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Roberts

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[45] **June 19, 1973**

[54] **PERMANENT SUPPORT FRAME FOR UPPER JAW DENTURE AND METHOD OF MOUNTING THE SAME**

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[52] **U.S. Cl.** ..... **32/10 A**
[51] **Int. Cl.** **A61c 13/00**
[58] **Field of Search** ..... 31/10 A, 2, 8

[56] **References Cited**

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Primary Examiner—Robert Peshock
Attorney—L. R. Geisler

[57] **ABSTRACT**

The denture support frame comprises a rigid bar, the main portion of which is sized and shaped to correspond to the alveolar ridge of the maxilla. At each end this main portion is turned approximately 90° to extend a short distance upwardly and is again turned approximately 90° so as to extend forwardly to form an implant which is driven anteriorally into the posterior tuberosity of the maxillary ridge. In the front or anterior part of the main portion of the bar a plurality of holes are provided in which the top ends of single implant posts are secured. The exposed portion of the bar is spaced a slight distance below the epithelium and provides a permanent inlay-mounted frame for removably supporting an artificial denture. If there is a remaining natural front tooth to which a bridge can be secured, a portion of the frame may be used as a bridge for one side of the jaw only. When the posterior of the alveolar ridge of the maxilla has deteriorated extensively a rear extension is added to the implant to bear in a groove on the pterygoid bone.

6 Claims, 9 Drawing Figures

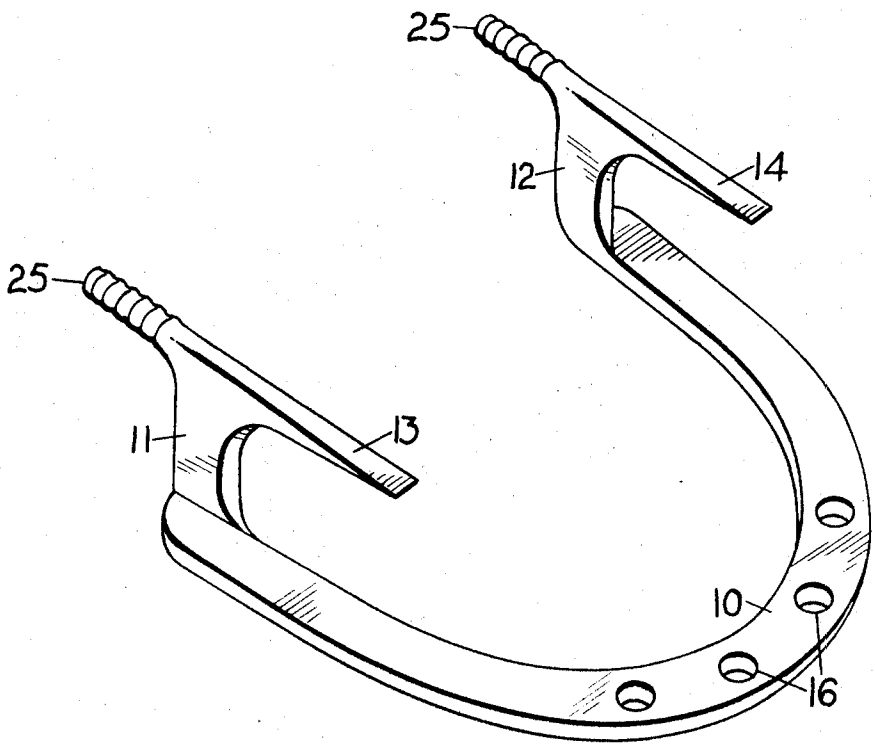


FIG. 1

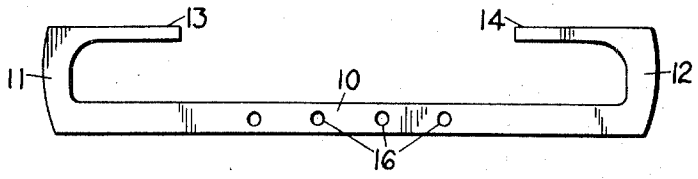


FIG. 2

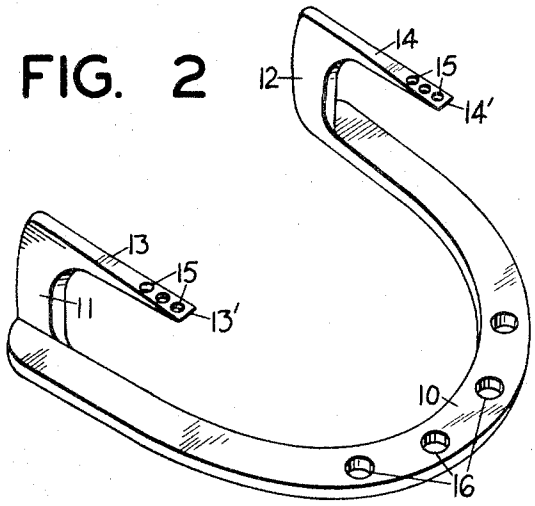


FIG. 3

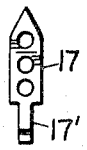


FIG. 7

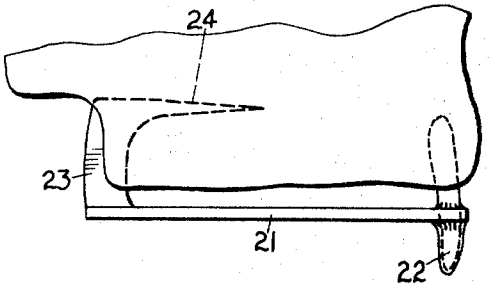
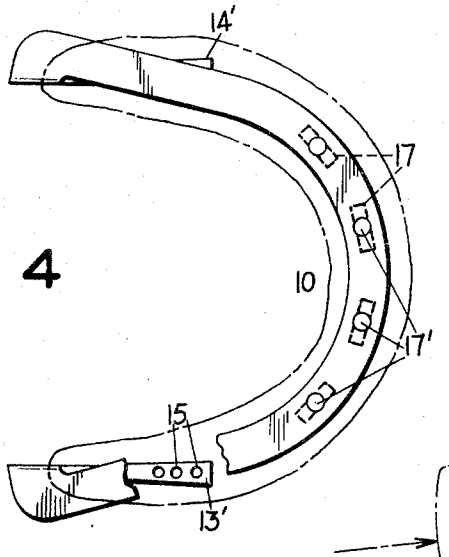


FIG. 4



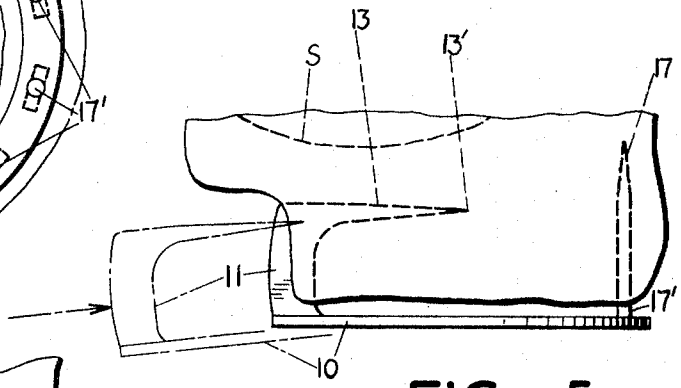


FIG. 5

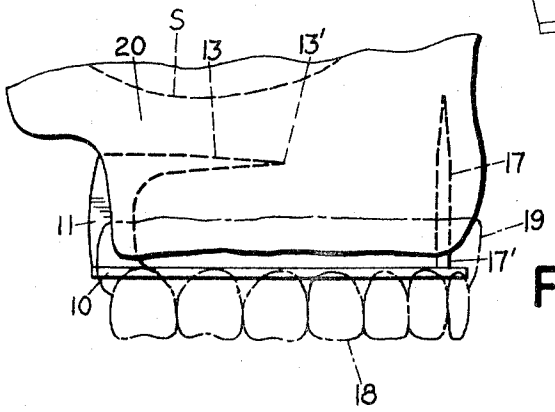


FIG. 6

FIG. 8

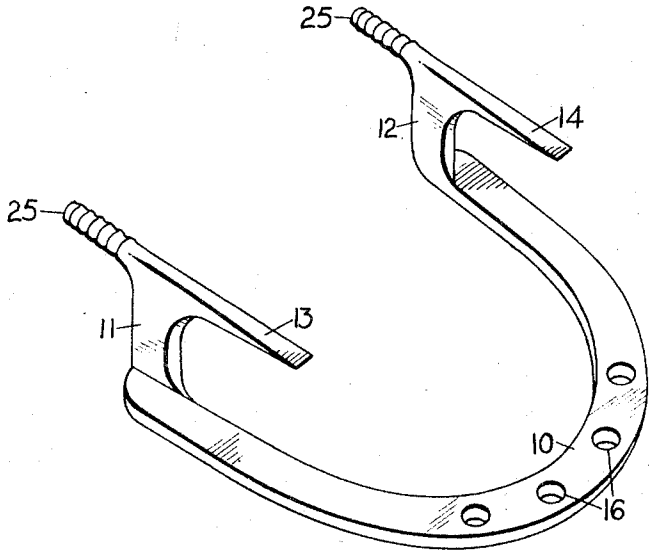
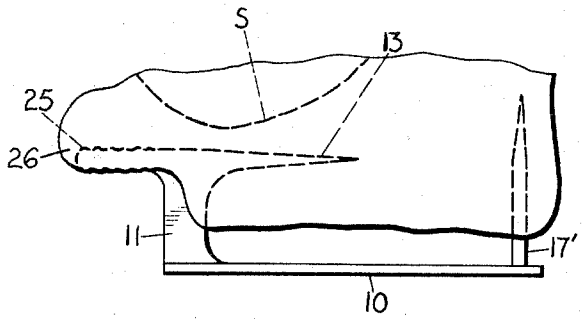


FIG. 9



PERMANENT SUPPORT FRAME FOR UPPER JAW DENTURE AND METHOD OF MOUNTING THE SAME

BACKGROUND OF THE INVENTION

The present invention is mainly concerned with dentures which take the place entirely of the upper jaw teeth and thus this invention is specifically designed for cases where there are no remaining natural teeth by which bridges and artificial dentures could be wholly or partially supported in place. While some forms of individual implants in the upper jaw are not uncommon, the bone structure, particularly as it approaches the posterior extension of the superior maxilla in the region of the pyramidal process and tubercle of the palatine bone would not generally enable common types of implants to be satisfactorily placed and securely mounted without probable injury to the membrane of the sinus above the thin bone layer.

United States Pat. No. 3,641,671, issued Feb. 15, 1972, describes how a somewhat similar denture support frame can be permanently mounted in the lower jaw when there are no remaining real teeth. However, the denture support frame described in this patent depends upon special implants in the ramus portions of the lower jaw to provide the necessary anchorages for the two rear ends of the denture support frame. Due to the entirely different structure of the rear portion of the upper jaw and to the fact that the alveolar ridge of the maxilla for the upper jaw teeth terminates definitely on each side at a location spaced anteriorally from the pyramidal process or tubercle, a similar anchorage for the rear ends of such a denture support frame for the upper jaw is not possible. The object of the present invention is to provide a denture support frame for the upper jaw which will include a permanent, secure, safe and satisfactory anchorage at the rear end of the denture support frame.

OUTLINE OF THE INVENTION

A rigid bar is formed with a main portion sized and shaped to provide the desired permanent support for the upper jaw denture. At each end this main exposed or denture support portion of the bar is turned first upwardly and then forwardly and so formed that each of the forwardly-extending end portions can be driven forwardly or anteriorally into the posterior extension of the maxilla so as to provide an anchoring implant in the bone substantially parallel to the rear of the exposed portion of the bar and implanted at a satisfactory distance above the crest of the bone and also a safe distance below the sinus tissue above the bone. The anterior portion of the curved, exposed support bar is provided with holes to accommodate the top ends of single implants to be placed in the corresponding anterior portion of the jaw. When the support bar, with its pair of rear end implants has first been mounted in position by being tapped forwardly, the locations for the separate anterior implants are marked to correspond to their holes in the support bar. Then the support bar is temporarily tapped posteriorally to enable the anterior implants to be set in place in the front portion of the jaw. Finally the support bar is returned to permanent position by being tapped forwardly, and the top ends of the anterior implants are inserted in their respective holes in the bar and are clamped or crimped solidly to the bar. In this way the support bar is permanently and

firmly secured in position, both at front and at the rear, beneath the tooth ridge of the jaw.

As a modification of the invention, when the permanent denture support frame is required on one side of the upper jaw only and thus when there is a remaining natural tooth located forwardly in the jaw capable of supporting the end of a permanent bridge, a section of the bar only is used with the rear end of the section secured in the posterior portion of the lingual ridge and the forward end secured to a cap placed on the natural tooth.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawing:

FIG. 1 is a side elevation of the stamped blank from which the entire denture support frame and its rear implants are formed;

FIG.2 is a perspective view of the same blank after the shaping of the same;

FIG. 3 is an elevation of one of the single post implants used at the anterior portion of the jaw in combination with the entire support frame;

FIG. 4 is a bottom plan view looking upwardly and showing the entire bar and the heads of the single implant posts in place, the adjacent portion of the upper jaw being indicated in broken line;

FIG. 5 is a side elevation illustrating the mounting of the bar in place in the jaw, one of the single implant posts being shown in broken line;

FIG. 6 is a side elevation similar to FIG. 5 but also showing part of a denture in place on the permanent bar, the denture being indicated by a dotted line;

FIG. 7 is a side elevation illustrating modification of the invention in which only one rear section of the bar is used and the front end is secured to a cap on a natural tooth.

FIG. 8 is a perspective view of the frame and rear implants, similar to FIG. 2, but showing a rear extension added to each rear implant to bear on the pterygoid bone; and

FIG. 9 is a side elevation similar to FIG. 5 but showing the modified frame of FIG. 8 in place.

Referring first to FIG. 1, the frame bar blank as first formed comprises a flat main frame portion 10, a pair of identical end portions 11 and 12 extending up substantially at right angles to the main portion, and a pair of tip ends 13 and 14 extending in opposite directions substantially at right angles to the portions 11 and 12 respectively. The length of the main portion 10 is made to conform approximately to the length of the curved alveolar ridge at the maxilla, or outer bone ridge of the upper jaw of the patient. The height of the end portions 11 and 12 is made slightly greater than the depth at which a forwardly-extending implant is to be set in the posterior of the alveolar ridge, as presently explained (generally approximately 10 mm.), and the length of the tip ends 13 and 14 is made not to exceed the spacing between the posterior of the alveolar ridge and the tubercle or edge of the pyramidal process to the rear (approximately 20 mm.).

The end portions 11 and 12 are then bent up at right angles to the plane of the main portion 10, as shown in FIG. 2, and the main portion is curved to correspond to the curvature of the alveolar ridge of the maxilla of the patient.

The main portion 10 is formed with a plurality of apertures 16 in the central and forward part in order to

receive the top ends of separate single implant posts to be placed in a corresponding anterior part of the jaw. The tip ends **13** and **14** are given a flat chisel-like edge as shown at **13'** and **–'** in FIG. **2** to facilitate the driving of these tips forwardly or anteriorally into the posterior of the alveolar ridge, and preferably also are provided with apertures **15** to permit bone growth therethrough when these tip ends are finally implanted in the respective posteriors of the alveolar ridge. These tip ends, instead of extending exactly parallel to the corresponding portion of the end of the main bar, are turned slightly outwardly as shown in FIG. **4** to prevent the possibility palate the tips terminating too close to the inside wall of the alveolar ridge.

When the formation of the sized frame is completed, as illustrated in FIG. **2**, the frame is ready for the first step in the mounting of the frame in place. A small, soft tissue incision is made in the upper posterior of the plate lingual to the tuberosity or ridge. A small, forwardly-extending bone incision is made with an air drill to start the implants and the frame and, consequently, each of the tip ends **13** and **14** is tapped anteriorally to form an implant piercing the bone inferior to the sinus, (indicated at S in FIGS. **5** and **6**), and superior to the crest of the bone, wedging itself in uncut bone to constitute the desired implant for anchoring the corresponding rear end of the frame.

After each implant is thrust forwardly to bring the frame into desired position, drill marks are run through the anterior holes **16** in the main frame **10** to mark the placement of single post implants in the anterior portion of the jaw for supporting the forward portion of the frame. The frame, with the rear implants, is then tapped posteriorally temporarily to enable the front, single implant posts **17** to be set in place. One such implant post **17** is shown by itself in FIG. **3**, and, as illustrated, the post **17** comprises a main implant blade designed to be driven up into the bone at the designated point in the anterior portion of the bone and a stem **17'** which extends down below the bone and epithelium. When the forward implant posts **17** have been set in position, the frame is again tapped anteriorally, as indicated in FIG. **5**, placing the rear implants **15** and **16** back into fully implanted position and the bringing of the holes **16** in the main frame into registration with the stems **17'** of the forward implant post **17**. The stems **17'** of the posts **17**, which previously have had indents placed on them, are then riveted to the frame **10** by crimping pliers. Thus the frame is solidly anchored at the rear ends to the posteriors of the alveolar ridge and at the front to the forward implant posts. The rear implants **15** and **16** and the stems **17'** of the front implant post are so set that when the frame **10** is finally and permanently positioned there will be a spacing normally not exceeding a fraction of an inch between the top edge of the exposed frame portion **10** and the bottom surface of the gum or epithelium. Consequently no problem of proper sanitation then will arise as far as the permanently set frame is concerned and thorough cleansing of the frame is a simple matter whenever the artificial denture on the frame is removed, and the frame itself can cause no irritation in the epithelium.

The artificial denture to be mounted on the permanent frame will include the usual base foundation of acrylic compound or other suitable denture material in which the artificial teeth are secured, and the base foundation is formed and shaped so that it can be removably pushed up over the permanent frame and the edges of the base foundation brought into desired proximity with the epithelium as usual. In FIG. **6** the artificial teeth are indicated at **18**, the base foundation material for the teeth is indicated at **19**, and part of the jaw in which the permanent frame **10** is mounted is shown at **20**. The permanent frame holds the base foundation **19** and therewith the artificial teeth **18** in place.

In the modified form of the invention illustrated in FIG. **7**, it is assumed that the patient has at least one natural anterior tooth capable of supporting the end of a bridge, but that there are no remaining teeth to the rear of this natural tooth on one side of the jaw. In such case, only one side portion of the frame, shown in FIG. **2**, is used and the main bar **10** is cut off at such length as to leave a side portion **21** (FIG. **7**) of proper length to extend from the posterior portion of the alveolar ridge, on the side where the artifical denture is required, to the natural tooth. Thus the modified and reduced permanent denture support frame **21** has the same upwardly-extending rear portion **23** and the same forwardly-extending implant blade **24** as each of the ends of the frame **10** of FIG. **2**. The implant blade **24** is tapped anteriorally into place the same as the implant blades **13** and **14** previously described, but the front end of the frame is secured to a cap **22** on the natural tooth. The denture support frame **21** is thus solidly anchored at the rear by the implant blade **24** and firmly supported at the front on the tooth cap **22**. Similarly, it is spaced only a slight distance below the bottom surface of the epithelium and provides the same sanitary and satisfactory mounting for an artificial denture as the entire frame previously described.

In some cases it may happen that the posteriors of the alveolar ridge of the maxilla have deteriorated to such extent that the bone structure between the sinus and the forwardly-driven implant will be insufficient and inadequate to resist pressure on the sinus satisfactorily under the force imposed by heavy mastication. In such event an integral rear extension, as shown at **25** in FIG. **8** is added to portions **11** and **12** of the frame assembly in substantial alignment with the implant blades **13** and **14**. These rear extensions are cut off to the proper length to bear on the pterygoid bone without extending rearwardly beyond the tubercle. A groove is cut in the pterygoid bone to receive the extension **25**.

FIG. **9** shows one side of such a modified frame in place. The rear extension **25** is held by the groove in the pterygoid bone (indicated at **26** in FIG. **9**), and although the spacing between the forwardly-extending implant **13** and the sinus S is less than would ordinarily be desirable due to the deterioration of the posterior of the alveolar ridge of the maxilla, nevertheless the engagement of the rear extension **25** with the pterygoid bone prevents any undesirable pressure on the sinus.

I claim:

1. An upper jaw denture assembly comprising a rigid, permanent support frame and an artificial denture removably mounted thereon, said support frame consisting of a main bar sized and shaped to correspond to the alveolar ridge of the maxilla, said main bar adapted to extend beneath the alveolar ridge slightly spaced below the bottom surface of the epithelium, a pair of identical integral rear portions extending upwardly from the ends of said main bar respectively substantially at right angles thereto, a pair of tip ends extending forwardly substantially at right angles from the top of said rear

portions respectively for a distance of approximately 20 mm., said tip ends adapted to form integral rear implants extending forwardly into the corresponding posterior of the alveolar ridge above the bottom of the bone of the alveolar ridge and at a safe distance below the sinus, an intervening integral portion of said frame connecting the rear of each of said implants with the corresponding end of said main bar, and an anterior implant in the alveolar ridge, the anterior portion of said main bar secured to said anterior implant.

2. The upper jaw denture assembly of claim **1** with said rear implants in the posterior portions of said alveolar ridge having flat, chisel-shaped tips to facilitate the tapping of said implants forwardly into said posterior portions of said ridge.

3. The upper jaw denture assembly of claim **2** with said rear implants extending slightly outwardly from parallelism with the respective underlying portions of said main bar, and with said rear implants having perforations to facilitate bone growth therethrough.

4. A permanent support frame for an artificial denture required for the space remaining between an anterior natural tooth and the end of the alveolar ridge of the maxilla on one side of the jaw, said frame consisting of a main bar extending beneath the alveolar ridge and conforming in shape thereto and slightly spaced below the bottom surface of the epithelium, a cap on the natural tooth supporting the forward end of said main bar, an integral rear portion extending upwardly from the rear end of said main bar substantially at right angles thereto, an integral tip end extending forwardly substantially at right angles from the top of said rear portion adapted to form an integral rear implant implant in the posterior of the alveolar ridge above the bottom of the bone of said ridge and at a safe distance below the sinus, and an intervening integral portion of said frame connecting said implant with said rear of said main bar.

5. The upper jaw denture assembly of claim **1** with at least one of said rear integral implants having an added rear extension adapted to bear in a groove on the corresponding pterygoid bone.

6. The denture support frame of claim **4** with said rear implant having an added rear extension adapted to bear on the pterygoid bone.

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