the vertical dimension of the stone teeth on the casts, it was still greater than the original vertical dimension which the patient probably had before the traumatic accidents.

A new centric relationship now existed which probably would have been impossible to change in any way other than by lowering the interocclusal relationship by operative and prosthetic procedures. Because any excessive reduction of their vertical height might endanger their pulps, the necessity of devitalizing one or more posterior teeth was considered. Using this method, the finished operative procedure would have resulted in sixteen gold inlays, one for each posterior tooth, correctly related at the decreased vertical dimension. The recession of the pulps of the involved teeth favored this approach. The case could have been treated surgically by mandibular resection, but it seemed like a radical procedure in contrast to the one which was just described. Simple occlusal equilibration by grinding would in no way accomplish the extensive reduction in vertical dimension that was necessary.

Suggested orthodontic therapy

The diagnosis and treatment planning were discussed with the patient's dentist. Before undertaking this work, the patient was referred to an oral surgeon and to an orthodontist for further consultation. The orthodontist advised that an attempt be made to reposition the mandible forward in spite of its apparent stable posterior relational position. Muscle exercises were to be a part of this therapy. Inasmuch as this was less involved than any other form of therapy that had been suggested, all parties concerned were in agreement that an attempt should be made first by the orthodontist. No one, including the orthodontist, was convinced of the possibility of success by means of this form of therapy. The patient was instructed in muscle exercises and agreed to practice them daily. She left . . . for an out-of-state home in November, 1949. In June, 1950, she returned and went to . . . to consult with another orthodontist. He agreed that there was a chance of being able to obtain a forward position of the mandible by orthodontic means.

Actual orthodontic treatment

In June, 1950, the orthodontic appliances were placed on her upper and lower teeth. Intermaxillary elastics were used. Mandibular joint roentgenograms were taken, but once again it was not possible to interpret them. The oral surgeon thought that the condyles were missing and gave that as a reason for the inability to obtain clear roentgenograms. The patient returned to her out-of-state home with the appliances in place. Muscle exercises were to be practiced daily. If no results were obtained within six months, the original prosthetic prescription would be undertaken.

Results

In December, 1950, the patient came to . . . for further observation. She had been conscientious with her elastics and with her muscle exercises. There had been a great improvement in her jaw relationship. She could now approximate her anterior teeth with some degree of comfort. In order to do so, she had to sit upright with her head forward. There were many premature contacts, and the interocclusal relationship was poor, but the intermaxillary elastics were no longer necessary, and she felt much happier. The mandible could still be retruded about three fourths of an inch. When this was done, the original open bite was present. What seems to have happened was that the gonial angle was now more acute than previously, and the osseous structure of the mandible had been bent upward by this change in its angle. The teeth also seemed to have shifted positions. A definite dual bite had now been established. It is also possible that there was a change in the condyle-fossa relationship.

Records should have been made in order to establish just where the changes had taken place. Unfortunately these were not obtainable because of apprehension on the part of the patient. This was early 1951.

Ten years later

This patient was not seen again for ten years. Upon inquiry, her orthodontist stated that she had had a difficult time physically and mentally in the interim. The orthodontist saw her in 1959 and observed that her occlusion had relapsed, but not to any great extent. She was 35 years old at this time and under constant psychiatric treatment. The orthodontist believed that the original cause was muscular spasm. If this were so, why did she develop the dual bite? When the

Text continued on p. 369.

Fig. 776. A woman in her early twenties showing a facial view of an open bite from the second molars forward. This photograph was taken in November, 1949. Her face was elongated, and the muscles appeared stretched and fatigued. (Figs. 776 to 784 are of the same case.)

Fig. 777. **A**, Same as Fig. 776 except that this is a view of the mouth with the mandible in its retruded position. The extent of the open bite can be observed. **B**, The mandible protruded. This is a forced position. The posterior molars contact.

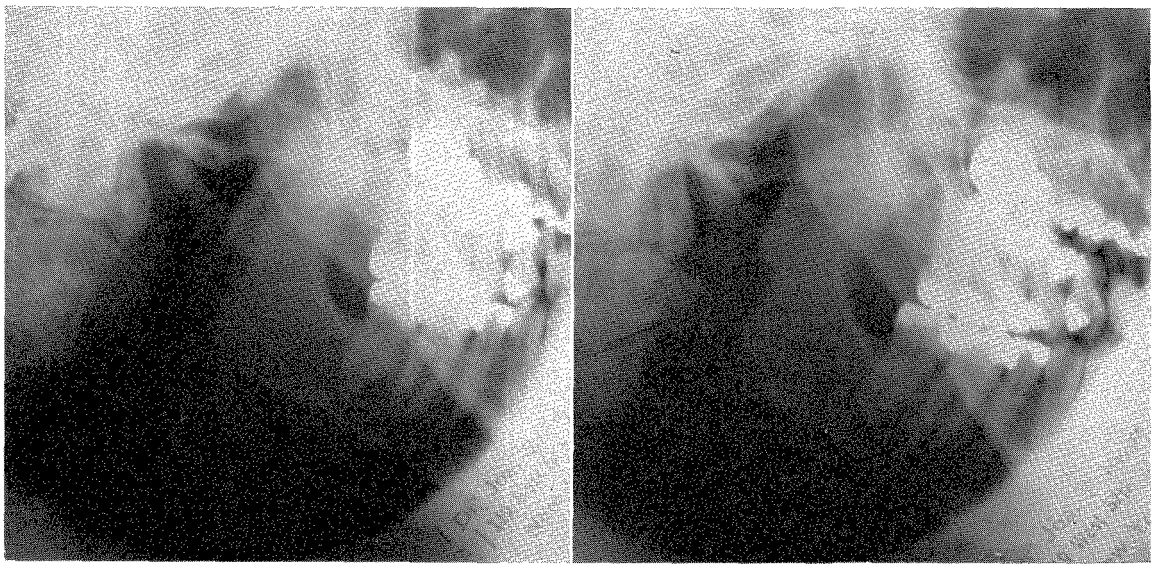


Fig. 778. Roentgenograms of the right temporomandibular joint with the mandible (**A**) protruded and (**B**) retruded. The protruded position is a forced one. There is no evidence of a condyle. (Refer to the text.)

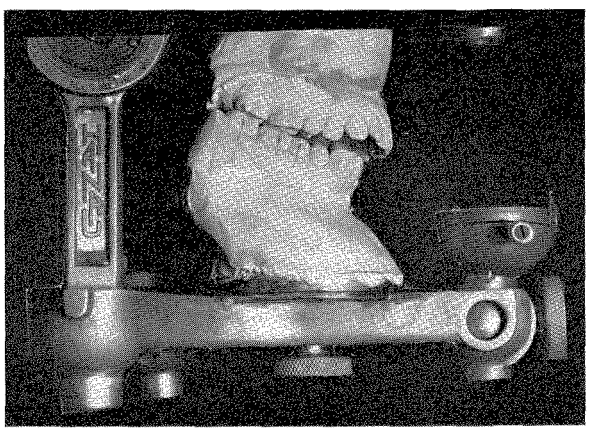


Fig. 779. Stone casts mounted upon a Hanau Model H articulator showing open bite from the second molar forward. These were taken in November, 1949.

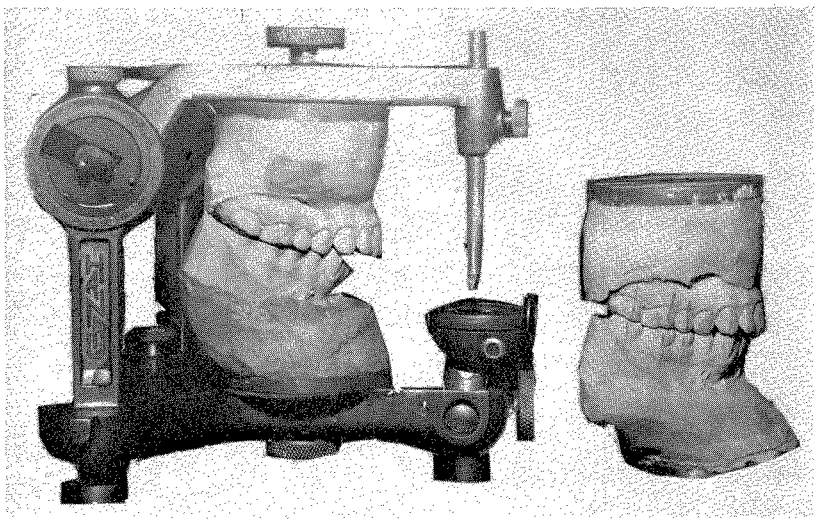


Fig. 780. With the casts removed from the articulator, the interocclusal relationship interdentated fairly normally, as shown on the right side. This was considered to be the original interocclusal relationship. The casts on the left which are mounted on the articulator had their stone posterior teeth ground down until a fair interocclusal relationship was attained. This would probably necessitate the devitalization of several posterior teeth because of the large amount of vertical decrease in order to attain contact between the posterior teeth, including the cuspids. In this form of mechanical treatment, the mandible would be positioned further posteriorly than shown by the casts on the right side of the photograph.

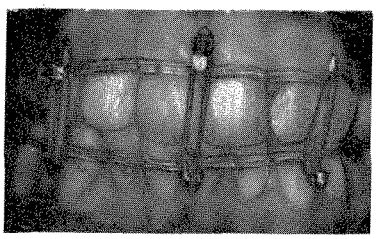


Fig. 781. In June, 1950, orthodontic appliances were placed upon her teeth as shown here. (Courtesy Dr. Dennis D. Glucksman, New York, N. Y.)

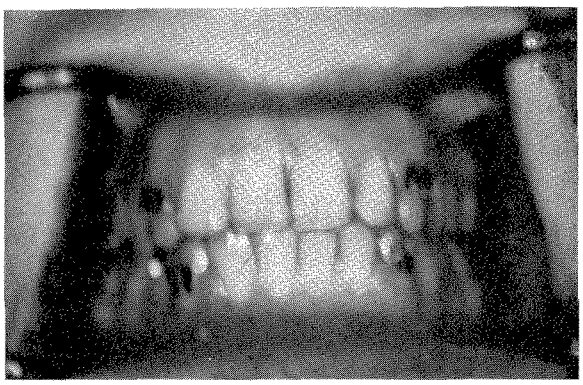


Fig. 782. This photograph was taken in 1951. The anterior teeth were approximated. (Refer to text.) (Courtesy Dr. Dennis D. Glucksman, New York, N. Y.)

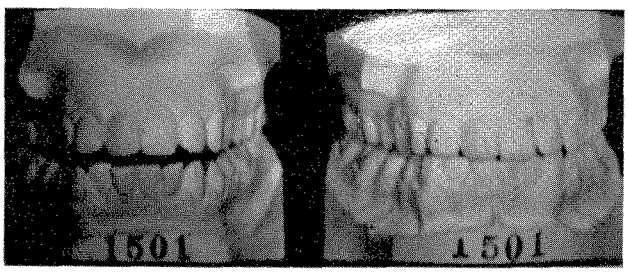


Fig. 783. Casts of the teeth before and after. These were taken in 1951. (Courtesy Dr. Dennis D. Glucksman, New York, N. Y.)

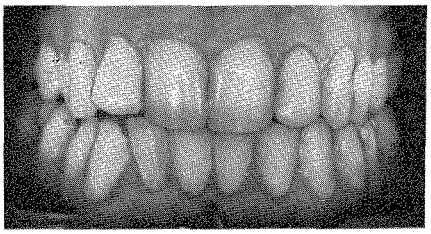


Fig. 784. Photograph taken in 1956 showing teeth occluding. (Courtesy Dr. Dennis D. Glucksman, New York, N. Y.)

spasm was relieved, why did the mandible not automatically move forward to its original position? And why was it possible for her to retrude her mandible further? This case is perplexing, but once again it demonstrates the many facets of true mandibular repositioning where a reorientation of all the structures, as well as the bony scaffolding, is necessary. Such was not the case here. (Figs. 776 to 784.)

CONTINUATION OF DISCUSSION OF DEEP VERTICAL OVERBITES

More will be said about raising the vertical dimension in cases of deep vertical overbites and those patients with retruded mandibles desiring repositioning in order to attain a more cosmetic appearance. This will be discussed under the classification of dual bites and open bite problem cases. For the present let us continue to discuss deep vertical anterior overbites.

Case 4

Clinical observation reveals many patients with such apparent malocclusions, yet both structurally and functionally their stomatological systems have remained

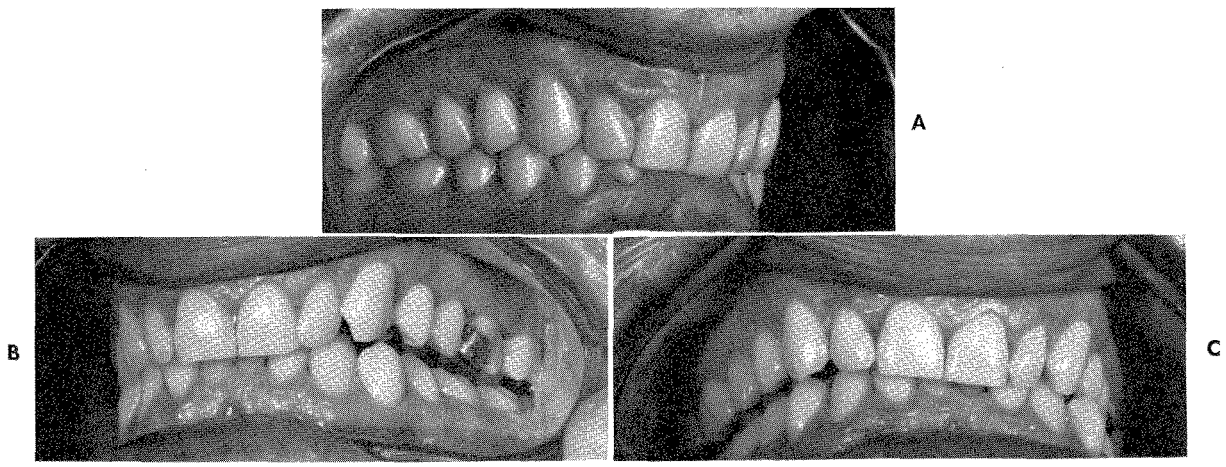


Fig. 785. A, Good example of a natural deep overbite in a 43-year-old man. Teeth and bone in good condition. Thirty-two teeth present. **B** and **C,** The working and balancing bites of the patient in **A.** The range is not extensive, but there are working and balancing bites. In the protrusive bite the posterior teeth are immediately taken out of contact. These photographs were taken in 1949. (Figs. 785 to 787 are of the same case.)

Fig. 786. Same patient as shown in Fig. 785. These photographs were taken in 1962 when the patient was 56 years old.

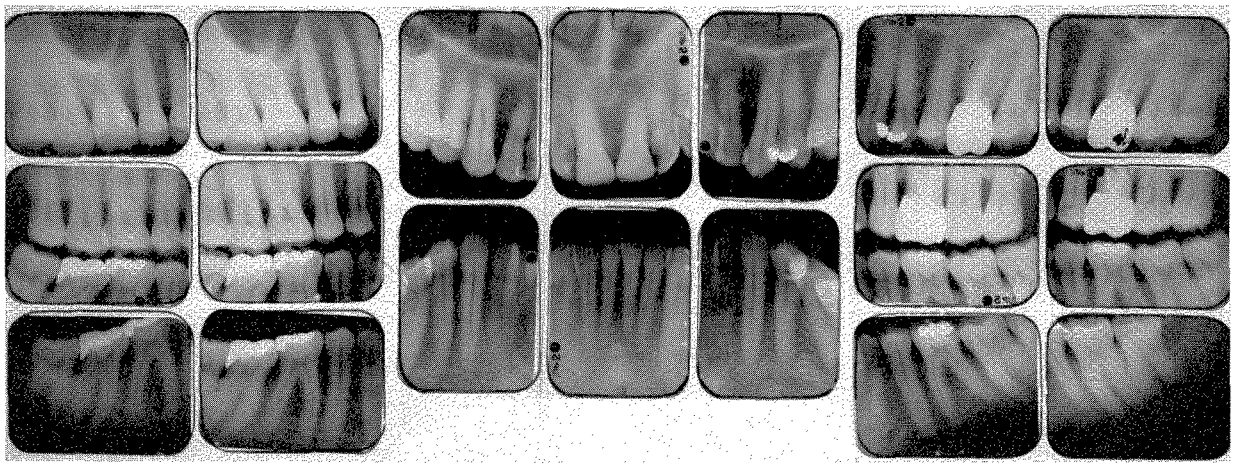


Fig. 787. Roentgenograms taken in August, 1961, of the patient shown in Figs. 785 and 786. The teeth and osseous structures are in excellent condition.

satisfactory in spite of the aging process. For these patients, several of whom already have been presented, vertical chewing is a necessity. A chopping stroke is the predominant one. The example which will now be shown is typical in the static interocclusal relationship. The maxillary incisors touch the lower labial gums, and the mandibular incisors reach the palatal gum tissue. There is a steep anteroposterior occlusal curve. Such a case was reported in 1951.* (Figs. 785 to 787.)

Case 5

This patient, another with a faulty overbite and overjet, came for regular dental treatment in the 1920's. His 1931 roentgenograms are shown. He was 42 years old when these were taken. His lower incisors had erupted beyond the normal occlusal plane. This abnormal eruption sometimes causes a separation between the upper incisors. It is difficult to account for the force which causes this overeruption

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., p. 772.

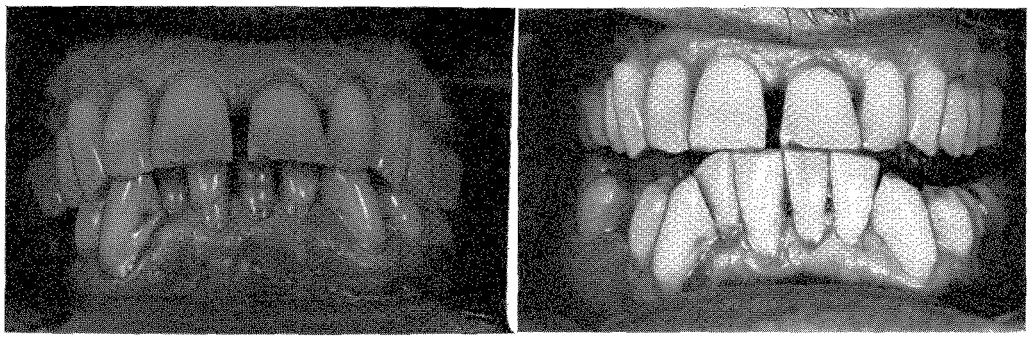


Fig. 788. The mouth of a man in his early forties showing a deep vertical overbite and a horizontal overjet. (Figs. 788 to 792 are of the same case.)

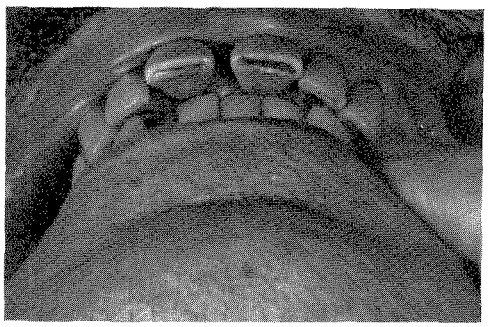


Fig. 789. The lower incisors contact the gum pad behind the upper incisors.

to take place, but that it does take place is evident. Two similar cases to this one were reported by me in 1951.* This patient in 1962 was 73 years old. In the past thirty-one years since the 1931 roentgenograms were taken, he had lost only four teeth. The nonvital lower right first molar was removed in the 1930's when the wave of extractions because of the possibility of focal infection caused the loss of many teeth which might otherwise have been treated and retained.

In 1955 the patient suffered a coronary attack and lost the upper left first bicuspid as a result of neglect plus his inability to submit to pulp therapy during that period. The two upper third molars were removed recently because of gum pockets. Oddly enough, the lower right first molar was replaced long ago with a clasp partial denture. He would never permit its replacement with a fixed bridge. He had been urged to have the left upper central incisor crowned but continually refused.

If it were possible to examine more documentary evidence of such cases as these, it would become increasingly apparent that these cases should not be disturbed unless there is more evidence of deterioration than they usually present. They are better left alone. (Figs. 788 to 792.)

If treatment must be undertaken, the minimum requirements should first be attempted. In some of the more involved cases, simple procedures may not suffice, and complete oral reintegration may be required. Heredity has its effect upon all types of occlusions. Many examples may be cited to establish the validity of this

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., p. 788, Figs. 608 and 609.

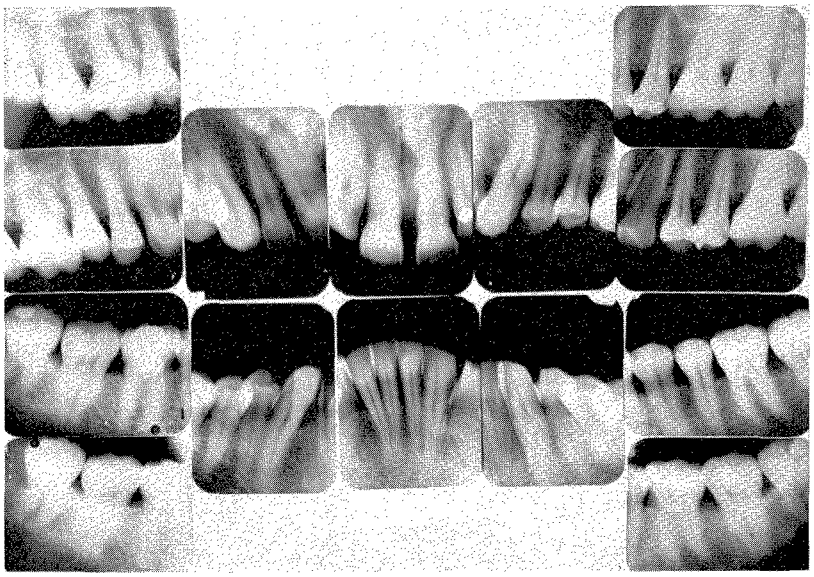


Fig. 790. Roentgenograms taken in 1931, when the patient was 42 years old, showing a complete set of thirty-two teeth and good oral structures.

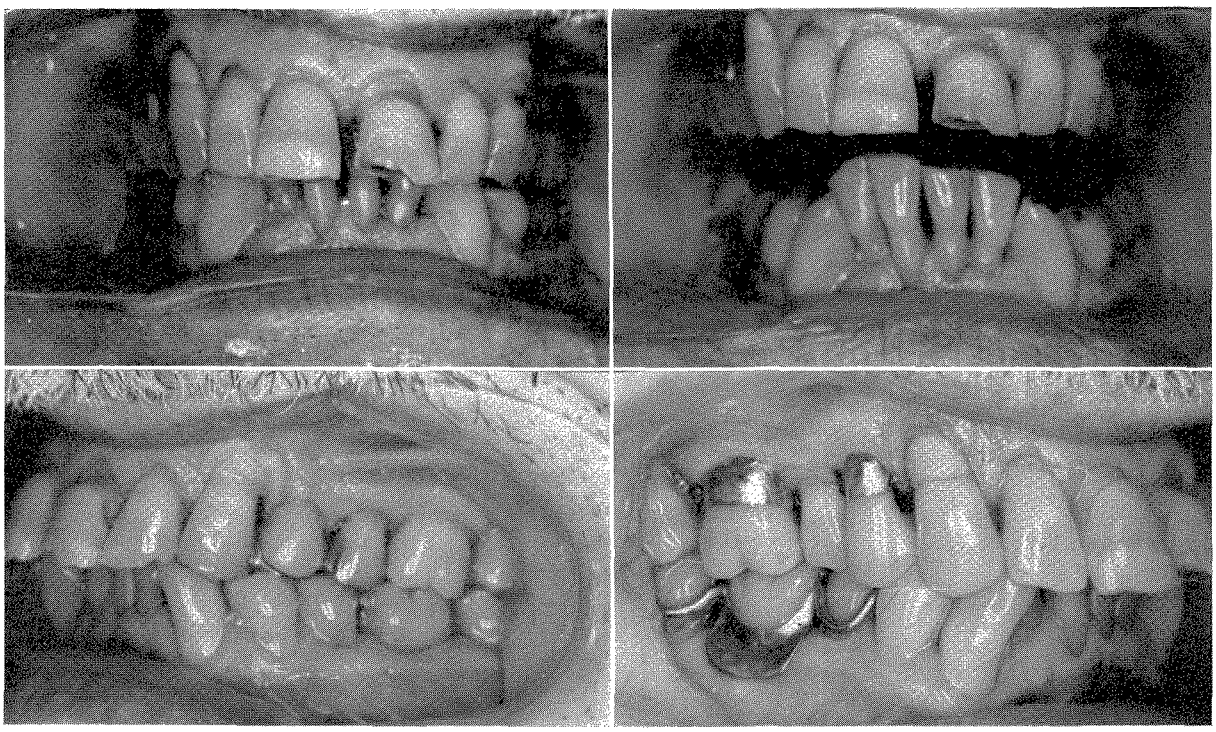


Fig. 791. Four views of the mouth as it looked in 1962. The patient was then 73 years old. The structures were still good.

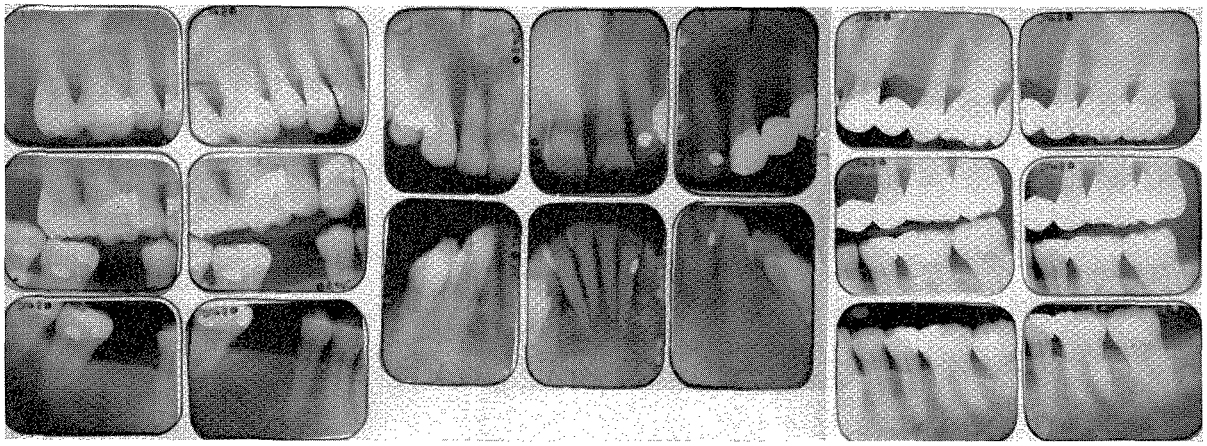


Fig. 792. Roentgenograms of the patient taken in 1962. Compare these with those in Fig. 790 which were taken thirty-one years previously.

theory. Several of these were already reported in the previous literature* and in this text. (See pp. 287 to 292 and 294 to 296.)

Case 6

The following report of a woman related to two patients discussed previously is a further example. (See Figs. 642 to 648, pp. 294 to 297.)

Present condition and treatment

A severe vertical overbite was present, and although no treatment had been instituted, it was observed for many years with apprehension. Only when the lower incisors showed definite signs of deterioration did it become necessary to consider treatment. The objective was to protect these teeth without disturbing the vertical dimension. To accomplish this with a minimum of effort, five of the six lower anterior teeth were covered with full crowns constructed of porcelain bonded to metal. The right lateral incisor was left uncovered because it had been least affected and also because it acted as a guide to the occlusion.

Conclusions

Not only was this method of treatment less difficult and time consuming than complete oral rehabilitation, but it was also considerably less expensive and involved little risk. Five years after the work was completed no further deterioration had taken place, and at that time (1962) the patient was 56 years old. She was very grateful for having been able to avoid the more complex forms of treatment.

The obvious undesirable feature of the present method of treatment is the abrasion which porcelain causes when continually contacting the natural enamel of the opposing upper teeth. Up to now, this has been minimal. However, it must be watched. (Figs. 793 to 798.)

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*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 694 and 695.

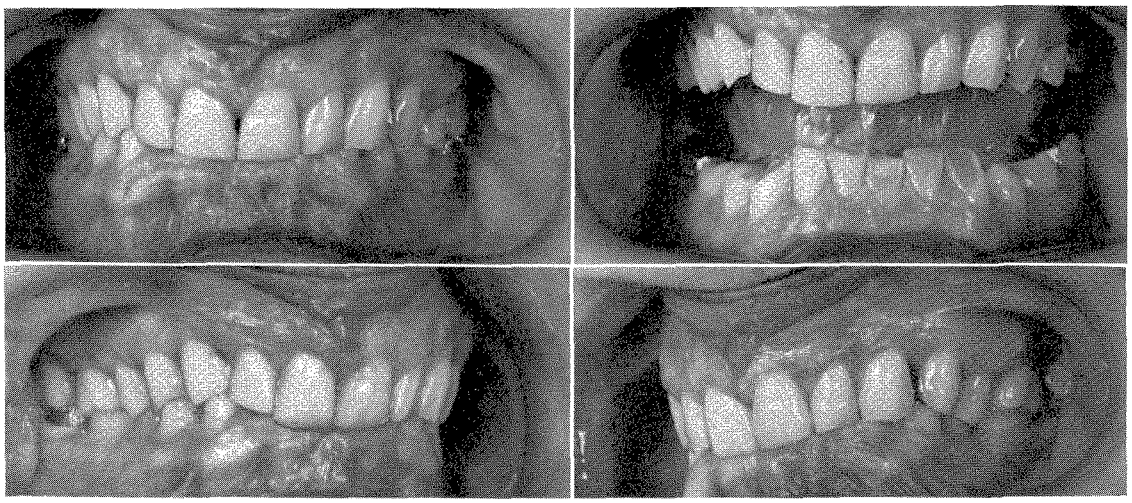

Fig. 793. Four views of the teeth of a 47-year-old woman with a deep overbite. (These photographs were taken in 1953.) This patient's brother and nephew are shown in Figs. 642 to 648. (Figs. 793 to 798 are of the same case.)

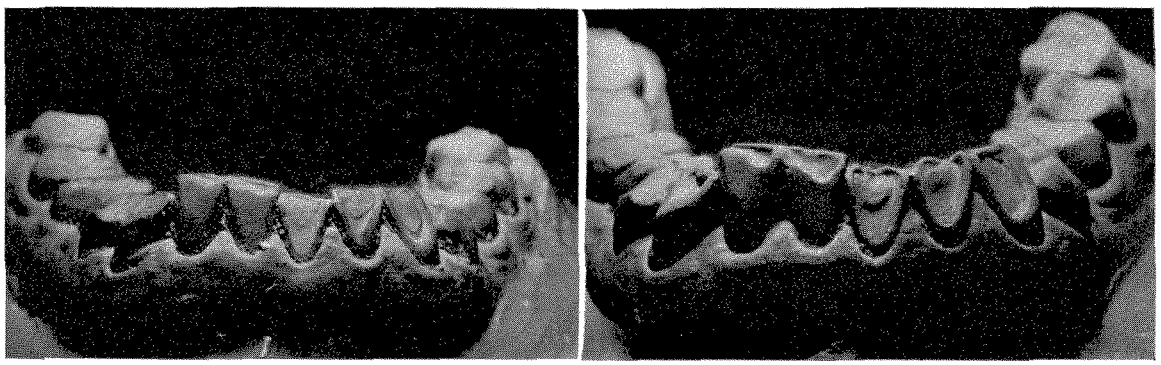

Fig. 794. A, Cast of the lower teeth taken in 1952. **B,** Cast of the lower teeth taken in 1956. The abrasion made deep inroads into the lower incisors and cuspids in four years.

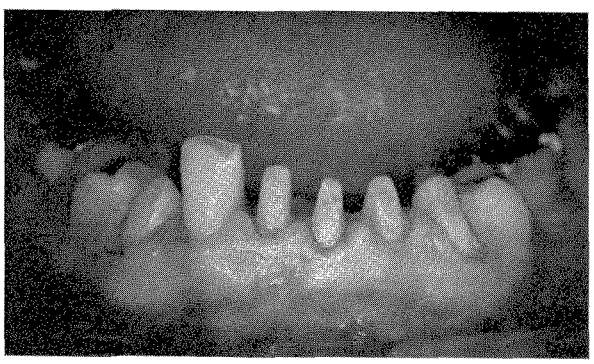

Fig. 795. The lower anterior teeth were prepared for five porcelain bonded-to-metal crowns, as shown here. This was done in October, 1956. The right lateral incisor was left uncovered.

Fig. 796. The porcelain bonded-to-metal crowns were inserted and are shown here in position.

Fig. 797. Four views of the mouth as it was in November, 1961. The patient was then 55 years old.

Fig. 798. Roentgenograms taken in March, 1962.

DEEP OVERBITES AS A RESULT OF DISEASE

Deep overbites may be the result of specific disease such as rheumatism, gout, and arthritis. These maladies may bring about skeletal changes which in turn may cause severe alterations in posture. Changes in the structure of the bones of the skeletal frame can cause a shortening or elongation of the origin and insertion

distances of the muscles of mastication as well as those associated with maintaining the relational position of the mandible to the maxilla. The most carefully planned and executed cases of occlusal reconstruction may eventually fail if the patient has been subjected to these diseases.

DENTISTRY HAS SEVERAL IMPORTANT AIMS

The efforts of those who maintain that correct occlusion and articulation are the aims of dentistry are to be commended. A well-coordinated occlusal pattern should be a goal, but to discover just what that occlusal pattern should resemble is not clear. Over a quarter of a century of careful documentation demonstrated that, although occlusion is important, it is still only one factor. There are others of equal if not greater importance. One is the so-called systemic or bone factor. Although it has already been discussed, more cases will continue to be shown in which illness in some part of the body may cause the breakdown of the most carefully coordinated interocclusal relationships.

Case 7

Present condition

The patient whose report follows was initially examined in 1944,* at the age of 47. His interocclusal relationship had completely deteriorated. The teeth had been severely abraded and probably intruded. There were missing teeth and pernicious habits of clenching and bruxing. Because of the severe closure of the bite, functional chewing distorted his face. Even so, the roentgenograms revealed good bone structure surrounding his remaining teeth. This may have been because of his arthritic condition. Arthritic cases seem to have an abundance of calcium. This may be beneficial to bone formation, and hence the end result may be strong dental structures. The patient complained of not being able to open his mouth wide enough to enable him to place his thumb between his front teeth.

The systemic factor

What one must be concerned with in cases of this nature is whether or not the systemic factor, which was responsible for the change in his posture and the closing of his bite, will not continue to operate after the oral reintegration has been completed. If these noxious influences continue to operate, the most carefully executed occlusions will be destroyed, and the final results will compare poorly with what the work resembled when it was inserted.

Diagnosis, treatment planning, and treatment

This case was planned carefully and took many months to execute. The Hanau kinoscope was the articulator which was used. It is regarded as one of the more accurate of those considered in the semiadjustable category. Needlepoint tracings

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*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 935-939.

were taken. Lateral, protrusive, and centric mandibular positions were registered by means of plaster and wax records. Surgery was performed in order to lengthen the short-crowned vital teeth and thus avoid their devitalization. In the removable partial dentures the occlusal load was divided over many teeth. Precision attachments acted as retaining devices. Large areas of the palate and lower ridges were covered by gold saddles in an effort to secure tissue as well as tooth support. Splinting was resorted to.

Knowing that it would be necessary to increase the vertical dimension in order to insert any prosthesis, this was first carried out in the transitional work. These bridges, at the newly established dimension, were then worn for several months to permit the oral tissues to react and to stabilize before inserting the final work. During this period different tissues reacted in various ways. The natural teeth were probably intruded whereas the alveolar ridges and soft tissues were resorbed until an equilibrium was again established at a new vertical dimension.

Infringing upon the free-way space

This leads to another area of discussion. There are instances when it is mechanically impossible to insert fixed or removable partial dentures unless the vertical dimension is raised. (See pp. 330 to 335, Figs. 715 to 730.) The word raised is used advisedly because in cases of this type the free-way space is infringed upon. If this happens when full dentures are inserted, the soft tissues and bony structures are resorbed until finally a normal free-way space is attained. However, when this takes place in dentulous cases such as Case 7, the natural teeth are intruded, and the tissues that are covered by the saddle areas are resorbed until the free-way space is re-established. This was clearly demonstrated in the patient whose case was shown in Figs. 715 to 730.

Concerning intrusion of teeth

Several examples of teeth being intruded, upon infringement of the free-way space, were reported.* This is more readily observed when the bite is opened only on the posterior teeth and to such a degree that the incisors are removed from contact. As the bite closed, the anterior teeth again contact until the original vertical overbite is established. In cases of similar nature this repeatedly takes place. It is due not alone to a depression of the posterior teeth but also to an overeruption of the anterior teeth in their effort to make contact.

With this evidence, if the amount of space originally obtained by opening the bite is to be retained, the increase in the vertical height must be so established that both anterior and posterior teeth are included instead of only the posterior ones. Then, the increase in the vertical dimension will be retained because all the teeth will be intruded simultaneously. It is difficult in these cases to observe or to even measure where and how the intrusion of the teeth took place, yet clinical evidence points to this conclusion.

Where there is a combination of removable and fixed prostheses in the same arch, it sometimes is necessary to increase the vertical dimension beyond the nor-

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 825-831.

mal. As a result, the tissue becomes inflamed beneath the saddle areas of the removable partial denture. This testifies to the pressures that are exerted as the muscles intrude the natural teeth and the removable partial denture in an effort to return to their normal origin and insertion length and re-establish a normal free-way space.

The reader is referred to pp. 320 to 325 for additional evidence to these statements.

With the preceding as a background, temporary procedures were first applied in order to establish sufficient room for good function and a normal free-way space, before engaging upon the final work.

Methods of obtaining necessary vertical room

When a mouth of this type is being rehabilitated, there are compromises that must be made during the entire complicated procedure. Though there is insufficient vertical height present to permit the replacement of teeth, the necessary room must be obtained from somewhere. There are several procedures that may be used to obtain this space.

The first would be guided by the assumption that originally there was a large free-way space and that the vertical growth and eruption of the teeth used up only a small portion. If this were true, then the vertical height of the teeth could be increased in the replacements without infringing upon the free-way space.

From careful observations using the obtainable clinical records of rest position, swallowing habits, pronunciation of various words, and other conventional routine methods,* the free-way space was not found to be excessive.

A second method of obtaining vertical height has been to resect surgically the soft tissues and alveolar bone around the natural teeth to increase the size of the clinical crowns (Fig. 718, **B**). By so doing, the teeth are made longer, and the free-way space needs to be increased that much less. These teeth that are so treated must have roots long enough to permit resection without unduly decreasing the correct crown-to-root proportion. This crown-to-root proportion should never exceed one to one if sufficient root is to remain in alveolar bone to provide adequate support to the remaining tooth. The clinical crown should be at most the same vertical length as the remaining root after the operation. (Figs. 806 to 810.)

Where the clinical crowns are unusually short, as they were in this case, the danger of devitalization during the operative procedure is ever present if these teeth must be shortened further to provide room for the restorations.

A third method of procedure, where possible, is to shorten the upper anterior teeth by grinding so that the bite does not have to be raised excessively.

A fourth method is by the use of a bite plate such as the Hawley which has the lingual platform to contact the lower anterior teeth only. The posterior teeth are taken out of occlusion. The desirable effects of this form of therapy are the intrusion of the lower anterior teeth, thereby decreasing the vertical overbite, and the continued eruption of the posterior teeth in their attempt to attain occlusal contacts. What probably takes effect is a combination of both movements.

All cases, however, are not amenable to all four forms of therapy aimed at pro-

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 510-567.

viding sufficient vertical room. It sometimes becomes necessary to encroach upon the free-way space. This is done with the knowledge of the dentist and not by accident—not unconsciously but deliberately. It is more successful when a large number of natural teeth are involved and when these teeth make interocclusal contact at the new level of opening.

In this instance the ability to intrude teeth helped solve the problem. Most of us recognize that over the years the free-way space has been infringed upon in some of the many dentitions that have been reconstructed. In spite of this, some of these cases were successful. Perhaps the greatest asset in achieving these successes was the experience and ability of the individual operator. Where the free-way space must be infringed upon, undoubtedly a combination of intrusion, surgery, shortening of the upper teeth, and a reorientation of the entire neuromuscular mechanism all play their part in achieving these successful results.

Although the free-way space is deliberately violated in this type of case and the origin and insertion length of the muscles is lengthened, this increased dimension is gradually closed over a period of time until the final result is almost the same origin and insertion length of the muscles as their original one, only now there is more room to insert teeth. The infringement on the free-way space was only temporary.

Returning to the case being discussed, the vertical dimension had to be raised considerably in the transitional work. This consisted of upper and lower fixed and removable prostheses. The patient wore this work for several months in order to permit the soft and hard tissues to adjust to the new dimensions. During this period the bite closed until it supposedly reached a point of stabilization. Then, after a careful evaluation, the final phase of the reconstruction was undertaken in April, 1944. It was completed in March, 1945, nearly a year later.

Further discussion

From the time of completion until the patient's death in 1955 at the age of 58, there was a constant struggle between the neuromuscular system, the teeth, and the osseous structures. The vertical dimension, which was considered to have stabilized after wearing the transitional work for several months, continued to close. The facial profiles clearly demonstrate this. The clenching, bruxing, and clamping never ceased. A comparison of 1945 and 1949 casts showed severe abrasion and attrition of all of the biting surfaces.

Because of the strong construction of the fixed and removable prostheses, there was little or no breakage. The elimination of anterior porcelain jacket crowns further insured the prosthesis against the destructive forces of the interocclusal pressures. These pressures resulted from continued postural changes due to the nature of his arthritic condition and other systemic ailments. It is interesting to note that the roentgenograms continually revealed stable and healthy osseous structures. His temporomandibular joint roentgenograms were difficult to evaluate owing to the density of the osseous structures, but they revealed nothing abnormal. He never complained of his mandibular articulation. As this patient suffered from rheumatism, gout, and arthritis, this type of pathology probably served to create dense bone which in turn helped sustain his dental structures in spite of severe trauma.

Attempt to re-establish centric relation

During the years following the insertion of the final work, his centric relation was upset and altered. The mandible had deviated to the left. A functional bite had been adopted. In March, 1949, centric bearing plates were inserted in his mouth, and an attempt was made to re-establish his centric relation position by occlusal equilibration. This was only partially successful. Every so often the saddles of his removable partial dentures had to be relieved by grinding where they had caused tissue inflammation.

Aging and postural changes

The patient was continually under medical care although he still led an active life. The joints of his hands became enlarged and disfigured. By 1954, nine years after completion, the vertical dimension had closed until it had reached what probably was its original length. It may have even closed further owing to continued deteriorating postural changes. The prosthesis was worn and battered but still holding because of its strong construction. During these years the patient had aged considerably. His posture had changed drastically. His head was bent forward and downward. He stooped in walking. The final records were made in 1954. The roentgenograms still disclosed healthy structures. He died of a coronary attack in 1955 at the age of 58. The patient-doctor relationship was most cordial. He was extremely grateful for all the interest that had been taken in his physical and dental welfare.

Much can be learned from a study of this case report. Once again we are confronted with our woeful lack of knowledge as to prevention of the destructive forces. It would have been possible to again reconstruct this mouth at the present established vertical dimension. There would have been no reason at this time for its increase. However, the patient was ill and consequently the work was never attempted. It is not even certain whether the occlusion would have remained stable had the vertical dimension not been altered in this second reconstruction.

Permanent changes had taken place

In the case just reported, the change in the entire skeletal structure and the alteration in the origin and insertion lengths of the muscles were important factors in causing the original abrasion and attrition and the subsequent closed bite. After the vertical dimension was restored by complete oral rehabilitation to a position that was closer to the one the patient had in his youth, the subsequent collapse of the dentition was due to the attempt made by the muscles to seek their normal origin and insertion lengths. There is little doubt that at some previous time he possessed a free-way space and an interocclusal vertical distance that was at least as long as the one to which his occlusion was restored.

The important fact now to remember is that a permanent change had taken place in his total being because of disease of one nature or another. When he was first examined, the free-way space had to be measured with due consideration to this important change.

Failure to do so for these patients often results in severe traumatic adjustments in which the neuromuscular system, the osseous tissues, and the temporomandibular joints battle for supremacy. The muscles usually win. As a result, carefully planned and executed cases are destroyed. (Figs. 799 to 841.)

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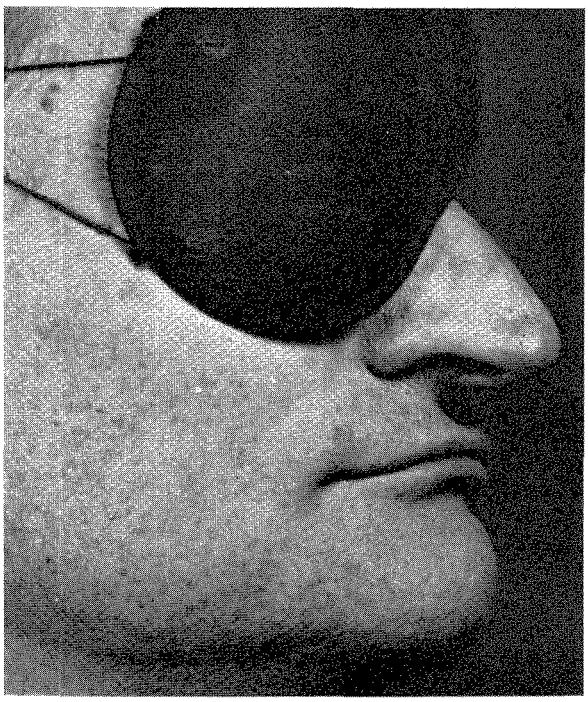

Fig. 799. The profile of the patient at the start of the rehabilitation. Observe the closure of the vertical dimension, which gives the lips their pouty expression. Compare this with the profile after the insertion of the temporary work (Fig. 805) and the profile of the completed work (Fig. 829). The patient was 47 years old at this time (1944). (Figs. 799 to 841 are of the same case.)

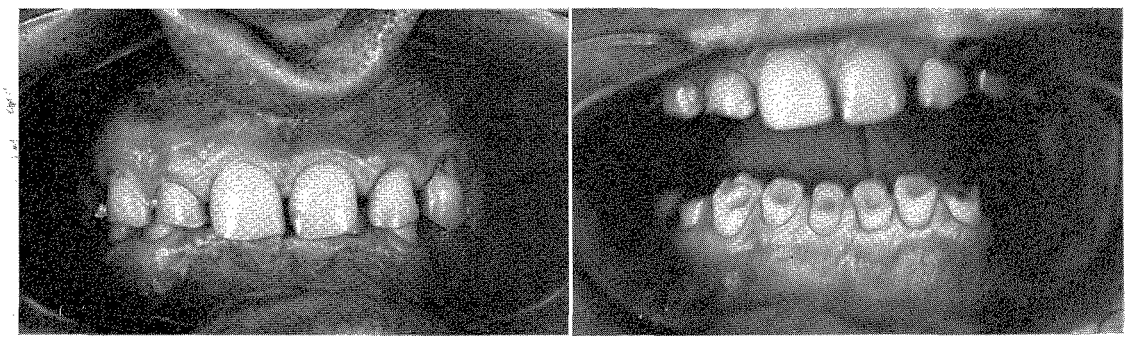

Fig. 800. The mouth at the start of treatment in open and closed positions of the teeth. The lower teeth presented frail and ragged edges. When these edges were removed, the lower teeth were practically at the level of the gums. The upper teeth in closure contacted the labial surface of the lower gingiva.

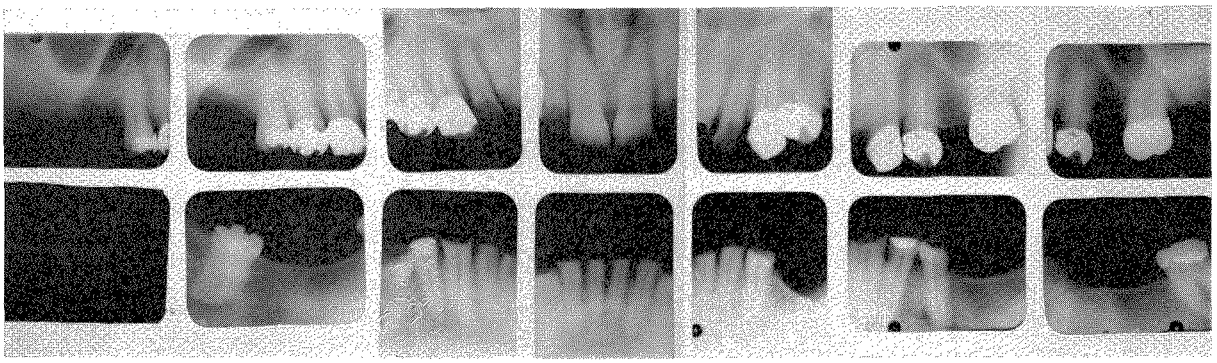

Fig. 801. Roentgenograms taken in 1944 at the start of treatment. The oral structures were excellent.

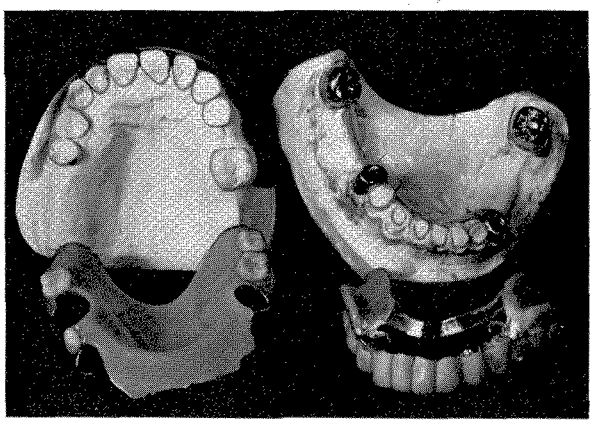

Fig. 802. The transitional splints which were constructed to raise the bite. First the four lower posterior cast crowns were made. Then the lower metal frame for the lingual bar was cast. Wax was added to this, and a centric bite was taken directly in the mouth at the increased vertical dimension. This was transferred back to a Hagman balancer, upon which these temporary partial dentures were processed. With the raising of the vertical dimension, the mandible was in a position which was considerably posterior to its starting position. This necessitated the construction of a flat anterior lingual platform on the upper prosthesis in order to permit contact with the large horizontal overjet.

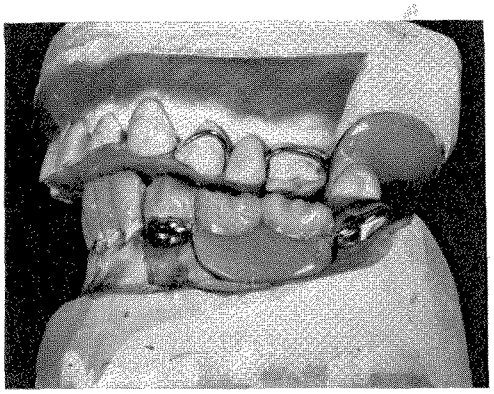

Fig. 803. The completed splints on their respective casts to show the interocclusal relationship. Some idea of the extent to which the vertical dimension was restored can be gauged here. Also, observe the position of the lower teeth with reference to the upper teeth in this sagittal projection. There is a large horizontal overjet.

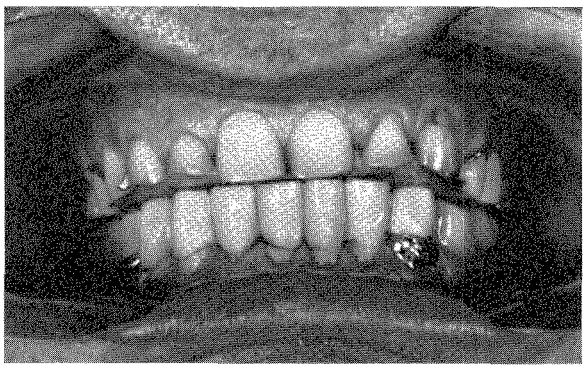

Fig. 804. The splints are shown here after their insertion in the mouth. Compare this with Fig. 800, **left,** to see how much the vertical dimension was increased. This phase was completed in July, 1944.

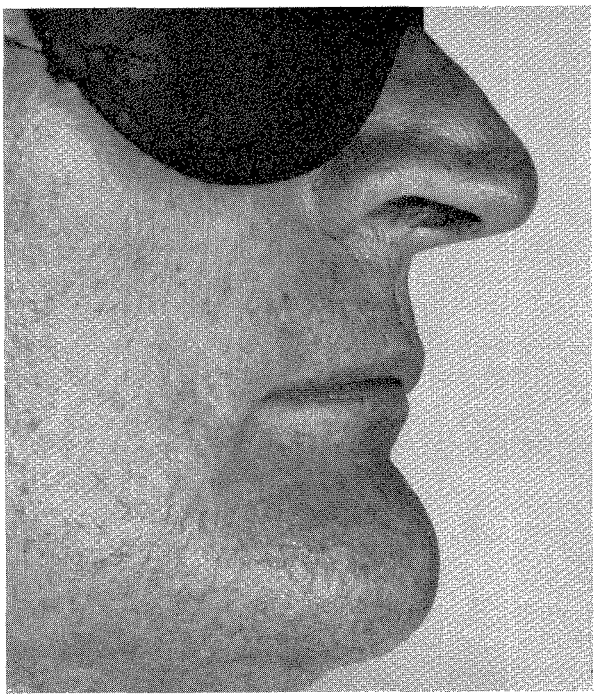

Fig. 805. The profile as a result of the insertion of the temporary partial dentures. Compare this with Figs. 799 and 829.

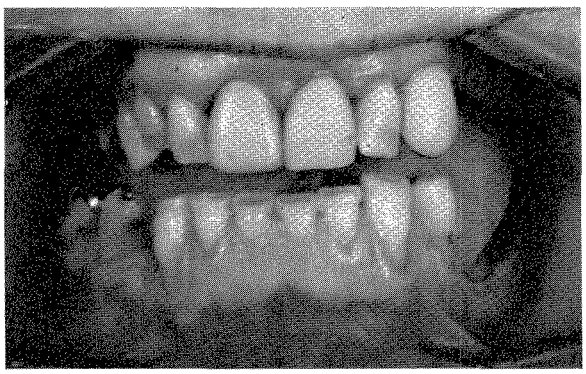

Fig. 806. Although this is the mouth of a different patient, it shows the method used in elongating the lower anterior teeth where more vertical length is needed. In this case, and in the one just being described, the teeth are vital. The lower teeth are shown just prior to surgery. This is the mouth of a young woman. (Figs. 806 to 810 are of the same case and have been inserted in this series.)

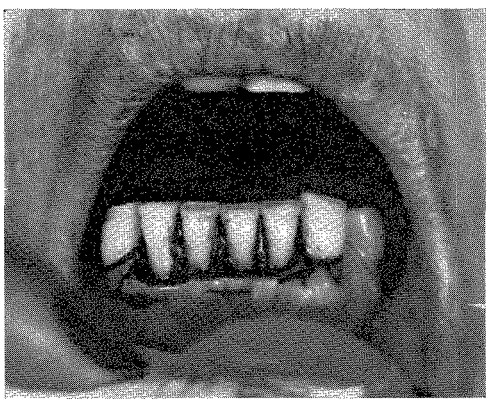

Fig. 807. The gum tissue was flapped, and the alveolar bone was reduced around the four incisors to increase their clinical crowns. The soft tissues were sutured back in position. A pack will be applied and kept in place until healing is complete.

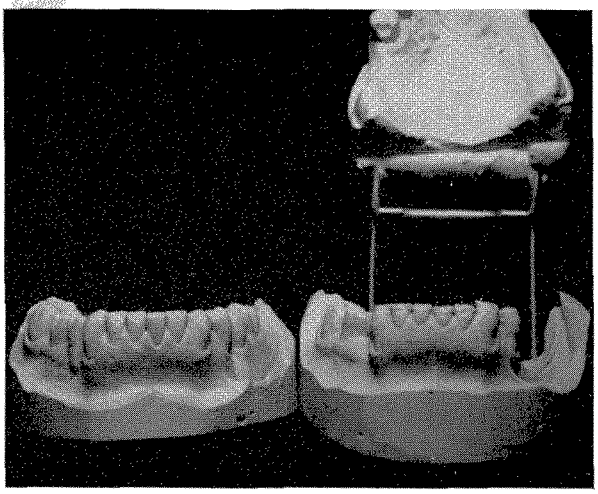

Fig. 808. Before and after casts of the lower incisors before surgery and after the reconstruction was completed.

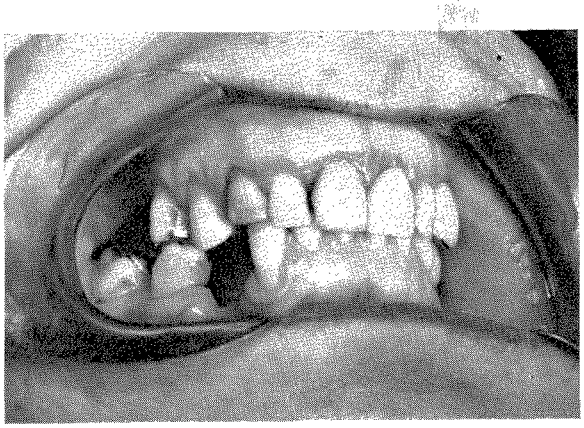

Fig. 809. The mouth of the patient shown in Figs. 806 to 808 before treatment and before the clinical crowns of the lower incisors were elongated by surgery.

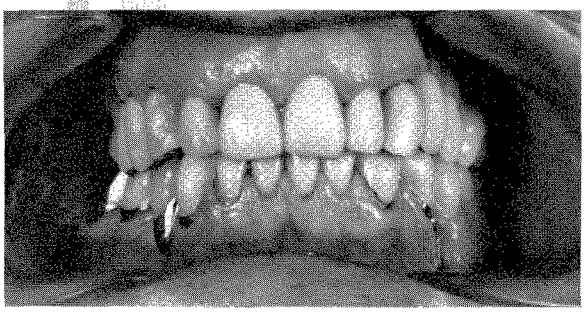

Fig. 810. The completed reconstruction showing the lower and upper anterior teeth covered by porcelain jacket crowns. The lower incisors are still vital. The gum tissue is healthy and normal.

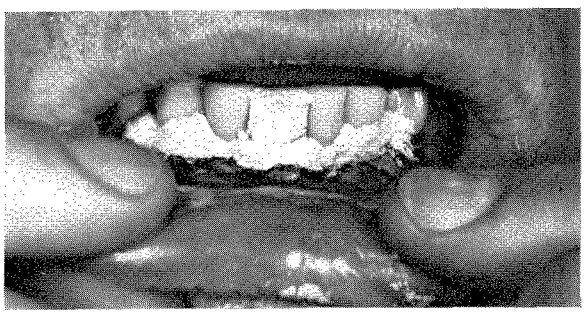

Fig. 811. In a similar manner, the patient shown in Figs. 799 to 805 had the lower gums resected in order to elongate the clinical crowns without devitalizing the teeth. The pack which acts to protect the gums during healing is shown in position. The temporary splint has been placed over it.

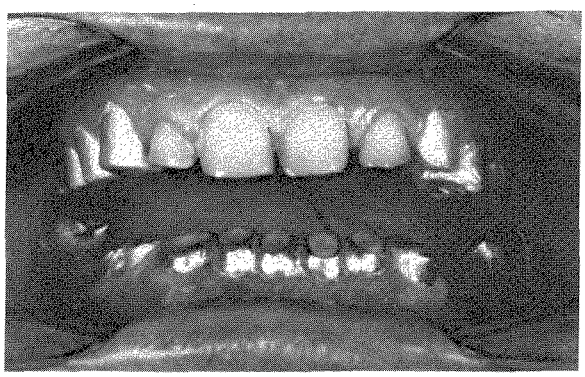

Fig. 812. The gold splint shown here covering the lower incisors was made to protect the incisors from sensitivity and also to prevent the soft tissues from again returning to their previous position. This was inserted forty-eight hours after the surgery. The lower splint was cut out in order to accommodate it. The lower incisors and cuspids are all vital teeth.

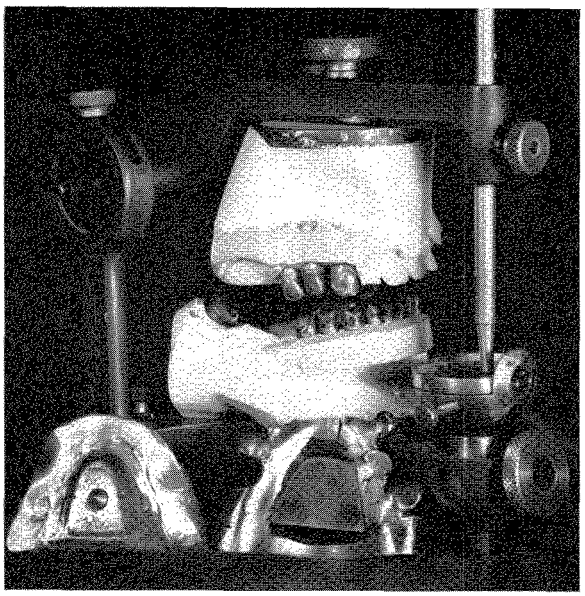

Fig. 813. The teeth were prepared for crowns. Copper-plated dies were made. Wax registrations were taken, and the casts were mounted upon the Hanau Model H articulator. Upper and lower metal plates were made with which the mandibular positions were to be registered. There were cast crowns on their undersurface which would fit over some of the prepared teeth in order to provide for stabilization.

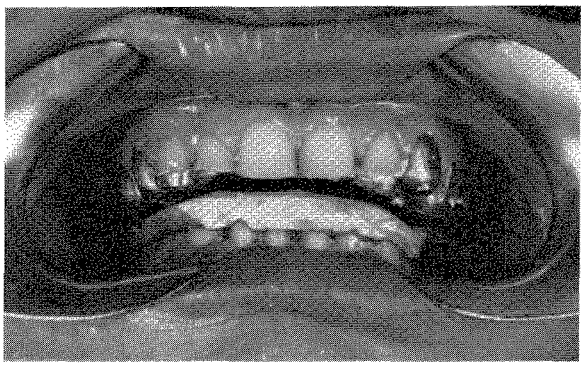

Fig. 814. The registration plates are shown here in the mouth. The central-bearing screw is on the lower cast. The jaws are separated by means of it. Registrations will now be taken in plaster of centric relation and right and left lateral and protrusive mandibular movements.

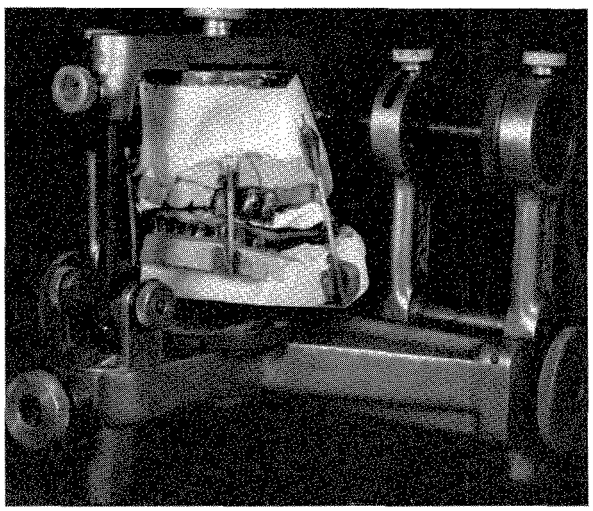

Fig. 815. The upper working cast removed from the Hanau Model H articulator (Fig. 813) and transferred to the kinoscope. The lower cast was related to it by means of the centric relation plate and plaster core. The illustration shows this. The lower cast will be attached to the lower frame of the articulator with stone.

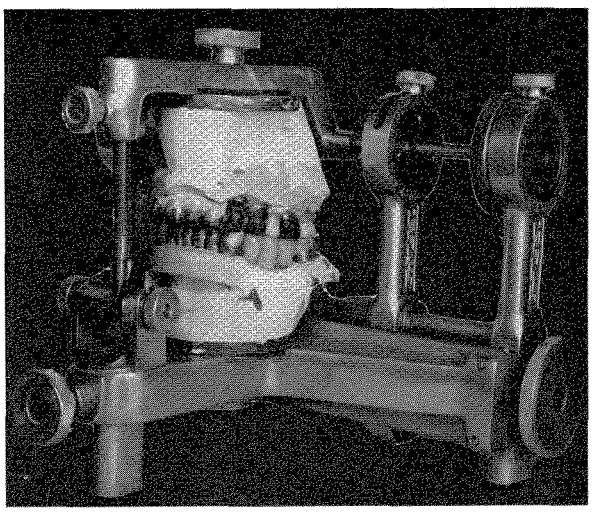

Fig. 816. The entire occlusion was coordinated. This is a view of the left side in the wax-up stage. Lower porcelain artificial crowns are necessary to be included in this procedure where spaces exist. Incisal guidance was provided by the cuspids.

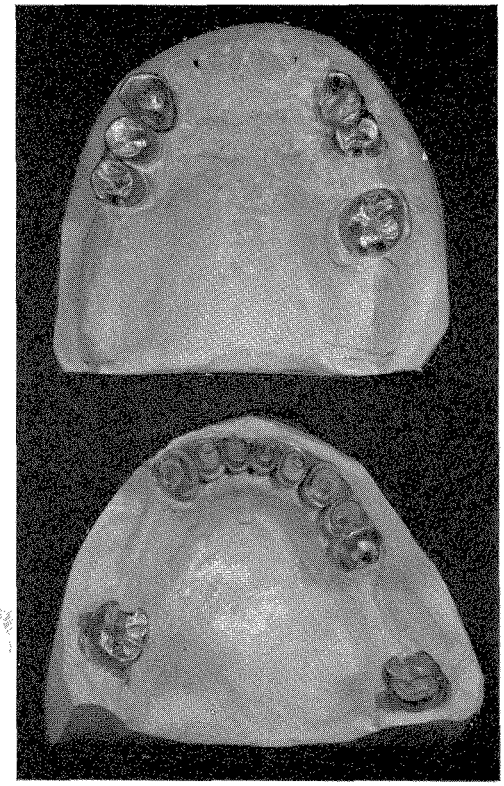

Fig. 817. The completed upper and lower castings were tried in the mouth and tested for fit, vertical dimension, and centric relation. When these were established, master upper and lower plaster impressions were taken. Stone casts were poured. They are shown here. The completed upper and lower removable partial dentures were to be constructed upon these casts.

Fig. 818. The bite height was kept at the level of the previously inserted splints. These had been inserted in July, 1944. It was now March, 1945. The vertical dimension had had enough time to correct itself and become more stable. This is only one method of testing the vertical dimension. The transitional splints are in position, and the teeth are in contact.

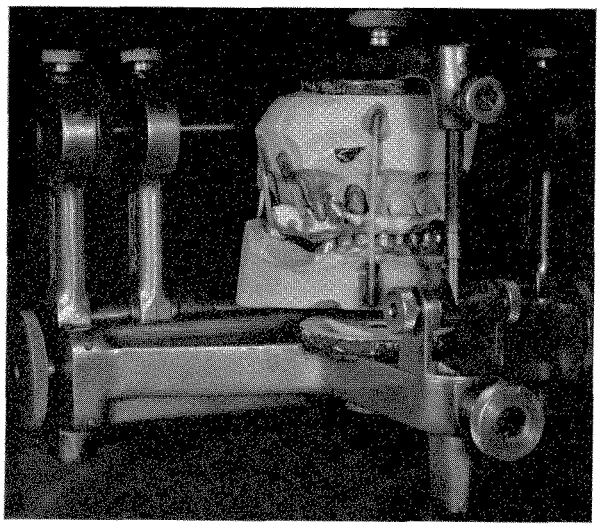

Fig. 819. The lower work cast was then related to the upper work cast by means of the plaster centric relation index which had been taken in the mouth with the metal registration plates again in place, only this time a second piece of metal was placed on the platforms with sticky wax, and this piece of metal covered the old registration of centric relation. (See Fig. 820.)

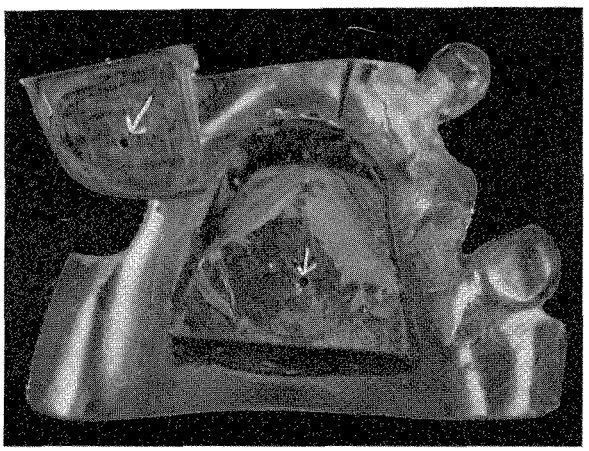

Fig. 820. This is the upper registration plate which was removed from the upper cast when the mounting shown in Fig. 819 was completed. The hole in the second metal plate which had covered the old registration of centric relation was now drilled completely through so that it would engage the first metallic platforms. The second metal plate was then removed, as shown here, to observe how the second registration of centric relation coincided with the first one. We see in this photograph that both holes coincided directly with each other.

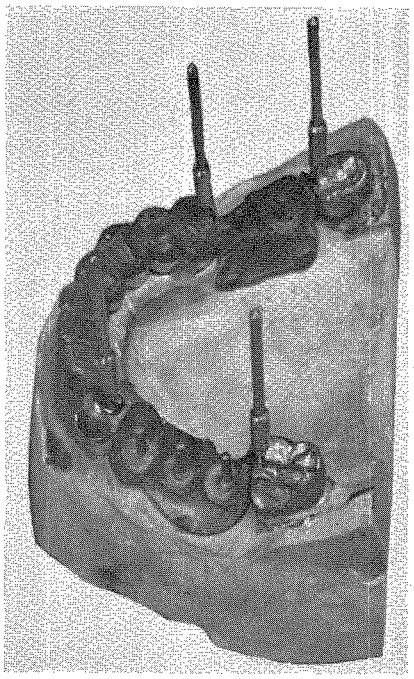

Fig. 821. The lower prosthesis in the process of construction is shown here. The bicuspids and molar received precision attachments. The anterior teeth had gold copings covering the stumps, and upon this the overlay removable partial denture rested.

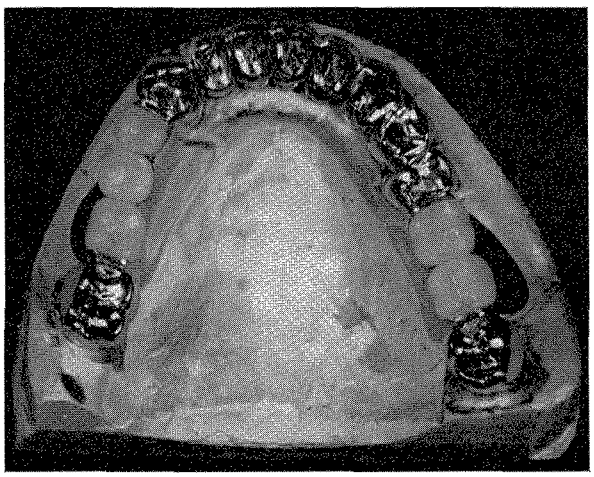

Fig. 822. The completed lower prosthesis is shown here. The anatomical detail is evident. The occlusal surfaces are narrowed buccolingually to decrease trauma.

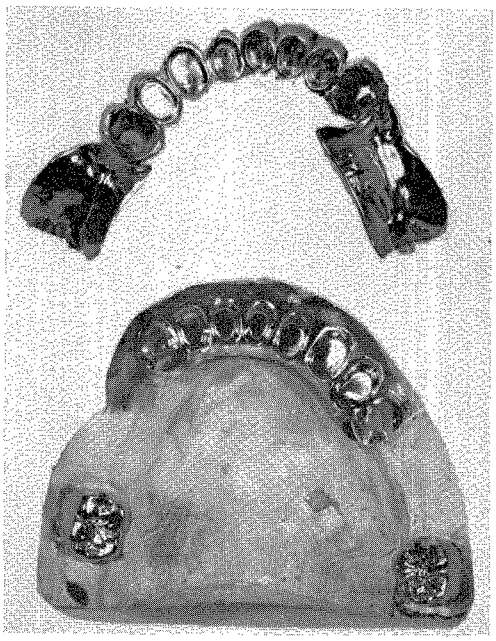

Fig. 823. The lower removable partial denture was removed from the cast to show the undersurface of the overlays which fit over the anterior copings as far back as the second bicuspids. These copings were individually cemented over each prepared tooth. Note the absence of the lingual bar. This was unnecessary because of the strength of the anterior section.

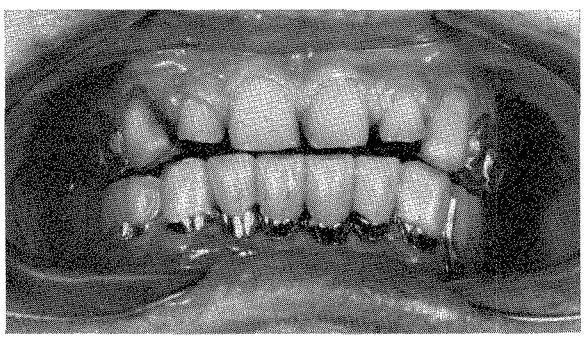

Fig. 824. The lower prosthesis was inserted. The cementation of the lower ten individual parts had to be done with extreme care in order to be able to insert the removable partial denture and still have the female parts parallel. The upper incompleted castings were also inserted, and the interocclusal relation was checked. A stone cast was then made of the completed lower work, and the upper work was completed against this cast.

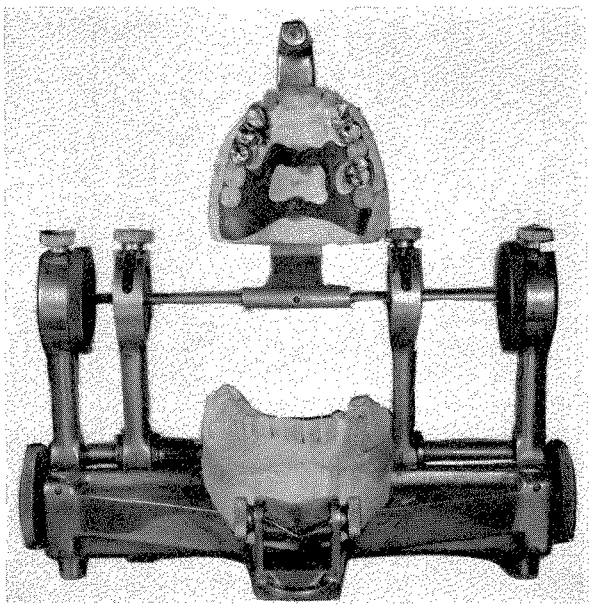

Fig. 825. The upper removable partial denture was cast in gold and transferred back to the original cast. The male attachments were then inserted, and the prosthesis was completed.

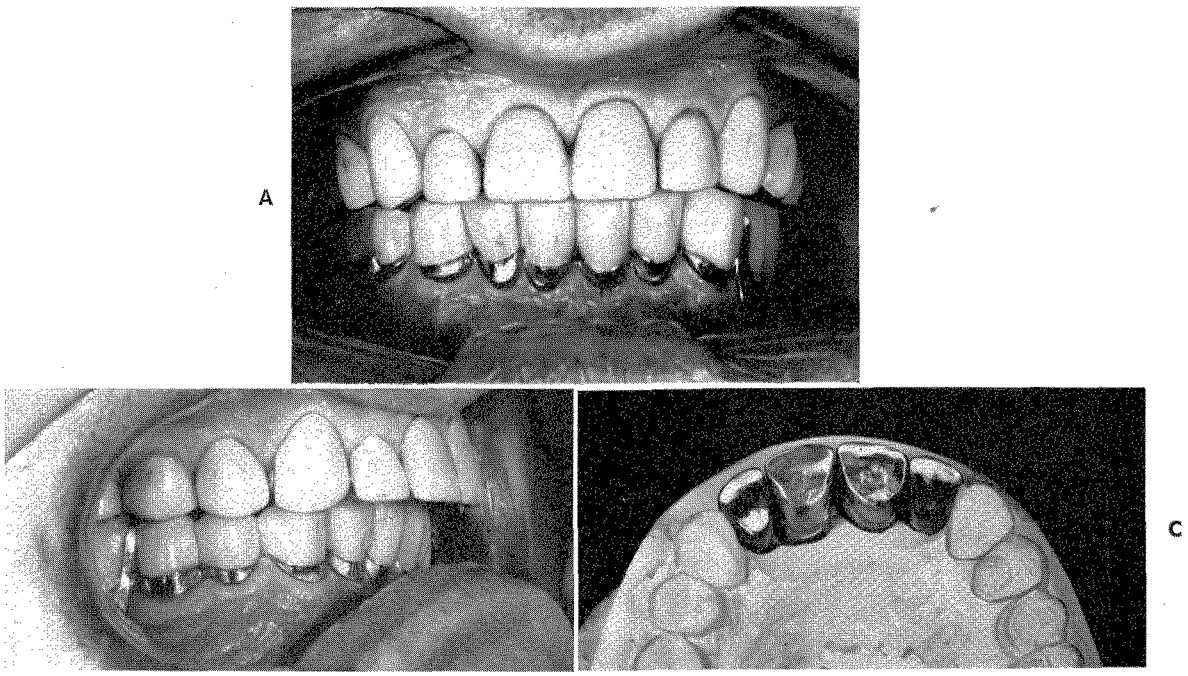

Fig. 826. The completed rehabilitation. The finished upper prosthesis was inserted in March, 1945. **A,** Front view. **B,** Right-side view. The lower incisors contact the lingual platform which extends from the upper central incisors as shown in **C.** The lingual platform extends from the upper central incisors to provide contact with the lower incisors. This was necessary because of the large horizontal overjet.

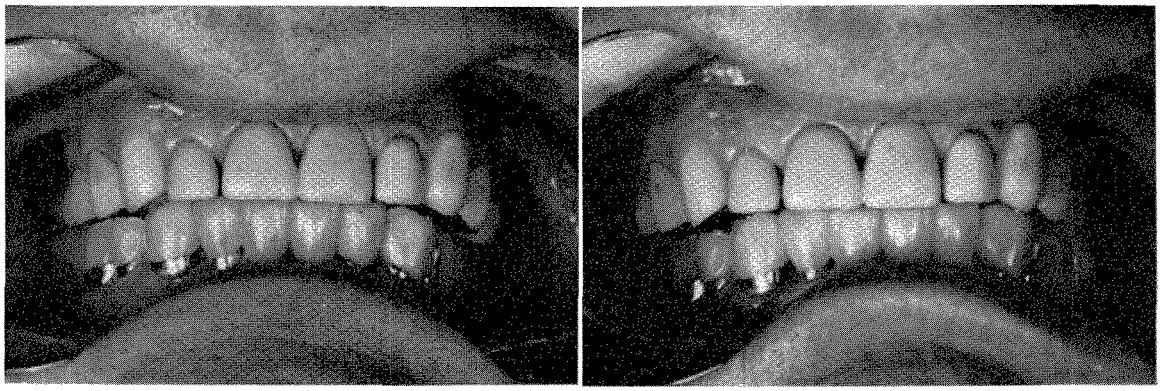

Fig. 827. Right and left working and balancing bites of the completed prostheses.

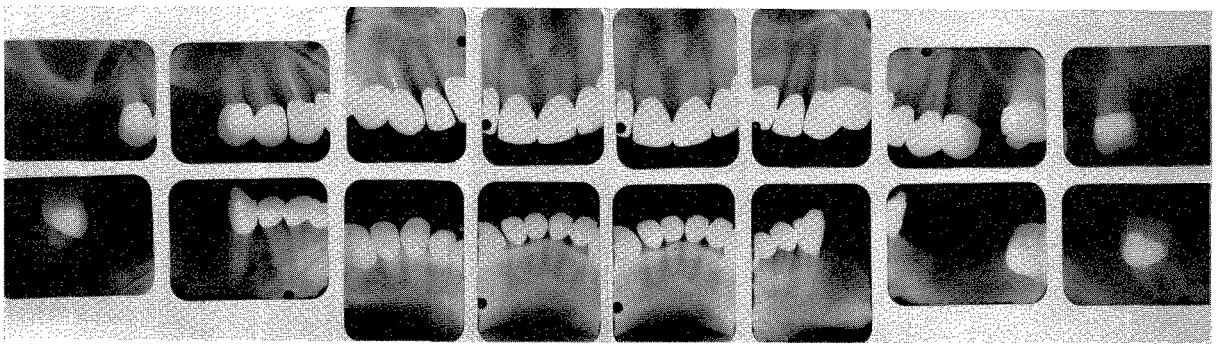

Fig. 828. Roentgenograms of the completed work. These were taken in March, 1945.

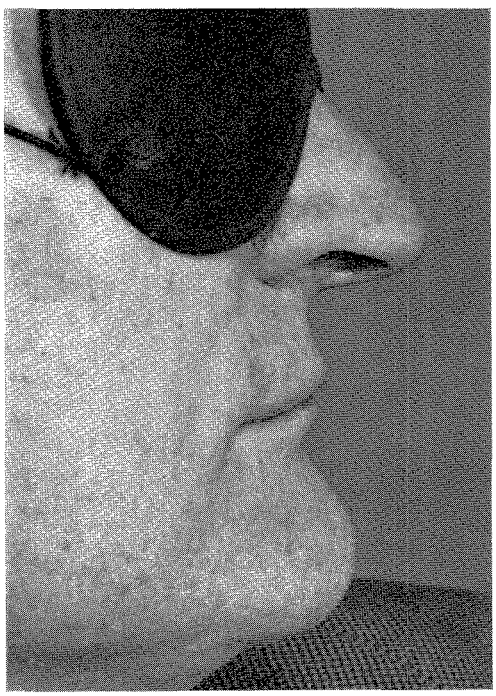

Fig. 829. Profile of the completed case. This photograph was taken in December, 1945, nine months after the insertion of the final work.

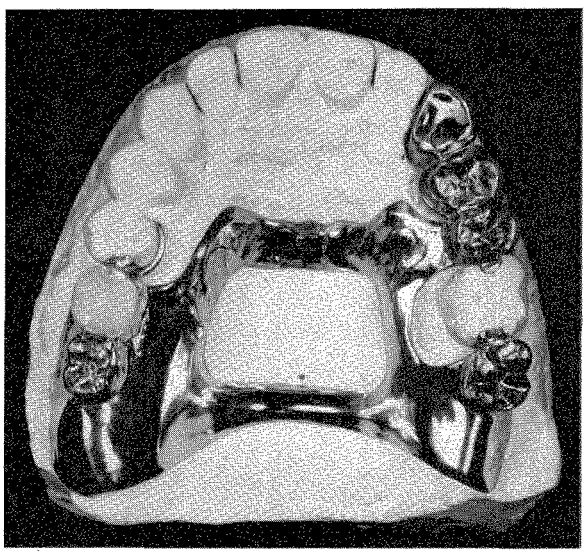

Fig. 830. In April, 1946, the upper left cuspid and both bicuspids were splinted together for greater strength.

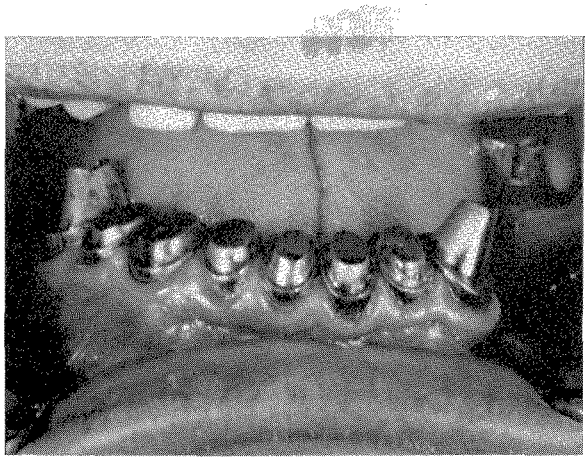

Fig. 831. This photograph was taken in February, 1948, of the lower anterior section of the mouth. The gums were healthy.

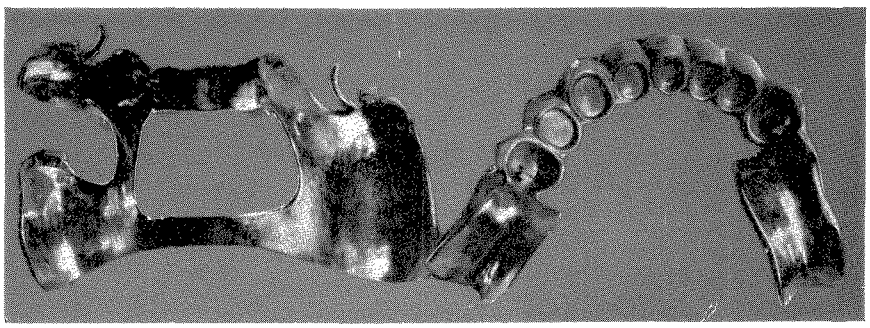

Fig. 832. The prosthesis was made to withstand heavy use. This is how it looked in 1948.

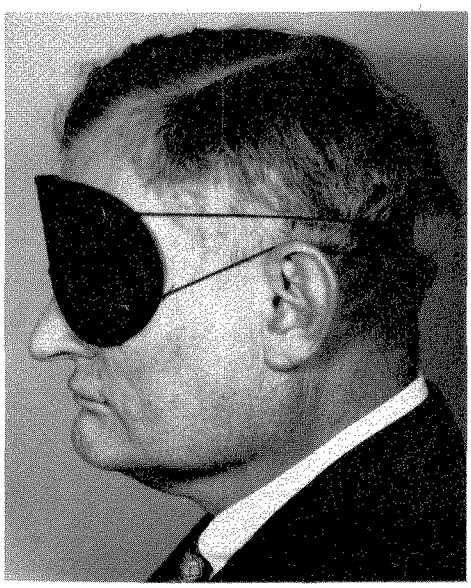

Fig. 833. This profile photograph was taken in 1948. The old bite closure was returning. The patient was then 51 years old. He stooped forward—his position was becoming more bent forward. Compare this photograph with Fig. 818 to realize how much this patient had aged in less than four years.

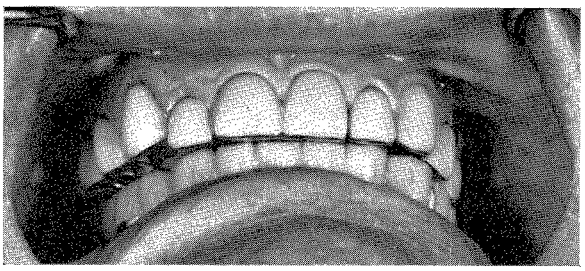

Fig. 834. By June, 1948, the mandible had shifted to the left. He continued to function in this position and was subjected to clenching and bruxing.

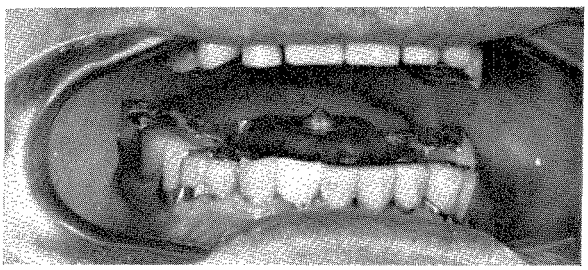

Fig. 835. In March, 1949, central-bearing plates were constructed in an effort to correct the mandibular position and to create a more favorable one by equilibrating the occlusion by grinding with stones and disks.

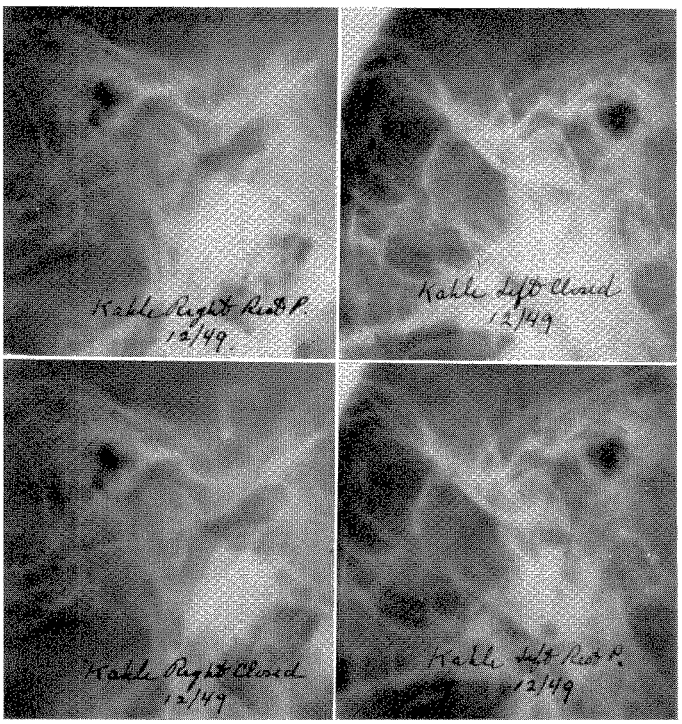

Fig. 836. Roentgenograms of the temporomandibular joints taken in December, 1949.

Fig. 837. In June, 1950, the photograph was taken of the patient's hands. Observe the knobs on the fingers. All his joints were subjected to arthritis. He had had osteoarthritis and gout since 1936.

Fig. 838. A comparison of the upper cast which was made in 1945 with the one made in 1953. Observe the abrasion and attrition over an eight-year period.

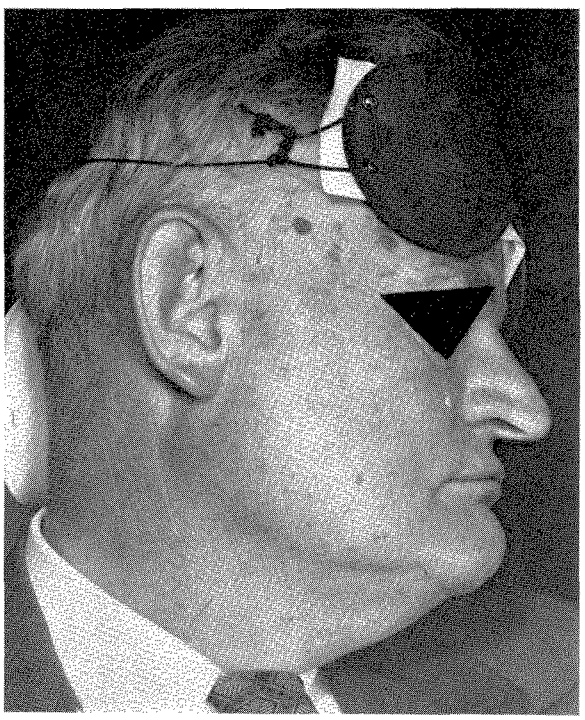

Fig. 839. A profile view taken in 1953. This is rest position. It is practically the same as shown in Fig. 799 which was taken at the start of treatment.

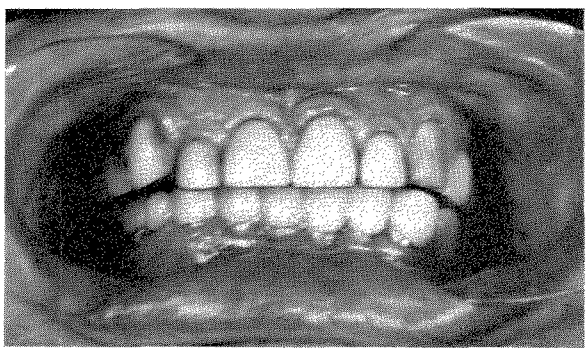

Fig. 840. This final photograph was taken in April, 1954, at the age of 57. The patient died in 1955 from a coronary attack.

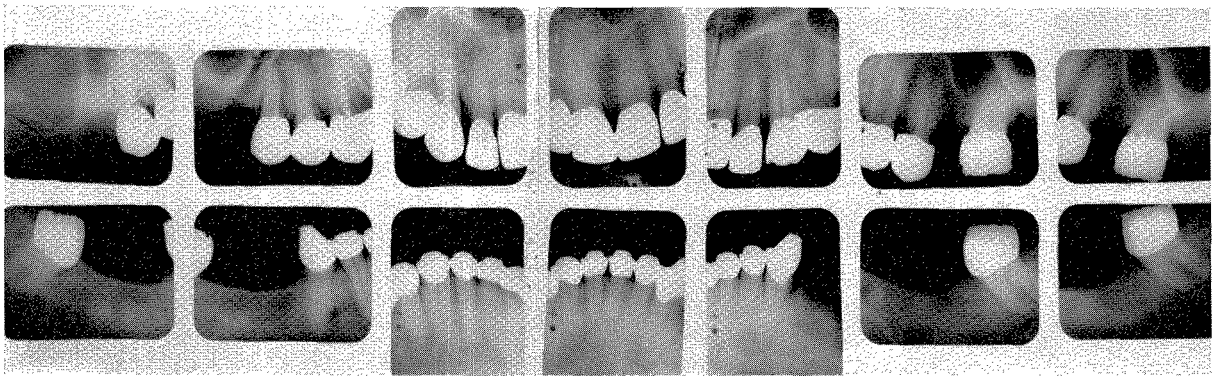

Fig. 841. Roentgenograms taken in March, 1954.

Case 8

Present condition

In January, 1944, a middle-aged woman presented herself for treatment. This case was reported previously in 1947.* Her occlusion had broken down, and her bite had collapsed. Only ten upper teeth remained. The patient was a school teacher just ready for retirement. She had had a tragedy that left her tense and nervous. The deleterious habit of clenching and bruxing was present.

Here again was an advanced stage of a closed bite. The patient abraded a great deal of her upper and lower anterior teeth. The upper left first molar had a deep periodontal pocket that involved the lingual root. The upper right first bicuspid was also deeply involved. These teeth were removed at the beginning of treatment. The upper left bicuspid had a short root, and the upper right molar had a mesial periodontal pocket. The free-way space was very small. In order to obtain the room necessary to insert anterior and posterior teeth, the vertical dimension had to be raised.

Preliminary treatment

For these subjects, before attempting to take any centric or excentric wax records of relational positions of the mandible to the maxillae, it is necessary to unlock the occlusion. This can sometimes be accomplished by the insertion of an upper bite plate with a flat occlusal surface. Wearing this over a period of time permits the freeing of the mandible from its locked position. It is then possible to find its true centric relational position. To actually accomplish this is not quite as easy as it is to explain it because sometimes the resulting interocclusal relationship, even after wearing the flat bite plate, is the same as before wearing it.

Treatment

In constructing this case, a conventional anatomical technique was used. The work was executed carefully on a Hanau Model H articulator. Many

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 268-278.

months were spent in its construction. This final work was inserted in May, 1944.

When a patient who has been clenching and bruxing for many years has her occlusion reconstructed, the operator hopes that because of interocclusal coordination these noxious habits will disappear. Although some research workers,* using electromyography, maintain that this is so, those who have had extensive experience with this type of patient are aware of the danger of these habits continuing long after the insertion of the final work. An entire chapter in *Oral rehabilitation* was devoted to this very subject of occlusal habit neuroses.†

Postinsertion changes

Any undue optimism proved unjustified in this case because the habits of clenching and bruxing continued long after the final work was inserted. By 1949 the vertical dimension had visibly closed. This was also confirmed by making new casts and comparing them with those that had been taken when the work was completed. The 1951 roentgenograms revealed no noticeable changes in the bone or tooth structure. The patient had retired from teaching and moved to . . . in the fall of 1949. In 1952 a further closure of the bite was observed during one of her visits to . . . . The periodontal pocket in the upper right molar was much deeper. The right upper cuspid had involved periodontal pathology and was mobile.

In May, 1952, on another visit to . . . , the upper right central and lateral incisors and cuspid were splinted together. In September, 1952, the upper left bicuspid developed an acute periodontal abscess and had to be removed. Its artificial substitute was added to the upper removable partial denture. In November, 1953, the upper right molar developed a periodontal abscess and was extracted. This was also added to the removable bridge. In repairing the upper partial denture, the right tuberosity was engaged for better tissue coverage and support. A full plastic palate was added where formerly the palatal bars had been separated.

During the closure of the bite the mandible had deviated slightly to the right. The lower labial and buccal plastic veneers were abraded. Otherwise there was no evidence of deterioration of the lower teeth. New casts were made in 1955. These demonstrated the closure of the bite over a ten-year period. The patient came to . . . in October, 1955, and did not return again for seven years. She had fractured the upper left cuspid at the gum line, but due to lack of time she was unable to have it repaired. It was more practical to have the work done in . . . because of the necessary travel expense and time factor. At that time (1955) complete upper splinting was suggested. She, on the other hand, was considering a full upper denture.

Present condition

The next time this patient was seen was in 1962. Four upper incisors were present. The remaining upper teeth had been removed. An upper partial denture

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*Ramfjord, Sigurd: Disfunctional T. M. joint and muscle pain, J. Pros. Dent. **2**:353-373, 1961.
†Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 607, 609-622.

was worn which had full palatal coverage and was completely tissue supported. The lower teeth were intact except for the abrasion of the acrylic veneers. At this time the decision was made to insert a full upper denture even though the upper four teeth had strong roots and could have been retained. A full denture was recommended for several reasons:

1. There would be less trauma on the lower natural teeth and, hence, greater longevity.
2. It would be less time consuming and less expensive.
3. The patient had been used to full palatal coverage because of the transitional upper partial denture that had been worn.
4. Future care and expense would be reduced greatly with a full denture.
5. If the upper four teeth were retained their future would be problematic.

Discussion

Once again much is to be gained from a careful study of this case over its eighteen-year period. If the reader sees only the published case in 1947, he cannot fully appreciate the subsequent events. The original breakdown, especially of the

Text continued on p. 398.

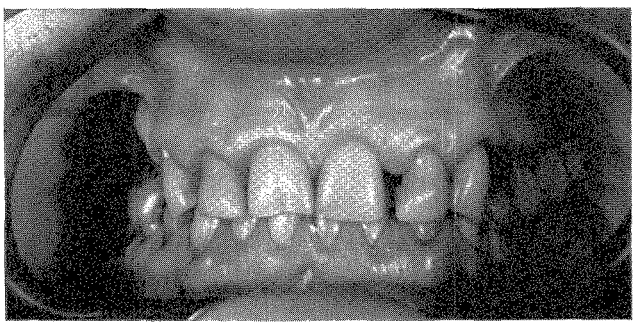

Fig. 842

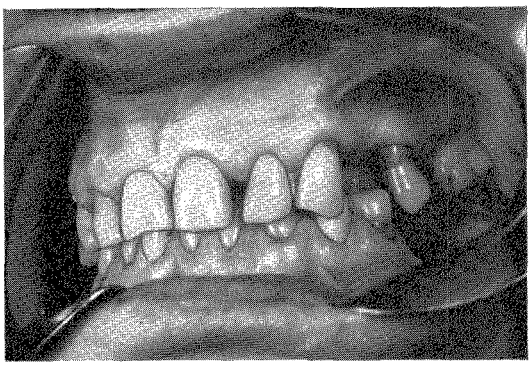

Fig. 843

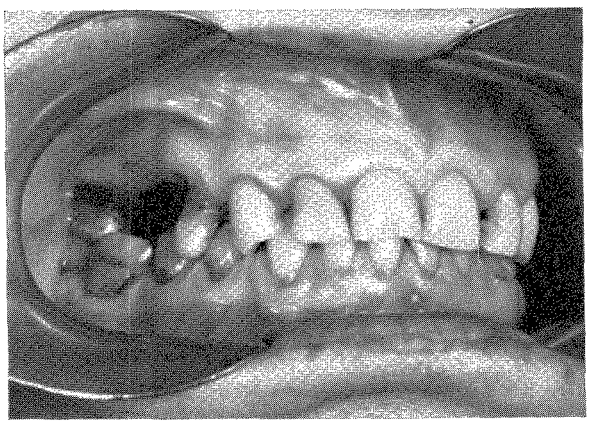

Fig. 844

Figs. 842 to 844. Case at start of reconstruction. (Figs. 842 to 873 are of the same case.)

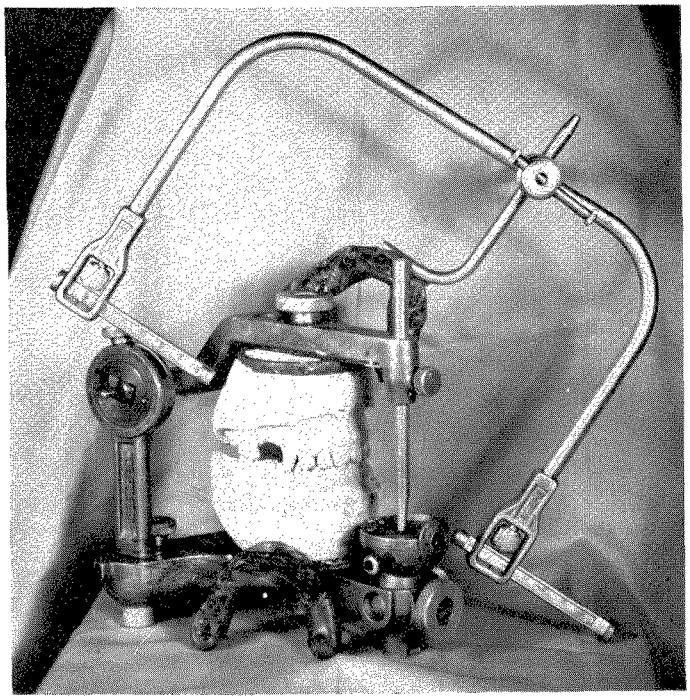

Fig. 845. Models mounted by means of a face-bow on the anatomical articulator. The condylar inclinations were adjusted by means of the protrusive wax. The lateral inclinations were computed by the following formula:

$$\frac{\text{Condylar inclinations}}{8} + 12 = \text{Lateral inclination}$$

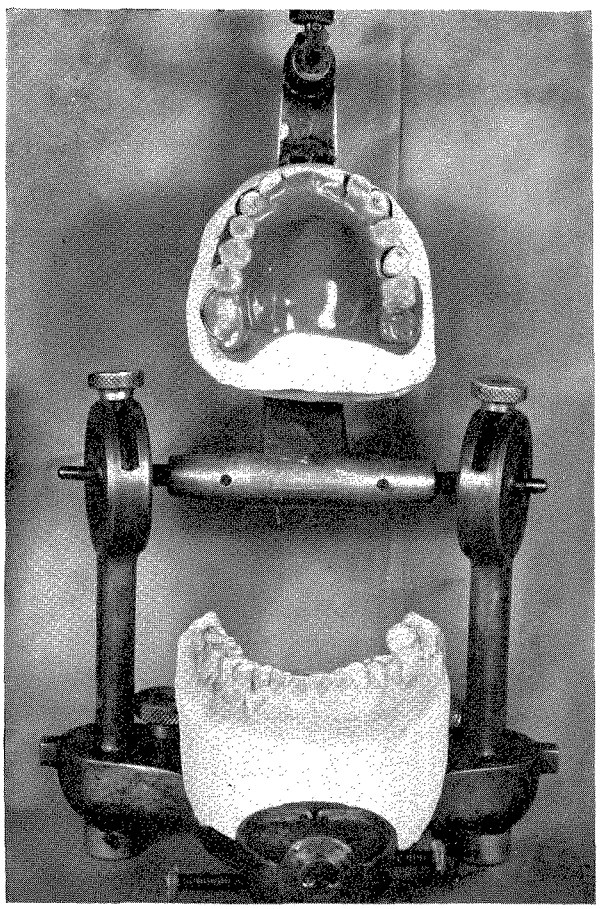

Fig. 846. Upper temporary splint in position on the model.

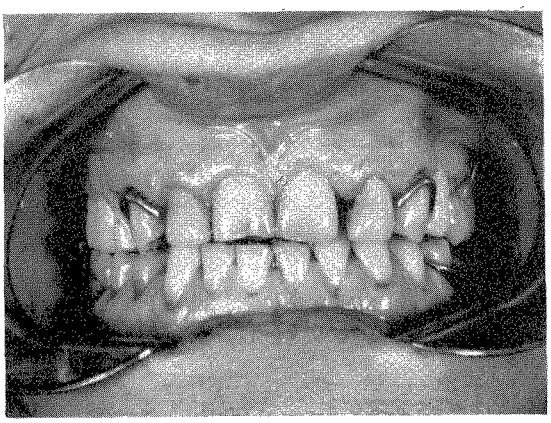

Fig. 847. Upper temporary splint in position in the mouth. By comparison with Fig. 842, the amount of bite restoration is evident.

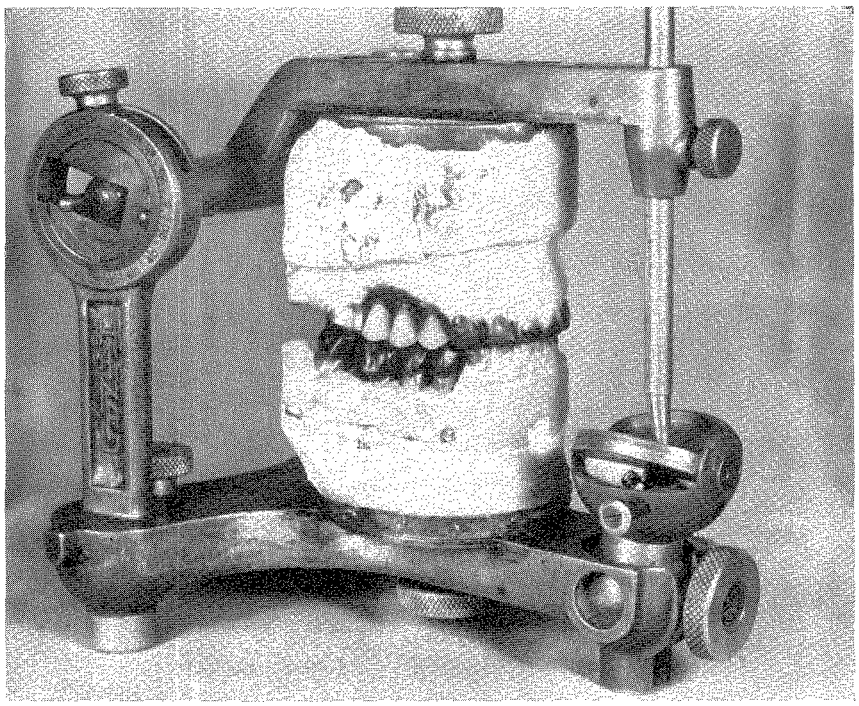

Fig. 848

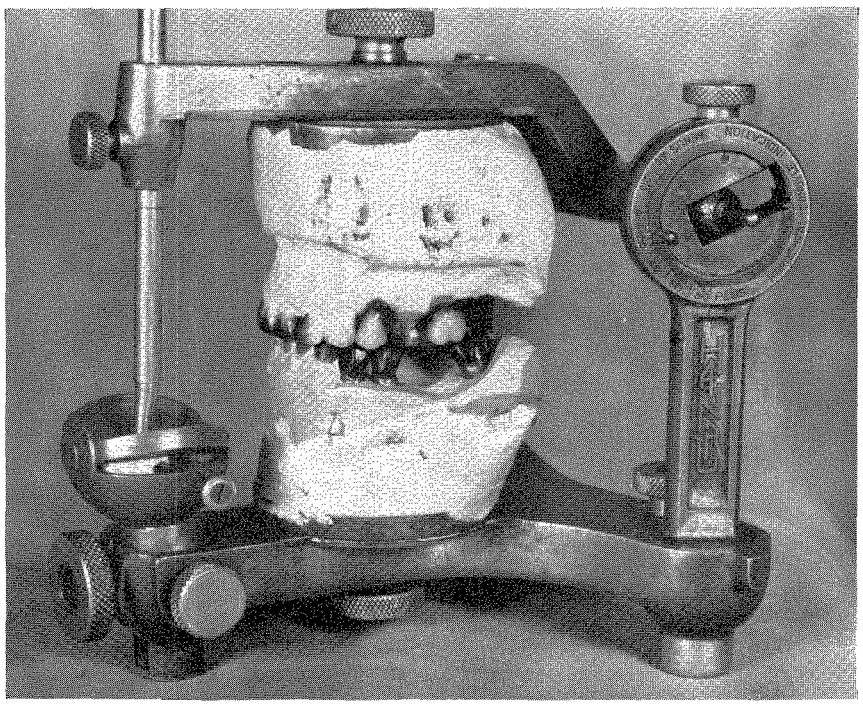

Fig. 849

Figs. 848 and 849. The entire occlusion is first worked out in wax and porcelain to harmonize with condylar registrations. Right and left views are shown here.

upper teeth, was caused primarily because of clenching and bruxing habits. These, in turn, were caused by a vicious neuromuscular complex originating partly in the psyche and partly in the soma. The condition was aggravated also by postural changes due to aging factors. Under these noxious influences, and others too complex for comprehension, the occlusion had broken down.

The first examination in January, 1944, revealed a closed bite. The loss of the posterior teeth and her failure to replace them also played a major role in the collapse of the bite. In order to insert conventional prosthesis, the vertical dimension had to be increased considerably. Over a period of years the muscles revolted against this unphysiological approach and gradually won the battle.

In 1944 the dental profession had not yet taken advantage of extensive splinting. If the remaining upper teeth had been splinted together, the entire masticatory pressure would have been divided equally among them. Had the isolated left upper bicuspid been included in the splint, its longevity and that of the remaining teeth may have been enhanced. Another factor to be considered as a cause for the breakdown of the upper teeth was the combined strength of the opposing teeth. The numerous lower teeth could have acted as a traumatic influence. The bruxing and clenching habits were never eliminated.

In a review of this case, repositioning the mandible must also be studied. In 1944 the original photographs showed a mandibular median line which was to the right of the maxillary median line when the central incisors were examined. At the completion of treatment the median lines coincided. This would indicate a mandibular repositioning to the left. Eighteen years later the median lines were again in positions similar to those at the start of treatment. Although there probably are errors in the deductions accounting for this apparent relapse, still a definite relapse did take place. (Figs. 842 to 873.)

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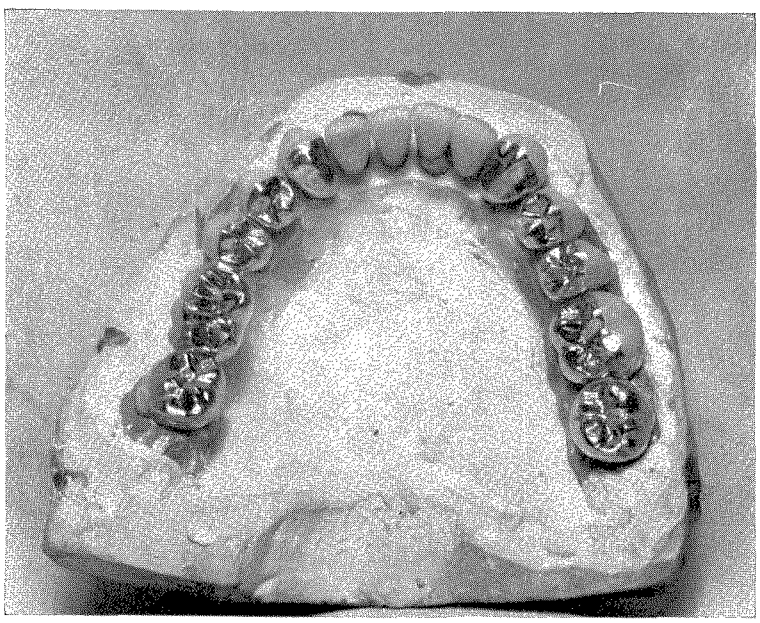


Fig. 850. The completed lower case. Notice the anatomical detail. The cutting edges provide for a minimum of trauma, especially in the lateral excursions.

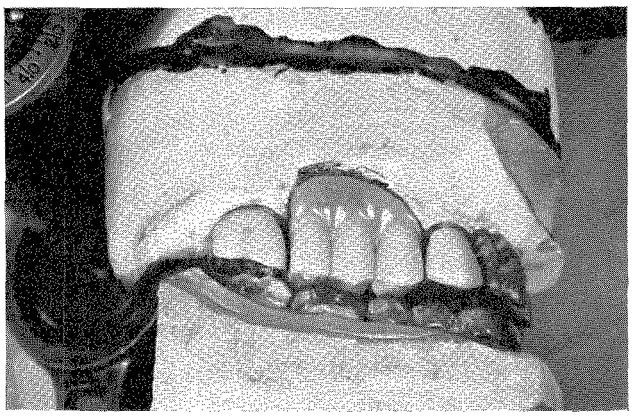


Fig. 851

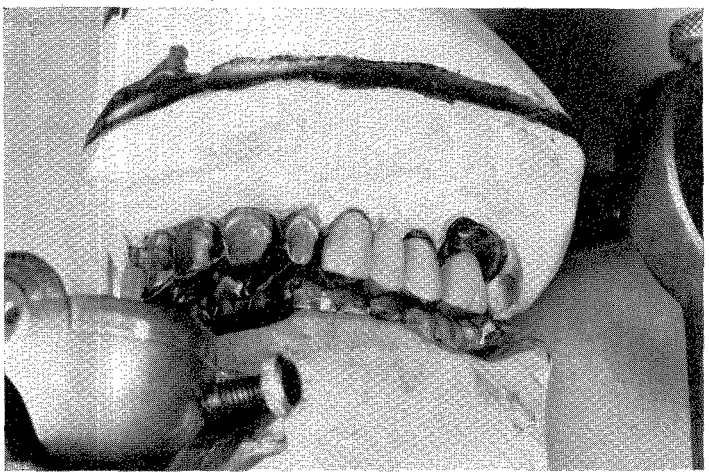


Fig. 852

Figs. 851 and 852. The right and left upper balancing bites. The mandibular teeth have already been completed.

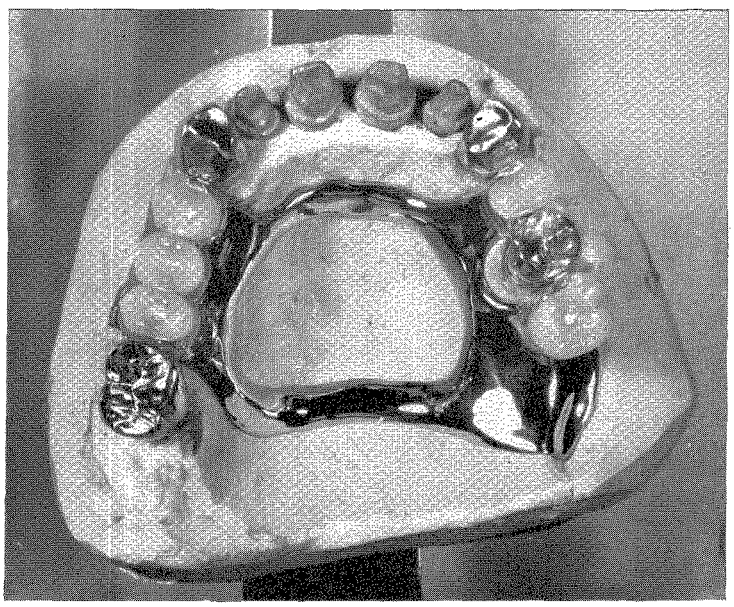


Fig. 853. The completed upper bridge. The precision upper bridge has four attachments and one lug rest. The porcelain jackets will be completed as a final procedure.

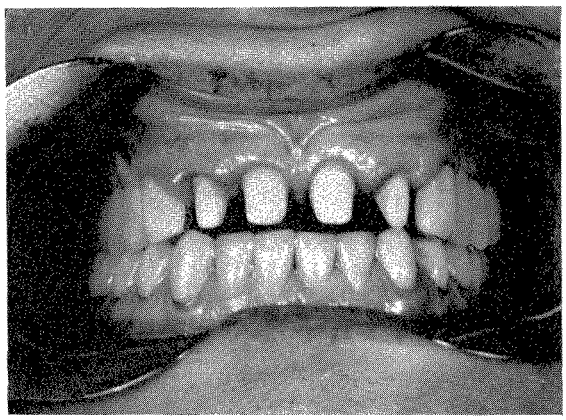


Fig. 854. The upper precision bridge has been assembled in the mouth. The anterior four incisors have been prepared for porcelain jacket crowns.

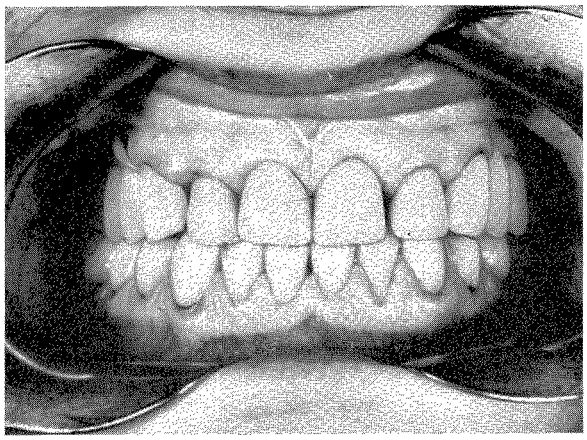


Fig. 855. The entire case has been completed. Compare this with Fig. 842. This case was completed in May, 1944.

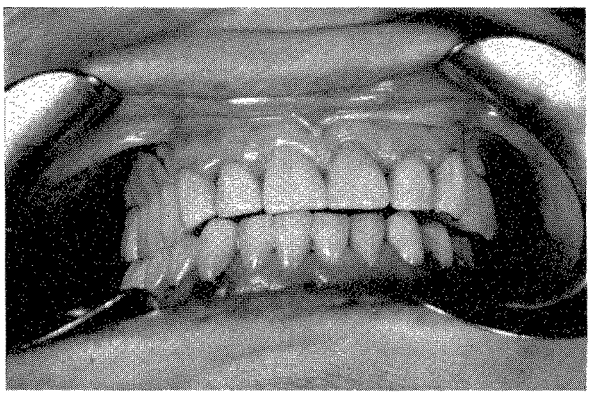


Fig. 856

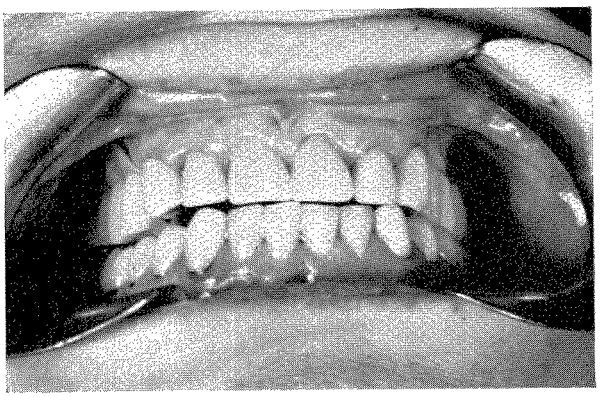


Fig. 857

Figs. 856 and 857. The head has been tipped backward to show the right and left working and balancing bites.

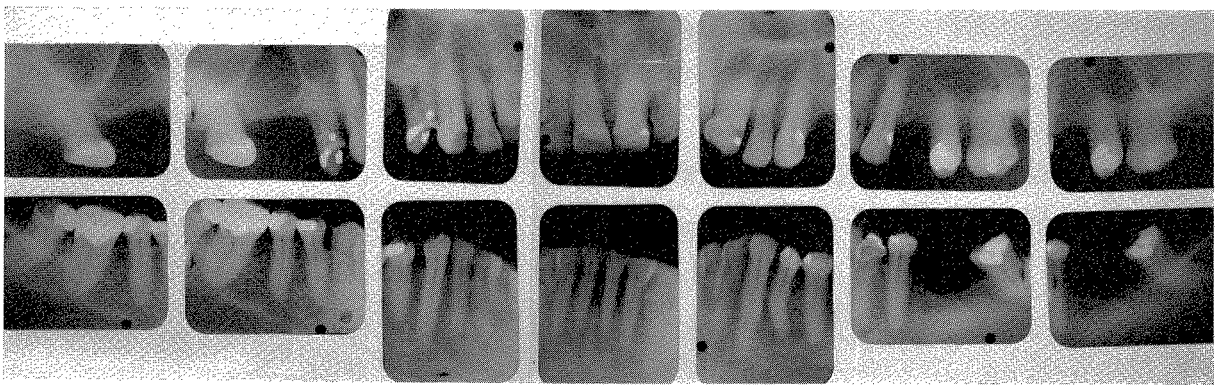


Fig. 858. Roentgenograms taken at the start of treatment (1944).

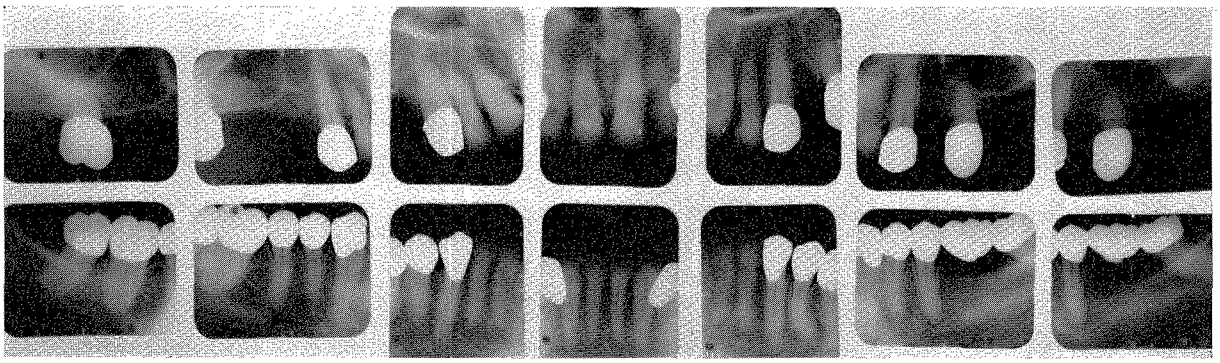


Fig. 859. Roentgenograms taken in March, 1946, two years after completion.

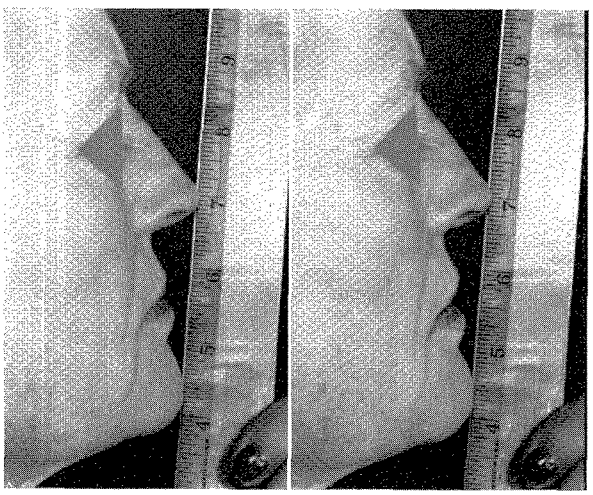


Fig. 860 **Fig. 861**

Figs. 860 and 861. Contact position and rest position. There is no detectable difference between these two positions if they are measured by the ruler shown here. This indicates an extremely small free-way space, if any at all. These photographs were taken in January, 1949.

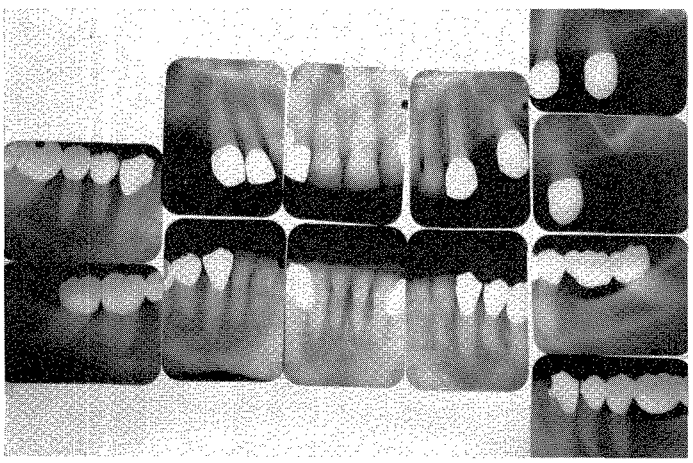


Fig. 862. Roentgenograms taken in February, 1949, nearly four years after completion.

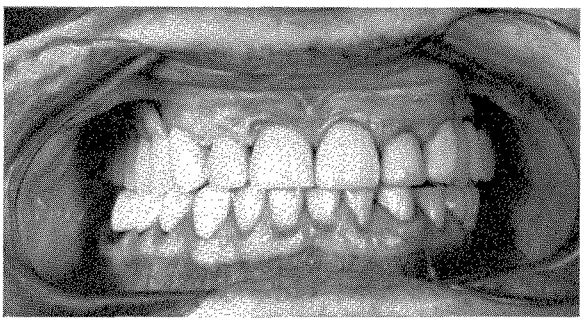


Fig. 863. The mouth as it looked in April, 1952. This is eight years after completion. The mandible had again deviated to the right as it was at the start of the work. (Refer to Fig. 842.) The bite had also closed.

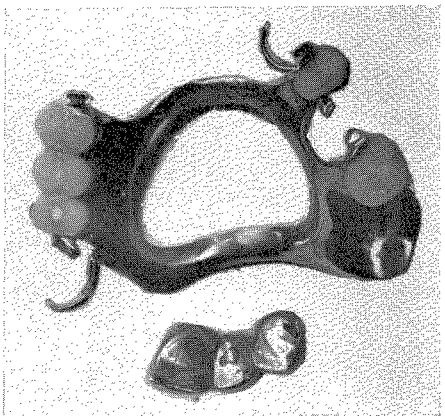


Fig. 864. In 1952 the upper right cuspid and the central and lateral incisors were splinted together, and new precision attachments were inserted in both cuspids.

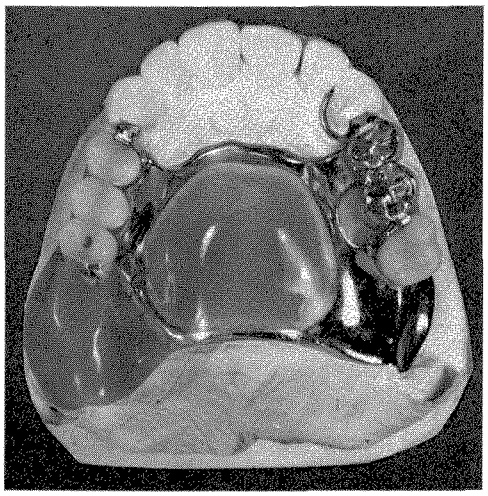


Fig. 865. In December, 1953, the upper right molar was removed because of periodontal infection, and the upper removable partial denture was repaired, as shown in this illustration. The palate was completely covered with acrylic resin, and the right tuberosity was engaged by an acrylic resin saddle.

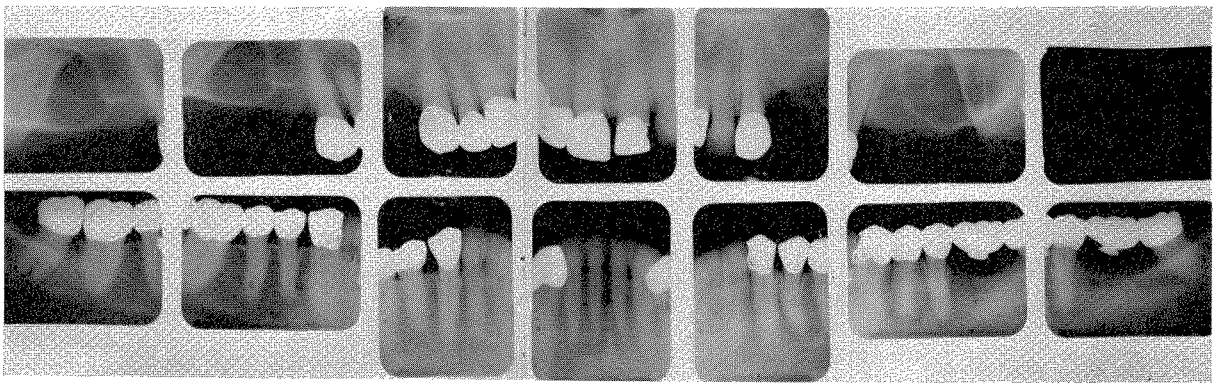


Fig. 866. These roentgenograms were taken in November, 1954, ten years after completion of treatment.

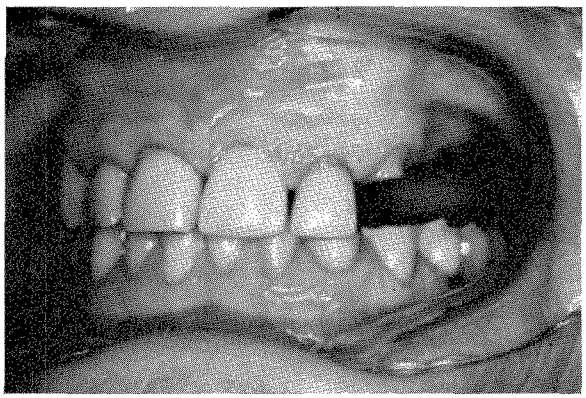


Fig. 867. In September, 1955, the left cuspid fractured at the gum line. The patient returned to her home in . . . to have this repaired and was not seen again until 1962.

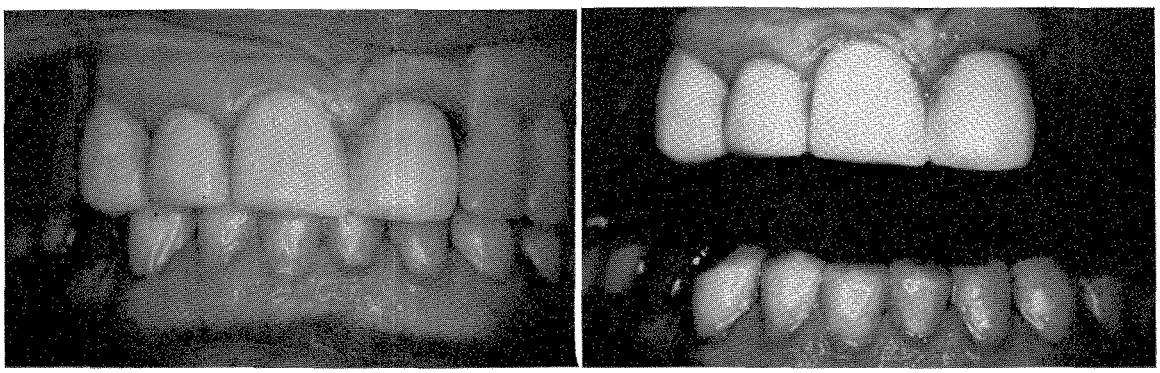


Fig. 868. These photographs were taken in March, 1962. Only four anterior upper teeth remain. This is eighteen years after the rehabilitation was completed. An upper full denture will be constructed. All the lower natural teeth are still present. These will be reconstructed together with the full upper denture. The vertical dimension will remain as it is. The patient continues to clench and brux even at this level. At the time of writing she was in her mid-sixties.

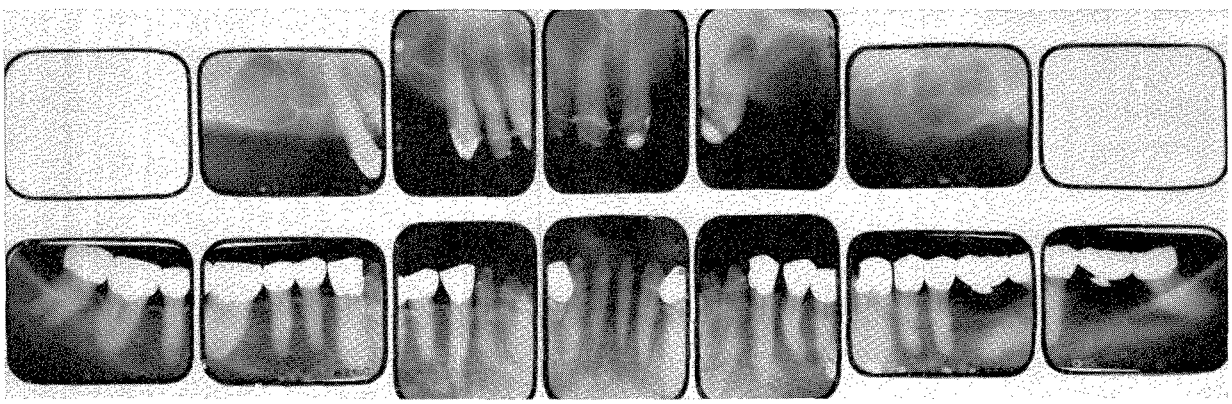


Fig. 869. Roentgenograms taken in 1962.

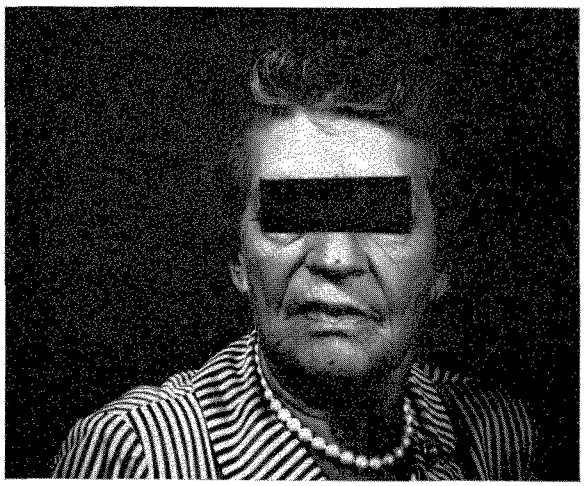


Fig. 870. The face had changed since 1944. The lines were deeper, and the muscle pulls were different. No doubt her mandibular relational position had also changed.

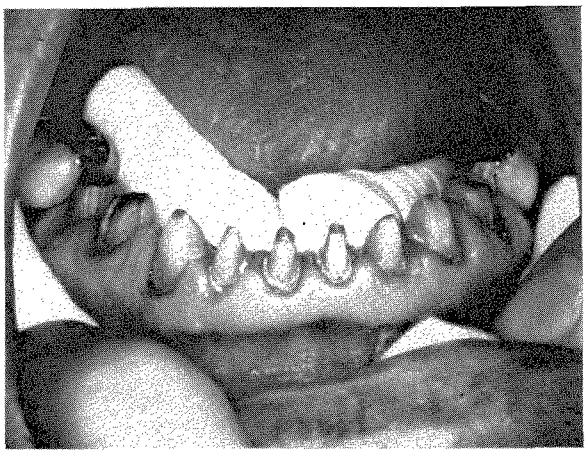


Fig. 871. Three lower bicuspids were prepared for gold veneer crowns, whereas the six anterior teeth were prepared for porcelain bonded-to-platinum crowns.

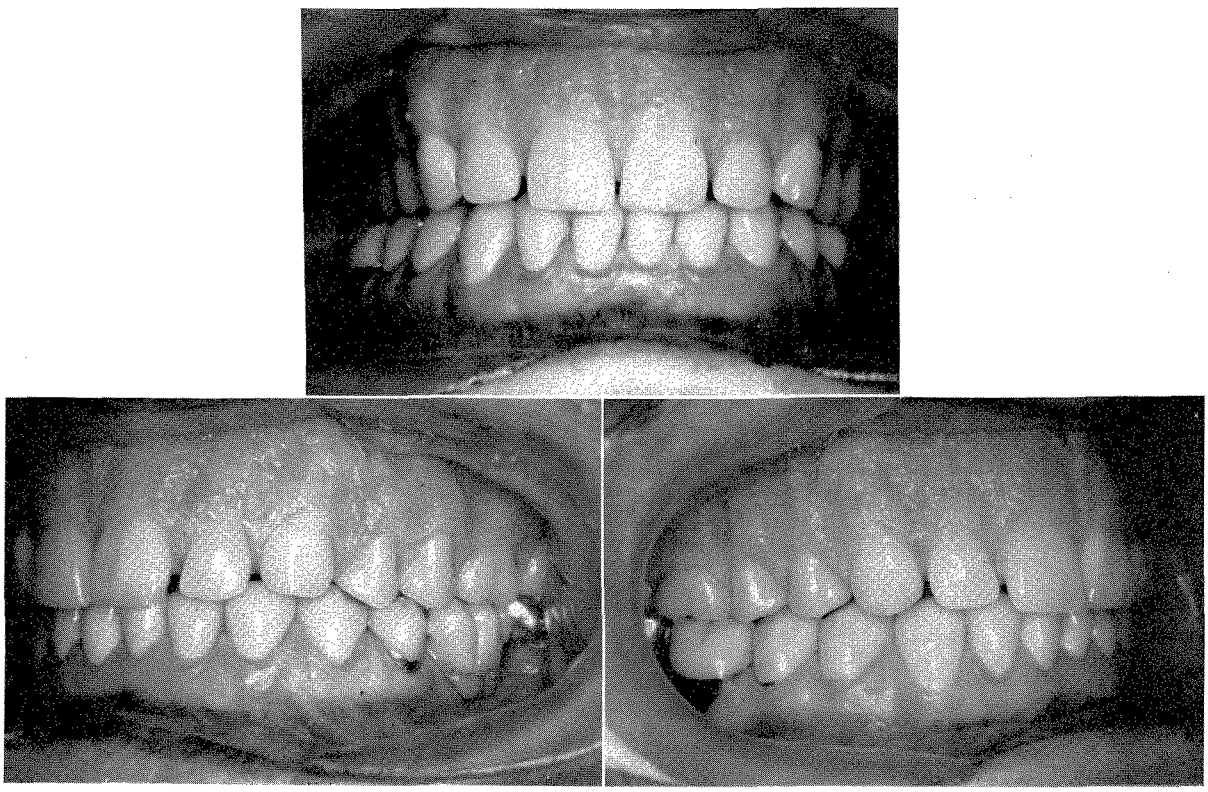


Fig. 872. The final work, namely, a full upper denture and the nine new crowns for the lower teeth, was completed in July, 1962. Three views are shown here.

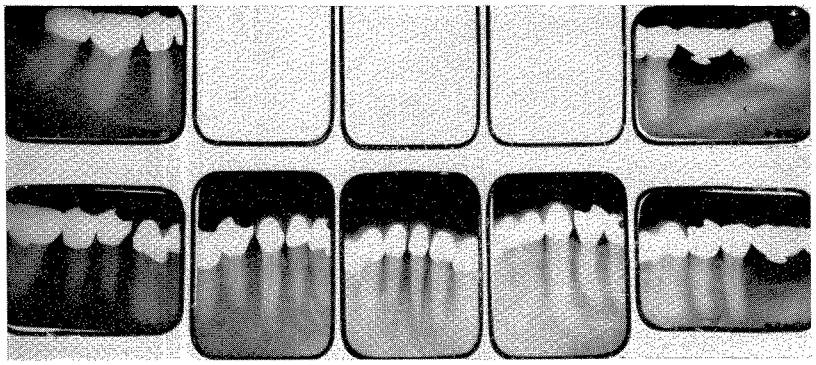


Fig. 873. Roentgenograms of the completed lower work taken in August, 1962.

REPOSITIONING OF MANDIBLE

Documentation such as this gives continued evidence of the difficulty of repositioning the mandible. While the mandible is in its hinge position, the upper and lower median lines may coincide. However, as soon as function begins, the masticatory musculature may exert uneven pressures, causing a deviation either to the right or to the left. This continued neuromuscular pattern eventually would result in a deviation similar to that observed in this and other cases.

The doctor-patient relationship was a very cordial one over the entire eighteen years. This still remains an important factor when dealing with people. The following letter was received after the work was completed.

Sept. 19, 1962

Dear Doctor:

You have done a mighty big job for me and I appreciate your personal interest in my case. It was a real inspiration. Thank you and please accept my best wishes to you and to your family.

Most sincerely,

(Signed)_____

CONTINUOUS ERUPTION AND VERTICAL DIMENSION

We are all aware that during the aging process the vertical dimension decreases. Continuous eruption does not always keep pace with continuous attrition and abrasion, and as a result the face shortens. This process takes place in many individuals. There are some cases, however, in which the vertical dimension is maintained (Figs. 874 to 878) in spite of aging.* Even where the vertical dimension had decreased with age, the process is physiological and may not always be manifest by the usual signs of severe abrasion and tooth destruction. Neither is decreased vertical height always caused by aging. In some cases the insertion of upper anterior porcelain jacket crowns may act to abrade the lower natural teeth rapidly and augment the closure of the bite. (Figs. 879 to 882.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 544-549.

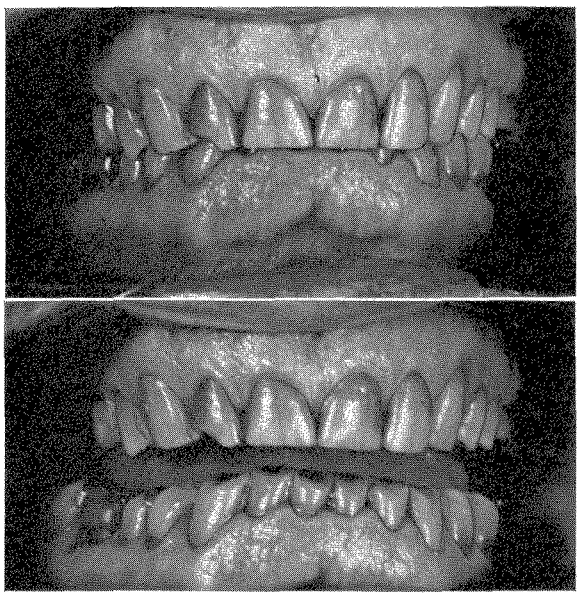


Fig. 874. **A,** Anterior view of the mouth of a 61-year-old man. Teeth and bone were in excellent condition. **B,** Teeth apart to show evidence of wear due to abrasion and attrition. Observe the strong and massive bone structure. (Figs. 874 and 875 are of the same case.)

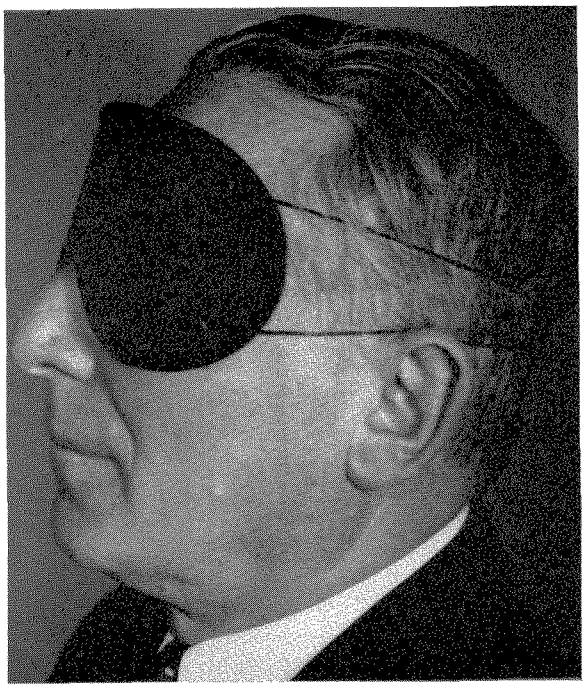


Fig. 875. Profile view of patient whose teeth are shown in Fig. 874. The teeth are in contact, yet in spite of wear the profile and vertical dimension are normal. (Read text.)

Fig. 876. Three views of the mouth of a 77-year-old woman whose teeth were well worn down due to abrasion and attrition, yet the bone structure was excellent. These were taken in 1962. The upper central incisors were covered by gold veneered crowns, and the upper left anterior bridge was replaced. (Figs. 876 to 878 are of the same case.)

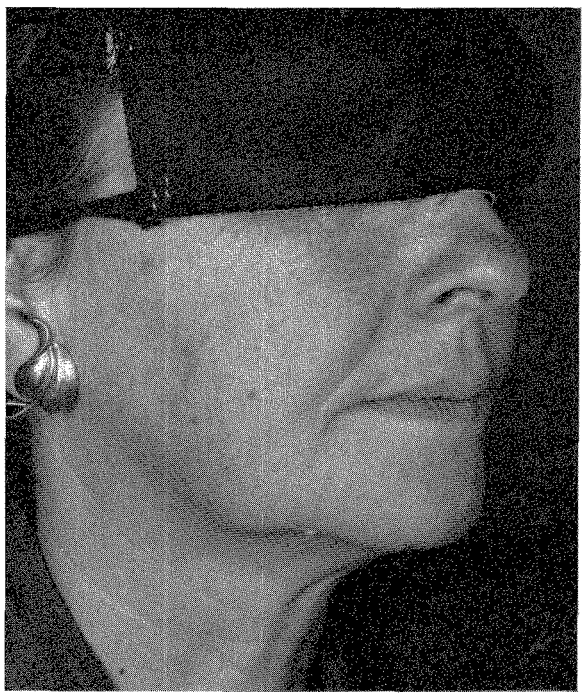


Fig. 877. This profile view was taken in 1951 when the patient was 66 years old. The teeth were in contact, yet the vertical dimension was normal. It was relatively unchanged in 1962.

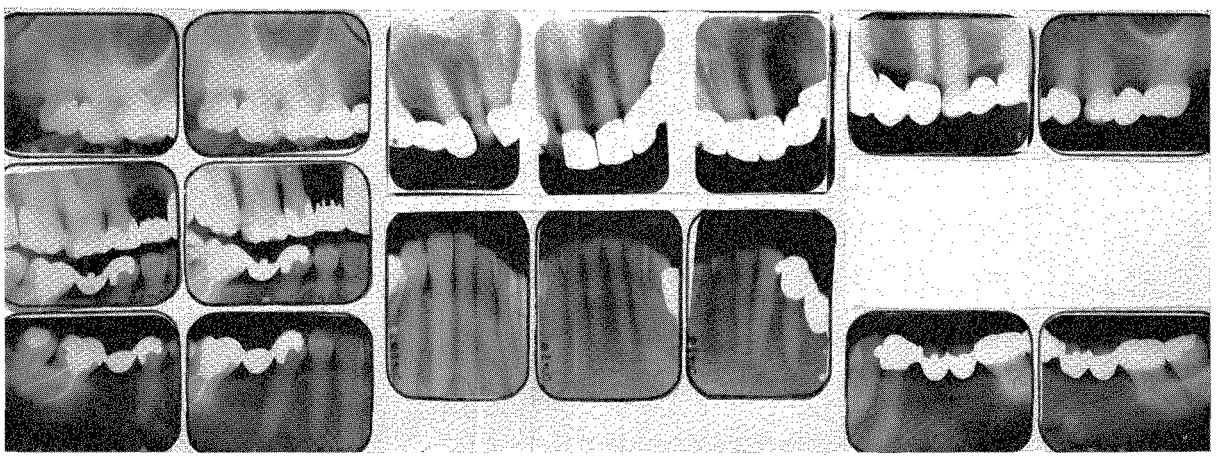
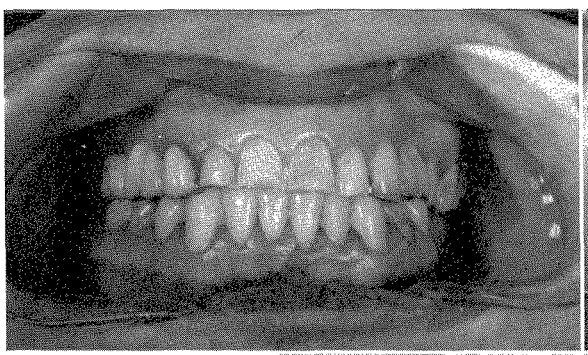


Fig. 878. Roentgenograms taken in November, 1962, showing good structures at the age of 77 years.

Fig. 879



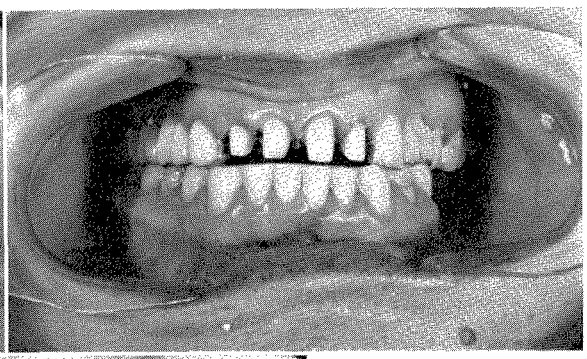


Fig. 880

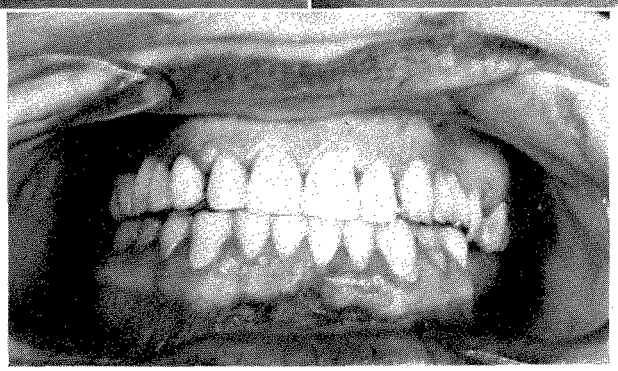


Fig. 881

Fig. 879. The upper incisors were subjected to lemon juice erosion for many years. This caused the acid erosion shown here. This photograph was taken in May, 1953. (Figs. 879 to 882 are of the same case.)

Fig. 880. The incisal edges of the lower incisors were ground down to permit enough room to insert porcelain jacket crowns.

Fig. 881. The porcelain jacket crowns were inserted. These were completed in 1953.

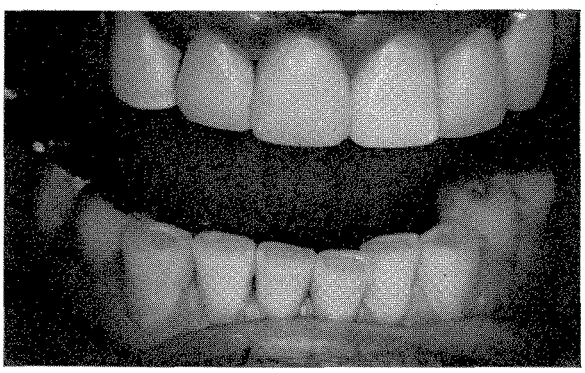


Fig. 882. The lower incisal edges are being worn by the upper porcelain jacket crowns. High-fusing porcelain is much harder than tooth structure. This photograph was taken in June, 1960.

IMPORTANCE OF OBTAINING SUFFICIENT ROOM TO INSERT ANTERIOR TEETH IN CLOSED BITE CASES

We are sometimes faced with the problem of rebuilding these abraded incisors. To make this mechanically possible, sufficient room must be obtained. This is discussed elsewhere in this book on p. 378. (Refer to Figs. 806 to 812 and Fig. 892.)

Case 9

In 1943 the mouth of a female patient was reconstructed. Her teeth had been affected by the chemical erosion and subsequent abrasion caused by the daily use of lemon juice in warm water. Full details of the complete history and step-by-step procedure of the work were reported in 1947.*

The lower incisors were being severely abraded by the porcelain jacket crowns which had been placed on the upper incisors as part of the reconstruction procedure. In May, 1950, the decision was made to redo the anterior teeth in order to protect the lower incisors from this continued abrasion. Twelve porcelain jacket crowns were prepared for the upper and lower anterior teeth. These were inserted in June, 1950. The patient was 65 years of age in 1962, and her structures were in excellent condition.

This case was reconstructed 19 years prior to the time of writing. It presented many areas of extreme interest. A functional technique was used. The Hagman balancer articulator was employed. The vertical dimension subsequently closed. The lateral deviation, which was corrected in the original work, again returned. What is of particular interest here is the abrasion and attrition caused by the upper porcelain jacket crowns functioning against the lower incisors. This was corrected in 1950 and has been successful. (See Figs. 883 to 891.)

• • •

The case which follows is one in which the upper porcelain jacket crowns were permitted to abrade the lower incisors until the entire clinical crowns were destroyed before the cause was recognized.

*Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp: 255-267, Figs. 540-570.

Text continued on p. 412.

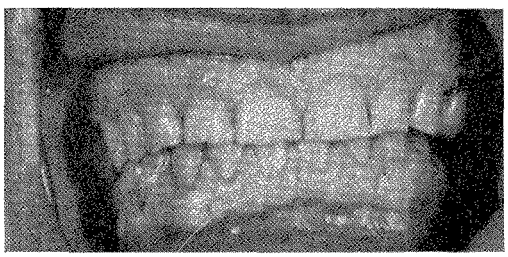


Fig. 883. In 1943 this mouth was reconstructed. This photograph was taken before the work was started. The cause of the bite closure and occlusal breakdown was the habitual daily use of lemon juice in warm water over a period of years. At the time this photograph was taken the patient was 46 years old. This case was reported in 1947. (Figs. 883 to 891 are of the same case.)

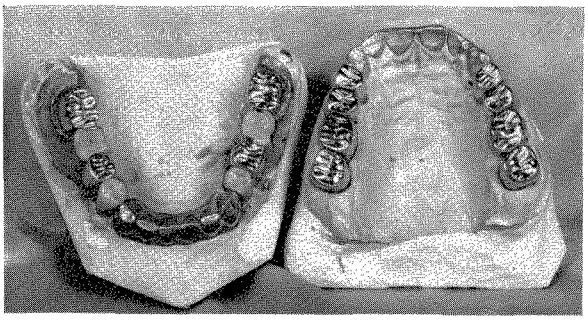


Fig. 884. The work was constructed on a Hagman balancer articulator using a functional technique. The completed posterior prostheses are shown here. The upper anterior porcelain jacket crowns were not yet constructed.

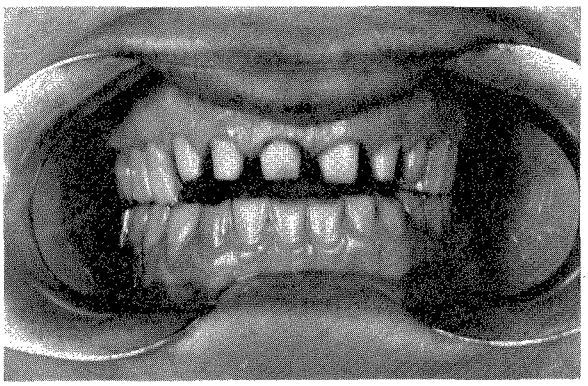


Fig. 885. The posterior prostheses shown in Fig. 884 were inserted, and the upper incisors were prepared for porcelain jacket crowns. The vertical dimension was raised at least 3 mm. The lower incisors were not touched.

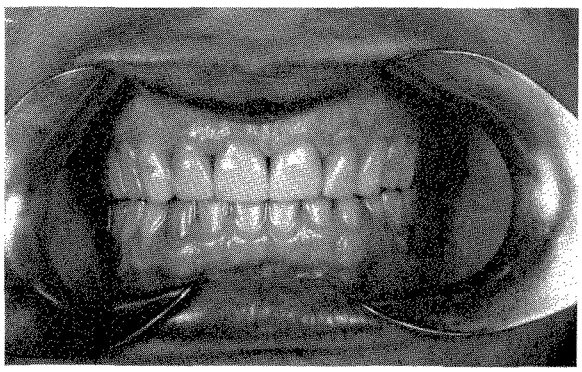


Fig. 886. The completed rehabilitation is shown here. This photograph was taken in 1943.

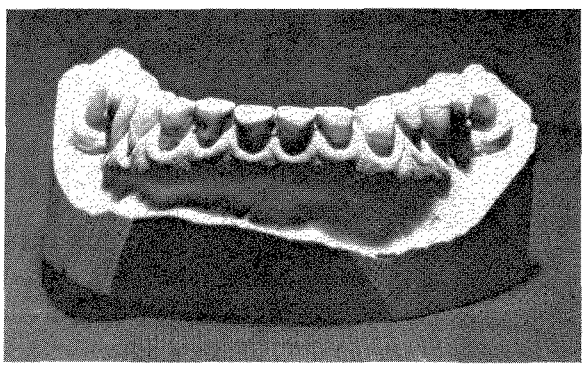


Fig. 887. This cast was made in 1950. It shows the result of the mechanical abrasion and attrition of the artificial porcelain on the natural enamel of the lower incisors. This took place in eight years.

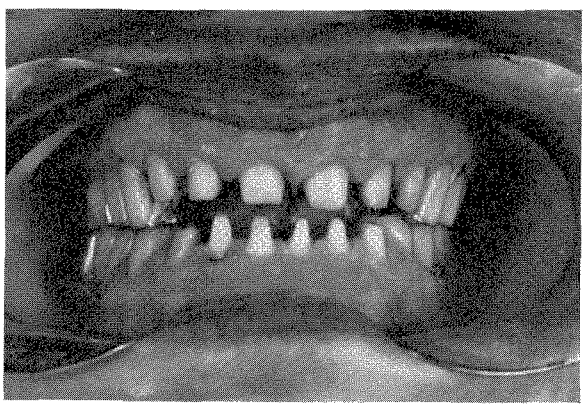


Fig. 888. In May, 1950, all the upper and lower incisors were prepared for porcelain jacket crowns. The vertical distance was divided equally.

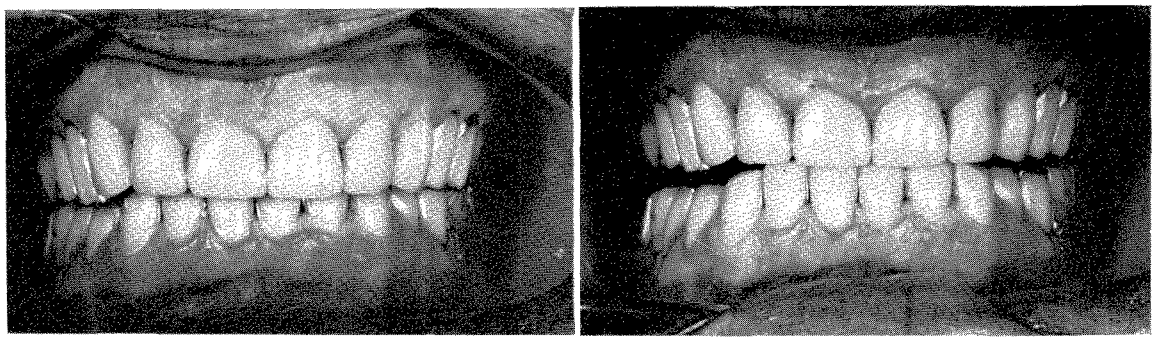


Fig. 889. A, The completed work is shown here. The twelve anterior upper and lower porcelain jacket crowns were inserted. **B,** The teeth were slightly separated to show the amount of vertical overbite.

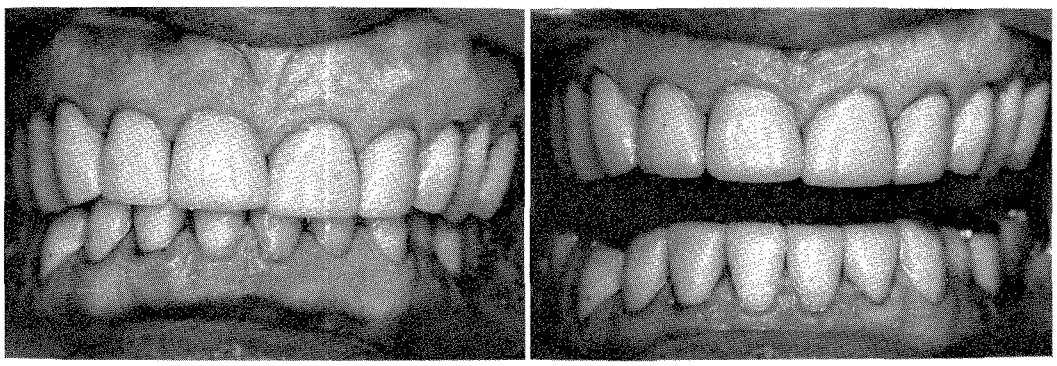


Fig. 890. These two photographs were taken in 1962. The reconstruction was nineteen years old. The patient was 65 years old. The lower anterior teeth were well protected from being abraded by the upper artificial porcelain teeth. An interesting observation can be made comparing Fig. 890 with Fig. 883, which was taken at the start of treatment in 1943. The mandible is positioned again toward the right. In Fig. 886, which was taken at the completion of the reconstruction, the upper and lower median lines coincided. The probable reason for some of these cases reverting to the old mandibular position is that the wax records record static positions, whereas when function begins, motion takes place. The right and left muscular movements are dissimilar and create different pressures. This would account for these happenings.

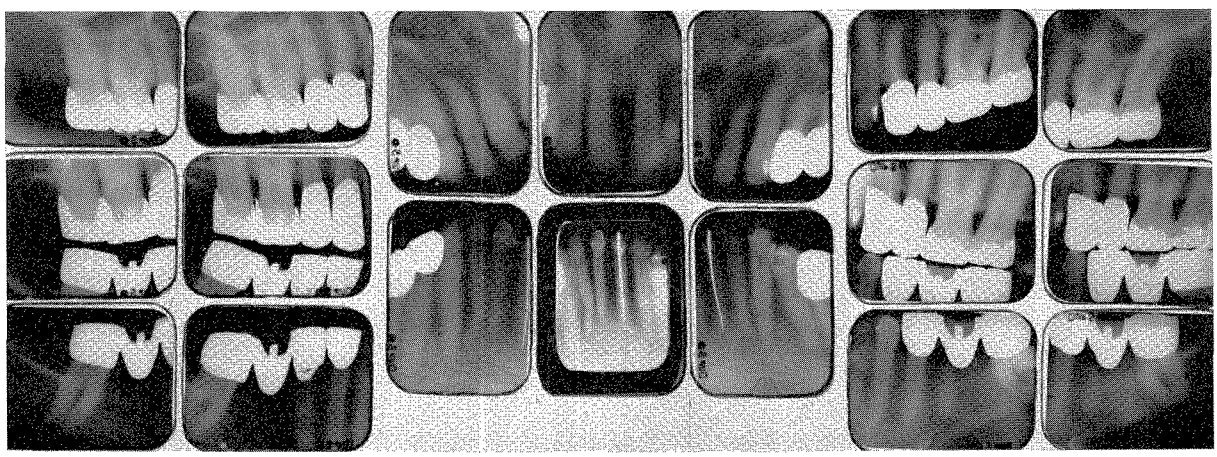


Fig. 891. Roentgenograms taken in 1962. This was nineteen years after the case was completed. The structures are excellent.

Case 10

Present condition

In September, 1953, a 60-year-old woman, who presented a deep vertical overbite in closure, was examined. The lower anterior teeth had been severely abraded. The upper central and lateral incisors were covered with porcelain jacket crowns. Six lower posterior teeth and two upper third molars were missing. The teeth had migrated and were spaced. The upper left central incisor was nonvital, and its root canal was filled. Unfortunately the lower right first molar had been removed just two months previously. Had it still been in place upon her first examination, the lower removable partial denture could have been avoided.

The uneven abrasion and attrition had resulted in the establishment of a functional bite. Curiously enough, excentric bites are called functional bites. Actually, centric bites are also functional, but our usage has made it appear that centric and functional bites differ in this respect. The temporomandibular roentgenograms revealed normal relationship between the condyle heads and the fossa. From rest position to contact, only rotation took place.

Treatment——transitional stage

A Hanau Model H articulator was used to study the casts. The vertical dimension was arbitrarily increased an amount sufficient to make the insertion of full crowns possible. Transitional upper and lower splints were constructed upon a simple laboratory articulator. A lower lingual bar was also constructed. The vertical dimension was increased at least 4 mm. anteriorly. The upper anterior teeth had not yet been prepared, but with the insertion of the other transitional splints, this was now undertaken. The upper anterior crowns were shortened in order to be able to add this extra height to the lower incisors. This was accomplished by adding quick-cure acrylic directly to the lower anterior splint. The entire transitional work had now been completed, providing the prescription for the final work.

Treatment——final stage

The preparations of the natural teeth to receive porcelain jacket crowns, gold crowns veneered with acrylic, gold inlays, and a partial lower lingual bar denture were now completed. Low-fusing metal transfers were made for all the posterior teeth. Silver crowns were cast for the anterior teeth. These crowns were used in place of porcelain jackets to establish the positions of the anterior teeth. After the insertion of all the posterior prostheses, the silver crowns were replaced with porcelain jacket crowns.

The temporary work was inserted on Dec. 9, 1953, and the final work on Jan. 28, 1954. These dates are important because they indicate that the transitional work had been worn for almost two months before the case was completed.

Sufficient time should be allowed for vertical increase to be accommodated

Owing to the large arbitrary increase in the vertical height, it became necessary to permit a sufficient time lapse after the insertion of the temporary work to

accommodate for the intrusion of the teeth and the possible closure of the bite which was expected. The saddles of the lower lingual bar caused pressure upon the soft tissues as the oral musculature squeezed the upper and lower teeth together in an attempt to attain its normal origin and insertion dimension. Until the vertical height became stable, the natural teeth were intruded, and the bar and saddles of the removable appliance needed constant adjustment. Where a large free-way space is originally present, accommodation to increased vertical dimension takes place with less constant adjustment or severe irritation of the soft tissues. The important consideration is individual variation within physiological limitations.

The time finally arrived when there no longer was any need for adjustment because of tissue impingement. When this occurred, it was assumed that the vertical dimension had become stable. The exact amount of tooth depression or intrusion was impossible to measure clinically because the interocclusal relationship had provided contact of all the teeth.

Lateral protrusive mandibular positions obtained directly in mouth

The incisors were employed as a guide for copying the established vertical dimension. Low-fusing metal transfers were used on the posterior teeth. The lateral and protrusive positions were ground and adjusted directly in the mouth. Wax records of these positions were then obtained. A face-bow recorded the position of the upper cast upon the Hanau Model H articulator. The lateral shafts and the condylar inclinations were set by means of the wax records. The movements of the articulator were then checked with the previous movements of the patient.

After the articulator had been set, the movements were observed carefully. Where they did not coincide with those of the patient and with the low-fusing transfers which had been directly ground in the mouth, the articulator was re-set to make the movements as close as possible to those which had been observed.

Method used to coordinate occlusion

The posterior low-fusing transfers were then removed from the dies, and the wax-up was accomplished. Inasmuch as the lower right posterior teeth were to be part of the lower removable partial denture, it was necessary to set up the porcelain teeth to occlude with the upper crowns in centric and excentric positions. The lower teeth were waxed up first in order to establish a reference plane and were then covered with tin foil. The upper teeth were then waxed up. In this manner a well-coordinated interocclusal relationship was obtained.

The lower crowns were cast first and returned to the articulator for corrections. Finally, the upper crowns were cast. This work was inserted in the mouth on Jan. 21, 1954. Roentgenograms were taken to check marginal fit. Adjustments were made for centric and lateral mandibular positions. A new face-bow record was taken, and two centric wax records were obtained. Upper and lower plaster impressions were taken. The new work casts were mounted upon the articulator by means of the new wax records and the face-bow. The lower lingual bar was constructed.

The entire prostheses were inserted on Jan. 24, 1954. The occlusion was adjusted where necessary, using a wax checkbite. At this stage the silver anterior crowns were replaced by porcelain jacket crowns. Upon completion the final prostheses were inserted on Jan. 28, 1954. There were several postinsertion adjustments. Complete roentgenograms and photographs were taken, and final study casts were made.

The postinsertion care was simple and uneventful. The lower right first bicuspid, which was problematic to start with, had eventually to be replaced by a three-unit splint. Unfortunately, this patient died in the fall of 1959 at the age of 66. (Figs. 892 to 916.)

Text continued on p. 422.

Fig. 892. Four views of the teeth of a 60-year-old woman with an extreme vertical overbite. These photographs were taken in September, 1953. The severe abrasion and attrition of the lower incisors could have been caused partly by the porcelain jacket crowns which covered several of the upper incisors. (Refer to Figs. 879 to 891.) (Figs. 892 to 916 are of the same case.)

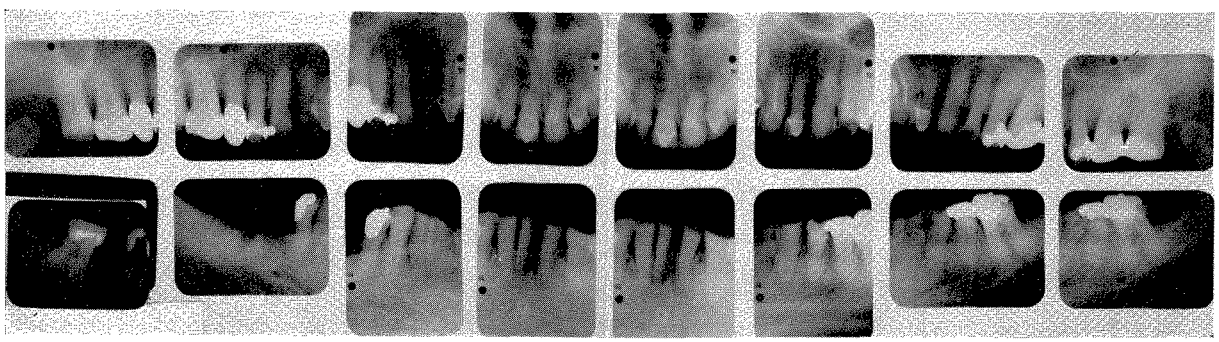


Fig. 893. Roentgenograms taken in September, 1953, before any work was undertaken. The lower right molar film was inserted although this tooth had been removed in July, 1953, as the bicuspid film indicates. (Read text.)

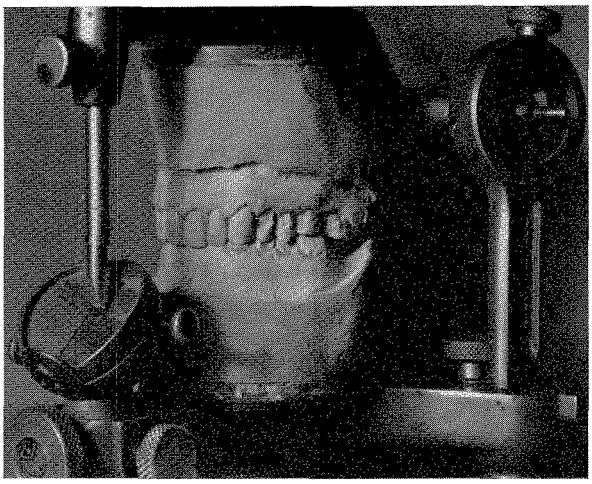


Fig. 894. Casts were mounted for study upon a Hanau Model H articulator.

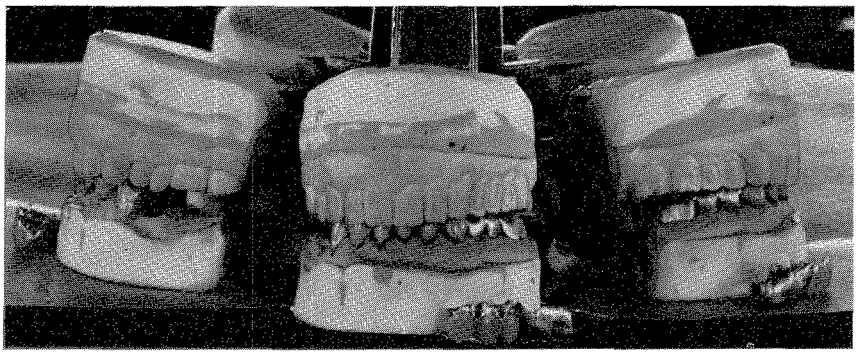


Fig. 895. The lower temporary work was constructed first upon a simple laboratory articulator. These splints raise the vertical dimension, as shown by the anterior overbite. The upper left splint, shown in the center foreground, was made next.

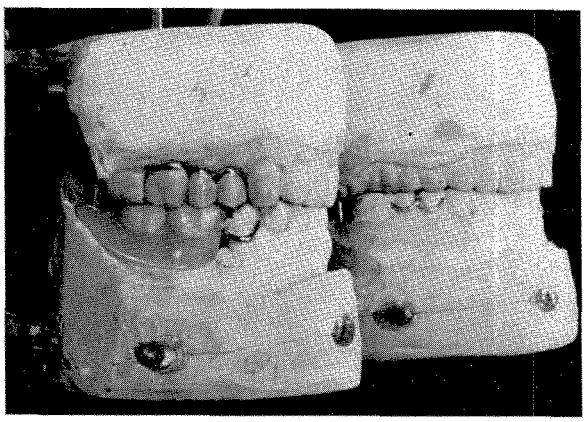


Fig. 896. Then the transitional upper right splint and the temporary lower lingual bar were constructed.

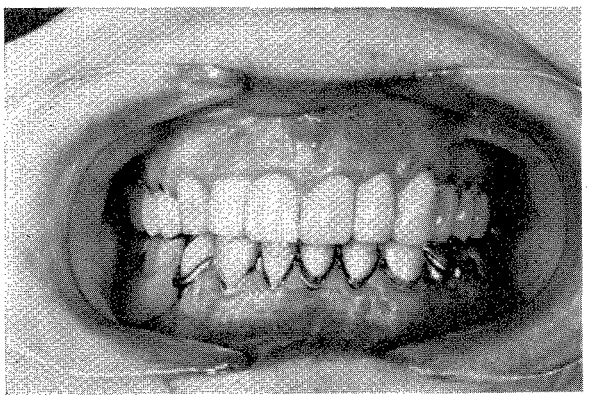


Fig. 897. With all the posterior transitional work in place, the upper anterior teeth would now be worked on. Compare this illustration with Fig. 892, top left, to see the amount of vertical increase. In restoring the lower incisors, no surgery was necessary.

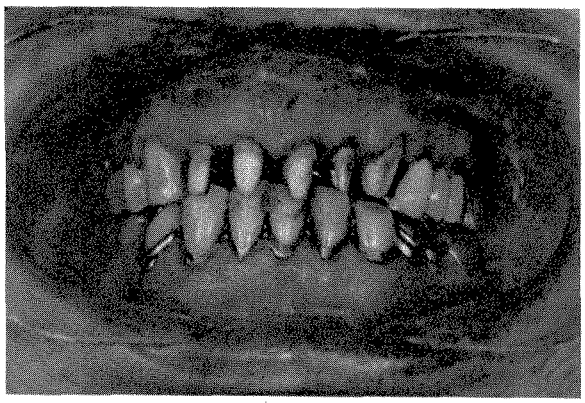


Fig. 898. The porcelain jackets were removed from the upper incisors, and these teeth were partially prepared. Quick-cure acrylic resin was added to the incisal edges of the lower incisor splint to obtain more room for the final lower porcelain jackets.

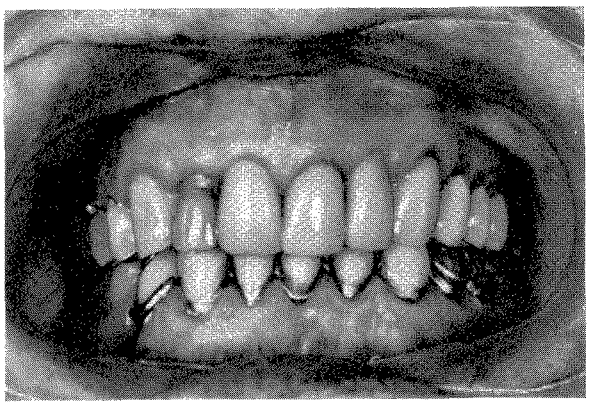


Fig. 899. The lower transitional work was completed in December, 1953.

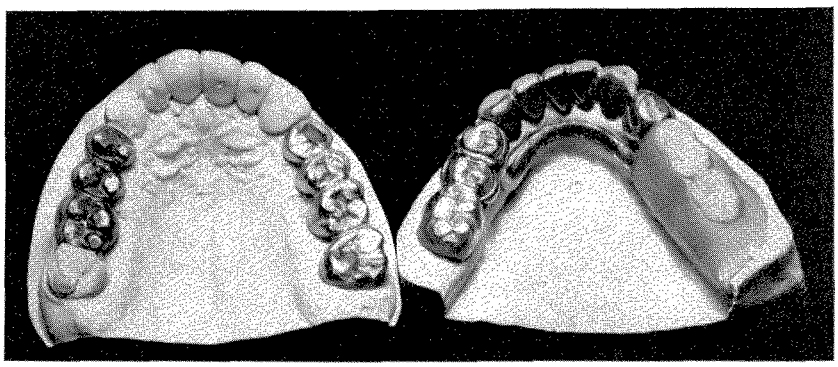


Fig. 900. Occlusal view of the lower transitional work.

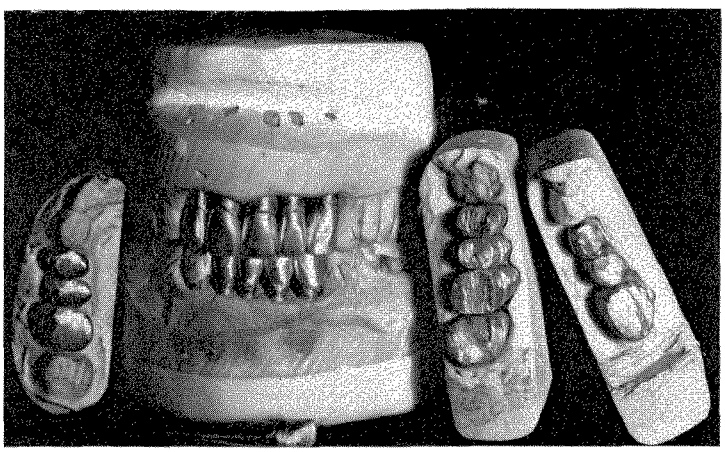


Fig. 901. All the teeth were finally prepared, and copper-plated dies were constructed. Low-fusing metal transfers were made for the posterior teeth. Silver cast crowns were made for the anterior teeth. These were constructed at the predetermined vertical dimension and centric relation as shown here. They would first serve to establish incisal guidance, vertical overbite, and centric relation.

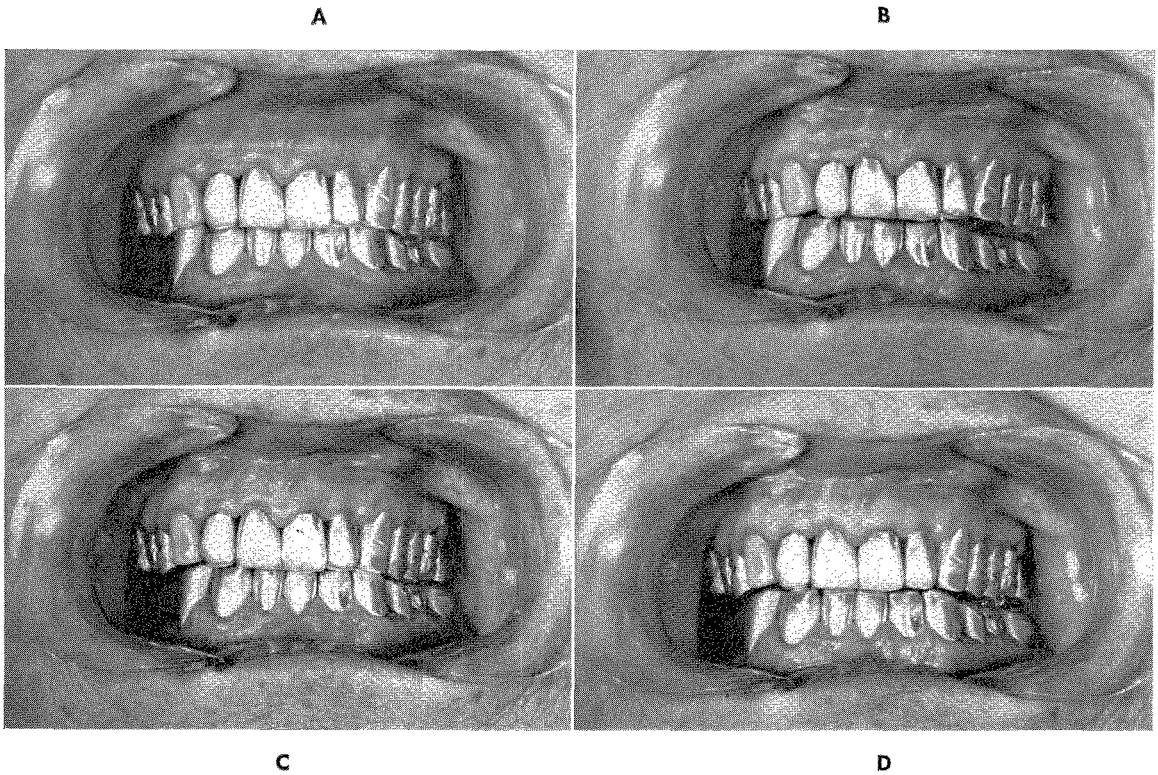


Fig. 902. **A**, All the crowns shown in Fig. 901 were inserted in the mouth. This is the centric relation bite. Incisal guidance was first established. Then the posterior transfers were inserted and ground into correct positions. **B**, The right lateral bite is being ground in directly in the mouth using the low-fusing transfers and the silver crowns as substitutes for the natural teeth. **C**, The left lateral bite was established in the mouth. **D**, Finally the protrusive bite was established.

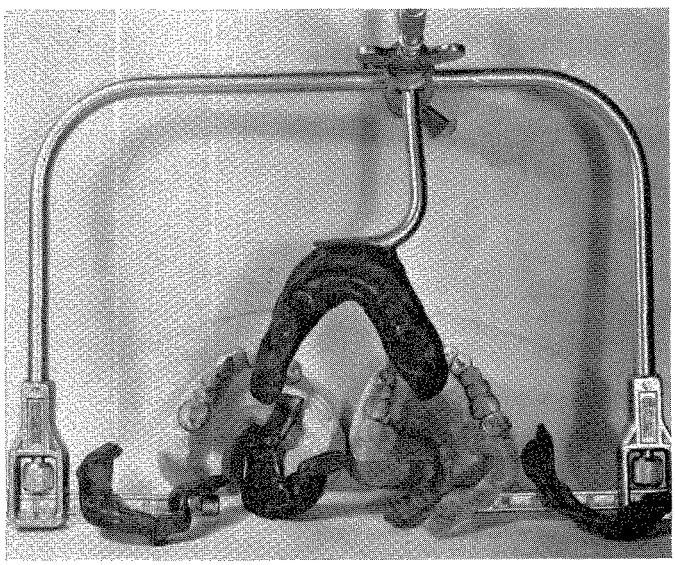


Fig. 903. Plaster impressions were taken as well as a face-bow record and wax records. Work casts were poured as shown here.

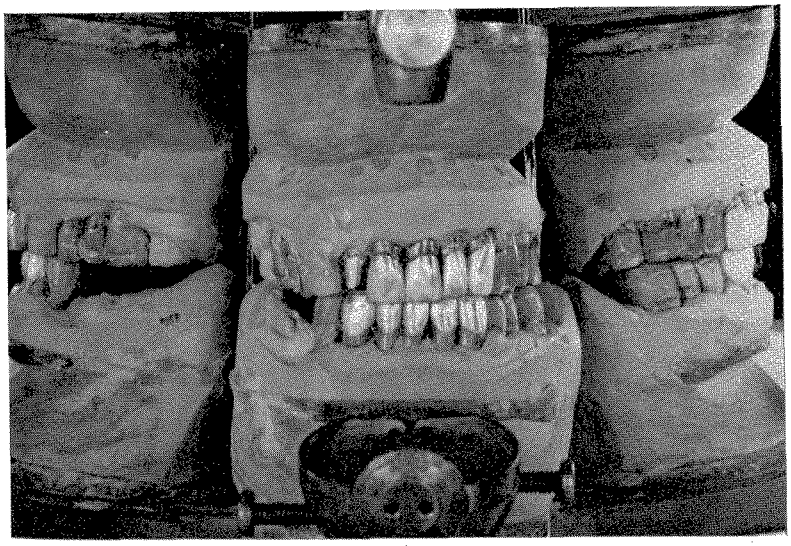


Fig. 904. The new work casts were mounted by means of the records which were taken. The low-fusing transfers and silver crowns will be used to check the articulator controls because they were ground in the mouth to establish the centric, right, and left lateral and protrusive bites. If the settings as established by the wax records do not correspond, the ground-in crowns will be given the preference.

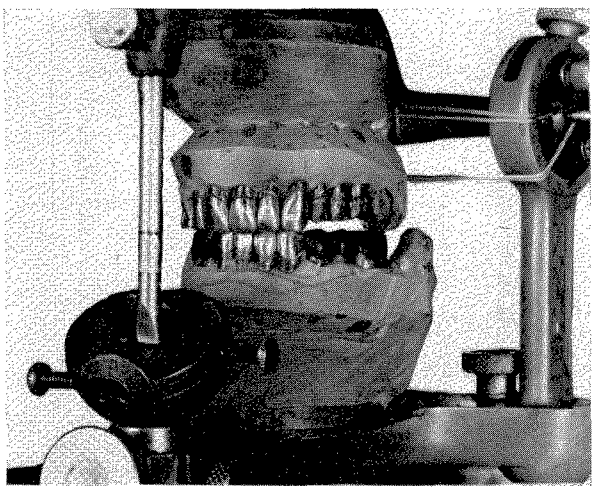


Fig. 905. The lower occlusal plane is first established arbitrarily in wax. This is then tin-foiled, and the upper posterior teeth are waxed up and coordinated with it and to the registrations of the articulator. Adjustments which differ from the arbitrary setting will have to be made where necessary.

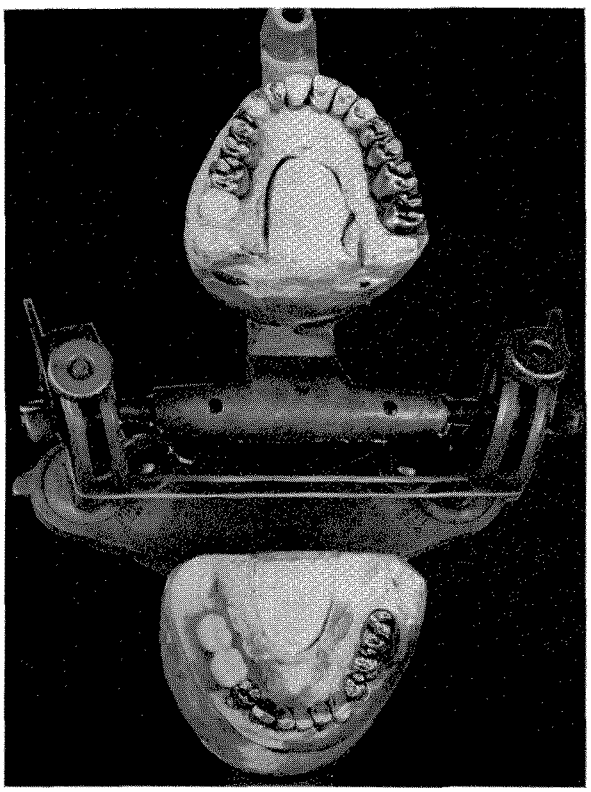


Fig. 906. The posterior castings were completed and returned to the articulator. The silver crowns still remain on the incisors.

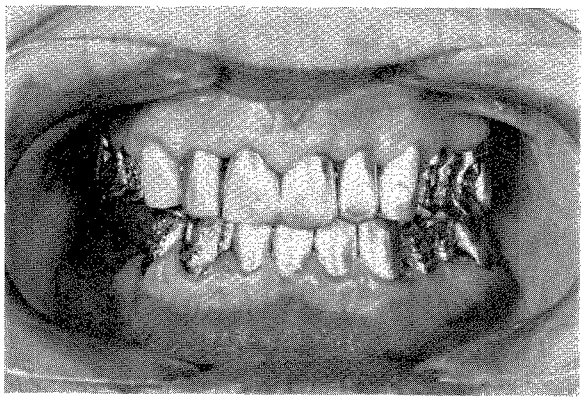


Fig. 907. This is the first try-in of the completed posterior castings. Centric occlusion, vertical dimension, cervical fit, etc. will be established. Roentgenograms and new plaster impressions will be taken. Wax records will again be made to check centric relation.

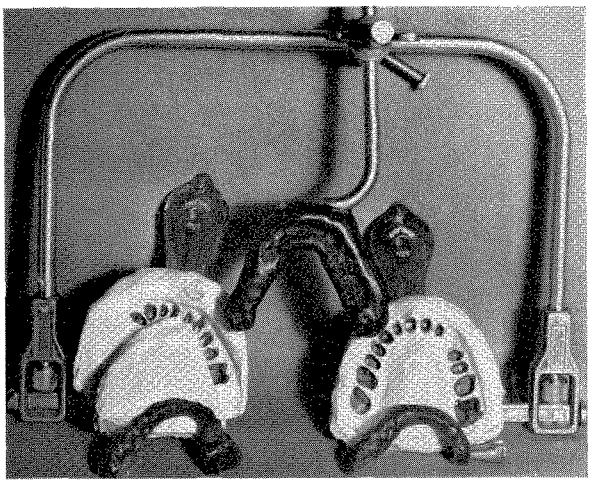


Fig. 908. The records described in Fig. 907 are shown here. They will be used to make new work casts and to mount them on the articulator in order to proceed with the final work.

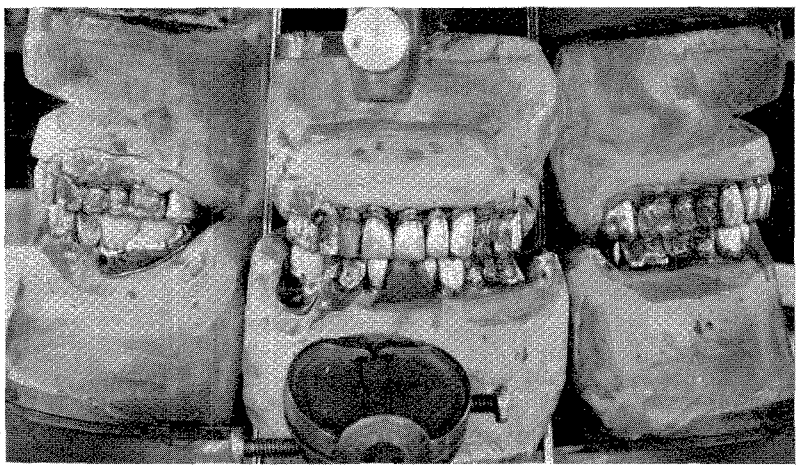


Fig. 909. The lower and upper work was completed further on the articulator. Another try-in of this stage of the work will now be made.

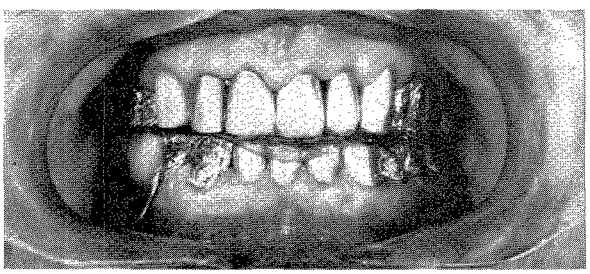


Fig. 910. The final try-in of all the prostheses is shown here. A checkbite with a thin layer of pink wax is being taken and is shown between the teeth. This will be used to see if the mounting is accurate. If not, the lower cast will be remounted, and the final coordination of the occlusion will be achieved by grinding.

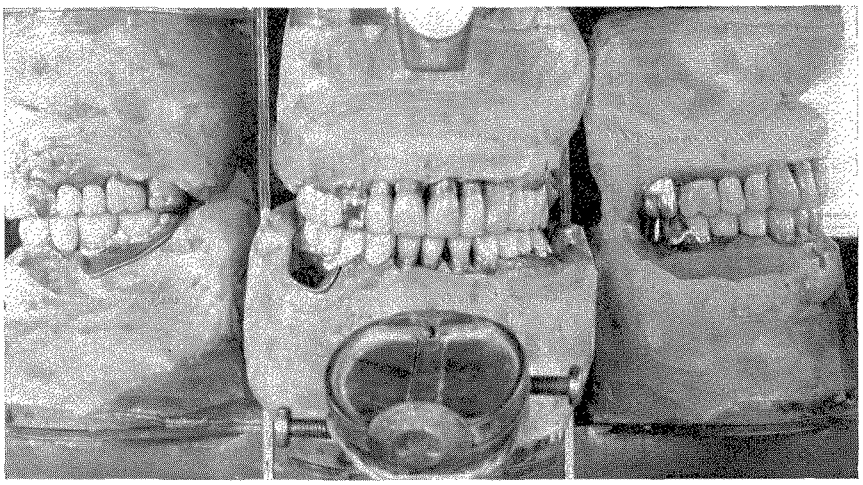


Fig. 911. The completed work on the articulator. The anterior silver crowns were replaced by porcelain jacket crowns, and the plastic veneers were completed, as well as the lower lingual bar. The removable partial denture was retained by precision attachments.

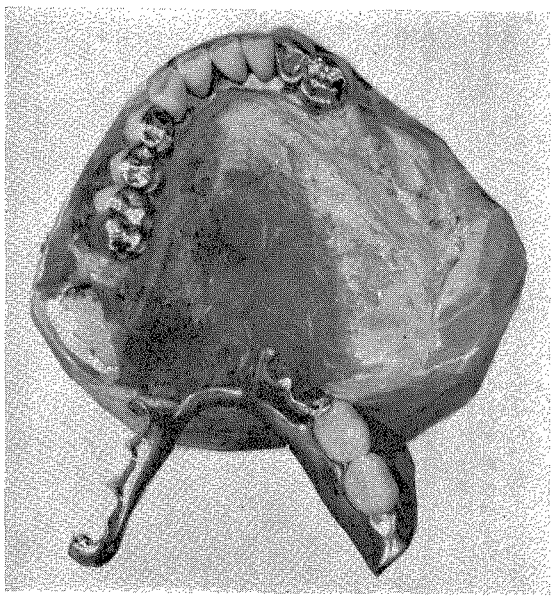


Fig. 912. The lower lingual bar replaced the two right molars. The left side shows a continuous clasp which was cut into the lingual surfaces of the left cast crowns. The right side had double abutments plus a continuous clasp.

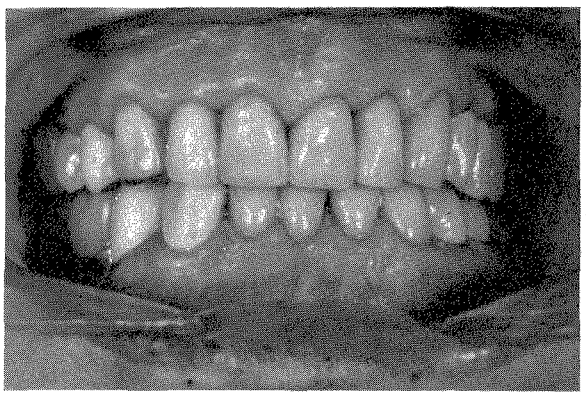


Fig. 913. The final work was inserted in the mouth. This was done in January, 1954. This is the centric relation bite.

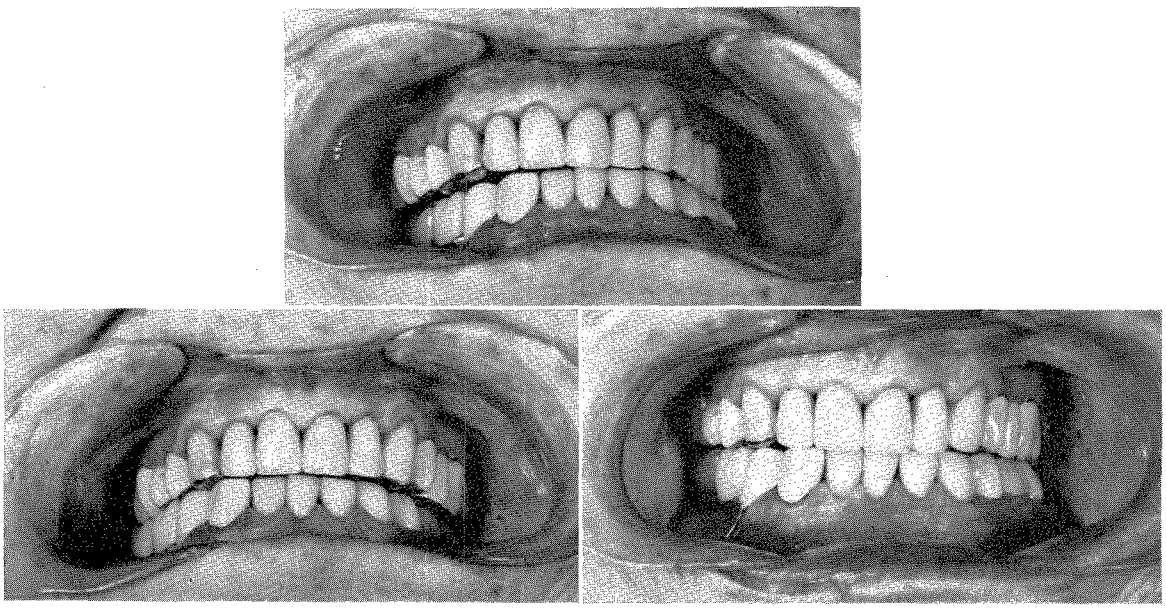


Fig. 914. The right and left lateral bites and the protrusive bite. Working and balancing contacts were established.

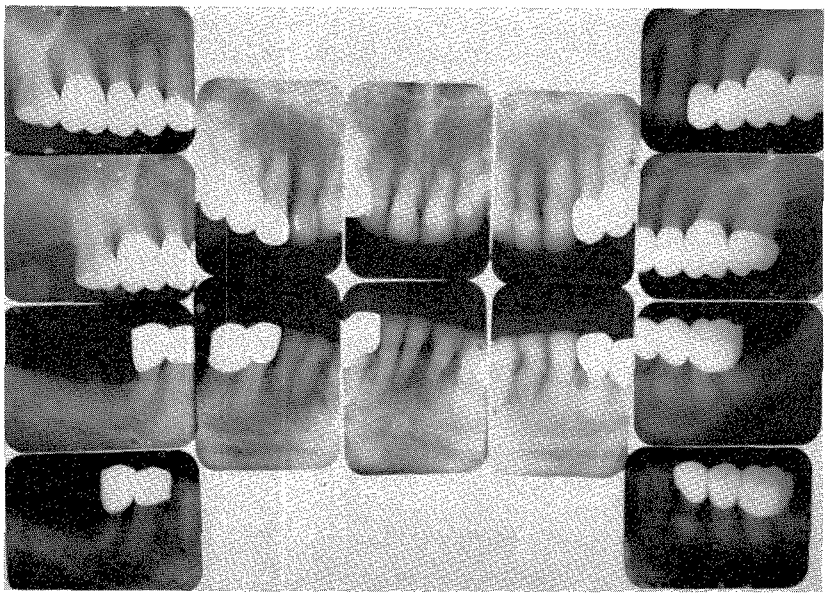


Fig. 915. Roentgenograms of the completed work. These were taken in February, 1954.

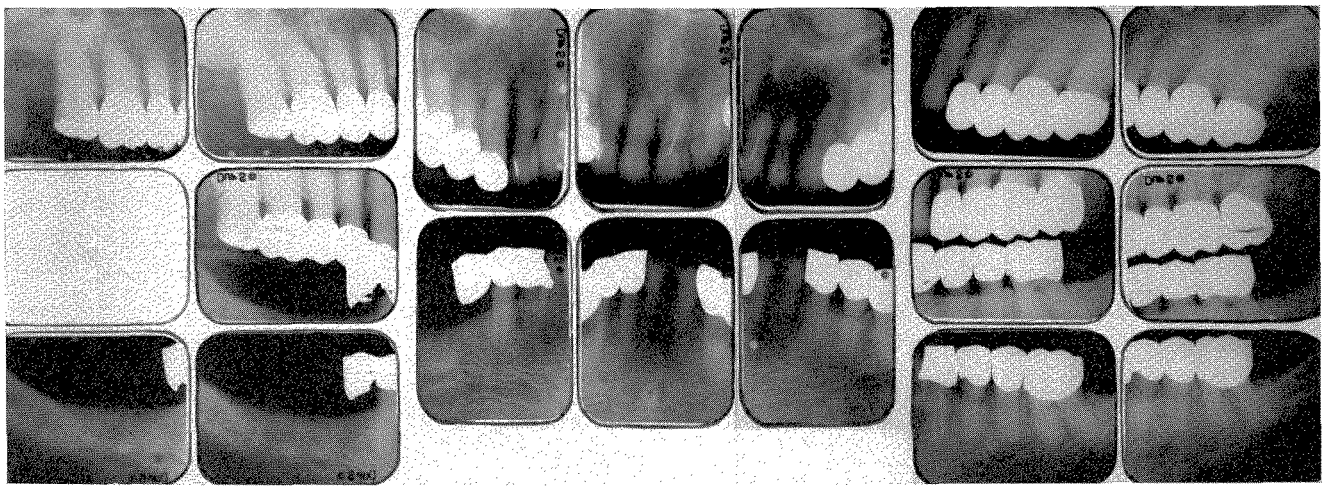


Fig. 916. Roentgenograms taken in December, 1958. The lower right bicuspid root was removed, and the right lateral incisor was added to the splint. The lower left lateral incisor jacket was replaced by a veneer. Otherwise, the structures remained unchanged in the five years that passed since the case was completed.

Discussion

Although this patient may have had an original deep anterior vertical overbite, it was greatly aggravated by the abrasion and attrition of the lower incisors caused by the hardness of the high-fusing porcelain of the upper crowns. As the lower teeth were worn down, the upper teeth continued to erupt. In this case the lower teeth were worn down almost to the level of the gums. This created the problem of leaving normal vertical height posteriorly and abnormal height anteriorly. In obtaining the necessary room to restore the lower anterior teeth, the upper incisors were shortened, and the vertical dimension was increased. Add to this the intrusion of the natural teeth and the resorption of the soft tissues during the transitional period, and one sees how the necessary room was obtained. All the lower incisors remained vital in spite of the abrasion. This would indicate that the cause extended over sufficient time to permit the recession of the pulp to keep pace with this abrasion. This patient lacked sensitivity of the tooth structure to the operative procedures. No anesthesia was used at any time. The patient experienced no pain. This is the only time in my entire career that this took place.

Case 11

This patient was a man first treated in 1930 when he was 30 years of age. He had a severe form of a deep vertical overbite with all the cardinal symptoms of this type of malocclusion. His photographs were shown in 1951.*

Past history

In 1930 a lower left lateral incisor and three posterior molars (two lower and one upper) were absent. The periodontal tissues were normal. An upper right

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 777-779.

second bicuspid and a left cuspid were nonvital. The lower left missing molar had been replaced with a fixed broken stress bridge.

During the next ten years there was some evidence of periodontal pathology, especially in the upper anterior region. By 1946 the soft tissue involvement became more pronounced. The 1952 roentgenograms revealed eight missing teeth and three fixed bridges. The periodontal tissues were then seriously involved. Oral rehabilitation had been suggested since 1945. The patient was unwilling to have it performed. I welcomed this decision because at best it would have been a difficult procedure, and I would have had to assume serious responsibilities.

Temporomandibular joint roentgenograms were taken regularly and were not significant. The mandibular joints were clinically asymptomatic. There was no difficulty with mastication. Auditory function was normal. If this mouth had to be reintegrated, it would be solely because of tissue breakdown due to faulty occlusion. This was not a case to influence the patient to consider immediate treatment.

In these difficult cases the responsibility should be shared. In 1952 the matter of oral reconstruction was brought up by the patient, who was at that time 52 years old and better prepared to consider this procedure. Wishing to share the responsibility, his records were sent for consultation to another prosthodontist. Oral reconstruction was recommended. The records were then sent to an orthodontist for still another opinion. This time the removal of all the upper incisors was recommended. He was finally referred to a periodontist who was to cooperate in the treatment of the periodontal tissues. Active treatment began in October, 1952.

Analysis, treatment planning, and construction

Casts were made of his teeth and were studied on the Hanau kinoscope. There was a decided prematurity in the upper right first bicuspid, lower cuspid contact which forced the mandible laterally and forward in closure. Because of the resultant loss of alveolar bone, the first bicuspid was removed.

Transitional procedures

The first temporary splint ran from the upper right cuspid to the right second molar. It was made upon a simple laboratory articulator and served to open the bite about 1.5 mm. With this splint as a guide, the upper left posterior splint which was made of gold crowns veneered with acrylic was constructed. It extended from the left cuspid to the left second molar. With these in place, the vertical dimension was increased by 1.5 mm. A similar amount would be obtained by increasing the height of the lower posterior teeth. In the protrusive bite there was contact only between two incisors.

At this stage the upper incisors were shortened by grinding, and in so doing four incisors were brought into contact in the protrusive bite. Next the lower posterior splints were constructed. The left one was completed first. This served to increase the vertical dimension an additional 1.5 mm. It extended from the cuspid to the second molar. With this acting as a guide to the vertical height, the lower right splint was constructed. It extended from the first bicuspid to the first

molar. The preliminary prescription had now been written and would be followed in the final work. Actually, even though this transitional work had been constructed on a simple articulator, the occlusion was fairly well coordinated according to traditional standards. With the mandible in its lateral positions, working and balancing interocclusal contacts were present. This phase of the work was completed on Nov. 24, 1952.

Another study was made after the completion of the transitional work. The upper incisors were then prepared for cast veneer crowns and a processed acrylic splint. These teeth were made as short as possible in order to decrease the vertical overbite. The posterior occlusion acted as the guide. This splint was inserted on Dec. 1, 1952. At this time another set of casts was made, and wax records were obtained with the transitional work in position. These casts were mounted on a Hanau Model H articulator, and once again a careful appraisal of the final procedure was made.

The lower anterior teeth were now prepared, and a transitional splint of gold veneered with plastic was made. This was inserted on Dec. 4, 1952, and served to complete the transitional work.

Final phase of reintegration

The final phase was then undertaken. Low-fusing metal transfers were prepared on copper-plated dies of the anterior teeth using the posterior teeth as a guide. These were inserted in the mouth. The incisal guidance and the correct mesiodistal curve were established (curve of Wilson). The centric relation and vertical dimension were checked, and the transfers were then soldered together in the mouth with a heated spatula and were removed by taking full upper and lower plaster impressions. A face-bow and a wax centric and protrusive record were also obtained, and the new working casts were mounted on a Hanau Model H articulator.

Relationship of upper and lower incisors determined by operator

The next step consisted of working out, on the articulator, a functional incisal guidance in wax for the anterior ten teeth. The lower castings were first completed and corrected before the upper castings were made. A definite contacting platform was established on the lingual surfaces of these upper anterior castings. The edges of the lower incisors contacted this platform. This was in sharp contrast to the original condition in which the lower incisal tips contacted the lingual gum pad behind the upper incisors. This new position brought all the upper and lower anterior teeth into definite contact and served to distribute the occlusal load over all the remaining teeth instead of only over the posterior teeth.

The transitional work was removed from the mouth, and the anterior veneer crowns were inserted. The centric relation and vertical dimension were checked. This was done with all the posterior crowns removed so that there would be no posterior interference. Following this, low-fusing metal transfers were inserted in the upper right and left second molars. These touched the lower teeth and provided positive contact posteriorly in centric relation on both sides, which permitted the definite wax records to be taken. A face-bow recording was also obtained, and upper and lower plaster impressions were taken from which new working casts

were poured. The new casts were mounted on the articulator by means of these records, and the posterior castings were waxed up in such a manner that the interocclusal relationship was coordinated. The lower crowns were cast first, and all corrections were made before the upper crowns were cast.

Try-ins of final prosthesis are exacting, time consuming, and difficult for both patient and operator

On Jan. 9, 1953, the final crowns were tried in the mouth. This is an exacting task for both operator and patient. It is very enervating. It can consume as much as four to six hours regardless of the skill of the operator or the cooperation of the patient. Each crown requires time in its fitting. Contacts must be checked. Cervical fit must be examined for accuracy. Roentgenograms must be taken to examine subgingival margins. The gold collars must be marked for esthetics. New wax records must be taken together with upper and lower plaster impressions in order to make and mount new working casts. This stage can be exhausting even to the most energetic patient and well-conditioned dentist. A full morning or afternoon is the minimum requirement. A whole day is not too much.

What makes this session even more trying is the fact that only after the fitting of the crowns and the checking of the main discrepancies of the interocclusal relationship does the operator have to again take the all-important wax records for checking the occlusion and remounting. Even after that comes the tiring but again important step of taking the upper and lower plaster impressions in order to make new casts for the next stage of the reintegration. It is needless to state that elderly people have a difficult time and that it is even dubious that they are able to give the operator correct positional records of the mandible. If it is possible to do these stages in shorter appointments, this should be considered even if the overall time of the rehabilitation must be extended.

With the new work casts and the new mounting, the prosthesis was then further coordinated, and the splints were connected while the bridgework was also fabricated. A final try-in was then made, and the shade was taken for the plastic veneers. Checkbite wax records were again taken. The occlusion received a final check, after which the acrylic resin was cured and the work completed and ready for insertion. The method of insertion was described previously (Chapter 6). The upper splinting was constructed in two sections connected by one precision lug rest. The lower left splinting was also completed in two sections and contained six units. The lower right and lower anterior splints each consisted of three units. At first the lower anterior crowns were separated but later they were united.

Completion

The final work was inserted on Jan. 26, 1953. There were positive working and balancing contacts and detailed occlusal anatomy. There was good interocclusal coordination. The roentgenograms revealed close marginal adaptation of all castings. The original deep vertical overbite had been considerably reduced both by raising the vertical height equally on both arches and by shortening the upper and lower incisors. The steep original anteroposterior curve of Spee was flattened, and

the deeply convex curve of Wilson or transverse curve was also considerably flattened although remaining slightly convex for esthetic reasons. A definite lingual platform was provided on the upper incisors with which the lower incisors made positive contact.

Postinsertion

In 1956 a gum resection was performed upon the upper incisors. The recession which followed exposed some of the root surfaces. Inasmuch as the position of his lips makes it impossible for the patient to show these exposed root surfaces, the esthetics has not been disturbed. Other than the normal postinsertion treatment which consisted of prophylaxis every three months and roentgenograms once a year, this patient has had nothing unusual happen during the ten years since the work was completed. At the time of writing he was 63 years old. (Figs. 917 to 955.)

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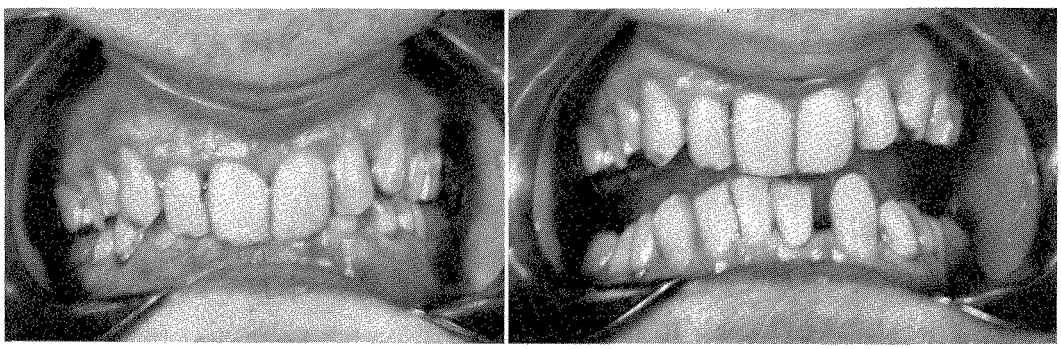


Fig. 917. A male patient whose teeth presented a deep vertical overbite. These photographs were taken in 1938 at the age of 38 years. (Figs. 917 to 955 are of the same case.)

Fig. 918. Roentgenograms taken in 1931 at the age of 31.

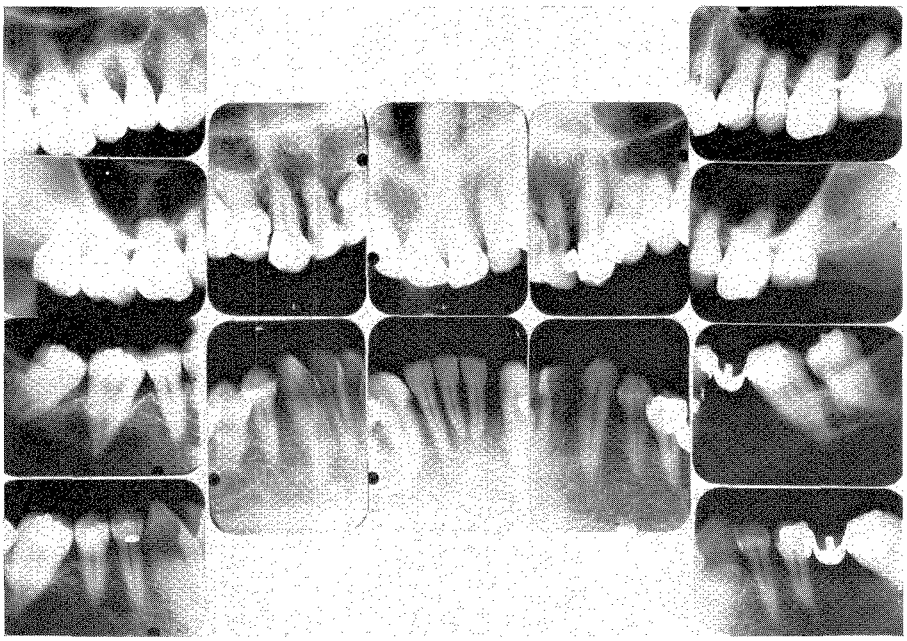
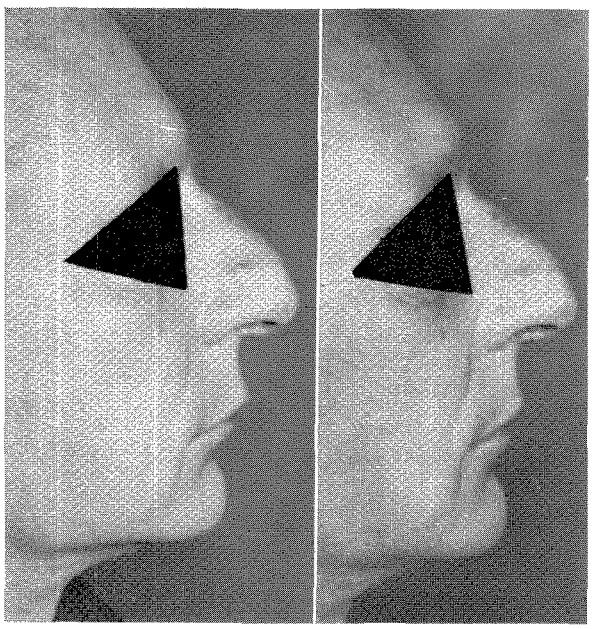


Fig. 919. Roentgenograms taken in 1941 at the age of 41.



A **B**

Fig. 920. Profile photographs of the face taken in 1948. **A** indicates contact position. **B** indicates rest position. These photographs can be superimposed. They indicate a small free-way space. The profile is similar to others with this type of bite. The lower third of the face is short.

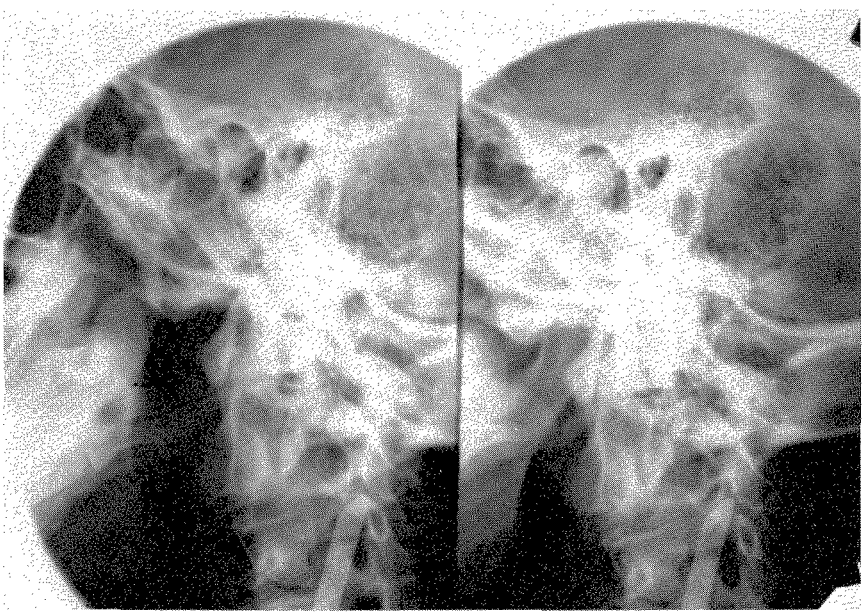


Fig. 921. Roentgenograms of the right temporomandibular joint are shown here in open and closed positions. In the open position the condyle lies in front of the articular eminence. In the left-side roentgenograms the condyle lies below the articular eminence in the open position. The condyles are large, and the fossa is fairly deep. There were no temporomandibular joint symptoms.

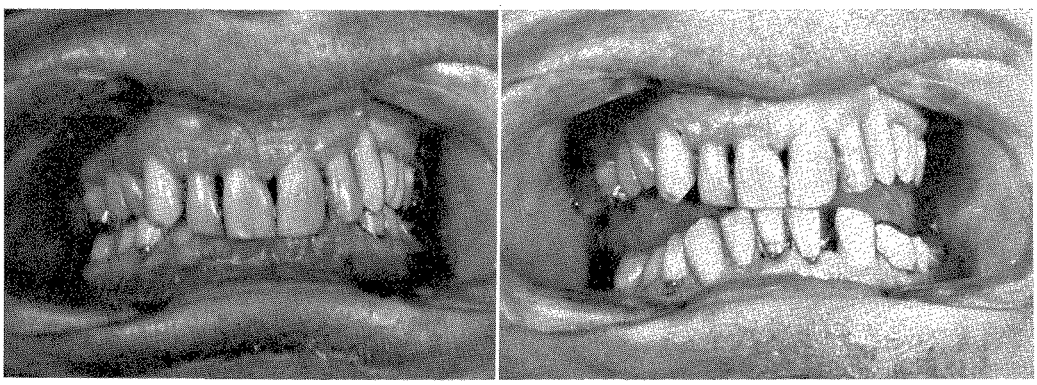


Fig. 922. These photographs were taken in 1952. The patient was 52 years old. This is just before the rehabilitation was started.

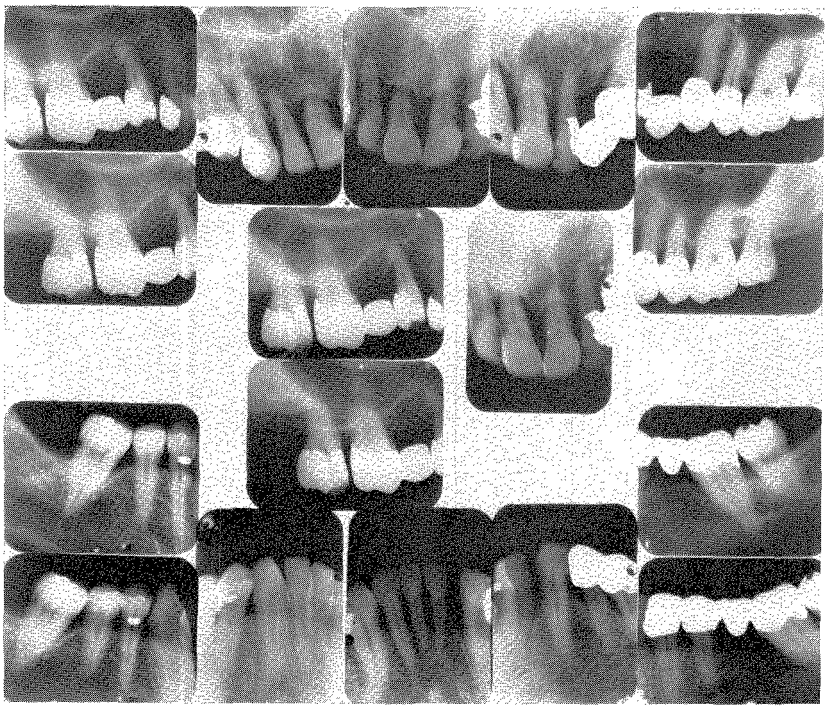


Fig. 923. Roentgenograms taken in 1952 at the start of treatment. Observe the small amount of supporting bone remaining around the upper incisors.

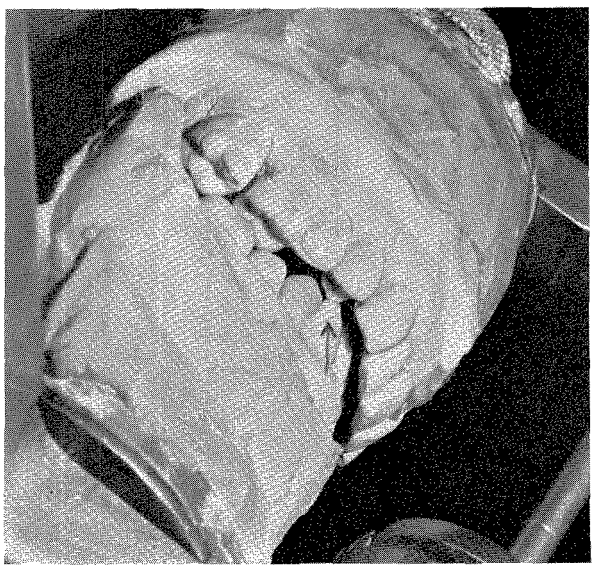


Fig. 924. Study casts were mounted upon a Hanau kinoscope. They indicated a prematurity between the upper right first bicuspid lingual cusp and the lower right cuspid. This served to cause a right mandibular deviation in closure. The upper tooth had lost a great deal of its supporting bone because of this.

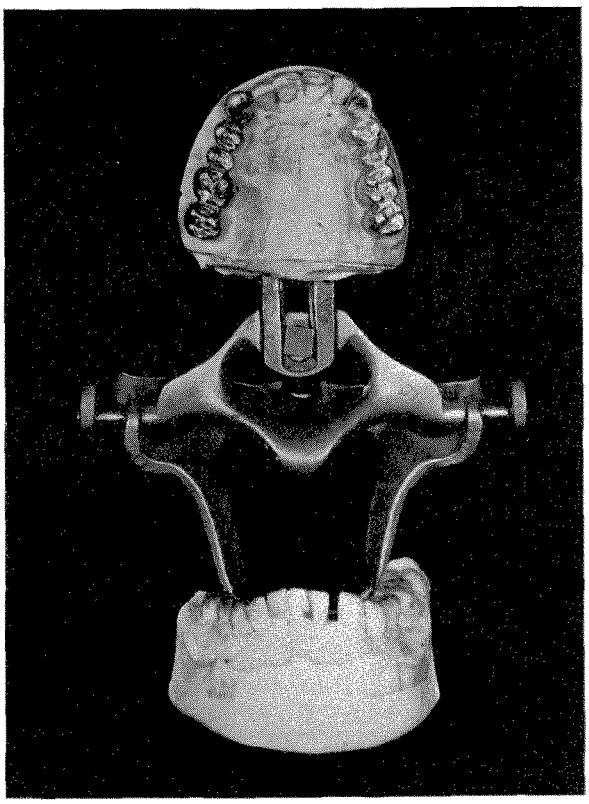


Fig. 925. The transitional work was done in several stages. First the upper right posterior bridge which ran from the cuspid to the second molar was constructed. This was cast in one piece and served to open the bite one half the distance which was deemed necessary. The other half would be obtained when the lower posterior transitional splints were constructed. Using the upper right transitional splint in the mouth as a guide, the upper left splint was completed. It ran from the cuspid to the second molar. Both splints are shown here on the simple laboratory articulator that was used in their construction.

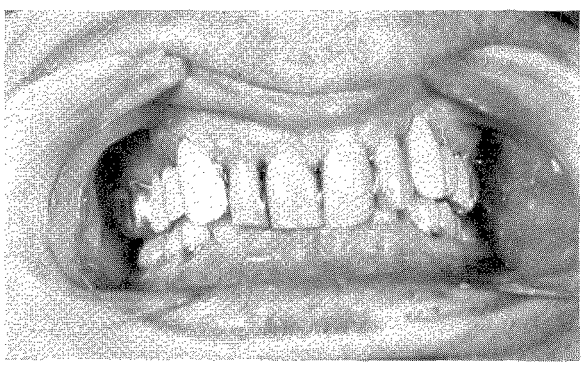


Fig. 926. The upper posterior transitional splints shown in Fig. 925 are in position. They cause a slight opening of the bite The upper and lower incisors will now be rebeveled in order to help reduce the severe vertical overbite.

Fig. 927. The incisors were rebeveled. Shortening them by grinding helped considerably to reduce the vertical overbite.

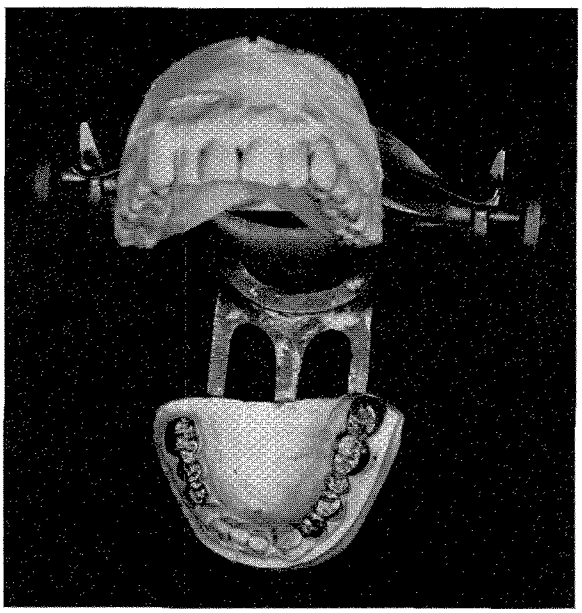


Fig. 928. Now the lower posterior transitional splints are constructed, first the right one and then, using this as a guide to the vertical opening, the left one. These are also one-piece castings made from modeling compound corrected impressions. They have also been constructed upon this simple laboratory articulator. The upper model was made from an impression that was taken with the upper transitional splints in position. These lower splints serve to double the bite opening because they increase the vertical dimension the same amount that the upper splints did. In this manner the increase in the vertical dimension is equally divided between both arches.

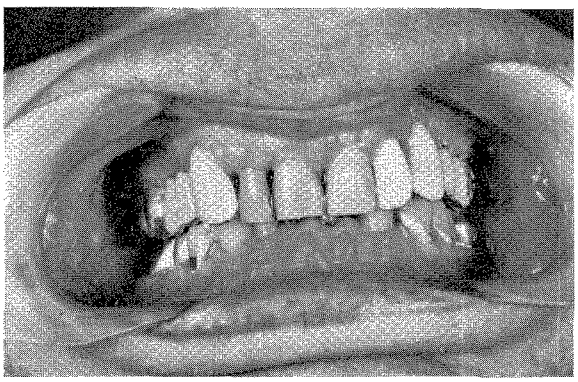


Fig. 929. All four posterior splints were inserted in the mouth. Actually the vertical dimension was increased only a small amount because some of the vertical overbite had also been eliminated by rebeveling the upper and lower incisors. Compare this with Fig. 917, **A.**

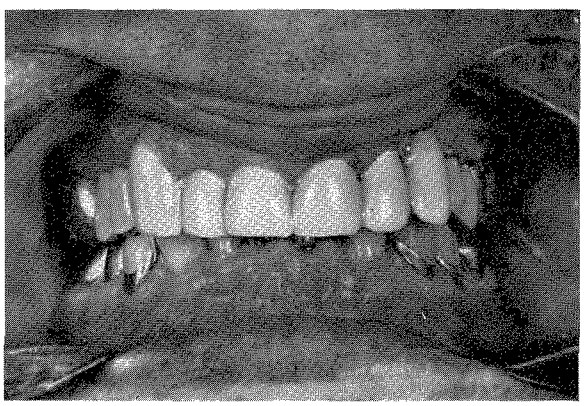


Fig. 930. The upper incisors were prepared for veneer crowns, and a temporary acrylic resin splint was processed to cover them.

Fig. 931. The lower incisors were prepared for crowns. The upper acrylic resin splint was removed from the teeth to show the interocclusal relationship.

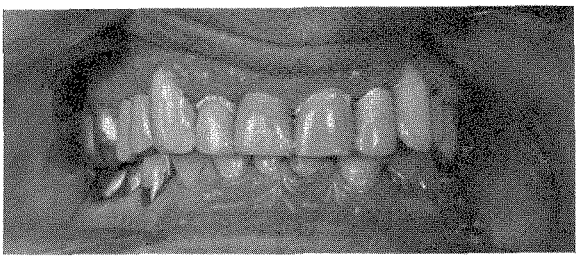


Fig. 932. The upper and lower transitional anterior splints were inserted. This photograph shows all the transitional work in place. This now provides a good means of judging the correction of the centric and vertical relationships. These splints will be worn until the final work is ready to take their place. This stage was completed in December, 1952.

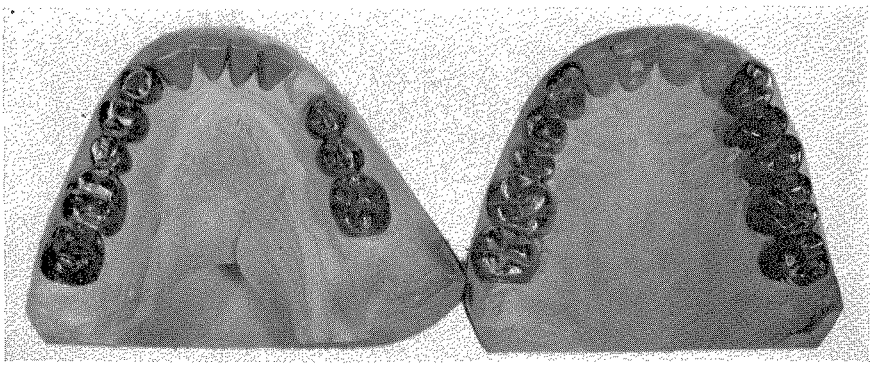


Fig. 933. An occlusal view of the transitional work.

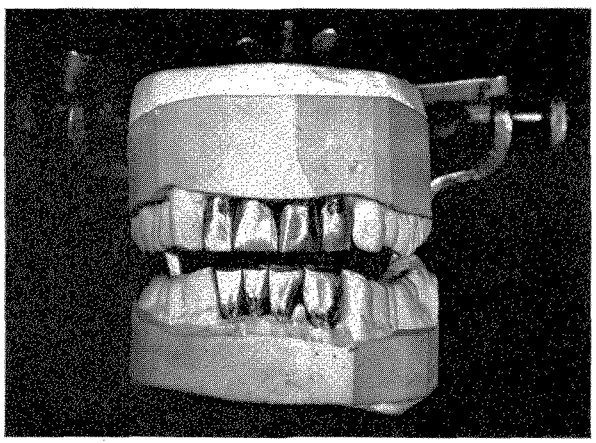


Fig. 934. Low-fusing transfers were made upon the copper-plated dies. These were made on casts that were poured from impressions taken with the upper and lower anterior splints removed. These will now be inserted in the mouth, and incisal guidance will be worked out.

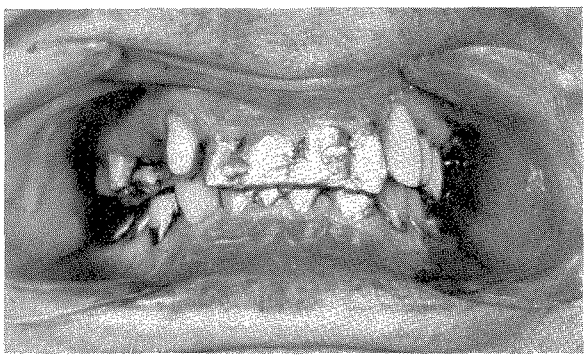


Fig. 935. The upper right and the lower left posterior splints were removed in order not to interfere with the centric relation bite. The anterior transfers were inserted, one by one, and then soldered together in the mouth using low-fusing metal as shown here. Incisal guidance, a correct curve of Wilson, vertical height, and centric relation are established. A face-bow, as well as plaster impressions, will also be taken. These will serve as records for mounting the work casts on the articulator.

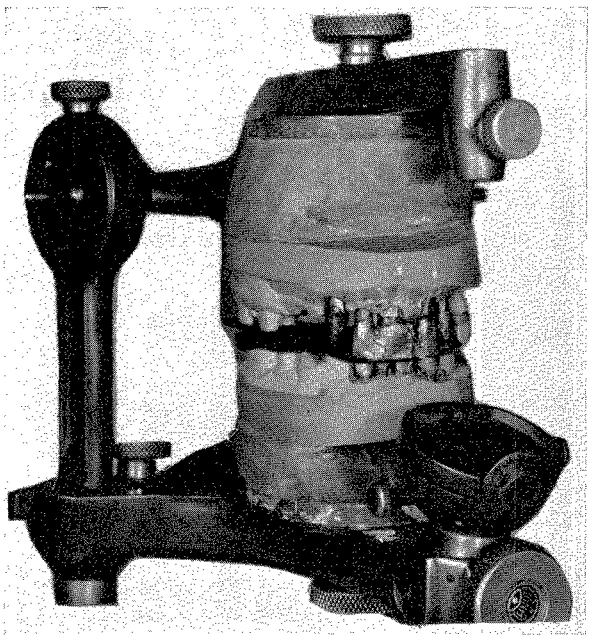


Fig. 936. The work casts were mounted upon the Hanau Model H articulator by means of a face-bow and wax interocclusal records. The low-fusing transfers that still cover the anterior teeth will be removed, and the anterior final castings will be constructed.

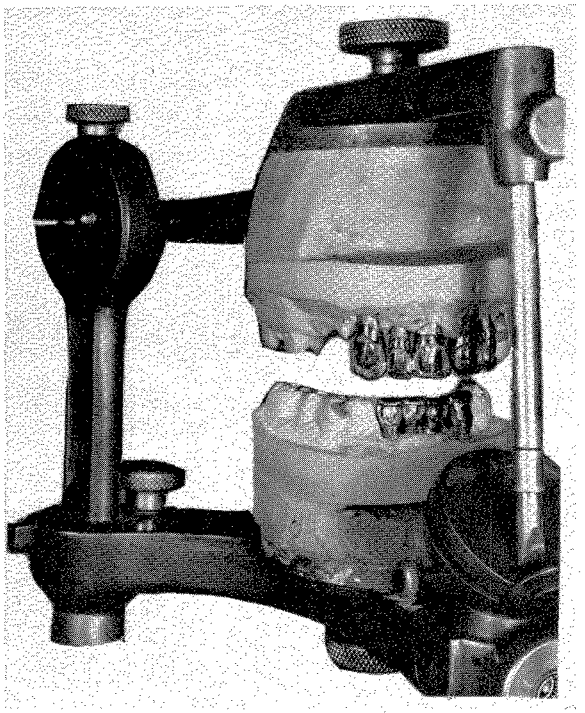


Fig. 937. The anterior final castings were completed. Incisal guidance was worked out on the articulator. These castings will now be inserted in the mouth for a first try-in.

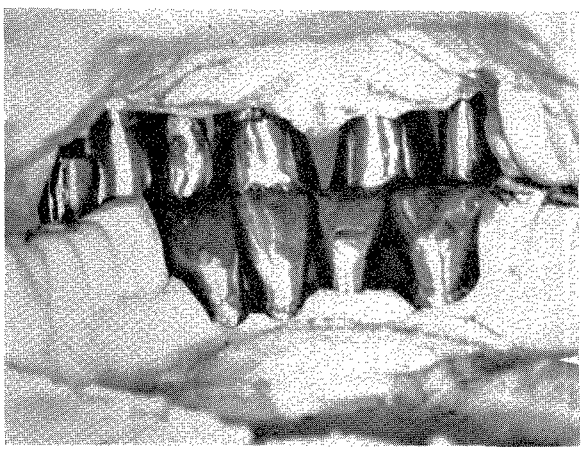


Fig. 938. This is a view from the rear showing that a definite lingual platform was provided where the incisal edges of the lower anterior teeth may contact. In the original casts shown in Fig. 953, **A,** the tips of the lower incisors strike the upper lingual gum pad.

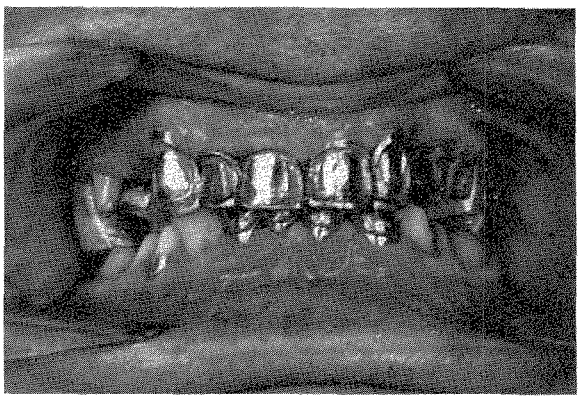


Fig. 939. The anterior crowns are being tried in the mouth. The posterior splints were removed in order not to interfere with mandibular movement. Centric relation, vertical height, the protrusive bite, etc. are established at this stage.

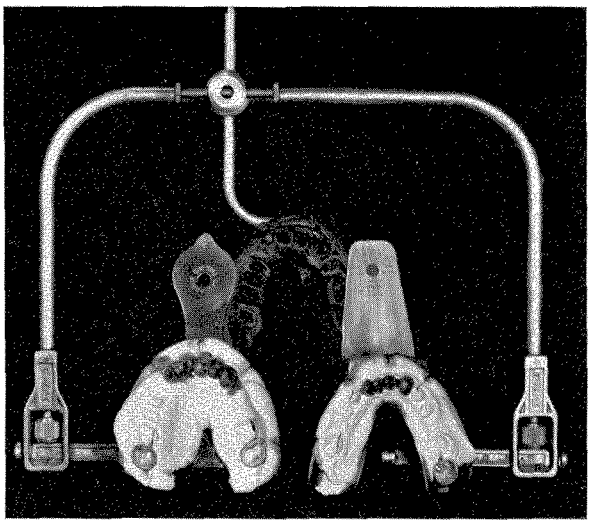


Fig. 940. New plaster impressions are taken, and new wax relational records are made. Another face-bow is taken.

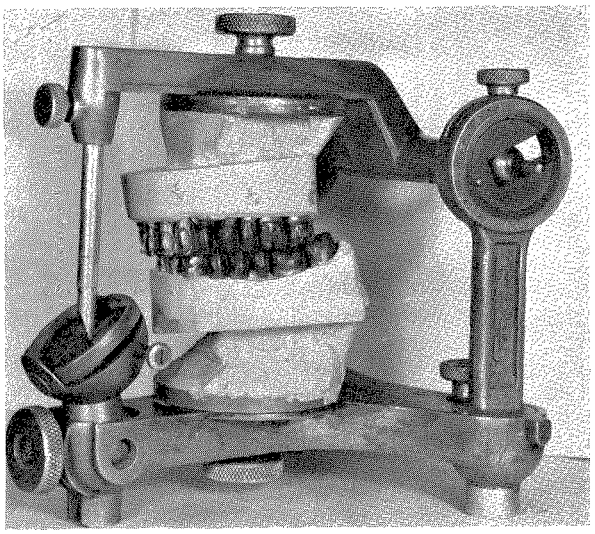


Fig. 941. The new work casts are mounted upon the articulator by means of the records shown in Fig. 940, and a complete posterior coordinated wax-up is fabricated. After this the posterior castings will be made. The anterior castings and the condylar settings act as the guides.

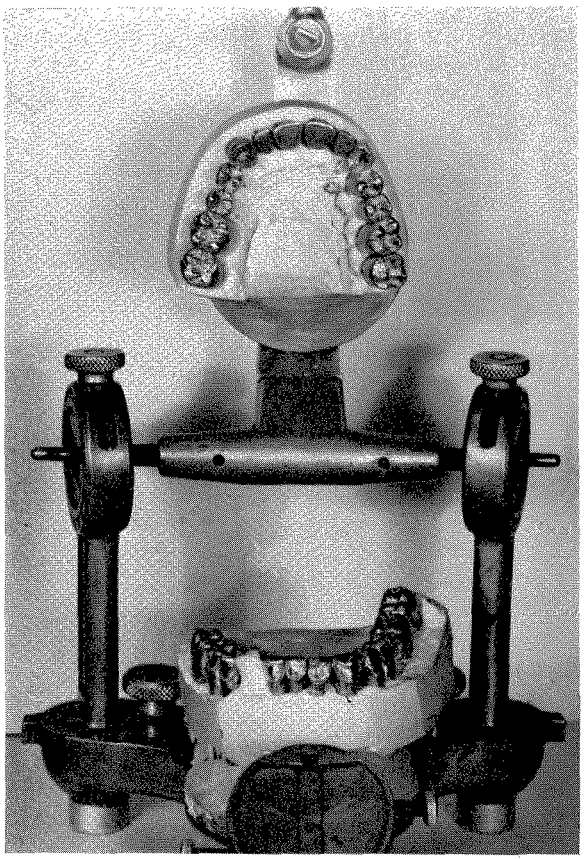


Fig. 942. The completed castings are shown here ready for another try-in to check the fit and the occlusion.

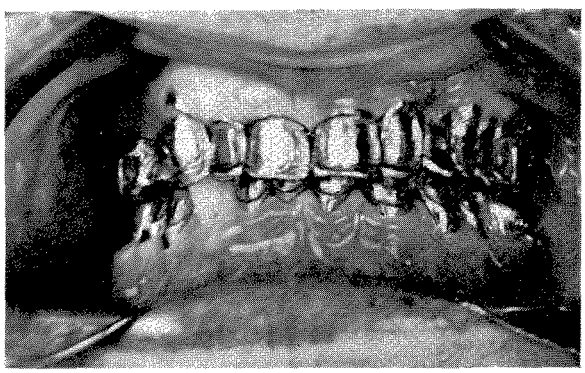


Fig. 943. All the prostheses have been assembled in the mouth, and once again the centric relation, vertical dimension, cervical fit, etc. of the inserted work have been checked. New records are again taken. These consist of a face-bow, centric wax, and upper and lower plaster impressions.

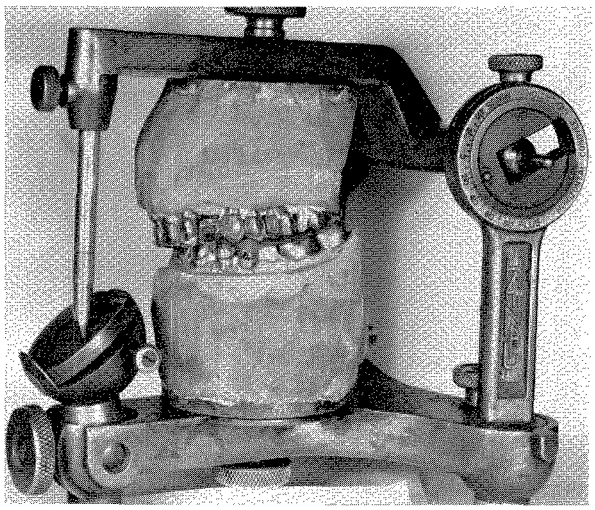


Fig. 944. The new work casts are mounted upon the articulator, and the prostheses are completed. In this photograph the lower cast is being related to the upper cast by means of the thin wax record of centric occlusion.

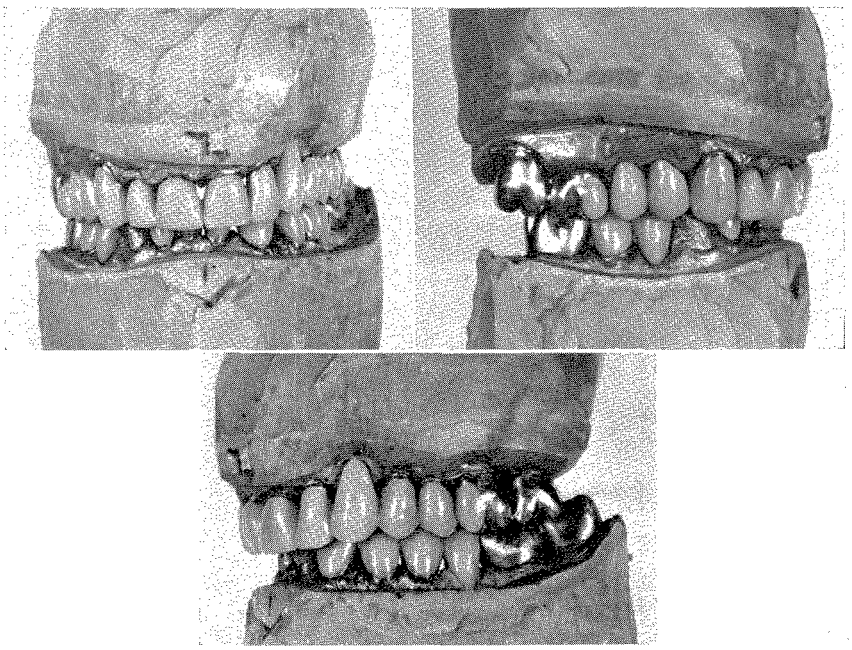


Fig. 945. Front and side views of the completed prostheses.

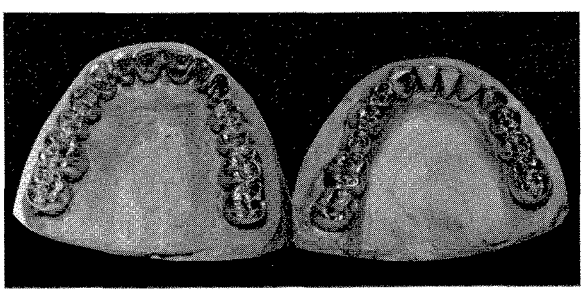


Fig. 946. Occlusal view of the completed work. Observe the anatomical detail.

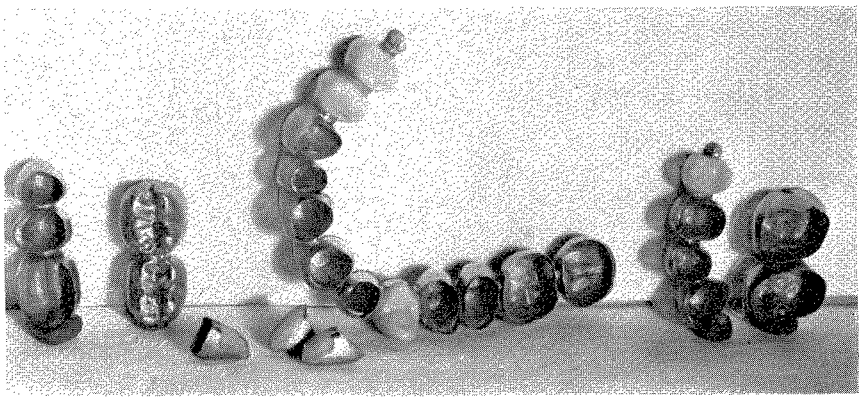


Fig. 947. The completed work off the cast. When the upper work is in place, it acts as one fourteen-unit splint because of the deep lug seat in the first molar crown.

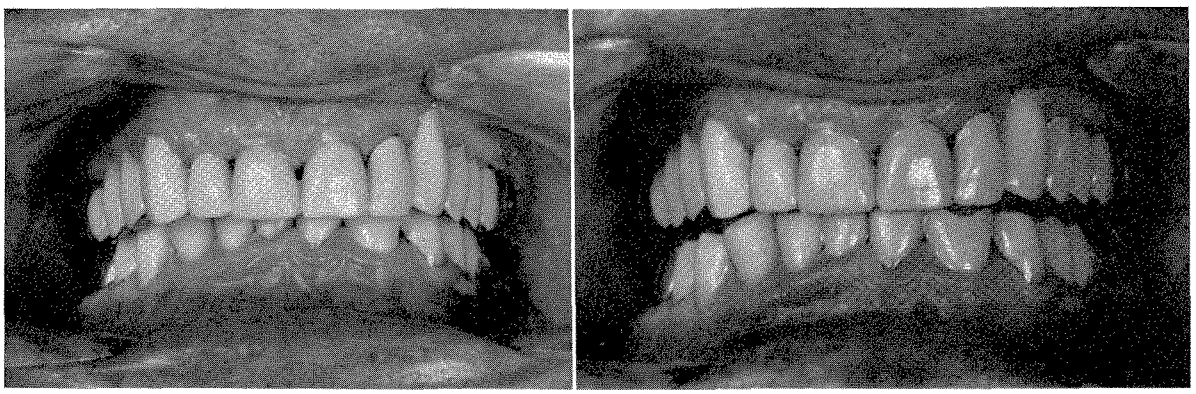
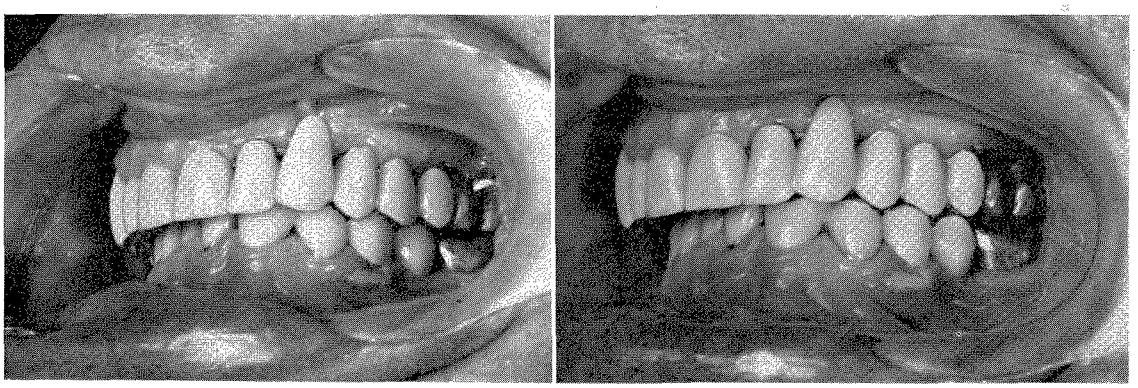


Fig. 948. Front view of the completed work with the teeth contacting and in a protrusive bite. Five teeth contact in the protrusive bite. The completed work was inserted on Jan. 26, 1953.



A **B**

Fig. 949. **A**, Left-side view of the completed work in centric occlusion. **B**, Left-side view of the completed work showing the working bite.

Fig. 950. **A**, Right-side view of the completed work in centric occlusion. **B**, Right-side view of the completed work showing the working bite.

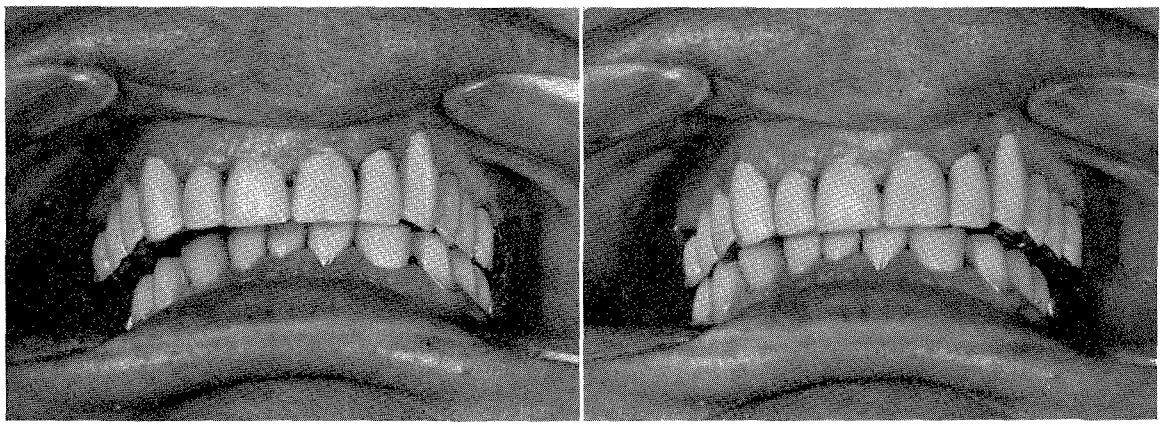


Fig. 951. **A**, Completed work—left working bite, right balancing bite. **B**, Completed work—right working bite, left balancing bite.

Fig. 952. Roentgenograms of the completed work taken in January, 1953.

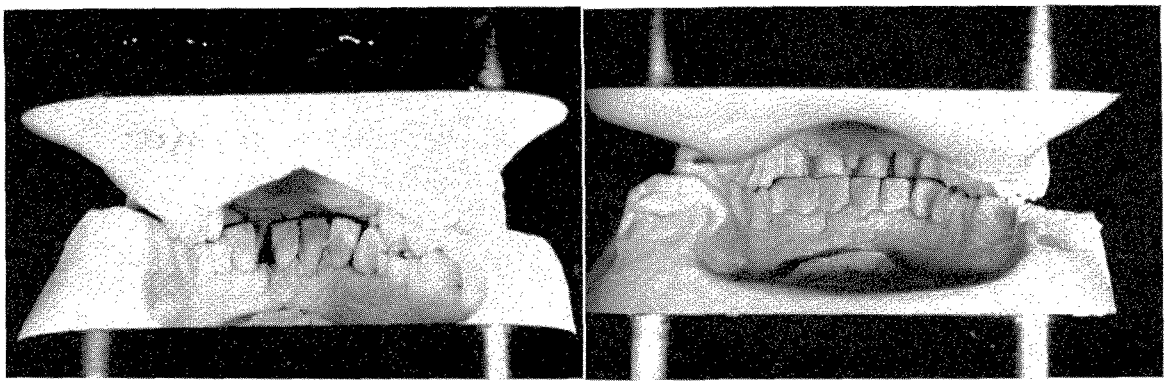


Fig. 953. A, A lingual view of the incisor relationship at the start of treatment. (Refer to Fig. 938.) **B,** A lingual view of the incisor relationship at the termination. (Refer to Fig. 938.)

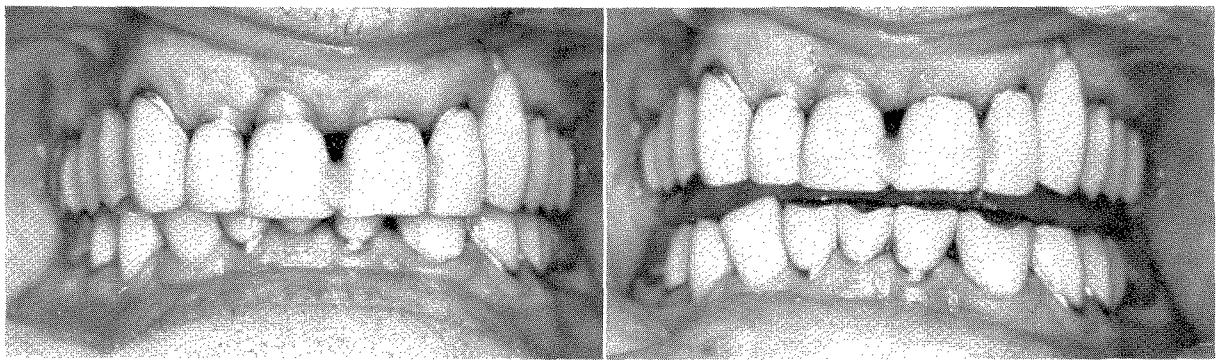


Fig. 954. Photographs taken in 1962. The only changes that have taken place during the last ten years were as follows: (1) in March, 1953, the lower anterior three-incisor crowns were soldered together for greater support; (2) in 1956 a gum resection was prepared to eliminate the periodontal pockets from the anterior teeth; (3) in 1958 the left central facing became loose, and it was re-enforced with acrylic cement which shows between the right central and left lateral incisors. Compare these with Fig. 948. There was no change in the vertical dimension.

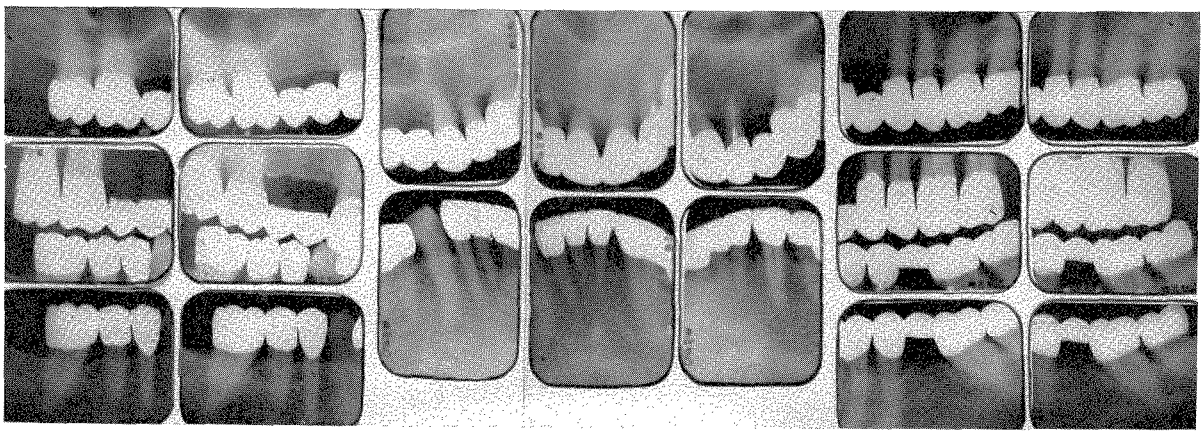


Fig. 955. Roentgenograms which were taken in 1962, when the patient was 62 years old.

Discussion

Problem cases such as this one must be undertaken with caution. Too much is at stake. All the knowledge that the dentist possesses is often inadequate because of the varied responses and limitations of treatment. Patients should not be urged or thrust into these involved procedures in which the health of their oral structures is seriously involved. Time should be spent in the study of their requirements, and consultation with able colleagues should be encouraged. This not only provides other approaches but also divides the responsibility and makes the patients aware that their welfare comes above all else. Dentists not equipped to solve these complicated cases should refer them to those better able to do so. This will not harm the dentist's prestige, and his patients will have greater respect for his judgment.

Conclusions

Fortunately for all concerned, the case just described proved satisfactory. The patient-doctor relationship was pleasant. The patient was very conscientious in his home care, and he reported regularly for prophylaxis and roentgenograms. The vertical dimension was increased the minimum necessary to unlock the vertical overbite. This patient chewed predominantly vertically in the transverse and sagittal planes rather than on the horizontal plane. The upper central incisors were retained by only a small amount of alveolar bone. It is possible that the roots will have to be removed at some future date. This can be accomplished without drastic changes.

OPEN BITE RESULTING FROM PLACING MANDIBLE IN FALSE POSITIONS

When a patient has already had an attempt made to reposition the mandible, it is not always easy to determine correctly what the original mandibular position had been before the work was undertaken. It makes little difference whether the mandible had been related to the maxillae in a false protrusive position, as in a case previously described (Figs. 753 to 760, pp. 354 to 356) or whether the mandible had drifted into a protrusive or lateral protrusive position in order to attain maximum function in a case of malocclusion. In either case, the correct posterior positioning of the mandible results in an anterior open bite. The posterior movement of the mandible forces the anterior teeth apart.

An exception to this would be cases of dual bite in which the cusps have been ground flat and the mandible is able to slide backward and forward with good functional contact in either position. Another exception would be one in which a patient had a dual bite, as a result of which his cusps had been ground flat, and then had his mouth reconstructed. The result of this reintegration should be the establishment of well-integrated cusps, and the patient should be able to function in both anterior and posterior positions. This can be attained, but it is difficult.

MANDIBLE OFTEN ADVANCED ARBITRARILY INTO UNSTABLE POSITION

Many of the cases examined after the mandible has been advanced indicate that no thought was given to their posterior position other than wishful thinking that these mandibles would maintain only their forward positioning.

An example of a case in which the mandible was arbitrarily protruded in the reconstruction is discussed in Case 12. The fact that the gold cusps were finally abraded, leaving flat occlusal surfaces, was indeed fortunate inasmuch as it permitted the patient to again retrude the mandible to its true position of centric relation. The golds used in that era were not as hard as those now used. With the present-day hard alloys, it would have been much more difficult to abrade the cusps and thereby lessen the trauma.

Case 12

A middle-aged woman with a deep vertical overbite and a collapsed occlusion was first treated in 1932. Her case was reported in 1936,* in 1947,† and again in 1951.‡ Several upper and many lower posterior teeth were missing. In the oral reconstruction the bite was arbitrarily raised a considerable amount, and the mandible was brought forward "on the articulator." The finished interocclusal relationship "on the articulator" was a favorable one.

Discussion

The instrument used was the Hagman balancer. It is based upon the spherical theory of occlusion. The rotational center from which the radii, supposed to pass through the occlusal surfaces of all the lower teeth, are suspended is in the area of the glabella. Hagman stated in his manual on articulation, "All the movements of the human jaw can be reproduced on an articulator functioning from a single point of rotation, in combination with a hinge axis."§ This theory was based upon the old Monson theory of occlusion. Many attempts were made to disprove these theories. This concept was explained previously in the literature of 1947.‖

Postinsertion observations

In the completed work, the occlusal anatomy was very shallow. This was fortunate because with little abrasion the gold cusps were ground flat, and the mandible was then able to function in both anterior and posterior positions. Otherwise, the teeth might have been destroyed as the mandible attempted to reach its posterior position of true centric relation. It is also interesting to have observed the anterior closure of the bite. This is in conformity with previous statements,

*Schweitzer, J. M.: Extensive prosthetic restoration, D. Digest **42**:112-116, 1936.
†Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 250-251.
‡Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 833-838.
§A manual of articulation, Minneapolis, Minn., 1953, The Hagman Balancer Co., p. 2.
‖Schweitzer, J. M.: Restorative dentistry, St. Louis, 1947, The C. V. Mosby Co., pp. 305-330.

Text continued on p. 445.

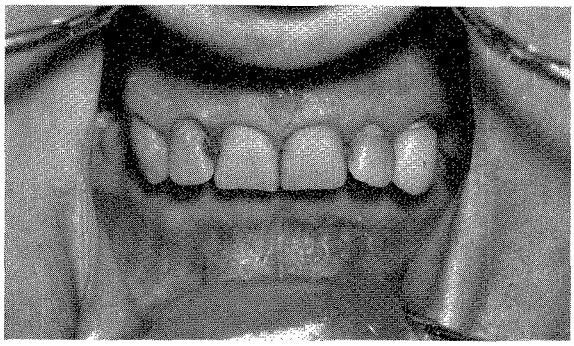


Fig. 956. Deep overbite in a 40-year-old woman at the start of treatment in 1932. (Figs. 956 to 968 are of the same case.)

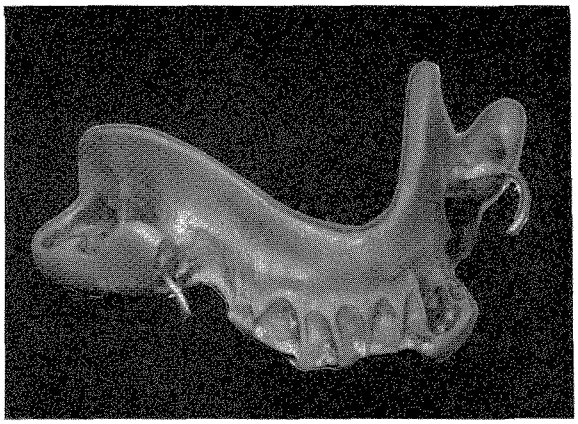


Fig. 957. Temporary vulcanite bite plate that overlaid the lower teeth. It was used during the procedure.

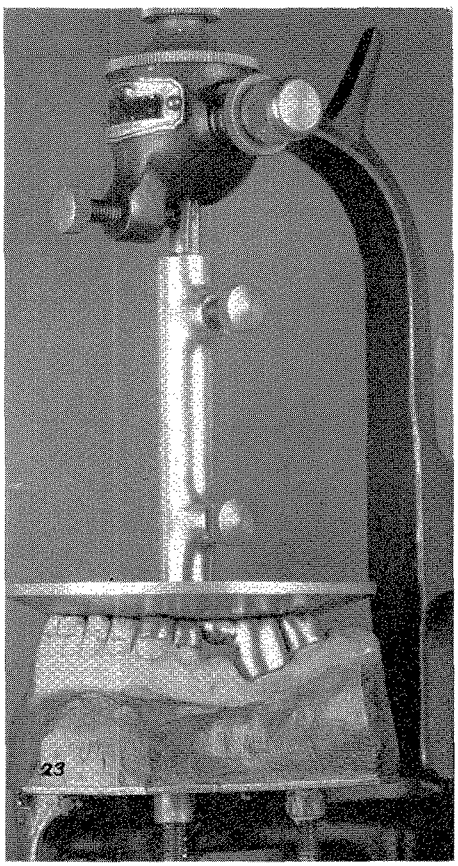


Fig. 958. Work constructed on a Hagman balancer. Arbitrary four-inch disk. The lower teeth were built up to this disk in the mouth. The mandibular prosthesis was completed first. Then the maxillary prosthesis was constructed to conform to it.

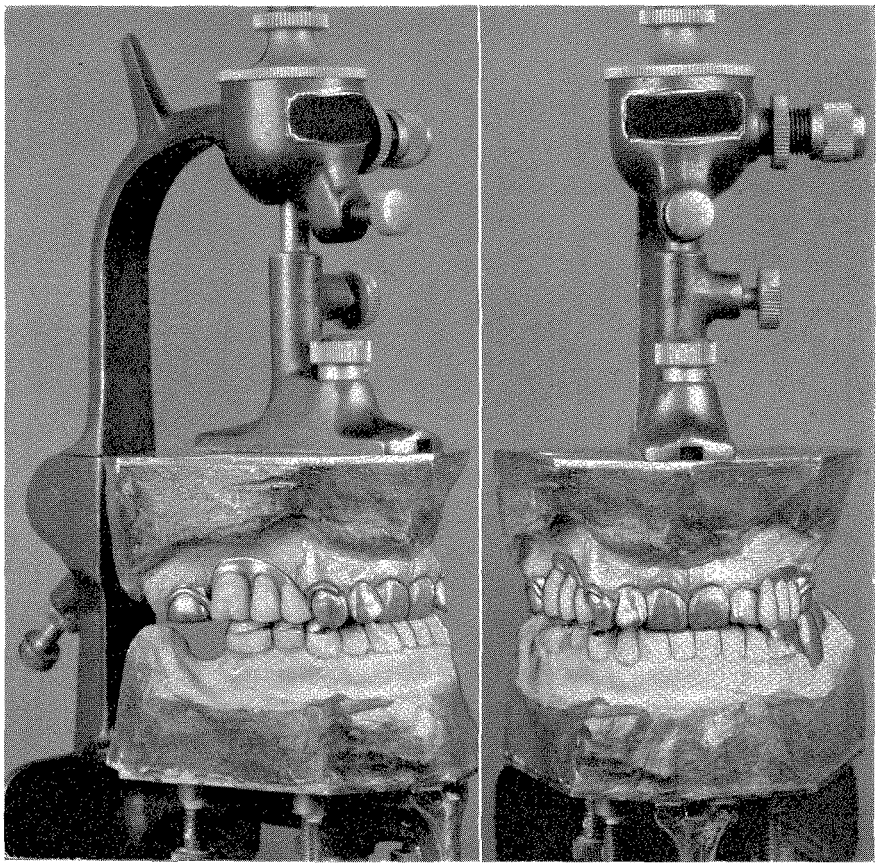


Fig. 959. Two views of the completed work on the articulator. The maxillary cast was retruded arbitrarily by means of the universal joint and set screw seen above. This advanced the mandible indirectly and established an anterior excentric bite.

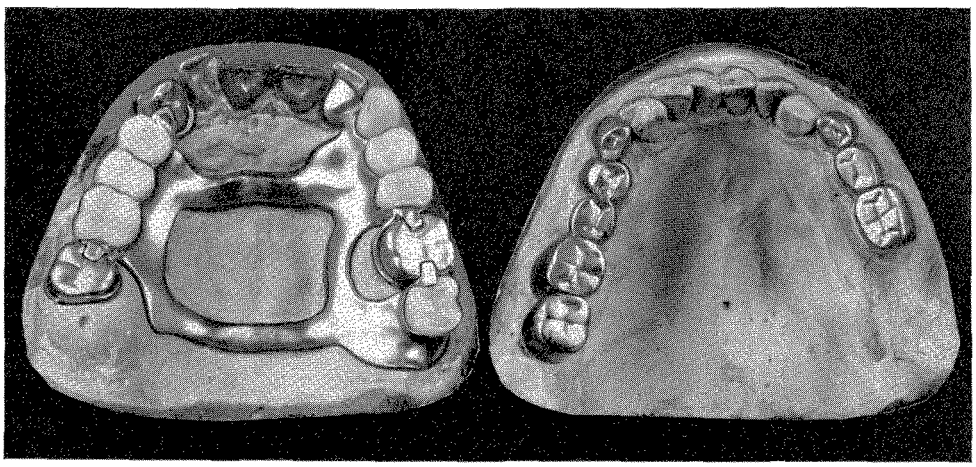


Fig. 960. The occlusal view of the completed work. Observe the flat cusps that permitted freedom of mandibular movements.

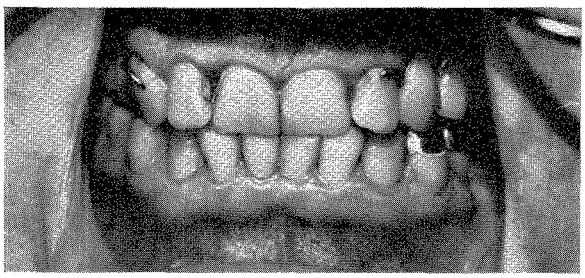
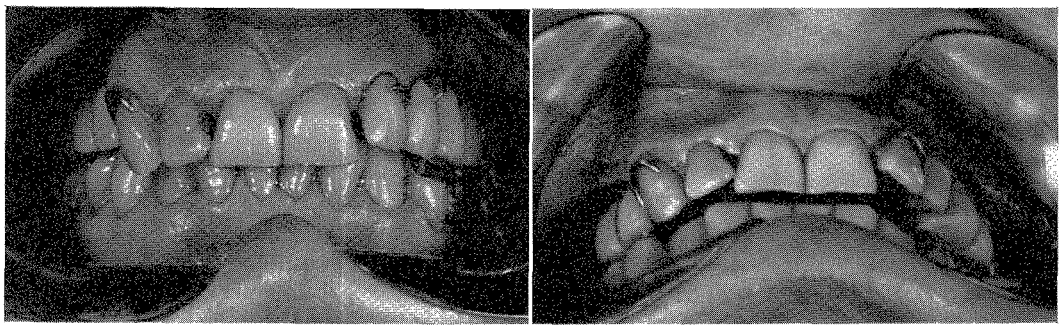


Fig. 961. The completed work in the mouth. Observe the large restoration of the vertical dimension as compared with Fig. 956. Also observe the arbitrary repositioning of the mandible in a forward position.

A



B

Fig. 962. A, Anterior view of the mouth fourteen years after Fig. 961 was taken. Observe the anterior closure of the bite as compared with the finished result in Fig. 961. **B,** The flat cusps shown in Fig. 960 permitted the mandible to function in its posterior position as shown here, which is its true centric relation position. These teeth probably would have been destroyed if the mandible was not able to assume its true centric relation position.

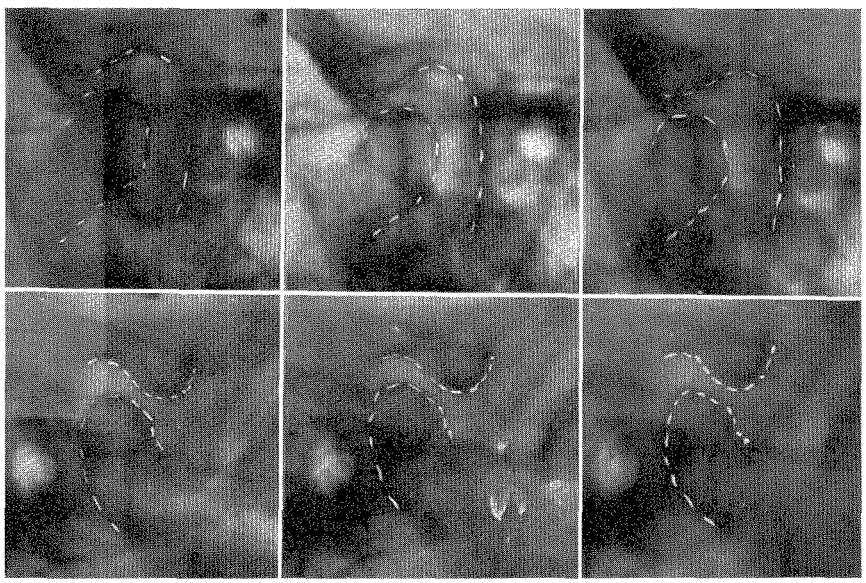


Fig. 963. Roentgenograms of the right and left temporomandibular joints. In the upper left roentgenogram of the right temporomandibular joint, the mandible is in its rest position. In the upper middle roentgenogram, the teeth are in contact in the posterior or true centric relation position. Observe that the condyle had simply rotated from its rest position. In the upper right roentgenogram, the teeth are in contact, but the mandible is in its forward position. This is not its true centric position. The lower roentgenograms represent the left condyle in the same positions as described for the right condyle. There is a small free-way space.

Fig. 964. Two views of the face. **A,** At the start of treatment. **B,** At the completion of treatment.

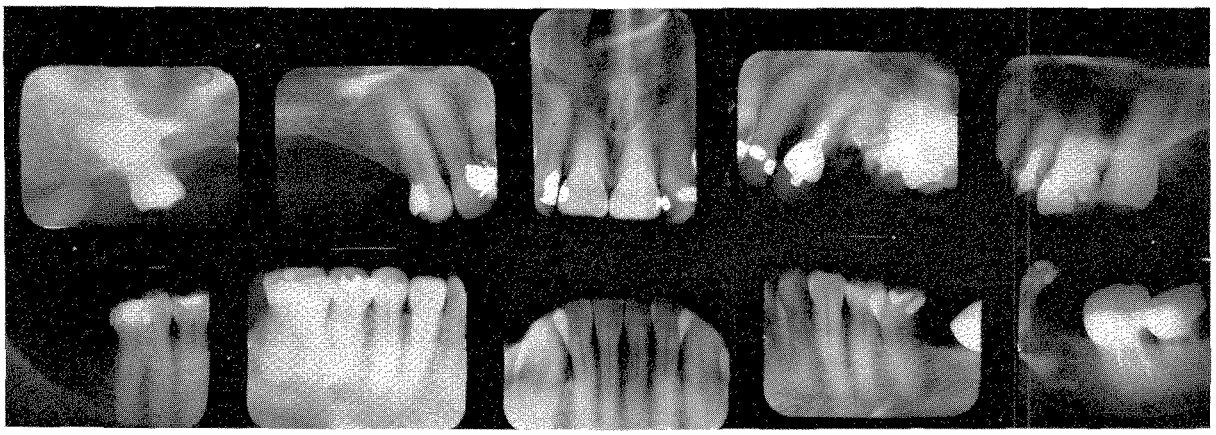


Fig. 965. Roentgenograms taken in 1932.

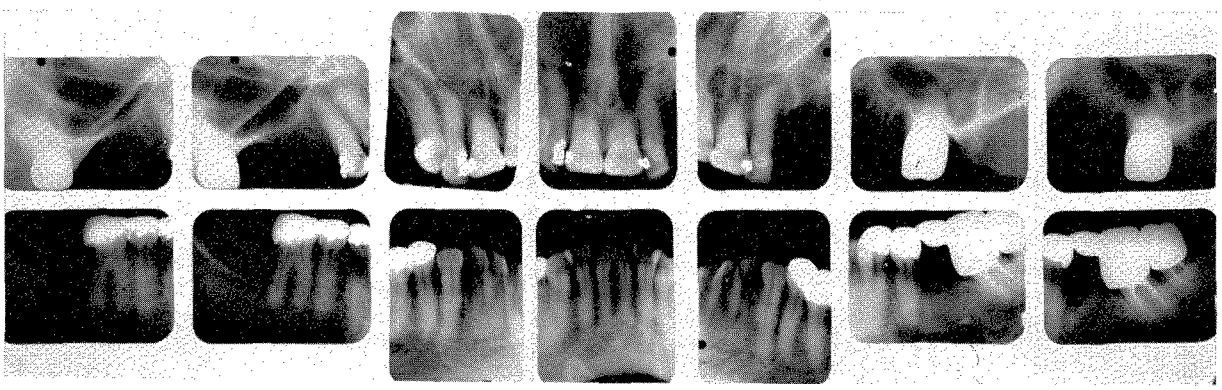


Fig. 966. Roentgenograms taken in 1934. The work was completed.

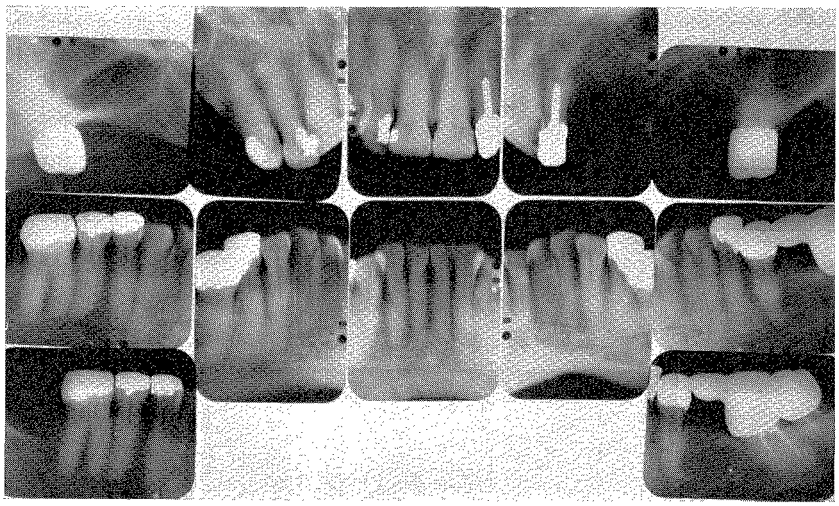


Fig. 967. Roentgenograms taken in 1951.

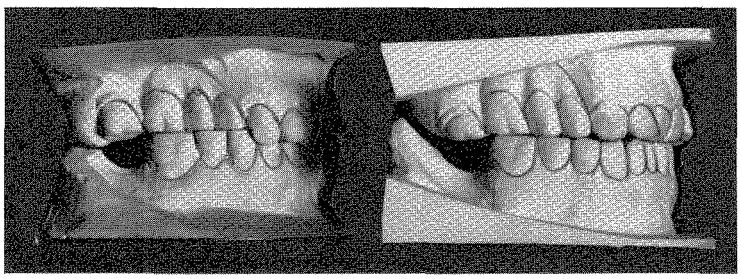


Fig. 968. Right-side views of the casts at the completion of the work (right) and fourteen years later (left). Observe the marked changes not only in the vertical overbite and in the cuspid region but also in the tuberosity area.

namely, that where the bite was raised and the anterior teeth were removed from their previous contact position, they will extrude until they reach a level that is in equilibrium with the oral tissues. By comparing the 1935 and the 1945 casts, the soft tissue and the alveolar ridge resorption were readily discernible.* The vertical closure of the bite was measurable in the anterior region. The distal positioning of the mandible in its return to its true centric relation position was clearly visible. The patient had established a dual bite. Once the vertical and horizontal overbites had reached their level of equilibrium there was no further change. The roentgenograms of the temporomandibular joints demonstrate the anterior and posterior positioning of the condyles in the mandibular fossa.

This patient's teeth and oral structures originally were healthy in spite of the malocclusion and extreme closure of her bite. Her oral tissues remained healthy, and her function was excellent until her death in April, 1952. (Figs. 956 to 968.)

Further discussion and analysis

In a comparison of the casts which were taken over a fourteen-year period, the extrusion of the upper molars and of the entire bony and soft tissues in the

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., p. 838.

region of the right tuberosity was clearly visible. These were adaptive changes that took place as a result of drastic and sudden changes inflicted upon a stable organism. These changes had been gradual, and unless careful records were taken, the lessons to be learned would have been lost.

Why has anterior vertical overbite never suffered complete relapse?

The question may be asked why the anterior overbite never returned to its original severity even though, with the mandible in its posterior position, there was no definite contact with the lower teeth to prevent this from taking place. The answer is that original bite closure probably took place because of the loss of posterior teeth and Nature's attempt to make the best functional adjustment possible under these unfavorable circumstances. This would result in a large free-way space at the beginning of treatment, some of which was never infringed upon. It is also possible that in function the upper and lower incisors established definite and regular contacts. If the tongue had been kept between the teeth for some part of the day or night, this also would have acted to prevent the further relapse of the anterior vertical overbite.

FALSE PROGNATHISM—TWO TYPES

Case 12 justifies the position of those who maintain that although the mandibular joints will adjust themselves to inconveniences from the teeth, they will not change to make the adjustment permanent. A good example of this adjustment of the mandibular joint to tooth inconveniences is cited in those cases of false prognathism in which the mandibular incisors, due to faulty cusp relationship, are positioned anteriorly to the maxillary incisors. Even though this condition has persisted for years and into adulthood, upon release of this false interlocking, the mandible will return to its correct distal position. Cases of this nature have been reported.*†‡

There are examples of false prognathism in which the posterior interocclusal relationship is a normal Angle Class I occlusion. In order to maintain this intercuspal position and still have the lower incisors anterior to the upper incisors, a space is present between the lower cuspids and the first bicuspids. This condition can be corrected in the adult by shortening the incisors, retruding the lower incisors and protruding the upper incisors. With a normal incisor relationship an Angle Class I occlusion is present. This is not to be considered as an adjustment of the temporomandibular joint to tooth inconveniences or a repositioning of the mandible in an anteroposterior direction since it is purely a tooth movement. The joint had always maintained its correct position.

The cases in which the posterior teeth, as well as the anterior teeth, have been functioning in a forced forward position during the course of their entire lives would be more difficult to reconstruct because not only does the anterior relationship have to be corrected but also the posterior relationship, in order that the centric relation and the interocclusal cuspal relationships are harmonious.

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*Howes, Ashley E.: Repositioning of the mandible, Am. J. Orthodontics **35**:1-15, 1949.

†Miller, S. C.: A simple method for improving tooth function and face form, D. Digest **41**:81-87, 1935.

‡Cohn, Meyer: Age and tooth movements, D. Items Int. **66**:1088-1093, 1944.

Case 13

A case of false prognathism was reported in 1951.* Although the condyles do not exhibit any great difference when the mandible is in its retruded position from that which is recorded when the mandible is in its forward false position, still there is enough difference to give it significance. This patient had not been seen since December, 1947. At the time of writing he was 70 years old. His mandible had been functioning in this false position for his entire life. His anterior teeth revealed severe abrasion on the lingual surface of the lower teeth and on the labial surface of the upper teeth. This indicated a decided posterior thrust in function which confirmed the false positioning. He permitted an examination of his mouth to be made again in October, 1961. The breakdown of the entire occlusion since 1947 had resulted from neglect. The significant facts were that there had been no essential changes in the occlusion or in the relationship of the condyles in the temporomandibular joints. (Figs. 969 to 974.)

*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 142-144, Figs. 67-73.

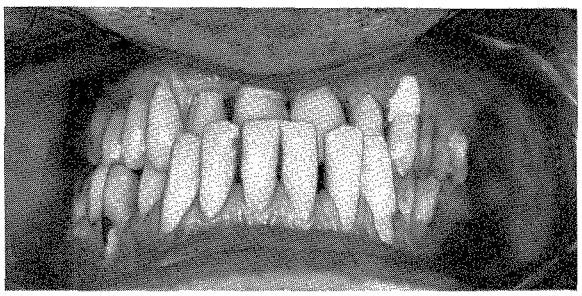
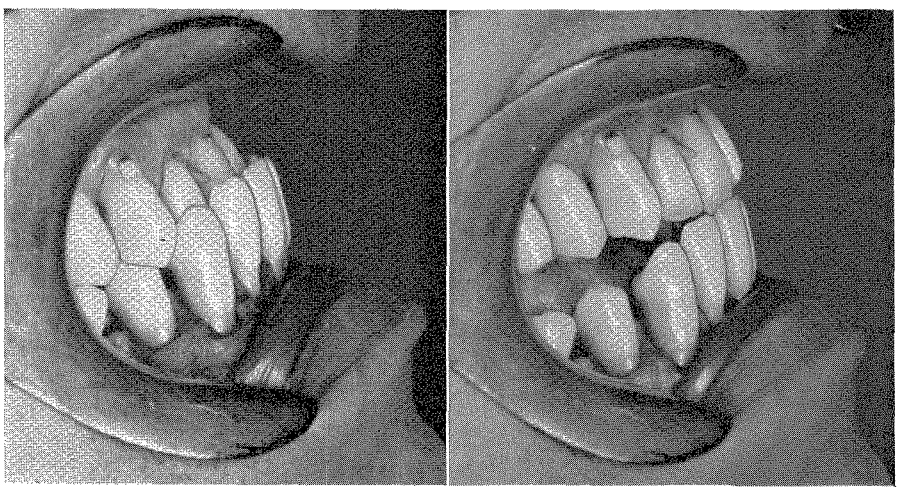


Fig. 969. False prognathism in a man 55 years old. This photograph was taken in 1947. (Figs. 969 to 974 are of the same case.)

A



B

Fig. 970. A, Right-side view with the teeth closed. Observe the spacing distal to the canine. **B,** Right-side view with the mandible retruded. The right upper central incisor is in premature contact. In a true Angle Class III malocclusion this ability to retrude the mandible is almost an impossibility. These photographs were taken in 1947.

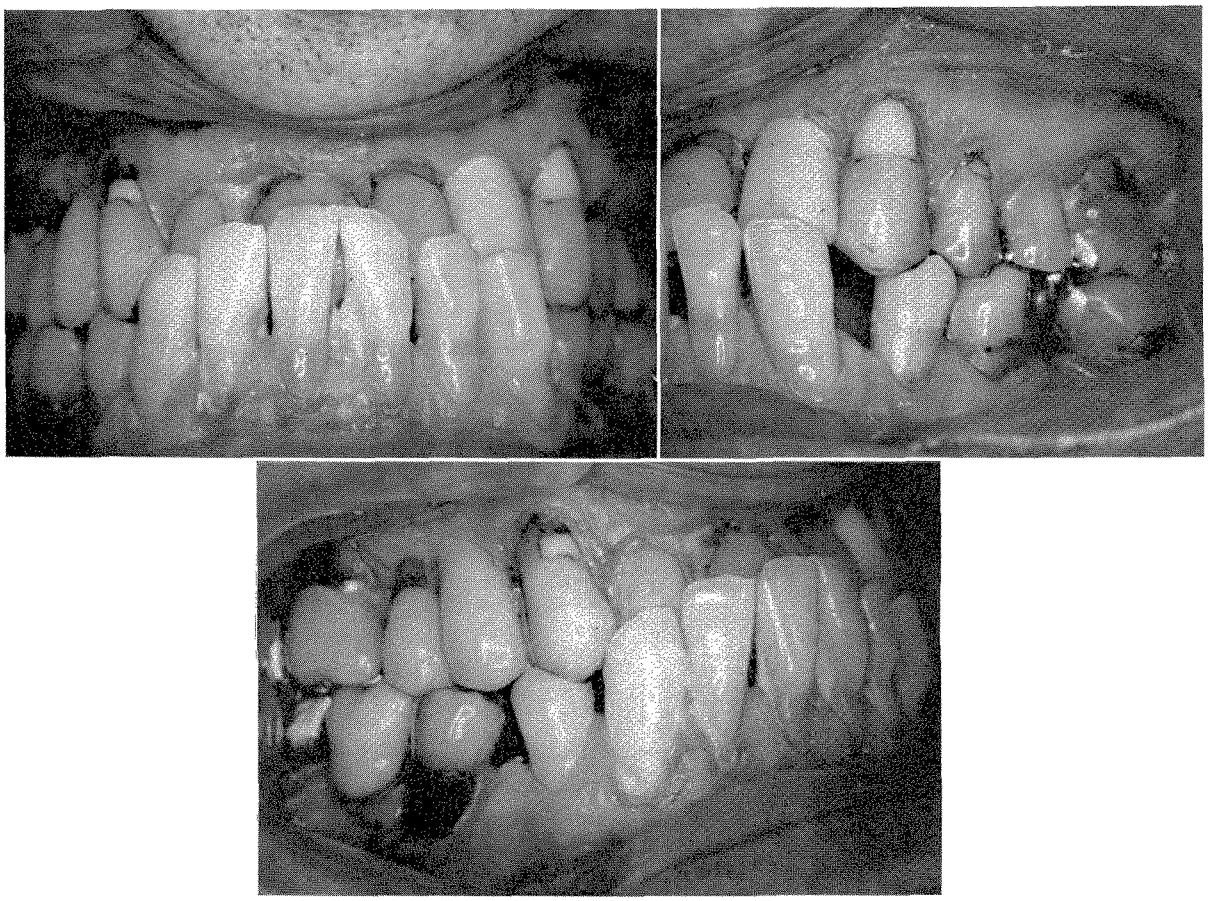


Fig. 971. Front, left, and right views of the teeth of the patient shown in Figs. 969 and 970. These were taken in 1961 at the age of 69. Observe the spacing in the cuspid-bicuspid areas.

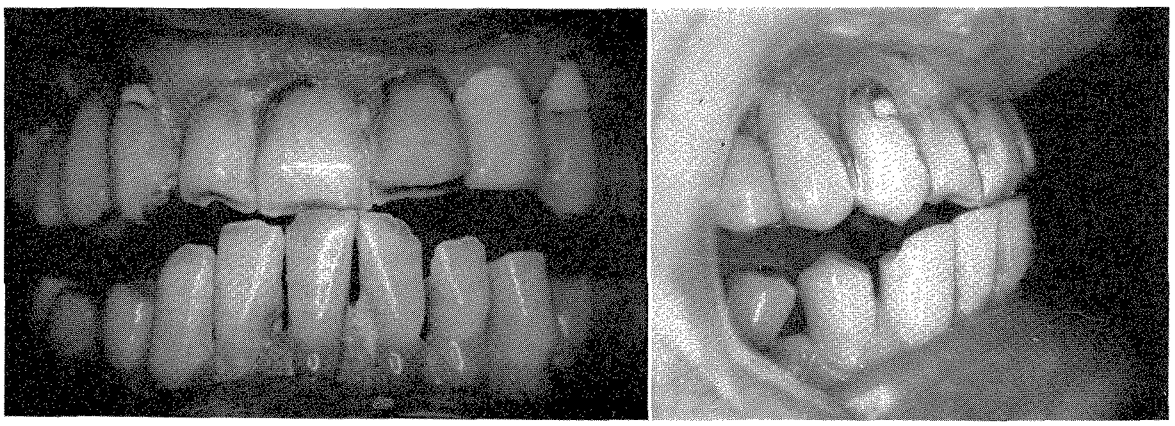


Fig. 972. A, Front view with the mandible retruded. The premature contact on the right central incisor is apparent. **B,** Right-side view with the mandible retruded. These photographs were taken in 1961 at the age of 69.

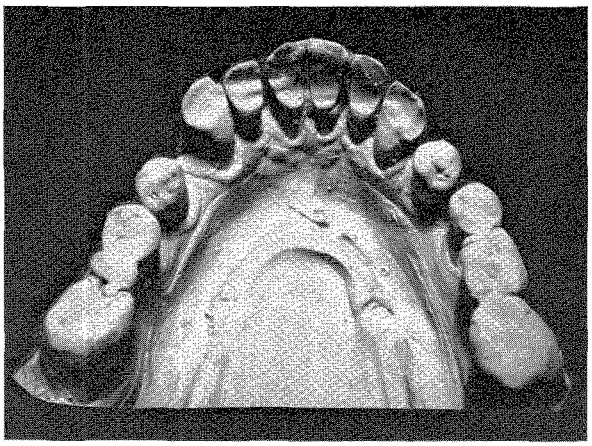


Fig. 973. Cast revealing the severe abrasion and attrition of the lingual surfaces of the lower anterior teeth as of 1961.

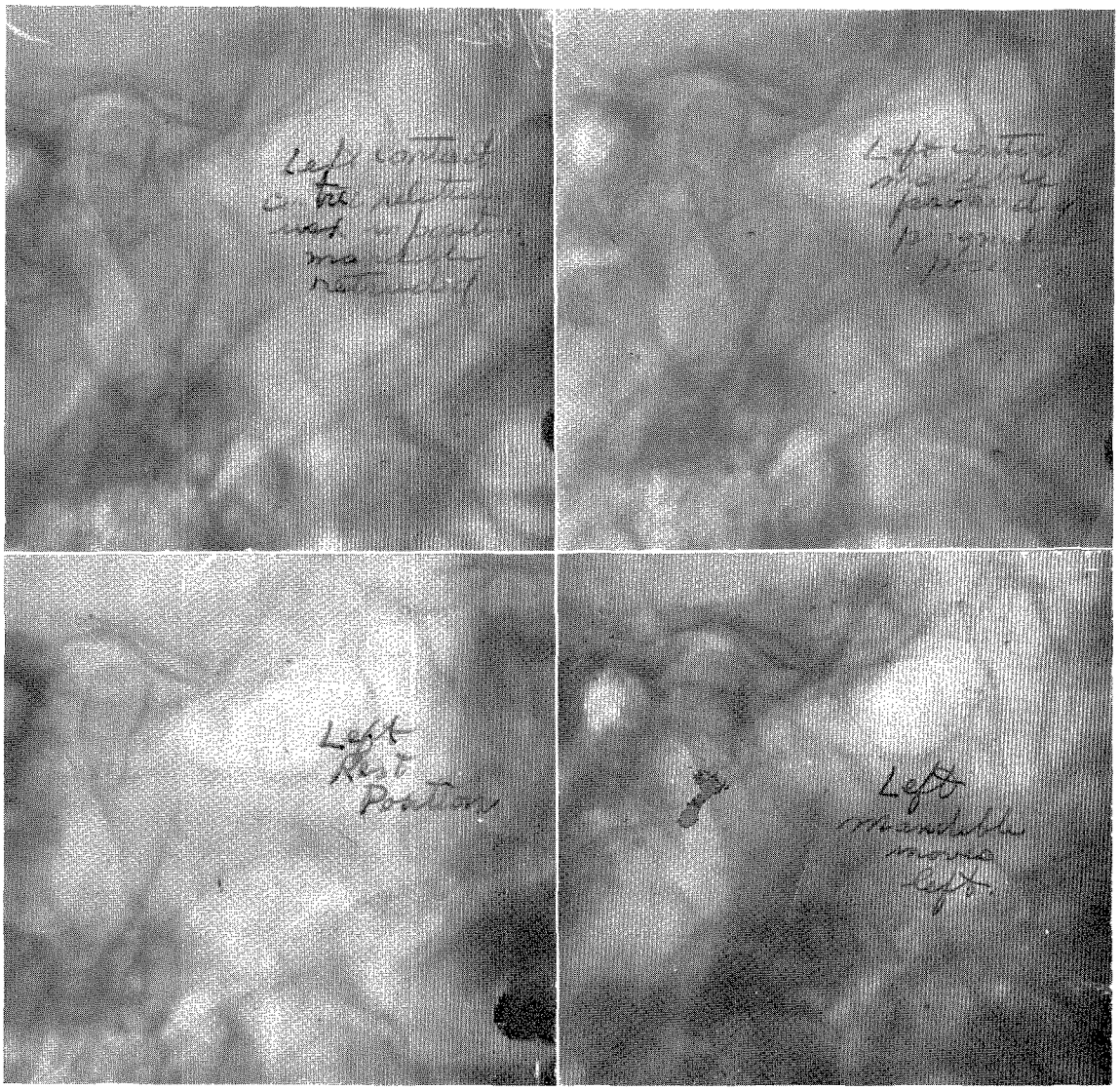


Fig. 974. Left temporomandibular joint roentgenograms. These were taken in March, 1962. A centric relation wax record was used to obtain the upper left roentgenogram. There is very little difference between this and the upper right roentgenogram that was taken with the teeth in direct contact. **A**, Left contact centric relation; wax in position; mandible retruded. **B**, Left contact; mandible protruded. **C**, Left rest position. **D**, Left lateral bite.

FURTHER ATTEMPTS TO REPOSITION MANDIBLE

There are great differences in the capacity of individuals to adapt to altered conditions. Although some people can readily adjust to changes, others cannot. For the latter, serious damage can result from persistent efforts to reposition the mandible in the face of neuromuscular resistance.

Case 14

In April, 1954, a woman in her mid-forties presented herself for treatment. Her former dentist had undertaken to reconstruct her teeth. The work was now in its third year. When first examined, she was under such severe dental and physical stress that it became necessary for her to have psychiatric treatment. It can readily be appreciated that if people with neurotic tendencies are subjected to traumatic incidents, dentistry included, their neuroses may take on dangerous and disagreeable aspects.

Previous treatment

When the results of prolonged dental treatment were unfavorable, the patient was referred to another dentist who belonged to a school of thought that believed the mandible could be arbitrarily advanced, the vertical overbite entirely eliminated, and the anteroposterior occlusal curve straightened. With this in mind, a Hawley bite plate with a flat lingual platform was inserted in her mouth and had been worn for one year. Because of the patient's conscientious attempt to comply with the prescribed treatment, this bite plate was worn in spite of her physical and mental discomfort.

Present condition (1954)

Eight teeth were absent, and the periodontal tissues were in poor condition. There was a mixture of temporary and final prostheses. Temporomandibular roentgenograms were taken. These indicated that the forward positioning of the mandible was false and untenable. With the Hawley bite plate in position, the right and left condyles were completely out of their respective fossa. This was very similar to a previous case. (Refer to Figs. 753 to 760, pp. 354 to 356.) With the bite plate removed and the mandible in rest position, the roentgenograms indicated a normal relationship. With the bite plate in position there was no difference between the true protruded position and the false centric occlusion position of the mandible.

Untenable present situation

The results attained allowed the mandible no rest. While the forward centric occlusion position was one of maximum functional contact, it was still an excentric position. Even in this position the interocclusal contacts were very faulty because of the lack of coordination in the various kinds of prostheses that were worn. When the mandible moved into its lateral positions there was no occlusal balance. Intercuspal contact was only between the molars. The patient was able

to retrude the mandible considerably. This resulted in an open bite with a large anterior vertical and horizontal overjet. Contact was made only in the posterior molar areas. Because the mandible was retruded into a wider area of the maxillary arch, this contact was only between the upper lingual and lower buccal molar cusps.

Treatment planning

Active work was started in late April, 1954. The entire month of May was spent in removing the old work and in preparing the teeth. At this stage the old bridges and crowns were repaired and used as the first temporary work. Treatment consisted of first removing all the prosthesis and immediately permitting the mandible to move distally into its true centric relation or hinge position. This required lowering the bite considerably to avoid the resulting open bite inasmuch as the mandible was retruded.

Lowering the bite

The upper and lower right transitional bridges were constructed on casts made from hydrocolloid impressions and mounted upon a simple laboratory articulator. The bite was lowered considerably. In fact, it was difficult to remove a sufficient amount of tooth substance from the lower posterior molars and perform the required lowering of the bite without devitalization. The right upper and lower transitional splints were inserted in the mouth, and the occlusion was adjusted. New hydrocolloid impressions were taken in order to construct the upper and lower left bridges at the bite level dictated by the right side. When this was completed, all the splints were inserted, and new wax records were taken. The interocclusal contacts were adjusted. Finally, plastic veneers were processed, and the second transitional work was completed. At that time new roentgenograms were taken of the teeth and the temporomandibular joints. The upper anterior crowns had broad lingual platforms to provide for definite contacts with the lower incisors. This was necessary because of the large horizontal overjet caused by the retrusion of the mandible.

Mandible assumes its correct position

The results were dramatic. Relief from her dental troubles was obtained immediately, and the patient was extremely appreciative. Her psychiatrist found an improvement in his patient's mental attitude. New temporomandibular roentgenograms indicated a correct positioning of the condyles in the mandibular fossae. The patient was then referred to a periodontist for gum treatment. Resections were resorted to. This was instituted during the summer months. In October, 1954, the periodontal tissues were sufficiently healed to permit the start of the final work. The patient had been very comfortable.

Final stage of reintegration

The decision was made to retain all the remaining teeth even though several of them had a questionable prognosis. If, at a future date extraction of these weak

members was necessary, it could be accomplished without the removal of the entire prosthesis.

It took one month to complete the preparations of the teeth. A transverse hinge axis recording was made in October, 1954. A modified Hanau Model H articulator was used with provision for using both a hinge axis and a cranial or axis orbital plane. The work casts were mounted on the articulator by means of wax positional records and a face-bow. The entire occlusion was coordinated in wax, and the patterns were cast in silver. These crowns were tried in the mouth on Nov. 10, 1954.

The occlusion was corrected by grinding. Roentgenograms were taken to check the cervical fit of the crowns. Wax checkbites and other excentric records were made. A hinge axis face-bow recording was made using the McCollum hinge axis bow. Upper and lower plaster impressions were taken for the new work casts. These were mounted on the articulator using the new records as guides. The transfers were removed, and the final gold castings were constructed using the transfers as the prescription. They were inserted on Nov. 28, 1954. Once again new records were taken. These included a checkbite and a face-bow, plus new plaster impressions from which new work casts were made and attached to the articulator.

In this stage the crowns were splinted where necessary, and the fixed partial dentures were constructed and tried in. The upper splint contained fifteen units. The right and left lower splints contained five units each and were made in two parts joined by a precision attachment. This was necessary because of the desire for rigidity, in spite of the extreme lack of parallelism of the abutments. A lug and lug rest would have permitted too much movement.

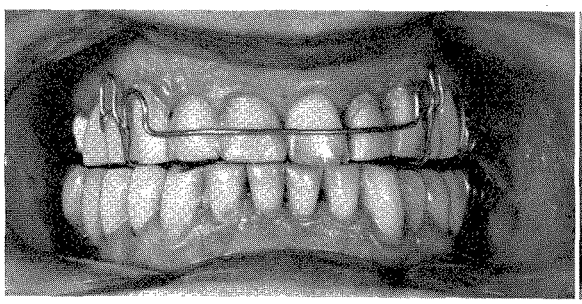
Insertion of final work

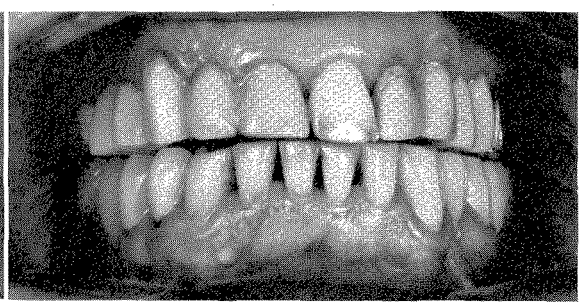
The final work was inserted on Dec. 10, 1954. The posterior teeth had been treated with silver nitrate. The upper anterior crowns had lingual platforms to make positive contact with the lower incisors. The occlusal surfaces had definite anatomy. The interocclusal relationship in both centric and excentric mandibular movements had been well coordinated.

Final roentgenograms were taken of both the teeth and the temporomandibular joints. Photographs were taken, and study casts were made. The condyles were positioned normally in the mandibular fossae. The postinsertion treatment was uneventful. (Figs. 975 to 999.)

Text continued on p. 463.

A





B

Fig. 975. A, The mouth as it looked at the start of treatment in April, 1954. The Hawley bite plate shown here had been worn for a considerable length of time in an effort to advance the mandible. **B,** The bite had been raised on the posterior teeth. The mandible was never at rest. (Figs. 975 to 999 are of the same case.)

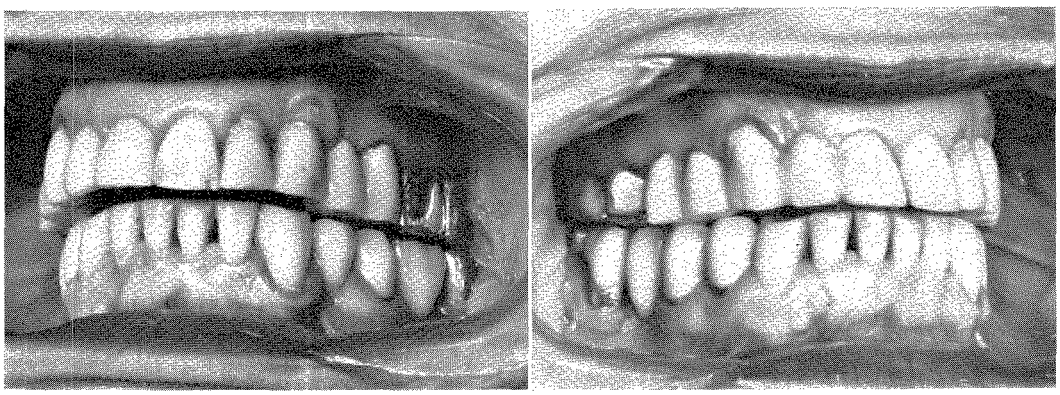


Fig. 976. A, Left side at the start of treatment. With the mandible retruded, as shown here, in its normal relational position to the maxilla, there was only contact on the last two molars. In addition, the vertical dimension was drastically violating the free-way space. **B,** Right-side view with the mandible retruded. The vertical dimension is excessive and must be reduced.

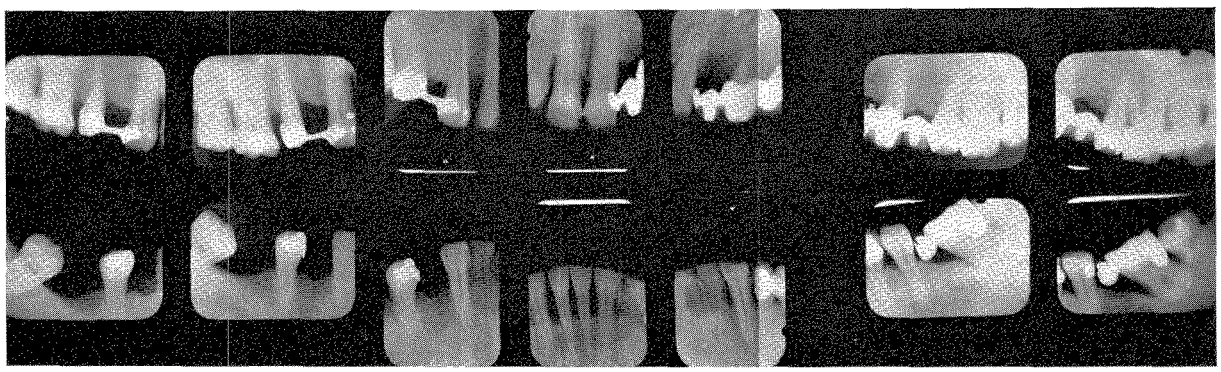


Fig. 977. Roentgenograms taken in 1947.

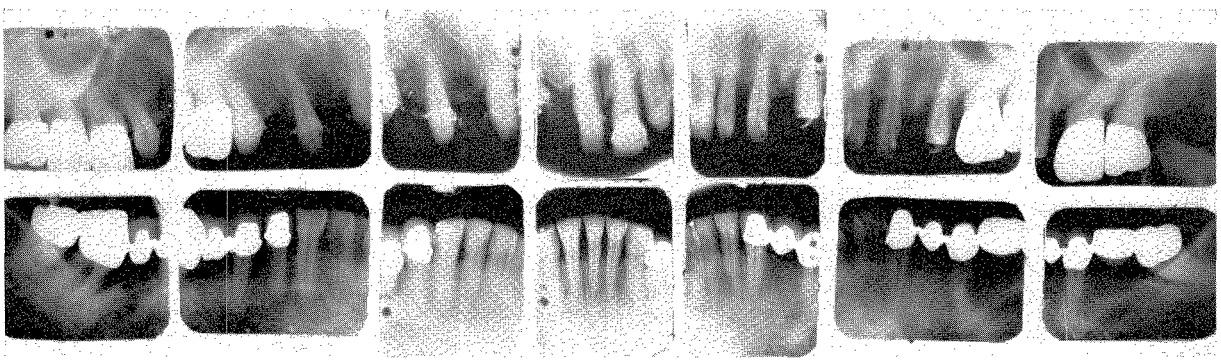


Fig. 978. Roentgenograms taken at the start of treatment in 1954. The plastic temporary bridges which were in position do not show in the radiographs.

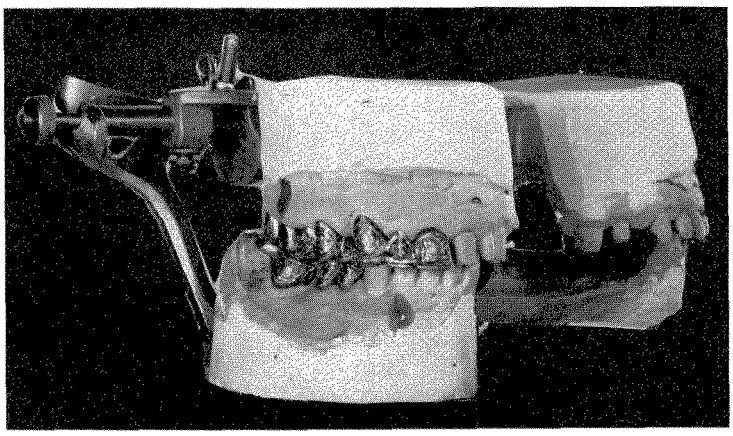


Fig. 979. The bite was lowered on the right side first by constructing fixed partial dentures for the upper and lower teeth at a greatly reduced vertical dimension. These were one-piece castings and were constructed on a simple articulator. The patient had no difficulty in registering her correct mandibular positions. With the upper and lower right bridges inserted in the mouth, the left prosthesis was constructed using the right side as a guide. By using a mirror, the left side may be seen.

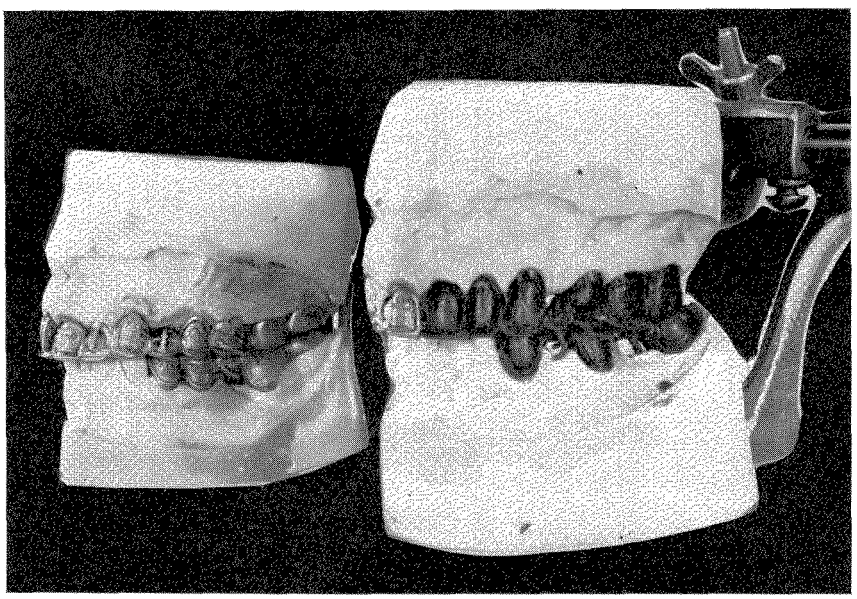


Fig. 980. The left transitional upper and lower fixed partial dentures were now waxed up using the right side as a reference. They were cast at one time. The casts were made from hydrocolloid impressions. When the mandible was retruded and the bite closed, it was difficult to grind the last molar crowns down enough to obtain sufficient room for the thickness required for the gold crowns.

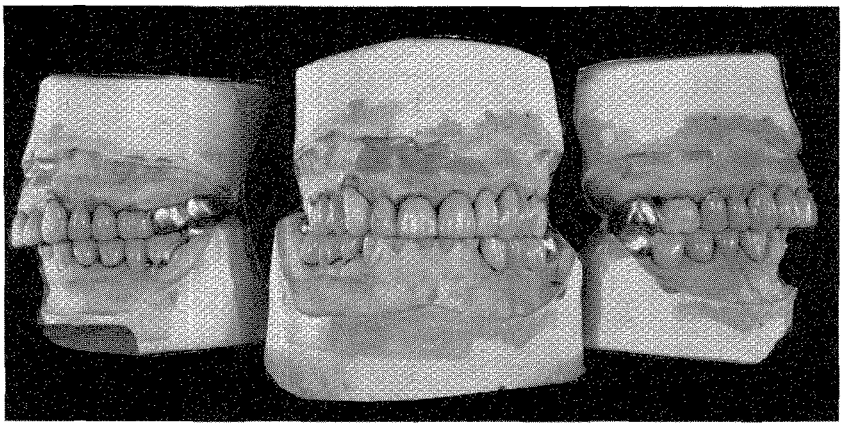


Fig. 981. The completed transitional work. The bite had been closed a great deal. This work was inserted in June, 1954 and gave the patient immediate relief.

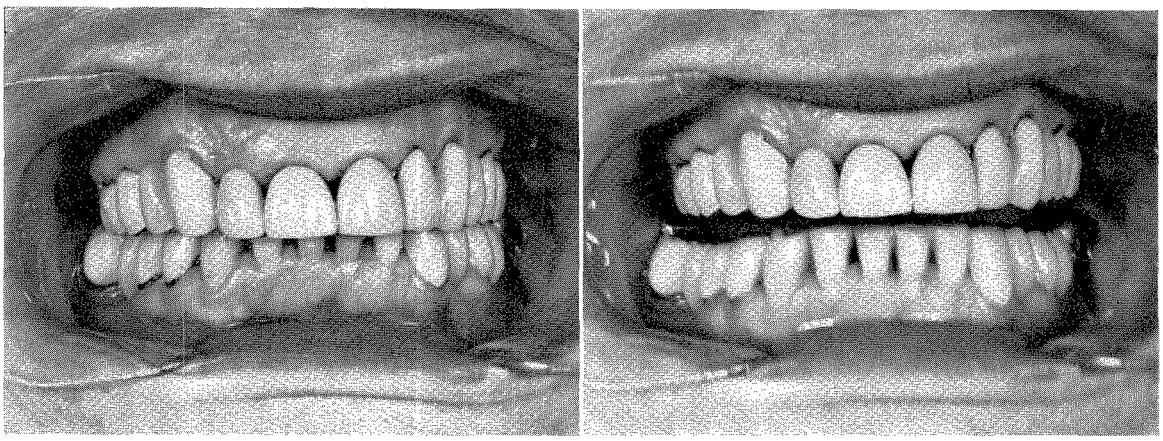


Fig. 982. The transitional work in the mouth. Compare these views with Fig. 975 to obtain some idea of the amount of closure of the bite and retrusion of the mandible.

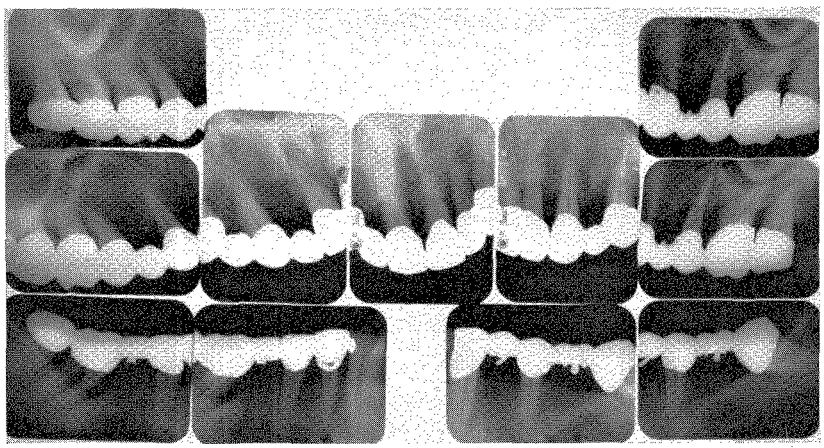


Fig. 983. Roentgenograms of the transitional work.

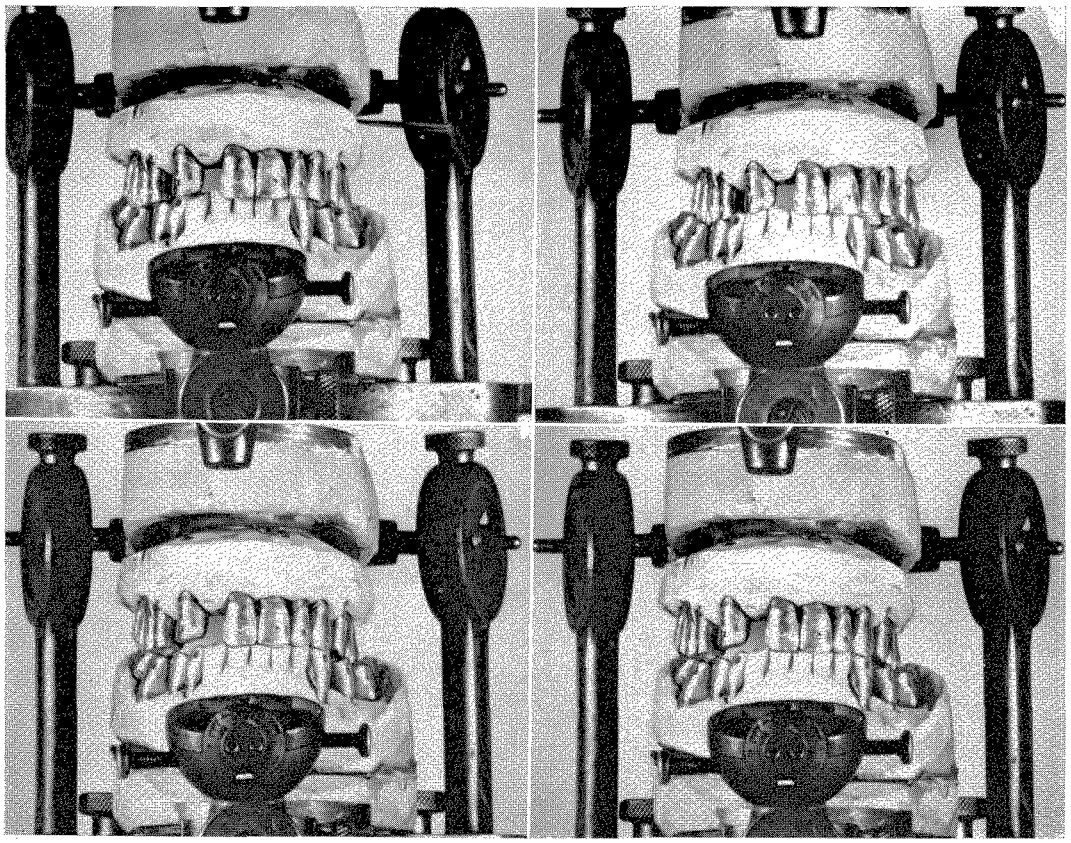


Fig. 984. During the next five months, specialized periodontal treatment was instituted. This included gum resections. In November, 1954, the periodontal tissues had healed sufficiently to proceed with the final work. Copper-plated dies were made for the teeth, and gold transfers were constructed on these dies. Wax records and a face-bow mounting were obtained. A coordination of the bite was accomplished first on the articulator, as shown in these four illustrations. **A**, The centric bite. **B**, The right lateral bite. **C**, The left lateral bite. **D**, The protrusive bite.

Fig. 985. These gold transfers were then inserted in the mouth, and the maxillomandibular relations were checked. New wax records were obtained in order to remount the work casts and proceed with the work.

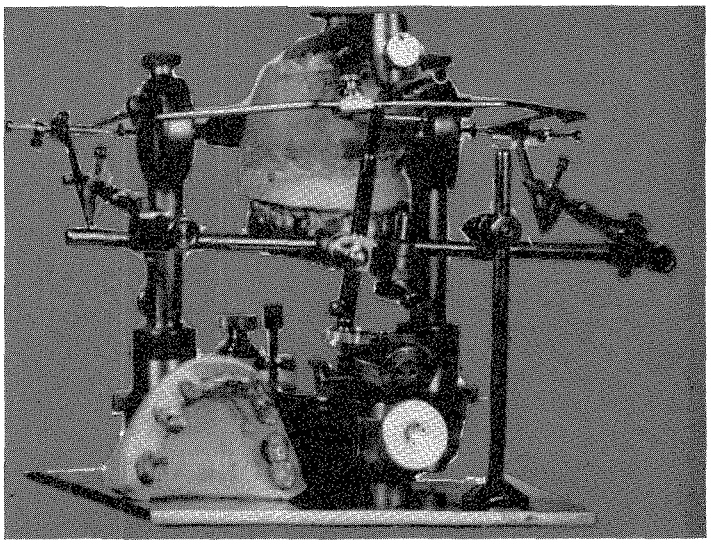


Fig. 986. The articulator used in this case was the modified Hanau Model H. A transverse hinge axis was recorded, and an axis orbital plane was also taken. The upper work cast is shown here being mounted on the articulator by means of the mounting frame. The lower cast will then be related to it by means of the centric relation wax record.

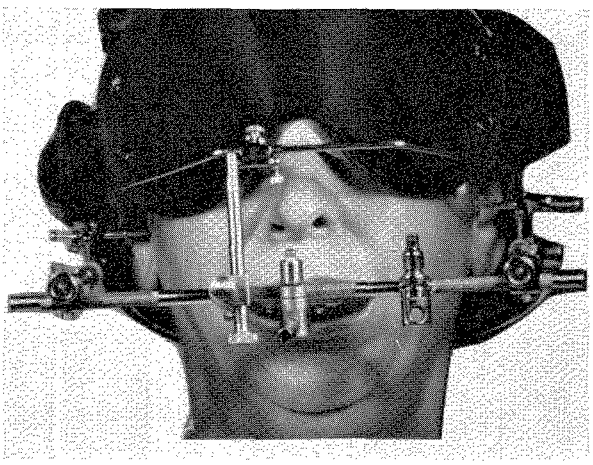


Fig. 987. Several remounts and try-ins are necessary as the work proceeds. This photograph shows the McCollum face-bow and axis orbital plane indicator being used for one of the remount records.

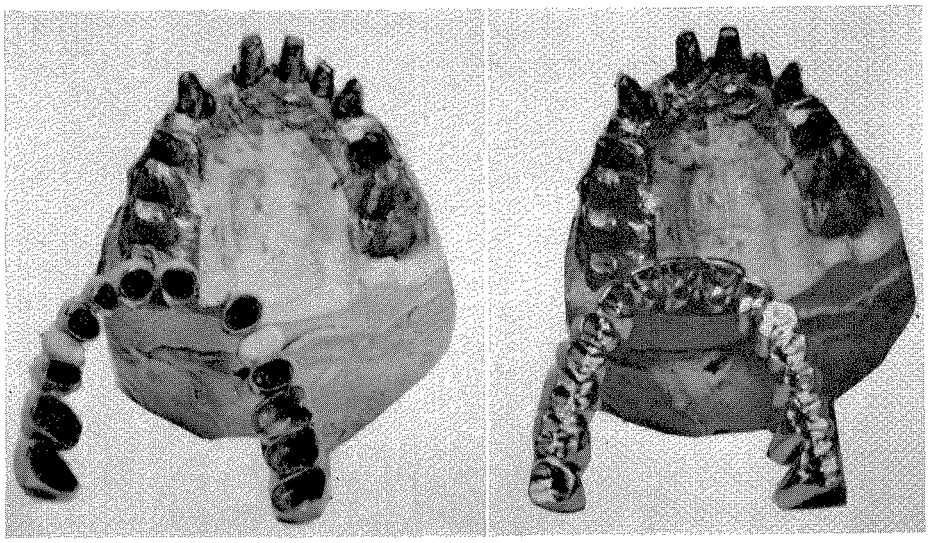


Fig. 988. Two views of the completed upper fifteen-unit rigid splint. This was supported by twelve abutments.

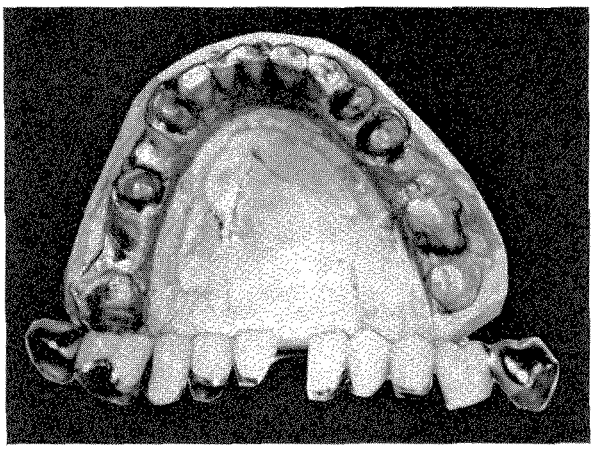


Fig. 989. The lower two posterior splints consisted of five units each, as shown in this illustration.

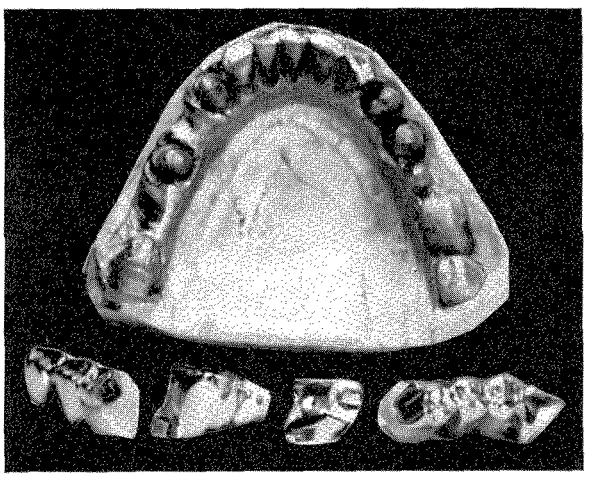


Fig. 990. The impossibility of paralleling the lower abutments, yet the necessity for rigidity, made it necessary to divide each bridge into two sections and to unite them by means of precision attachments, as shown here.

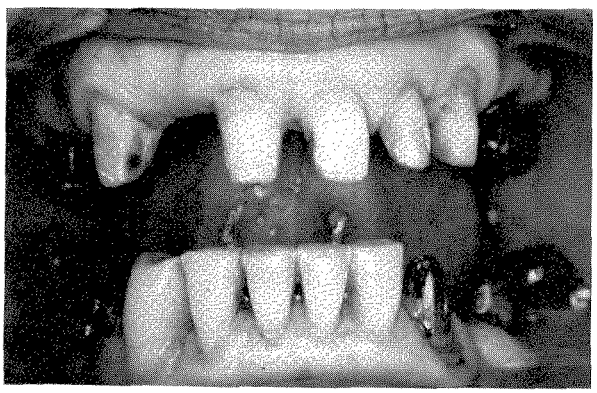
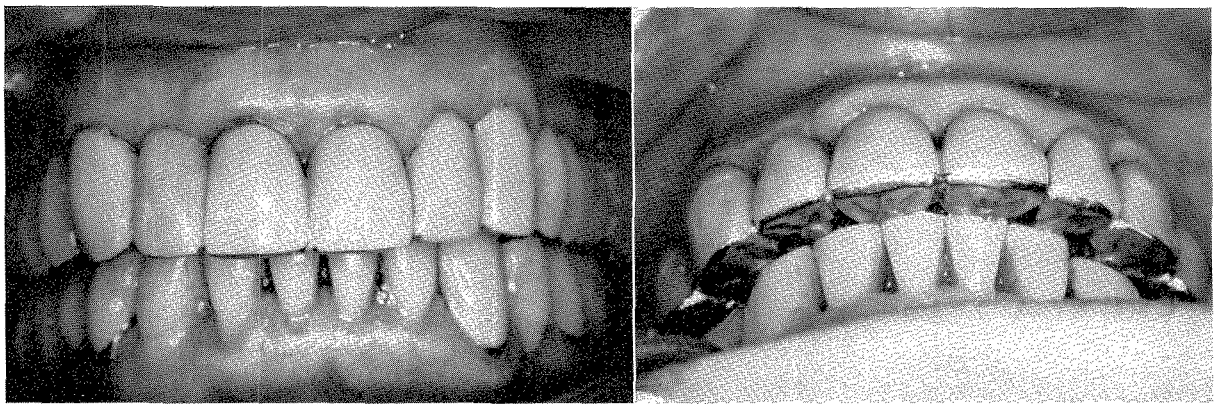


Fig. 991. The posterior teeth were treated with silver nitrate. This shows the mouth just prior to the insertion of the final work.

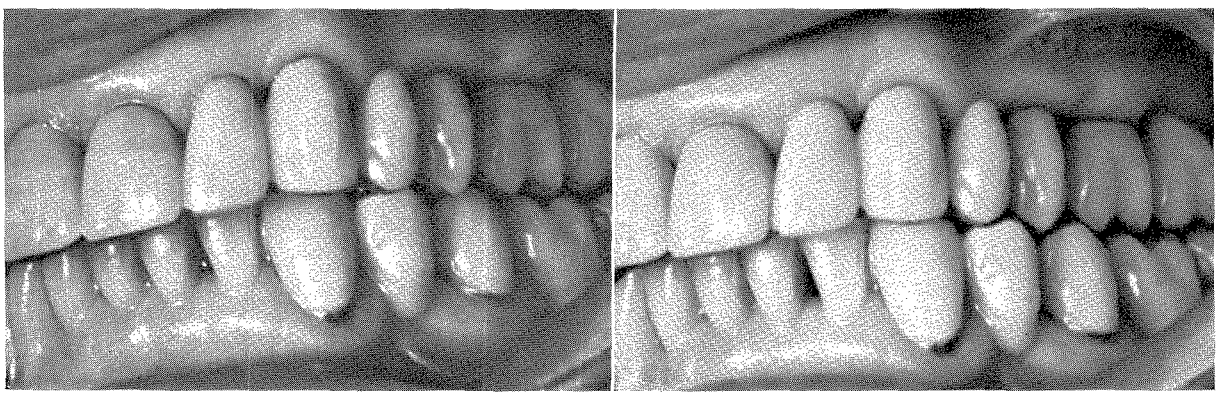


A B

Fig. 992. **A**, The final work was inserted in December, 1954. **B**, Lingual platforms on the upper incisors permitted contact with the lower incisors. These platforms were necessary because of the large horizontal overjet.

A B

Fig. 993. The final work, right side showing. **A**, Centric bite. **B**, Working bite.



A B

Fig. 994. The final work, left side showing. **A**, Centric bite. **B**, Working bite.

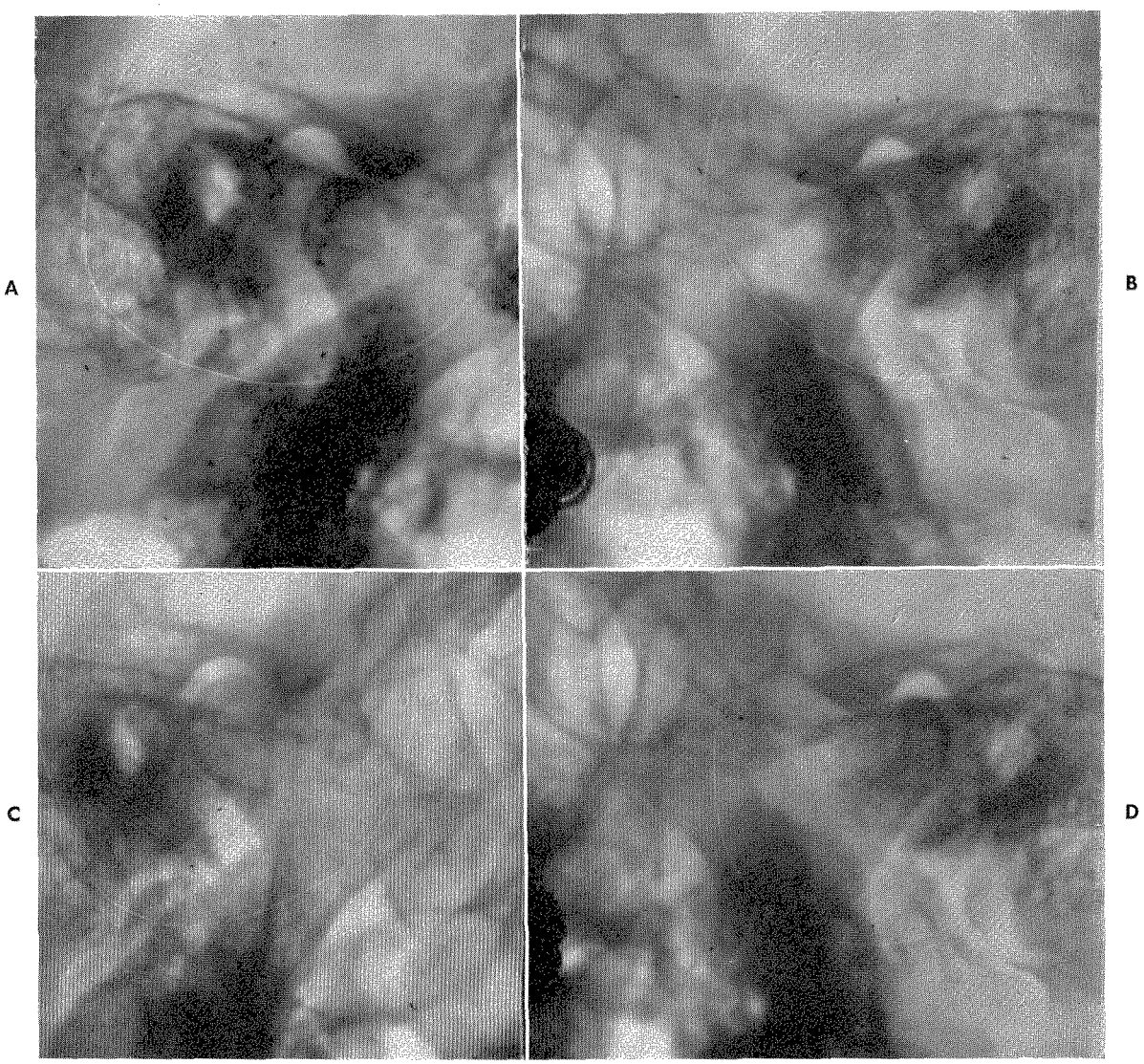


Fig. 995. Roentgenograms of the right and left temporomandibular joints at the start of treatment. **A** and **B**, Bite plate in place. The condyle is displaced downward and forward. **C** and **D**, Bite was lowered. After treatment splints were inserted. The condyles are in a more favorable position.

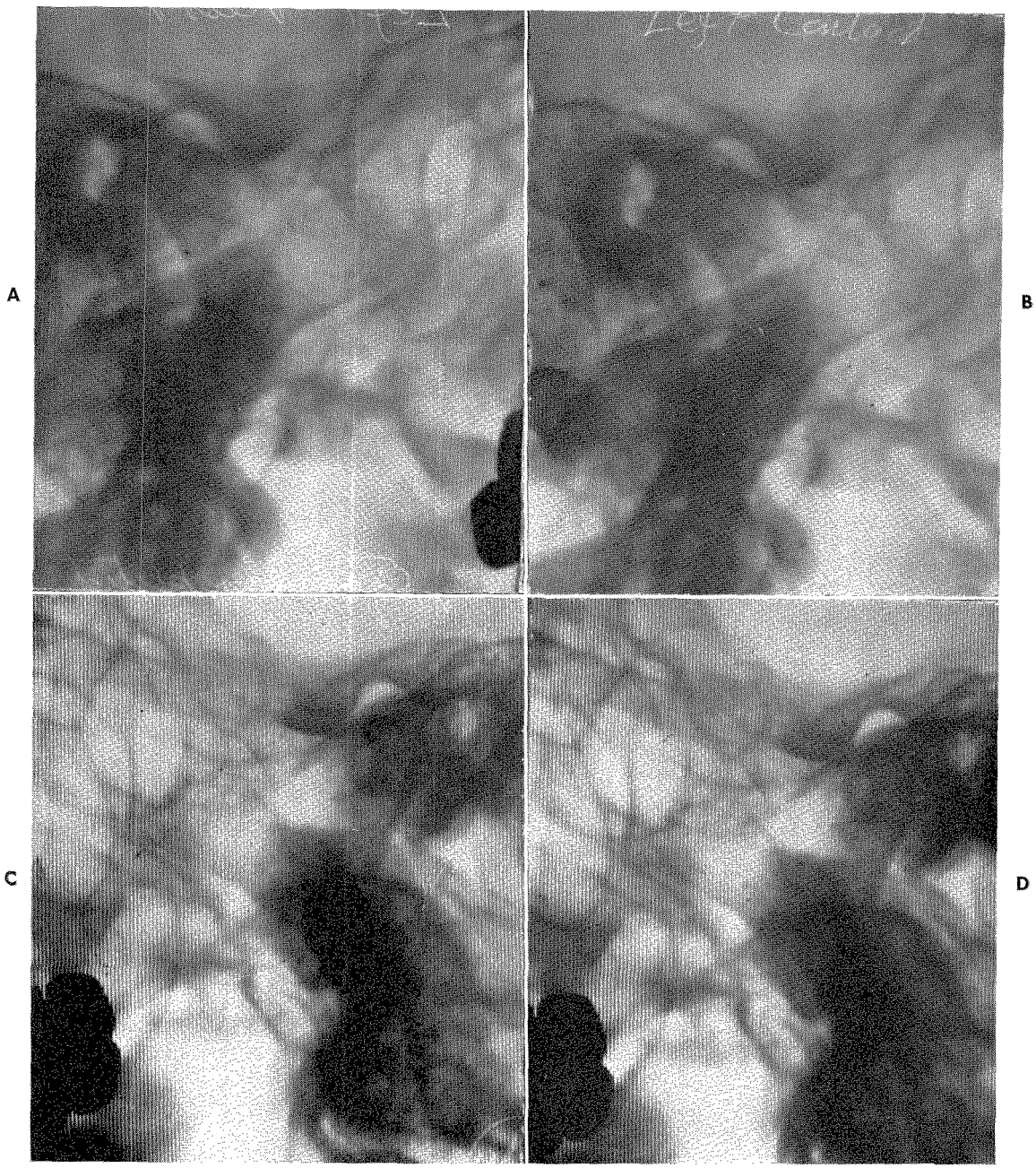


Fig. 996. Roentgenograms of the right and left temporomandibular joints at the conclusion of treatment. **A**, Left rest position. **B**, Left contact position. **C**, Right contact position. **D**, Right rest position. Compare these with Fig. 995, **A** and **B**.

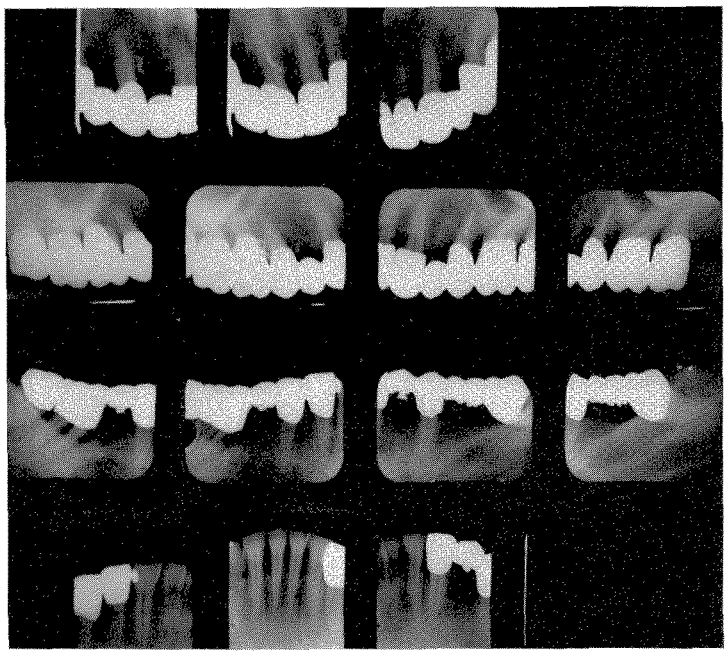


Fig. 997. Roentgenograms at the completion of treatment, December, 1954.

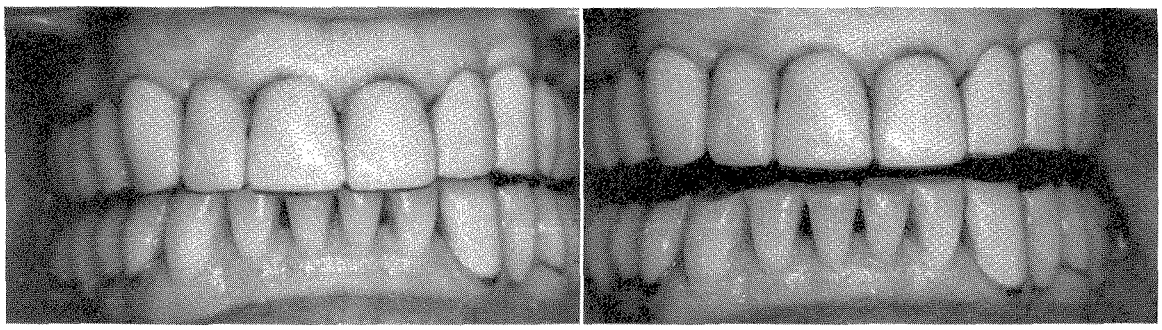


Fig. 998. Two views of the mouth taken in 1962. This is eight years after completion.

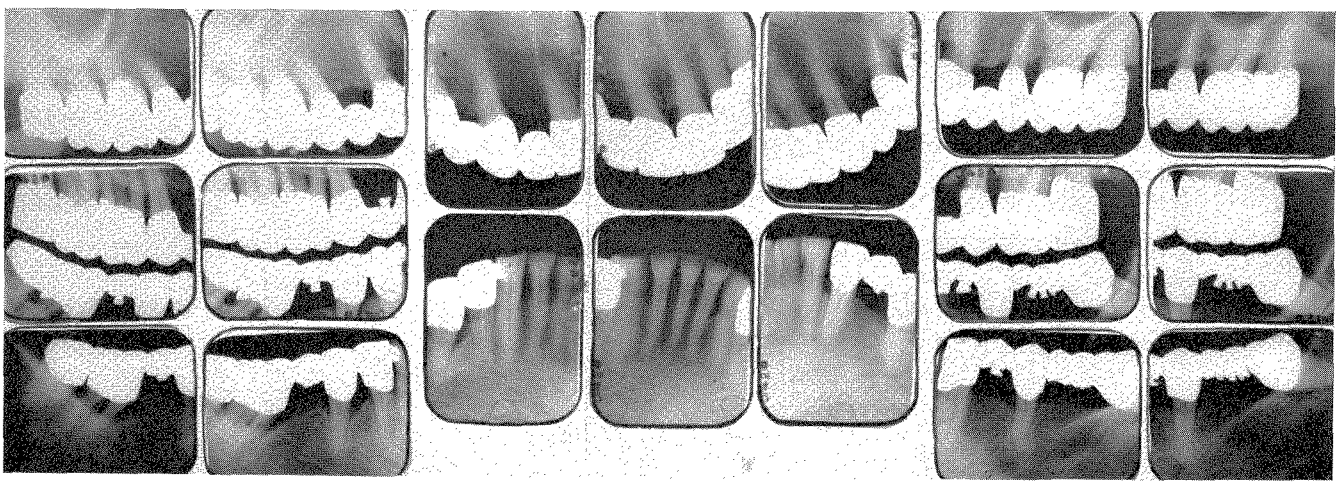


Fig. 999. Roentgenograms taken in 1962.

Discussion

This case presents several areas of discussion. At the time of writing it was over eight years since completion. The structures were fair, but one must consider the condition of the mouth at the start in order to compare and evaluate results. Function was excellent. All concerned were satisfied. The patient had not forgotten the problems involved. Her hygiene was good, and she came regularly for checkups.

Regarding validity of hinge axes of mandible

This case represents one which would be difficult to execute except by complete oral rehabilitation. A transverse hinge axis was recorded. This was discussed in 1951.* Those interested in obtaining more accuracy will probably benefit by its use. (Refer to p. 496.)

Value of recording cranial plane

Another area of discussion is the articulator used. A modified Hanau Model H articulator is capable of accepting a hinge-bow and also has the equipment for taking an axis orbital plane. In 1957 an article was published in which the importance of the axis orbital or cranial plane was explained.† Although the entire discussion will not be repeated at this time, the important point to remember is that the use of a cranial plane on this particular articulator is useless. A cranial plane can be effective only if the articulator functions in the manner of the human masticatory system, namely, when the condyles are attached to the mandible and the fossa is part of the cranium. In this articulator the joint path is attached to the lower member whereas the condyles are attached to the upper member. There are articulators whose upper and lower arms function correctly. Among them are the gnathoscope and the Transograph. These have been designated as arcon articulators, whereas the modified Hanau is a non-arcon articulator. When this articulator is opened, the fixed relationship between the mandibular fossa and the maxillary cast is immediately destroyed. Therefore, its registration is meaningless.

This case bears some resemblance to Case 12 (Figs. 956 to 968, pp. 441 to 445) in several respects. They are as follows:

1. Both were cases of deep overbite in closure, and both had lost many posterior teeth.
2. Both bites were raised arbitrarily and considerably.
3. In both cases the mandibles were advanced without regard to the true maxillomandibular centric relational position.
4. In both cases the position of the condyles in the mandibular fossa, with the mandible in a forward position, was untenable.

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*Schweitzer, J. M.: Oral rehabilitation, St. Louis, 1951, The C. V. Mosby Co., pp. 93-95, 117, 118, 120, 121, 124, 127, 128, 141, 142, 519.

†Schweitzer, J. M.: The Transograph and Transographic articulation, J. Pros. Dent. **7**:595-620, 1957.

These cases were dissimilar in the following respects:

1. The patient in Case 12 was about fifteen years older than the one in Case 14.
2. In the forward position of centric occlusion and maximum interocclusal contact, the patient in Case 12 was well balanced. Furthermore, her cusps were relatively flat. When her mandible was retruded to its true position of centric relation or hinge occlusion, she had adequate posterior functional contacts.
3. Accurate records were kept of the former patient so that the changes could be observed.
4. In Case 14 the entire occlusion was coordinated on an articulator and inserted during one chair session.
5. The periodontal tissues were in better condition in the patient in Case 12 than in the one in Case 14.

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