No. 672,081. Patented Apr. 16, 1901.

C. A. PALMER.

SWAGING APPARATUS.

(Application filed June 7, 1900.)

(No Model.)

Fig. 3.

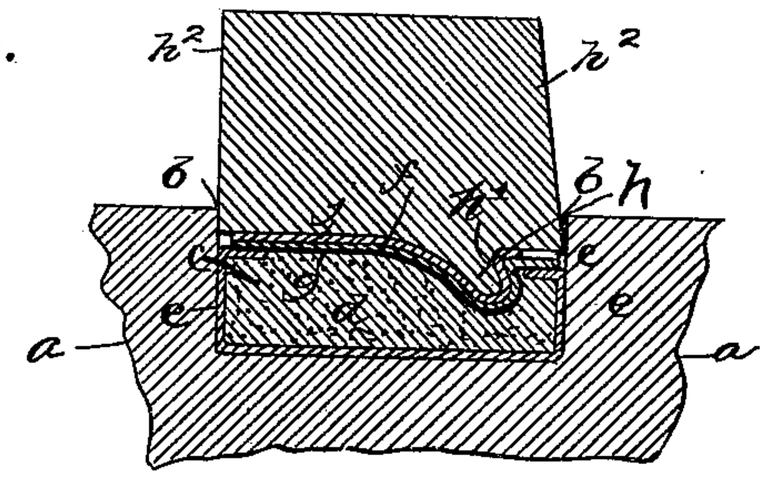


Fig. 1.

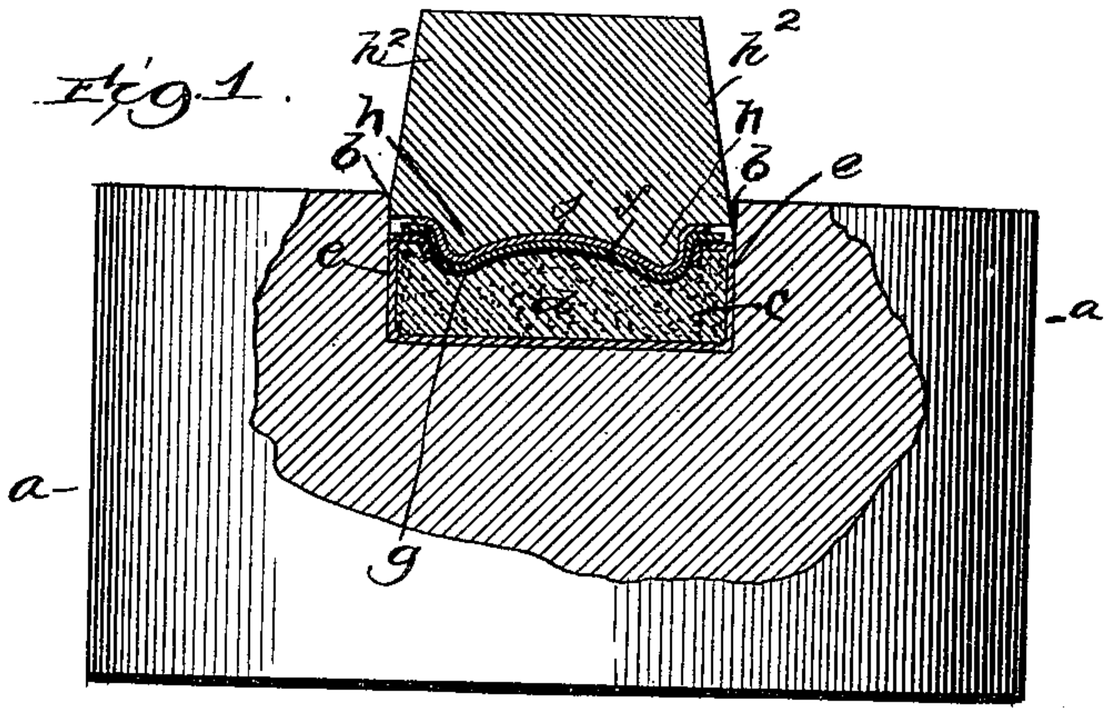
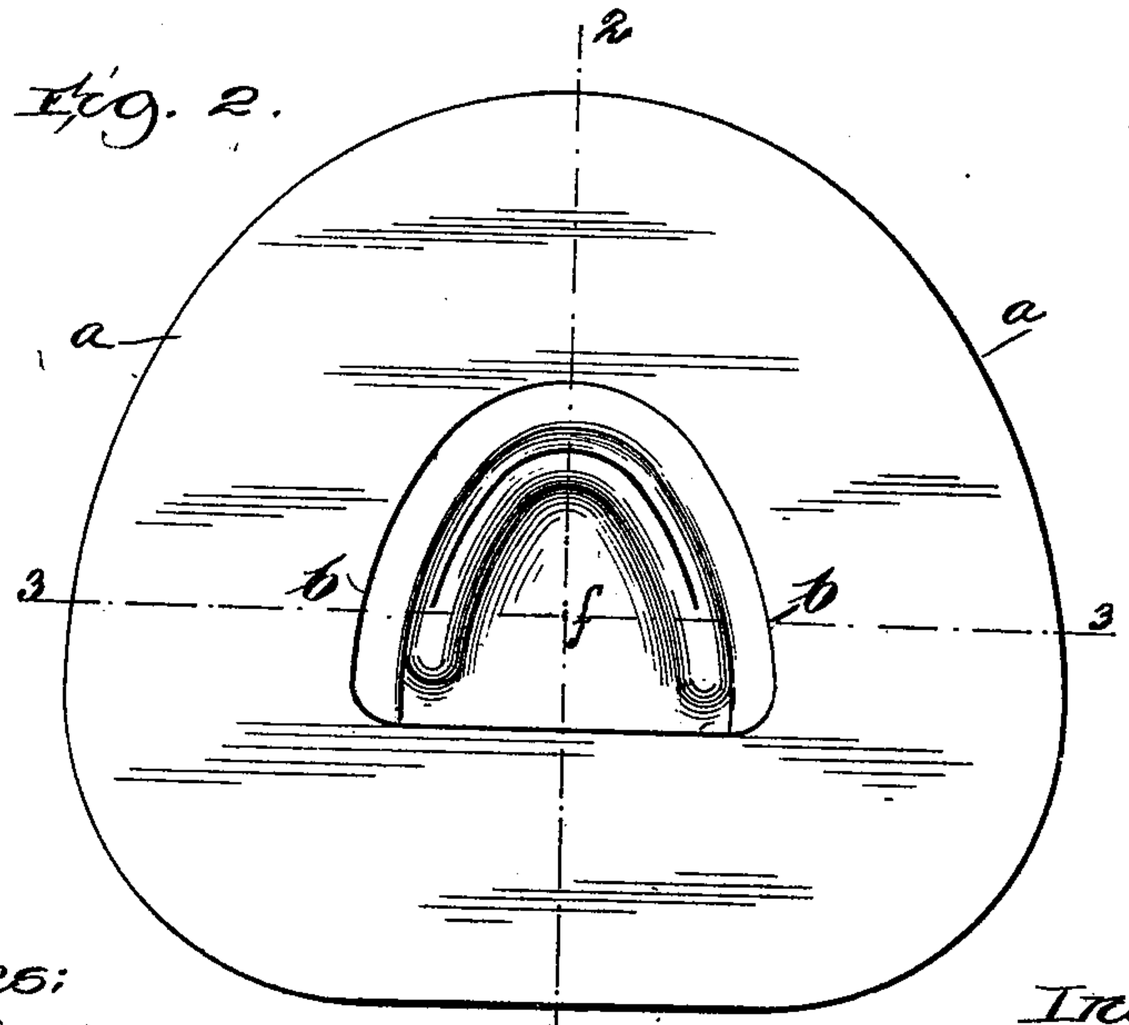


Fig. 2.



Witnesses:
Harry R. White.
R. White.

Inventor:
Charles Alfred Palmer.
By A. B. Dennis Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES ALFRED PALMER, OF GRINNELL, IOWA.

SWAGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 672,081, dated April 16, 1901.

Application filed June 7, 1900. Serial No. 19,354. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ALFRED PALMER, a citizen of the United States of America, and a resident of Grinnell, in the county of Poweshiek and State of Iowa, have invented certain new and useful Improvements in Swaging Apparatus, (Case No. 3,) of which the following is a specification.

My invention relates to improvements in swaging apparatus, and more particularly to an appliance adapted to readily and accurately effect a swage of metal dental plates.

The object of my said invention is the production of a swaging device which is of the simplest construction and operation, while combining the advantages of strength, durability, and extreme accuracy.

I have shown in my application for United States Letters Patent, Serial No. 714,491, filed April 26, 1899, an improved swaging appliance utilizing screw-pressure in connection with a plastic medium to which such pressure is directly applied for effecting the swage of dental plates, certain features of which apparatus I have applied in simplified form and claim in the present application.

In swaging dental plates as previously practiced in the art it has been customary to form metal dies and counter-dies, between which the sheet of metal to form a dental plate is shaped or swaged. An apparatus also placed in use contemplates the embedding of a small dental model with the plate in a mass of shot, pressure being applied to the shot by means of a peculiarly-formed presser, whereby the plate is caused to conform to the dental model. Other devices more or less complicated in character have been suggested employing screw-pressure or the principle of the hydrostatic press for accomplishing similar results. With all these devices certain objections are found to arise in practice. The first-named appliance requires unnecessary labor in forming the metal counter-die, which, moreover, frequently fails to swage an accurately-fitting plate. In the device employing shot the small non-reinforced model is not infrequently broken or damaged, and, moreover, the shot mar the dental plate swaged thereby. The latter class of devices are found to be rather too complicated in construction for ordinary use and develop numerous disadvantages necessarily present in devices of complex structure. In the appliance of my present invention I have endeavored to remedy these defects by providing a structure which after repeated experiments has been modified to admirably effect the purpose for which it is designed.

The embodiment of my invention herein illustrated may be briefly described as consisting of a relatively large and heavy swage-block provided with a recess in its upper face conforming generally in outline to the shape of the dental model, within which opening is disposed a suitably protected or enveloped body of plastic material adapted to serve as the counter-die. Upon the protective covering of the counter-die the sheet of metal to be swaged is placed, and by any suitable means, such as a hammer, the dental model or die is driven against said sheet of metal, which in turn is embedded within the counter-die and caused to conform to said model by the surrounding portions of the plastic material.

My invention will be more readily understood by reference to the accompanying drawings, illustrating an embodiment of my said invention, wherein—

Figure 1 is a view partially in vertical section, illustrating my improved swaging device with the die or dental model in position after the swage has been effected. Fig. 2 is a plan view of the swage-block and plastic counter-die with the dental model and plate removed; and Fig. 3 is a sectional view through the dental model and plate, illustrating how the swage of an undercut portion is effected.

The same letter of reference is used to designate similar parts in each of the several figures of the drawings.

The swage-block *a* consists of a heavy casting of iron or other suitable material. In the top or upper face of said block is provided a recess *b*, generally conforming in plan view to the dental model, said recess being encircled by walls of sufficient thickness to resist a considerable amount of internal pressure. Within this recess is provided the plastic or semiplastic counter-die *c*, which I preferably construct as follows: A mass or body of ordinary laundry soap *d* is well adapted to serve as the semiplastic element, al-

though other suitable materials may readily be substituted therefor. About the bottom, sides, and upper edges of the body of plastic material are wrapped one or more layers of an enveloping fabric *e*, such as canvas, the whole fitting readily within the recess *b*. Upon the upper face of the plastic body and overlapping the canvas are provided a protective diaphragm *f*, of leather, and an attached auxiliary diaphragm *g*, of sheet rubber, said diaphragms or protective coverings being entirely free and unattached to the swage-block or counter-die. A semicircular or U-shaped slit is provided in the leather diaphragm of approximately the size and shape of a dental model, which enables the diaphragm and plastic material to conform more readily to said model during the swaging process. The auxiliary diaphragm is principally valuable in preventing the soap or other plastic body from drying out.

For the purpose of illustration merely, the fabric, the leather, the rubber diaphragms, and the dental plate are shown slightly exaggerated in thickness. The swaging die or model h^2, which for the preliminary swage preferably is of cast metal, such as zinc, is formed in a manner well known to those skilled in the art, said model carrying upon its lower or engaging face an accurate reproduction or model *h* of the mouth of the patient for whom the plate is to be made. The sheet of metal *j*, formed of gold, aluminium, or other suitable material which it is desired to swage, is placed upon the leather diaphragm, and the dental model, which conforms in plan view to the recess *b*, is placed upon said sheet, and by means of a heavy hammer or short-handled sledge the model and the sheet of metal *j* are driven into or embedded within the plastic counter-die. By reason of the general conformity of the recess to said dental model the plastic material is caused by the encircling walls to be inwardly displaced sufficiently to fill in the undercut portion or portions *h'* of such dental model as the pressure is applied to said plastic counter-die by pounding upon the upper end of the die h^2. The preliminary swage having been effected in the above-described manner, the metal die and the approximately-swaged plate are removed and said plate is placed over the plaster cast or model of the patient's mouth. It will be understood that this plaster cast and metal die are exactly similar in appearance, inasmuch as the latter is cast from the former; but by reason of the fact that the cast metal undergoes a slight shrinkage in cooling the plaster cast is a more accurate reproduction of the patient's mouth than is the metal die. The plaster cast or die and the partly-swaged plate are then returned to place in the swage-block. A block of soft wood or other suitable material is interposed between the plaster die and the hammer, and the swage is completed by pounding upon said block of wood, causing the plastic counter-die *c* and the plate *j* to conform accurately to every portion of the plaster model. The dental plate is then removed and finished in the usual manner.

By providing a body of plastic material within the recess *b* conforming to the dental model the said material is caused under pressure to be inwardly displaced by the conforming walls of said recess to effect the accurate swage of undercut or other difficult portions of the model, while at the same time the plastic body is confined by the swage-block and the engaging portions of the model to prevent its improper displacement. By providing a canvas envelop for the lower portion and sides of the plastic body, which overlaps or envelops the upper face for a short distance, a secure containing-case is provided for the plastic body, which retains the plastic medium, while permitting its proper displacement under the pressure of the swaging part or die. This flow or displacement of the plastic body is unimpeded by the slit diaphragm, resulting in a perfect conformation of the plate to the model and its undercut portions. The body of the plastic material being contained within an envelop may readily be withdrawn from the recess and renewed whenever it is desirable—as, for instance, when the material is found to be too hard.

By the first swage of the dental model the heavier portion of the work is accomplished, so that the final swage may be effected over the plaster model without danger of breakage, both of said models being sufficiently large and reinforced to sustain the necessary pressure for effecting the swage. The ability to employ the plaster cast is an important feature accomplished by my improved device, since it is an absolutely accurate copy or reproduction of the patient's mouth. This has hitherto been impossible to secure with apparatus employed in the prior art. The pressure may accordingly be imparted directly to the die—the manner best calculated to effect a swage—rather than through any intervening medium, such as the shot employed in apparatus known in the art. This plastic medium, with its protective coverings, forms a permanent counter-die for the swage-block, which does not require manipulation and may be repeatedly used for swaging.

It will at once be seen that the device of my invention is extremely simple in construction and operation and by its use the dental plates or other articles may be swaged with the least amount of labor, since the necessity for constructing a metal counter-die or for investing the model and sheet of metal to be swaged in a suitable manner for accomplishing the result by means of a shot or hydraulic swager is done away with.

The entire swage may of course be accomplished over a single model; but it is preferable to adhere to the process above outlined when the greatest accuracy is required.

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

1. An appliance for swaging dental plates comprising a relatively heavy block or casting having a recess or receptacle in its upper face conforming generally in outline to a dental model, a plastic counter-die contained within the receptacle, comprising a body of plastic or semiplastic material provided with a protective covering, substantially as described.

2. A dental swaging appliance comprising a heavy swaging block or anvil provided with a recess or receptacle in its upper face conforming generally in shape or outline to the dental model, and a plastic counter-die disposed in said receptacle, composed of a body of plastic material suitably enveloped or supported and provided with an unconstrained upper covering or diaphragm, substantially as described.

3. A swaging appliance for dental plates, comprising a relatively heavy swaging block or anvil *a* having a recess *b* in its upper face conforming in outline to the dental model, the walls thereof being shaped to effect the swage of the undercut portion of said model, a plastic or semiplastic counter-die *c* disposed within said recess, comprising a body of plastic or semiplastic material fitting within said recess, provided with a protective envelop or covering whereon the plate is placed to be swaged, the upper portion of said covering being unconstrained, whereby an accurate swage is secured, and a cast-metal dental model over which the swage is effected, substantially as described.

4. In a swaging apparatus for dental plates, the combination with a relatively heavy swaging block or casting *a* having a recess or receptacle *b* in its upper face conforming generally in outline to a dental model, a plastic counter-die disposed within the receptacle, comprising a body of plastic or semiplastic material and a protective covering or diaphragm, and a swaging die or part carrying a dental model over which the swage is to be effected, adapted to be driven into and embedded in the counter-die, substantially as described.

5. In a swaging appliance for dental plates, the combination with a relatively heavy swaging block or anvil *a*, having a recess or receptacle *b* in its upper face, conforming in shape or outline to a dental model; a plastic counter-die *c* disposed and supported within the receptacle, comprising a body of plastic material *d;* a covering of fabric *e* partially enveloping the same, and an unattached leather diaphragm *f* protecting its upper face; and a swaging part or parts carrying the dental model *h* over which the swage is to be effected by driving the same into and embedding it in the counter-die, substantially as described.

6. In a swaging appliance for dental plates, the combination with a relatively heavy swaging block or casting *a* provided with a recess in its upper face conforming in shape or outline to a dental model; a plastic counter-die *c* disposed and supported within the recess, comprising a body of plastic material *d*, a fabric envelop *e* covering the bottom and sides and overlapping along the upper edges of said plastic material, and an unattached diaphragm *f* having a slit conforming to the shape of the dental model, for protecting the upper face of said plastic material; and a swaging part or parts carrying a dental model *h* over which the swage is adapted to be effected by driving the model and metal to be swaged into and embedding them in the counter-die, substantially as described.

Signed by me at Grinnell, Iowa, this 1st day of June, A. D. 1900, in the presence of two subscribing witnesses.

CHARLES ALFRED PALMER.

Witnesses:

J. P. LYMAN,

C. S. STIEKLE.