March 22, 1938. C. W. KNOWLES 2,111,787

DENTAL BRIDGE AND METHOD OF MAKING SAME

Filed Oct. 3, 1936

Fig. 1.

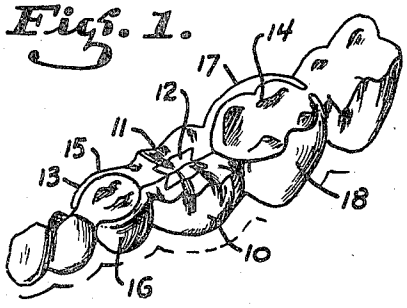


Fig. 2.

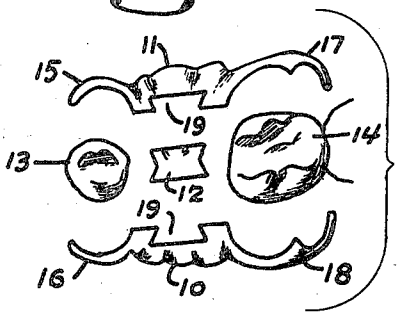


Fig. 3.

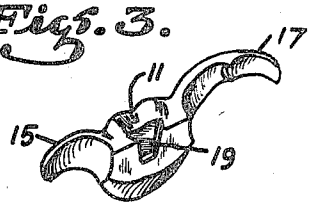


Fig. 4.

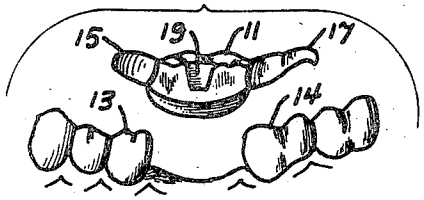


Fig. 5.

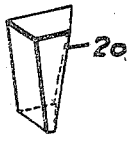


Fig. 6.

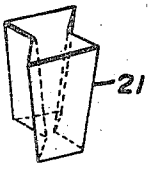


Fig. 7.

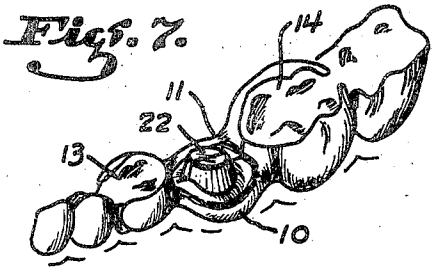
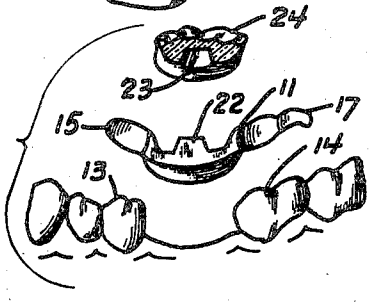


Fig. 8.



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DENTAL BRIDGE AND METHOD OF MAKING SAME

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Application October 3, 1936, Serial No. 103,939

5 Claims. (Cl. 32—6)

The present invention relates to dental bridges and a method of making the same. A dental bridge is an artificial denture employed to fill the space left by one or more extracted teeth and secured in place in the mouth by attachment to the natural teeth on opposite sides of the space to be filled by the bridgework.

It is an object of the present invention to provide an improved dental bridge and improved means for securing in place such a bridge without grinding away or in any way destroying or defacing any part of the natural teeth to which the bridge is secured.

Another object of the invention is to provide a bridge which may be secured in place by connection with natural teeth without interfering with the occluding surfaces of the teeth.

A further object is the provision of a bridge formed in sections which may be firmly secured together and to the natural teeth without the necessity of employing screws or other machined parts.

A further object of the invention is the provision of a sectional bridge and means for securing the sections thereof together and to the natural teeth, in which all parts of the bridge, including the securing means thereof, are made by a casting or investment process from patterns taken directly from the mouth, or models made from direct impressions.

A still further object of the invention is the provision of a novel method for forming the elements of a sectional bridge and the member by which the sections thereof are secured together and to the teeth which support the bridge.

Further objects and advantages of the invention will be made apparent in the following specification, in which reference is made to the accompanying drawing, wherein one form of the invention is illustrated.

In the drawing—

Fig. 1 is a perspective view of an assembled sectional bridge constructed in accordance with my invention;

Fig. 2 is a plan view of the same bridge with the sections thereof separated;

Fig. 3 is a perspective view of one of the major sections of the bridge illustrated in Figs. 1 and 2;

Fig. 4 is an elevation of one of the major sections of the bridge, ready to be placed in the position that it will occupy in the mouth;

Fig. 5 is a perspective view of a die which may be used for forming a dovetail, wedge-shaped slot in the wax pattern from which a major section of the bridge is to be cast;

Fig. 6 is a perspective view of a modified form of die employed when the two major castings are formed together and subsequently sawed apart;

Fig. 7 is a perspective view of a modified form of my invention, the sections of the bridge shown therein being shaped to receive and be secured together by a porcelain cap or crown; and

Fig. 8 is an elevation of one of the major sections of the bridge shown in Fig. 7 ready to be placed in position in the mouth and also showing in cross section the porcelain crown to be used therewith.

The bridge illustrated in the drawing comprises vertically and longitudinally separated major sections 10 and 11 secured together and to the supporting teeth by a double dovetail, wedge-shaped member 12. The central portions of the major sections 10 and 11 are relatively thick and combine, when drawn together by the wedge 12, to form an artificial tooth in the space between two natural teeth, indicated at 13 and 14. The outer ends of the two major sections are in the form of thin, shell-like wings, cast to embrace closely the natural teeth and support the central portion. The wings 15 and 16 embrace the natural tooth 13, and the wings 17 and 18 embrace the natural tooth 14.

Complementary wedge-shaped recesses or slots 19 are formed in the two major sections of the bridge, and when these sections are placed in position between the natural, supporting teeth 13 and 14, the closely fitting, tapered wedge 12 is placed in these complementary slots and pressed firmly into the recess formed by the slots, thereby drawing the two major sections of the bridge together and producing a close fit between the separate sections and between their supporting wings and the natural teeth 13 and 14. As the crown of the natural teeth, or those portions of the teeth which are visible above the gums, are somewhat rounded or protruding outwardly as they rise from the gums, and the wings are fitted closely to their exposed surfaces, this contact absolutely prevents any shifting of the bridge, and makes it impossible for the bridge, after the sections thereof have been drawn together by the wedge 12, to be moved either upwardly or downwardly relative to the supporting teeth. The several parts of the bridge are additionally secured to each other and sealed relative to the surfaces of the natural teeth that they contact, by the use of any suitable dental cement, preferably of the class used for cementing in gold inlays and the like. The occluding surfaces of the natural teeth are neither covered with the

bridge structure nor in any way effaced, so that their normal function of mastication is not impaired.

In constructing a bridge according to the present invention, assuming that there is a space between two natural, healthy teeth, and that it is indicated that bridgework is desirable, the natural teeth are first scaled and polished to provide a clean, regular surface against which the cast portions of the bridgework may be closely fitted. A model of that portion of the denture to be occupied by the bridge, including especially the two natural teeth to which the bridge is to be anchored, and the surrounding gums, is then made in a plaster-like material by any recognized method of model-making, such, for example, as the plaster-impression method well known to the dental profession.

The model having been made, the work is outlined in wax which is applied directly to the model, or, in other words, patterns of the two major sections of the bridge **10** and **11** are formed in wax against the model. During the forming of these wax patterns a die **20**, such as illustrated in Fig. 5 and which is formed of steel or other durable material, is placed in the wax pattern so that upon removal it will leave therein a recess which is in its shape identical with the recess **19**, which is formed in each of the major sections of the bridge. The use of this die is preferred but not essential, as the recess may be carved or otherwise formed in the wax if desired.

The completed wax patterns are then invested in any suitable investment material, and upon hardening of the investment material the wax is removed, as is common practice, by boiling in water or applying heat directly to melt the wax and permit it to flow from the investment material. The major sections of the bridge are then cast in gold or any other material suitable for dental use, and the castings may be trimmed or polished before the bridge is finally assembled in the mouth.

When the castings are completed and removed from the investment material, they are placed in position on the model and an impression is then taken, preferably in wax, of the recess in the central portion of the bridge which comprises the two wedge-shaped slots **19**. This wax impression is invested and a casting made, the same practice being followed as though an inlay were being made for a cavity in a natural tooth. The casting thus obtained, therefore, fits perfectly the double wedge-shaped opening, and due to its tapered shape has a tendency, upon being inserted in said opening, to draw together the major sections of the bridge and cause them to fit perfectly about the outer walls of the natural teeth which support the bridge structure. The occluding surface of the artificial tooth, which includes the top surface of the double dovetail wedge **12**, is shaped for proper registry with the other teeth in the mouth, and the entire assembly is then placed in the mouth, cement being employed between all contacting surfaces of the major sections of the bridge, the wedge **12** and the supporting teeth **13** and **14**.

Owing to the method of constructing the bridge that has been set forth above, the castings fit the supporting teeth with the same precision that the ordinary, well-made inlay or crown possesses and the bridge is firmly and permanently supported without danger of any harmful result to the natural teeth. Furthermore, owing to the manner of construction of this bridge, any imperfections in the nature of cavities or breaks in either of the supporting teeth **13** or **14** may be repaired by the bridge structure itself; that is to say, should a cavity exist in one or both of the natural teeth to which the bridge is to be secured, the cavity may be prepared prior to the taking of the impression from which the model is made so that in forming the wax patterns from which the bridge sections are to be cast, an inlay will be formed as an integral part of one of the bridge sections.

In placing the bridge in the mouth it is necessary to bring the two major sections thereof into position separately and from opposite sides of the teeth to which they are to be secured, owing to the convexity of the teeth which prevents the bridge from being slipped on or off after it has been assembled. The wedge **12** is therefore inserted after the major sections have been brought into place, and by its interlocking connection between these sections it insures against their becoming loosened or accidentally removed.

As an alternative to the method of forming the wax pattern in separate sections, as described above, the pattern may be made in a single piece and thereafter cut into the separable sections **10** and **11**. If this procedure is followed, it is preferable to use the double wedge-shaped die **21** illustrated in Fig. 6, before the wax is separated for providing the space in the wax pattern that is later to be occupied by the wedge **12**. The wedge-shaped members illustrated in Figs. 5 and 6 are provided with relatively sharp, angular edges; but it is to be understood that the invention is not limited to the particular shape of these members and that any suitable shape may be employed for forming an interlock and a wedging action between the separable halves of the bridge.

The appearance of the bridge, as described above, may be enhanced by the use, on the exposed surfaces thereof, of porcelain veneer which may be constructed and applied by any well known method.

Figs. 7 and 8 illustrate a modification in which the major exposed portions of the central section of the bridge are of porcelain rather than gold, as is usually desired in dental work that is likely to be frequently exposed to view. In this modification, the separable sections **10** and **11** of the bridge are of the same construction as that heretofore described with the exception that the central portions of these sections, instead of being shaped in the likeness of a tooth, are formed with registering halves of a frusto-conical or tapered pin **22**. The pin **22** is shaped to be received within the identically shaped socket **23** formed in a porcelain cap or crown **24**, illustrated in Fig. 8.

In assembling this modification with the bridge in the mouth, the two sections **10** and **11** thereof are brought together in their proper position with relation to the supporting teeth **13** and **14**, cement being applied between the contacting surfaces of the sections and the surfaces of contact between the sections and the supporting teeth. The porcelain crown **24** is then pressed into place over the registering halves of the pin **22**, cement being employed to retain it in this position and the pressure applied being sufficient to draw together the separable halves of the bridge in much the same manner and with the same effect as is produced by the use of the wedge **12** illustrated in Figs. 1 and 2.

In forming the wax pattern for the metal portions of the bridge illustrated in Figs. 7 and 8, the central portion of the pattern is first roughly

shaped to approximately the final form illustrated in Fig. 7; and with the wax in a pliable condition, the porcelain crown **24** is pressed into place to form for itself an exactly fitting seat in which it will eventually be received when the bridge is reproduced in gold. Care is taken in impressing this seat in the wax pattern that the occluding surfaces of the porcelain crown are in a proper position relative to the other teeth in the mouth, and that the crown assumes that position which it will eventually assume when secured to the finished sections of the bridge.

While certain features of the invention are more or less specifically described herein, it is to be understood that various changes may be resorted to in the construction of its several parts and the practice of the methods disclosed, within the scope of the appended claims.

Having described my invention, what I claim and desire to secure by Letters Patent is—

1. A dental bridge comprising a pair of separable sections, each section having portions adapted to embrace natural teeth for support and having registering tapered slots formed therein, and a double wedge member fitting within said registering slots to secure said sections against separation.

2. The method of forming a dental bridge of separable sections having a wedge-like member for securing them together which comprises casting said sections with a recess into which the wedge is to fit, and then taking an impression of said recess and casting a wedge, using the impression so taken as a pattern.

3. A dental bridge comprising a pair of separable sections, registering extensions on said sections to form a tapered pin when the sections are brought together, and a crown member having a tapered socket fitting over said pin.

4. A dental bridge comprising separable metal sections, a tapered pin formed one-half on each of said sections, and a porcelain crown having a tapered socket fitting over said pin whereby the crown is supported and the said sections are secured together.

5. A dental bridge comprising a pair of sections engageable with abutment teeth and separable on a plane disposed vertically and longitudinally with respect to the abutment teeth, complementary wedge-like surfaces on said sections, and a member movable vertically in said plane to engage said wedge-like surfaces and draw them together and into close contact with the abutment teeth.

CALVIN W. KNOWLES.