May 28, 1963 L. HIRSHHORN 3,091,032

FIXED RESTORATIVE DENTISTRY

Filed June 13, 1961

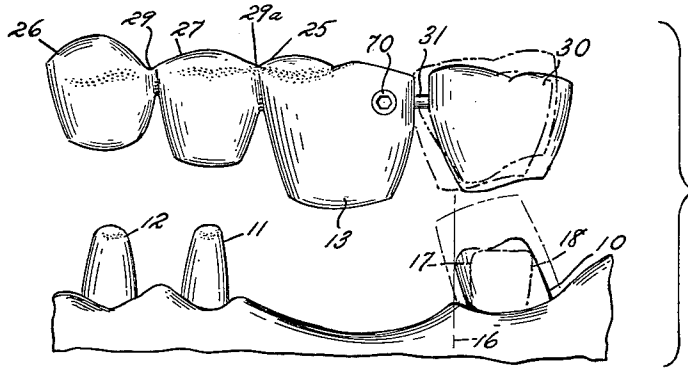


Fig.1

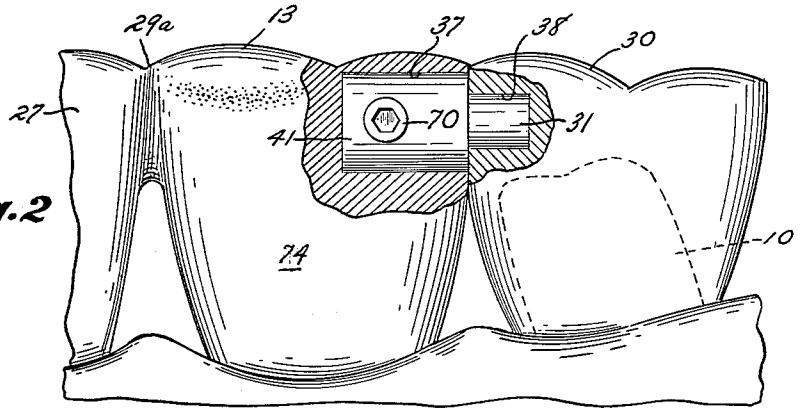


Fig.2

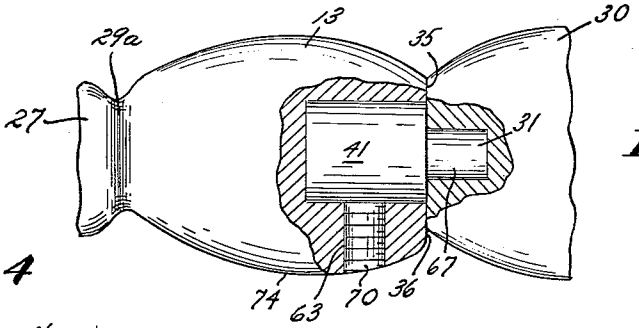
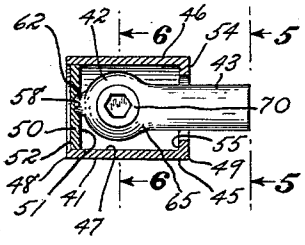


Fig.3

Fig.4



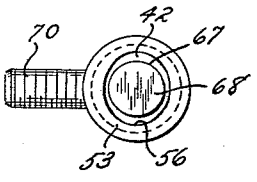


Fig.5

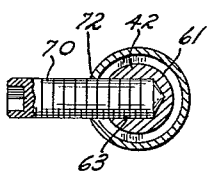


Fig.6

United States Patent Office

3,091,032
Patented May 28, 1963

3,091,032

FIXED RESTORATIVE DENTISTRY

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Filed June 13, 1961, Ser. No. 116,747
4 Claims. (Cl. 32—6)

This invention relates generally to the field of restorative dentistry, and more particularly to an improved dental construction permitting the capping of teeth under special situations in a manner which has heretofore been impossible in the prior art.

It is among the principal objects of the present invention to provide an improved dental capping construction which may be used in conjunction with adjacent or abutment teeth, the principal axes of which are disposed in non-parallel relation without the necessity of devitalizing either or any of the teeth.

Another object of the invention lies in the provision of improved dental construction of the class described in which one or more pairs of adjacent capping members and/or prosthetic teeth are interconnected in a manner which permits limited relative rotational and translational movement prior to the engagement with corresponding adjacent teeth, and in which each of the capping members and/or prosthetic teeth may be anchored to prevent relative movement after installation within the mouth of the user.

A further object of the invention lies in the provision of structure of the class described and possessed of the above advantages which may be manufactured and fitted using techniques known and existing in the prosthetic denture art, and which is adaptable for use in conjunction with a wide variety of oral conditions.

A feature of the invention lies in the fact that the inventive structure permits installation either on adjacent normal teeth or similar construction may be used to support a prosthetic tooth or teeth adjacent a normal one.

These objects and features, as well as other incidental ends and advantages, will more fully appear in the course of the following disclosure, and be pointed out in the appended claims.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is an exploded view in elevation of an embodiment of the invention, showing the inventive construction in completely fabricated condition and prior to installation within the mouth of the user.

FIGURE 2 is a fragmentary view in elevation, partially broken away to show detail of the embodiment in installed condition.

FIGURE 3 is a fragmentary plan view as seen from the upper portion of FIGURE 2, partially broken away to show detail.

FIGURE 4 is a longitudinal vertical sectional view of linking means comprising a part of the embodiment.

FIGURE 5 is an end elevational view of the linking means as seen from the plane 5—5 in FIGURE 4.

FIGURE 6 is a transverse sectional view as seen from the plane 6—6 in FIGURE 4.

Before entering into a detailed consideration of the inventive structure, reference is made to FIGURE 1 in the drawing, which illustrates a common situation encountered by dentists and technicians engaged in dental restoration where it is desired to cap a plurality of adjoining teeth. As indicated on this figure, a first tooth 10 is disposed with its principal axis inclined from the vertical, while second and third teeth 11 and 12 are disposed with the principal axis thereof substantially vertical.

As is well-known in the art, in preparing the teeth for the reception of capping members, the enamel is completely removed therefrom, along with a portion of the dentine, to form a prepared stump upon which the capping member is cemented. Reference character 16 indicates the normal limit of cutting in the formation of the stump, and it is desirable to avoid cutting through the dentine into the pulp of the tooth, a course which results in devitalizing the tooth. Where all of the teeth involved are in healthy condition, but are otherwise unattractive, individual capping members may be applied to the teeth without difficulty. Often, for reasons of mechanical strength, it is necessary that a group of capping members be integrated in such manner that each will reinforce the roots of the other teeth. In order that the integrated capping members may be accurately fitted, it is usually necessary that the stumps be prepared to have their principal axes disposed substantially parallel, since otherwise the integrated capping members cannot be slid into position. Where such a technique is resorted to in a condition as represented by FIGURE 1, it will be necessary to cut into the pulp of the tooth 10 at portions indicated by reference characters 17 and 18. Such a procedure necessarily devitalizes the tooth, and also weakens the mechanical strength of the same after the integrated capping members have been applied. The only other solution known in the prior art is to make a separate capping member for the tooth 10, but where the prosthetic tooth 13 requires mechanical support, it is best to support the tooth from both of the adjacent abutment teeth. The solution, therefore, lies in the provision of integrated capping members in which at least one of the same is capable of limited movement with respect to the others prior to and during installation of the capping members in position, the movable capping member being locked in position after installation to give the same mechanical strength as a fully integrated and rigid group of capping members and/or prosthetic teeth.

In FIGURE 1 of the drawing, there are shown the teeth 10, 11 and 12 after preparation for reception of capping members, not as indicated by reference character 16, but in which the stump is prepared along the natural axis of the tooth resulting in a non-parallel condition. In preparing the tooth in this manner, the vitality of none of the teeth is affected, but a normally integrated group of capping members cannot be placed upon the same owing to the non-parallel condition of at least one of the teeth.

In accordance with the invention, the stump portions on teeth 10, 11 and 12 are prepared in the normal manner in which the enamel and part of the dentine is removed to a point slightly below the gum or gingiva. The appliance, generally indicated by reference character 25, comprises a plurality of cap members 26 and 27 which are connected by a conventional soldered joint 29 and a prosthetic tooth 13, which may be also interconnected to the cap member 27 by a similar joint 29a. A third cap member 30 is interconnected to the opposite side of the tooth 28 by linking means 31, the details of which are best seen in FIGURES 4 to 6, inclusive, in the drawing. The cap members 26, 27 and 30 are preferably of high-temperature metallic alloy construction, including an outer shell upon which porcelain or other suitable synthetic resinous materials (not shown) may be bonded, as well as a filler which brings the internal configuration of the cavity formed by the shell to that of the respective stump portion, as is well known in the art.

Extending into the outer surface 35 of the tooth 13 and the outer surface 36 of the cap member 30 are a pair of recesses or cavities 37 and 38, respectively, the

same being disposed entirely within the filler material of each tooth (see FIGURES 2 and 3).

The linking means 31, during installation, must permit a limited degree of both rotational and translational movement in which one of the cap members (in this case, member 30) may move with respect to the other relatively fixed portions of the appliance 25. Since very often the tooth 10 will be disposed at an angle with respect to the labial-lingual plane, the permissive movement must include pivotal and rocking components, and the non-parallel condition shown in FIGURE 1 also requires movement of the type illustrated by a comparison of the full and dashed lines in FIGURE 1. Since the appliance may often be interconnected with similar appliances (not shown) by a threaded means, which interconnection is usually performed on the model formed from an impression taken from the mouth of the user, it is desirable that the cap member 30 be capable of full 360° rotation with respect to the remaining parts of the appliance 25.

Referring to FIGURES 3 to 6, inclusive, there is shown a linking means contemplated by the present invention which fulfills all of the above described requirements. It includes a box or socket-forming member 41, a spherically shaped socket-engaging member 42, and a shaft member 43 rigidly interconnected with the socket-engaging member 42.

The socket-forming member 41 is preferably formed from suitable precious metal, as, for example, platinum, gold and/or high-temperature alloys of the same, and includes a generally horizontally disposed cylindrical wall 45 having an outer surface 46, an inner surface 47, and being bounded by inner and outer ends 48 and 49, respectively. Mounted within the wall 45 at the inner end thereof is an inner wall 50 having a first surface 51 and a second surface 52, while at the outer end 49 there is disposed an outer wall 53 having a first surface 54 and a second surface 55. An oval-shaped opening 56, best seen in FIGURE 5, extends between the surfaces 54 and 55. Referring to FIGURE 4, there is seen a frusto-conically shaped recess 58, generally centrally disposed and extending from the inner surface 51 in a direction towards the outer surface 52.

The socket-engaging member 42 includes a generally spherical outer surface 61 having a frusto-conical projection 62 thereon corresponding in size and configuration to the recess 58. A threaded bore 63 extends along a lateral axis from the surface 61 into the body of the member 42, as best seen in FIGURE 6. The surface 61 includes a fillet portion 65 at the line of interconnection with the shaft member 43.

The shaft member 43 is of an outer diameter substantially less than the diameter of the socket-engaging member 42, and includes a cylindrical outer surface 67 and an end surface 68.

During the fabrication of the appliance 25, the linking means 31 is soldered into position with the socket-engaging member 42 engaged within the socket-forming member 41 in such manner that the projection 62 is engaged within the recess 58. This position is maintained by the engagement of the threaded bore 63 by a nickel or other active metal screw 70, which engages a correspondingly threaded opening 72 in the member 41. Where the linking means 31 is cast in place as a mold insert, the precious metal forming a part of the tooth 13 may be allowed to flow around the threads of the screw 70, and thereby form a corresponding mating thread in the tooth. When the casting has been completed, the appliance 25 may be immersed in a strong acid which will dissolve the screw 70 leaving the formed threads in precious metal intact, so that the now-dissolved screw may be replaced by a similar one of stainless steel.

During installation of the appliance 25 within the mouth of the wearer, the screw 70 is backed off to a point where it is engaged only with the threaded opening 72, permitting relative movement between the cap member 30 and the tooth 13. Upon the seating of the appliance within the mouth of the wearer, proper fitting is obtained upon the entry of the projection 62 into the recess 58, which will simultaneously align the threaded bore 63 with the threaded opening 72, so that the screw 70 may be tightened to the position shown in FIGURE 6, wherein the outer end of the screw 70 will be flush with the outer surface 74 of the tooth 13. Until proper seating is realized, the screw will not enter the bore 63, so that improper installation cannot occur accidentally.

It is preferable that the screw 70 enter the appliance from the lingual side so as to be concealed from view when the appliance is worn. Normally, the diameter of the threaded portion of the screw 70 will be only .06 inch.

It may thus be seen that I have invented novel and highly useful improvements in dental restorative construction, in which a dental problem of long standing has been substantially solved. By the use of the inventive structure, it is possible to cap a plurality of teeth disposed in non-parallel relation with an integrated appliance, which, when installed, may be employed to render support as in fixed bridge construction, and which may be utilized without the necessity of devitalizing any of the teeth being capped. The structure and method of applying the same are suitable for use over a wide variety of oral conditions, and may be employed by the practicing dentist without the necessity of special equipment. Not only may misaligned teeth be capped, but the inventive construction may be used in connection with the replacement of missing teeth as well.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. In a dental restorative construction including a pair of movably linked restorative members, improved linking means comprising: a socket-forming member embedded in one of said restorative members and having a recess therein, a socket-engaging member disposed within said socket-forming member, and initially capable of limited rotational and translational movement within said socket-engaging member, a shaft extending outwardly of said socket-forming member and engaged with said socket-engaging member at one end thereof and at a second end thereof with a recess in the other of said restorative members, and means for rigidly fixing the position of said socket-engaging member within said socket-forming member after installation of said first and second restorative members within the mouth of the user.

2. In a dental restorative construction including a pair of movably linked restorative members, improved linking means comprising: a socket-forming member embedded in one of said restorative members and having a recess therein, a socket-engaging member disposed within said socket-forming member, and initially capable of limited rotational and translational movement within said socket-forming member, a shaft extending outwardly of said socket-forming member and engaged with said socket-engaging member at one end thereof and at a second end thereof with a recess in the other of said restorative members, and threaded means penetrating said socket-forming member and socket-engaging member for rigidly fixing the position of said socket-engaging member within said socket-forming member after installation of said first and second restorative members within the mouth of the user.

3. In a dental restorative construction including a pair of movably linked restorative members, improved linking means comprising: a socket-forming member in one of said restorative members, said socket-forming member having a first generally cylindrical recess therein and an

inner wall having a second recess therein; a socket-engaging member disposed within said socket-forming member, a shaft member connected to said socket-engaging member at a first end thereof and to the other of said restorative members at a second end thereof; said socket-engaging member having a projection thereon corresponding in size and configuration to said second recess, and means selectively penetrating said socket-forming member and socket-engaging member for preventing relative movement therebetween.

4. In a dental restorative construction including a pair of movably linked restorative members, improved linking means comprising: a socket-forming member in one of said restorative members, said socket-forming member having a first generally cylindrical recess therein and

an inner wall having a second recess therein; a socket-engaging member disposed within said socket-forming member, a shaft member connected to said socket-engaging member at a first end thereof and to the other of said restorative members at a second end thereof; said socket-engaging member having a projection thereon corresponding in size and configuration to said second recess, and threaded means selectively penetrating said socket-forming member and socket-engaging member for preventing relative movement therebetween.

References Cited in the file of this patent

Noyes Dental Attachment, Oral Hygiene, February 1925, page 268, copy 32–12.