P. B. McCULLOUGH.

TOOTH CROWN OR PLATE AND SWAGING DEVICE THEREFOR.

APPLICATION FILED JULY 27, 1904.

906,911. **Patented Dec. 15, 1908.**

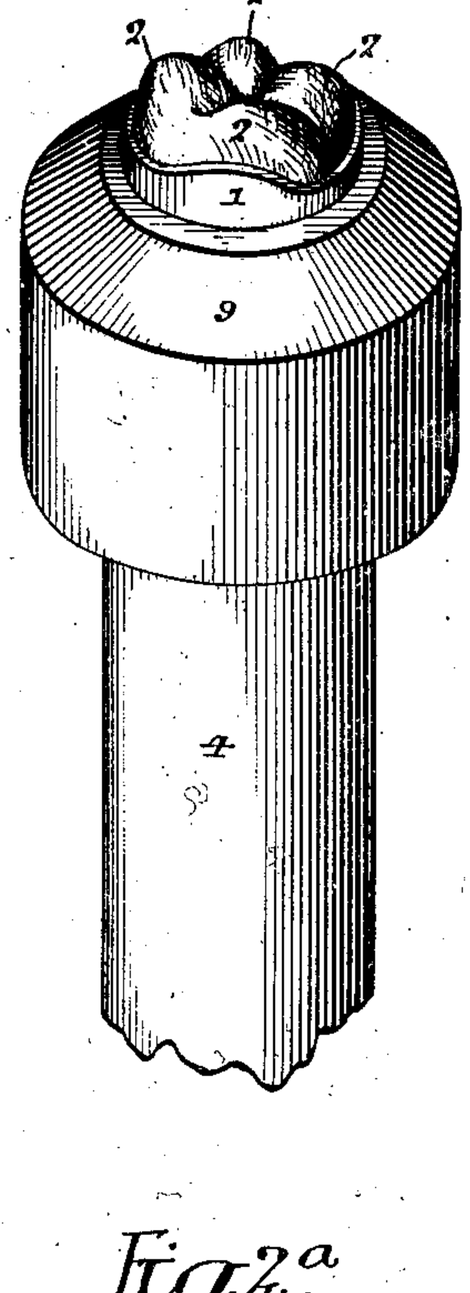

Fig. 3.

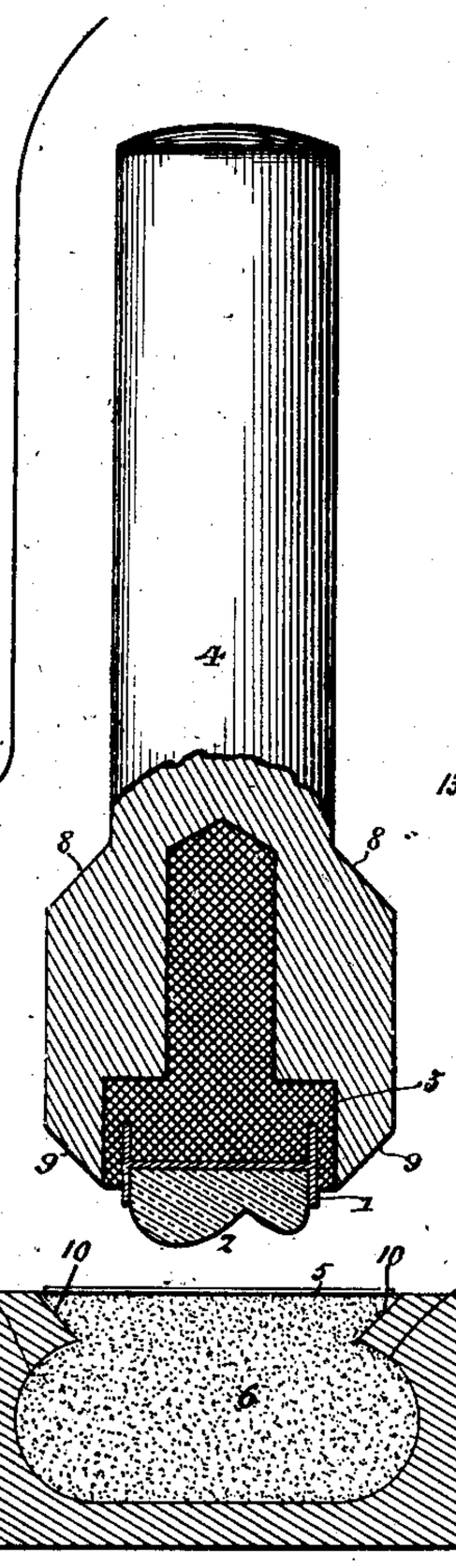

Fig. 1.

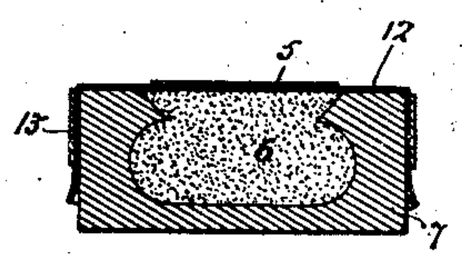

Fig. 2ª.

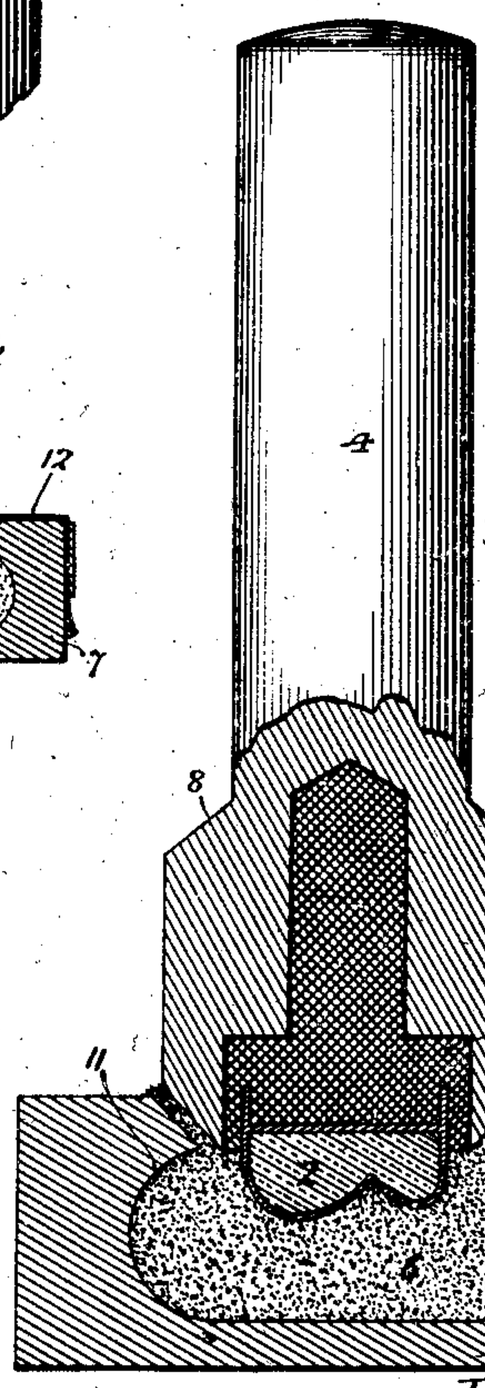

Fig. 2.

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UNITED STATES PATENT OFFICE.

PIERCY B. McCULLOUGH, OF PHILADELPHIA, PENNSYLVANIA.

TOOTH CROWN OR PLATE AND SWAGING DEVICE THEREFOR.

No. 906,911. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed July 27, 1904. Serial No. 218,354.

To all whom it may concern:

Be it known that I, PIERCY B. McCULLOUGH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Forming Tooth Crowns or Plates and in Swaging Devices Therefor, of which the following is a specification.

One object of my invention is to insure the accurate formation of the occlusal or masticating surfaces of a gold tooth crown without injury to the model, cast or die upon which the same is formed, a further object being to provide the dentist with a simple and efficient swaging device whereby this result may be attained.

In the accompanying drawing: Figure 1, is a vertical sectional view showing, separated from each other, the two parts of a swaging device made in accordance with my invention; Fig. 2, is a similar view, showing the parts in action, Fig. 2ª, is a view illustrating a modification, and Fig. 3, is a perspective view of the mandrel portion of the swaging device showing the model in position ready for swaging.

Of a number of known methods for forming the occlusal surfaces of bicuspid and molar crowns there are two in general use. The first provides a metal plate containing a number of countersunk reproductions of the occlusal surfaces of the bicuspid and molar teeth. The swaging is done by laying a piece of gold plate over one of the countersunk impressions, covering the plate with shot or a piece of lead and then driving the gold into the die by striking the lead with a hammer. The objection to this method is that as the die plates are unchangeable they do not provide for the variations in size and form of the teeth of different individuals and at different ages, hence, the section formed in this manner must be modified to fit the band previously fitted to the natural root, or the band must be changed to fit the swaged section thereby destroying the fit of the band to the natural root. The second method is to first fit the gold band to the natural root, then fill it with plaster so that when the patient closes the jaws an impression of the occluding teeth will be formed in the soft plaster. The plaster, when hard, is carved in imitation of the natural tooth which it is desired to reproduce and, from the model thus made a matrix is formed in a second plastic mass, and in said matrix a casting is made with a low fusing alloy, this casting forming a metal die upon which a second casting is made, forming a metal counter die. Between the die and counter die the gold plate is swaged forming the occlusal surface of the crown. This method is objectionable because of the labor which it involves and the difficulty in making a sharp casting with a small quantity of metal in a cold matrix and, further, because the method of forming the die and counter die provides no space for the gold plate to be swaged between them, hence any guide lines that may have originally appeared on the die, such, for instance, as those made by the edges of the band, are entirely destroyed by the force necessary to drive the gold between the dies.

In carrying out that part of the crown work preparatory to the swaging operation, I place the band section upon the root in the mouth and then fill to excess the space within the band with oxy-phosphate of zinc cement, so that, when the patient closes the jaws, an exact impression of the masticating surface of the occluding teeth will be formed in said cement. The cement is then carved in imitation of the tooth to be reproduced. The band section 1 with carved cement cusps 2 is then set in a mass of hard wax 3, contained in a recess at the end of a mandrel 4 of the swaging device, the cement cusps being in relief and the edge of the band exposed, as shown in Figs. 1 and 3. A piece of flat gold plate 5 of the desired thickness is then placed over the plastic mass 6 which is contained in a recess in the matrix member 7 of the swaging device and the cement cusps are driven onto said plate, the latter being trimmed as required until fitted flush to the exposed edge of the gold band 1.

The recess of the mandrel member 4 is formed for the reception of sections of molar crowns, and from the center of this recess extends a sub-recess to admit the pin or pins of bicuspid crowns or the roots of natural bicuspid teeth. The mandrel is further provided with a finger rest 8 upon which pressure is exerted during the swaging operation and it has a beveled end 9 corresponding to a countersunk bevel 10 in the matrix member 7 and designed to guide the mandrel to the center during the swaging operation and to control the escape of the plastic mass from the recess in the matrix member. The said recess is bounded by walls which con-

verge towards the top, as shown at 11 in Fig. 1.

Upon the first application of mallet blows upon the mandrel, the plastic material 6 is driven downwards, then laterally and then upwards, escaping between the beveled surfaces of the mandrel and matrix plate. As the operation approaches the final stage the plastic mass is so confined by the close proximity of these beveled surfaces that, upon further malleting, the plastic mass, directed by the converging walls 11 and following the direction of least resistance, presses the gold tightly to the sides of the model or die, and to the edge of the gold band. The plastic body 6, is composed of material, such as fullers' earth and glycerin, which the the property of remaining permanently plastic, and hence has the advantage over other swaging mediums previously used, such as flour, cornmeal, shot and graphite, that it flows readily under pressure and does not pack. By reason of this difference, I am enabled to effect the swaging operation by the use of a mallet weighing but a few ounces, instead of the much greater force otherwise required. The even distribution of force and the little comparative force required to swage by this method make it possible to use a natural tooth set in the mandrel as a model or die, and any surface desired can therefore, be reproduced in gold or other suitable metal. Upon the same principle, and after the above described method, a gold or other metal base for a full or partial set of artificial teeth may be swaged by fixing in a mandrel of sufficient size, a plaster or builder's cement model or a zinc or alloy die of either jaw.

I believe that I am the first to devise a method of swaging plates whereby it is possible to form such a plate directly by the swaging device from a flat piece of metal; other methods require the preliminary shaping of the gold upon a metal die with a horn mallet.

The forming of the recess in the matrix member 7 of the swaging device with converging walls provides for a greater mass of plastic material 6 than would a cylindrical opening extending from the base of the bevel countersink 10, thus providing a more yielding cushion for the plate to be swaged.

In order to prevent the plastic material from flying about when it is being forcibly ejected from the space between the beveled faces 9 and 10 of the mandrel and matrix block, the latter may be provided with a covering of sheet rubber, such as shown for instance at 12, in Fig. 2ª, this covering being retained in place by a ring 13, or in any other suitable manner.

The gold plate 5 is placed upon the rubber sheet, which thus serves to keep the plate from contact with the plastic mass and facilitates the withdrawal of the swaged plate from the matrix block.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. The mode herein described of forming a tooth crown or plate, said mode consisting in first forming a primary cement model of the crown or surface and then by means of said primary cement model, acting directly as a die, pressing a plate of previously unformed malleable metal into a bed of plastic material, substantially as specified.

2. The mode herein described of forming a tooth crown, said mode consisting in first applying a band to the natural root of the tooth, then forming, partly within and partly beyond said band, a model of the crown to be produced, and then, by means of said model, acting directly as a die, forcing a sheet of previously unformed malleable metal into a mass of plastic material, substantially as specified.

3. The mode herein described of forming a tooth crown, said mode consisting in first applying a band to the natural root of the tooth, then forming, partly within and partly beyond said band, a model of the crown to be produced, then setting the band and its contained model, in a mandrel, so that they project therefrom and form a die, and then directly by means of said die, forcing a sheet of previously unformed malleable metal into a mass of plastic material, substantially as specified.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

PIERCY B. McCULLOUGH.

Witnesses:

JAMES McMORRIS,

JOS. H. KLEIN.