

No. 833,883.

PATENTED OCT. 23, 1906.

J. A. LENTZ.

PROCESS FOR FORMING DENTAL STRUCTURES.

APPLICATION FILED AUG. 30, 1905.

Fig. 1

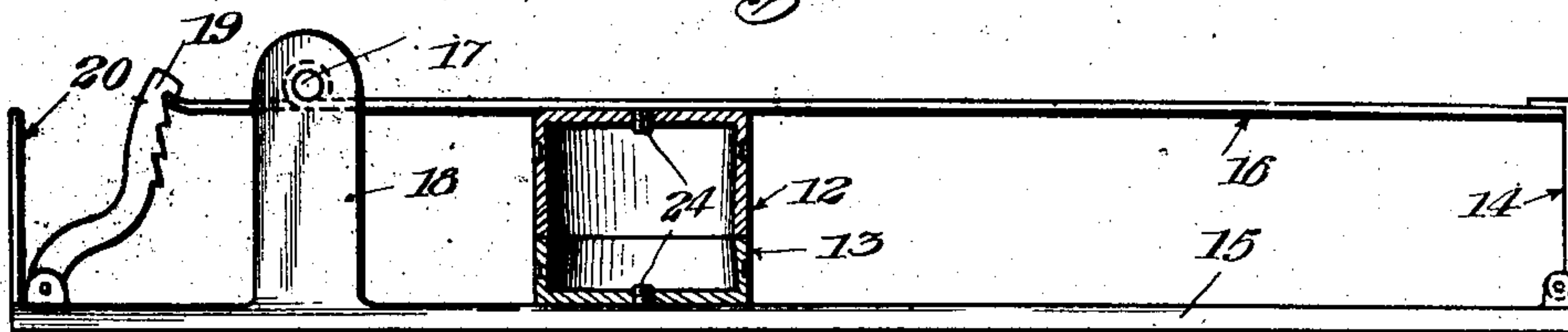


Fig. 2

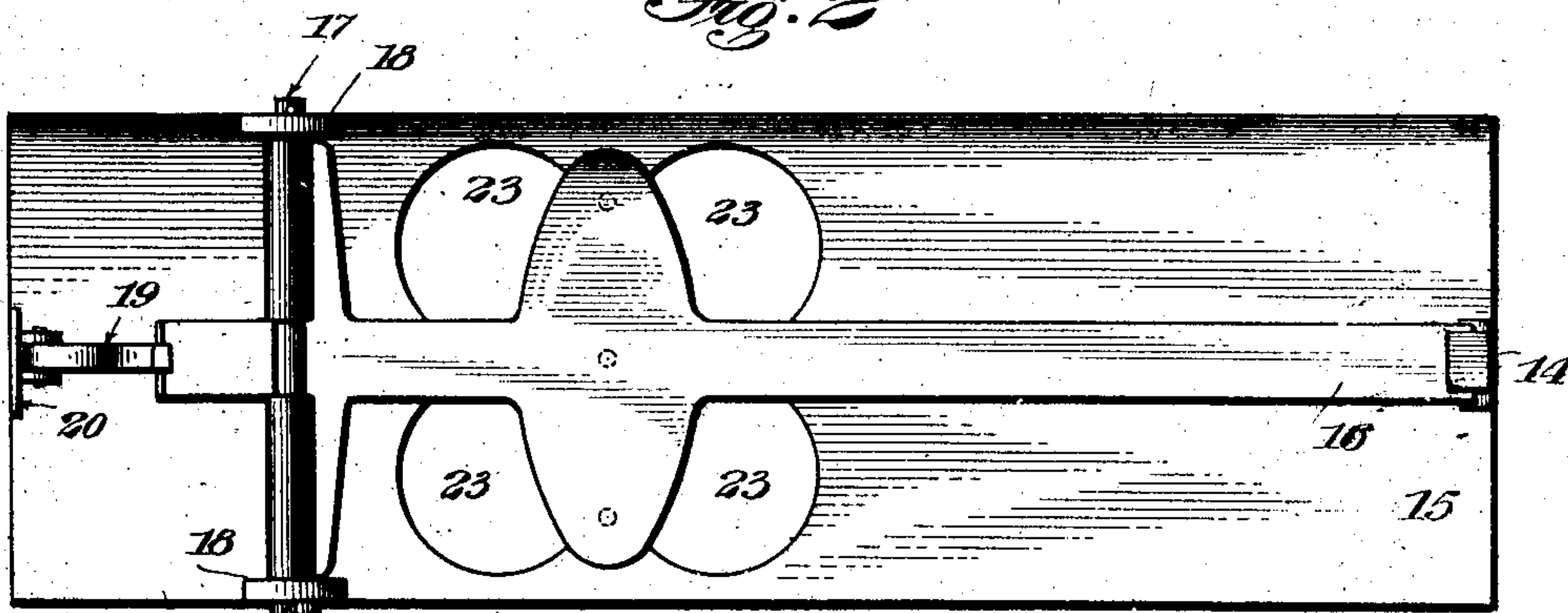


Fig. 3

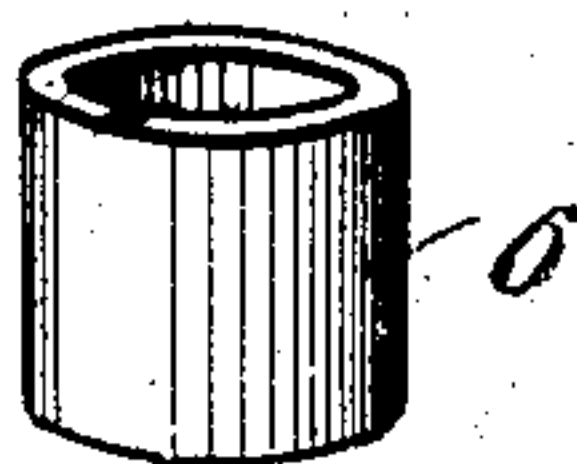


Fig. 4

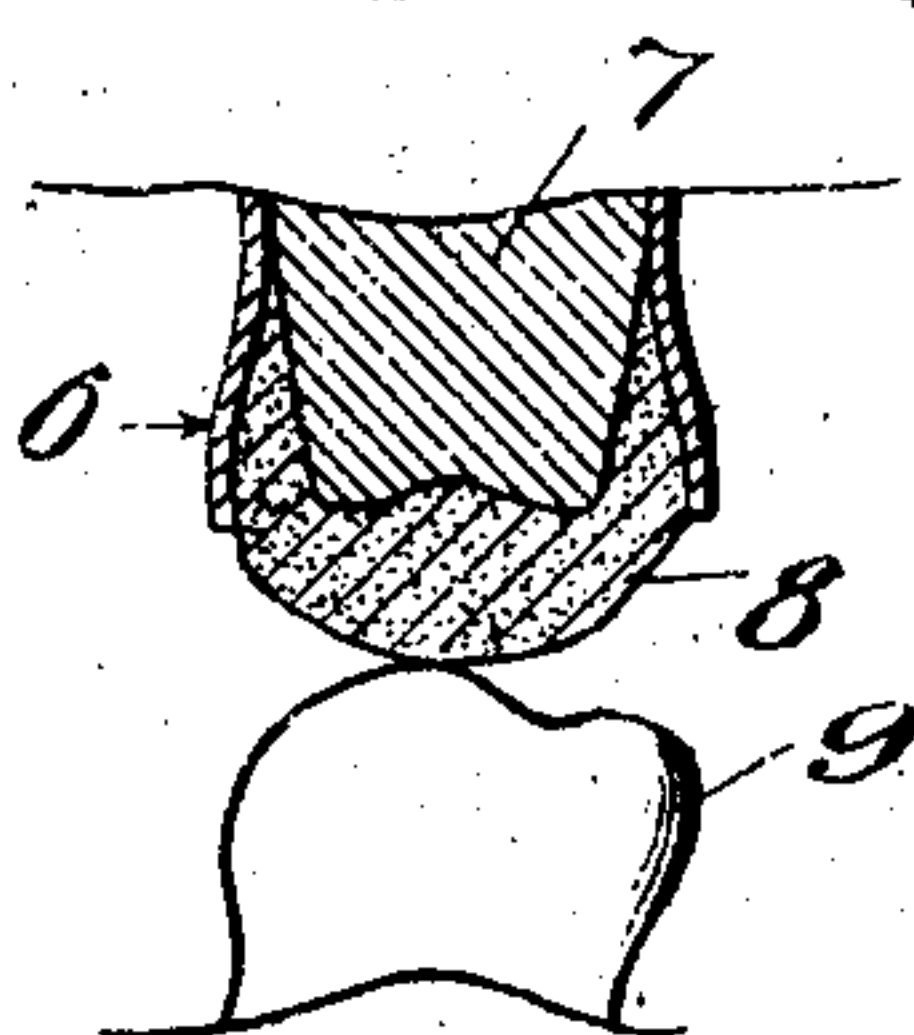


Fig. 5

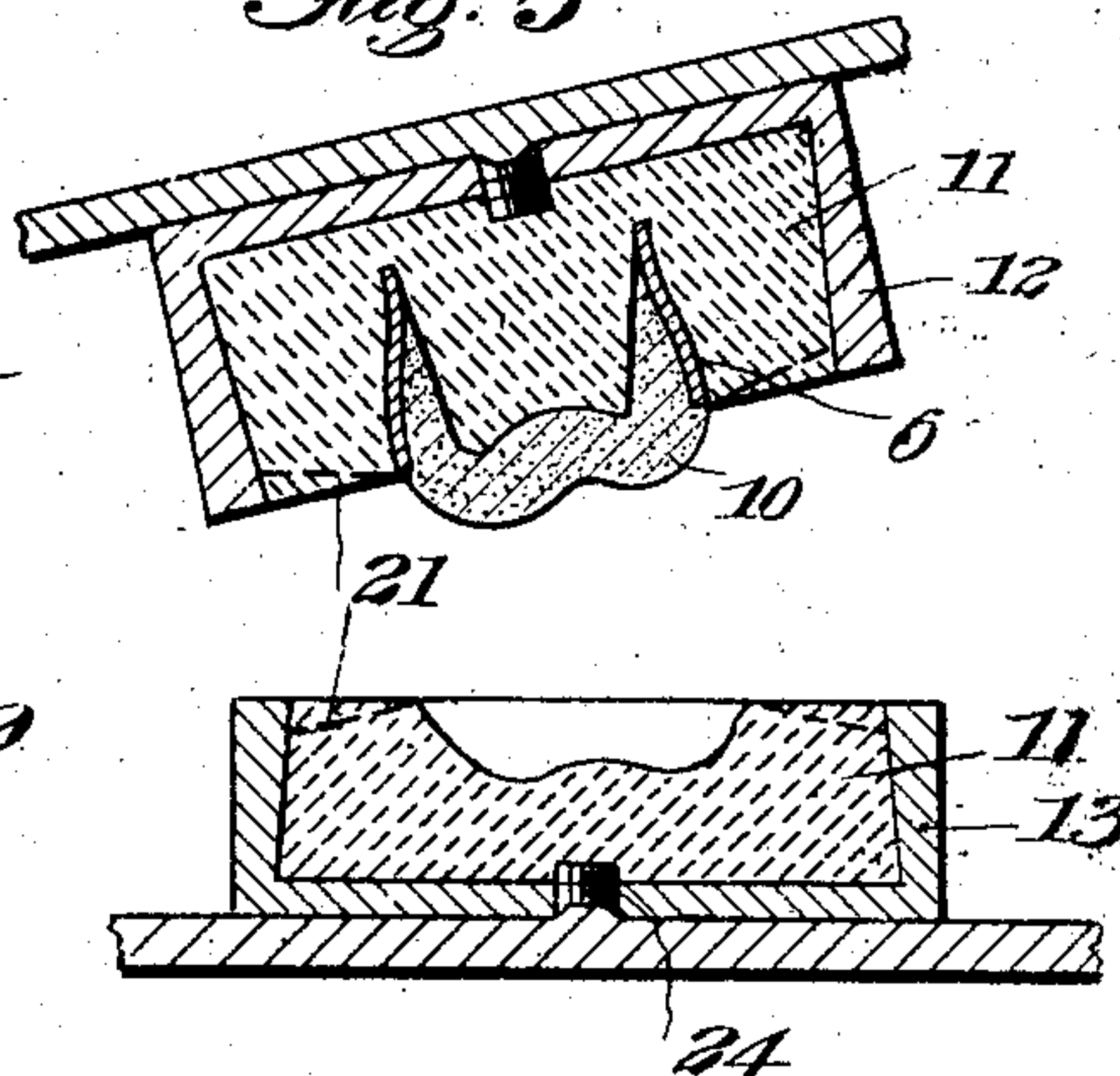
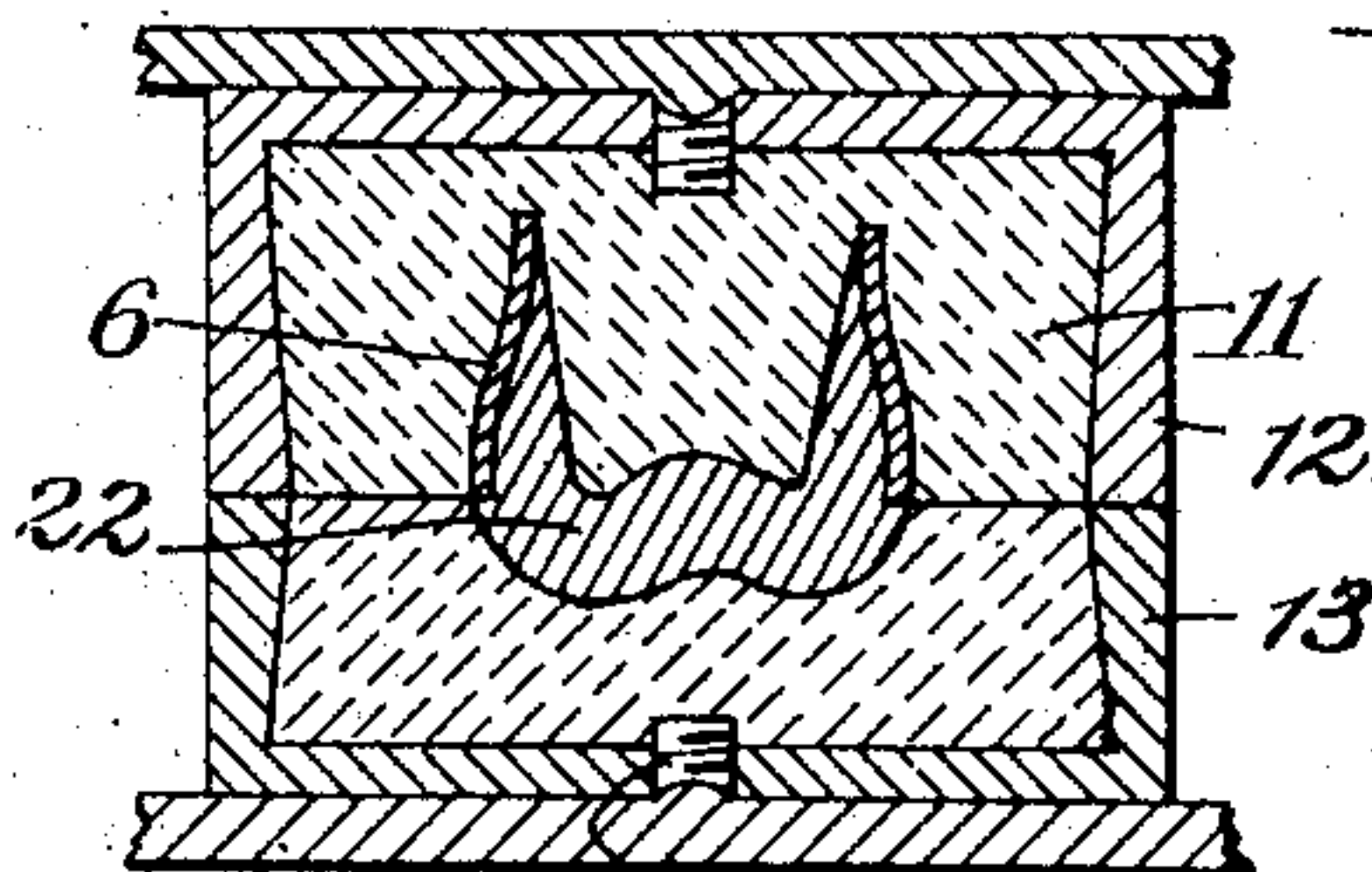


Fig. 6



Witnesses 24

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UNITED STATES PATENT OFFICE.

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PROCESS FOR FORMING DENTAL STRUCTURES.

No. 833,883.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed August 30, 1905. Serial No. 276,428.

To all whom it may concern:

Be it known that I, JOHN A. LENTZ, a citizen of the United States, residing at Phoenix, in the county of Maricopa, in the Territory of Arizona, have invented new and useful Improvements in Processes for Forming Dental Structures, of which the following is a specification.

My invention relates to such dental work as making inlays, onlays, crowns, bridges, artificial dentures, and other dental structure, or certain parts of the foregoing.

The nature of my invention and its objects are such that the above-mentioned work can in general be performed more quickly, with less labor and expense, and with more perfect results than heretofore.

More specifically stated, my objects are, first, to facilitate and expedite the reproduction or duplication in gold, gold alloy, or similar substance of a variety of forms, such as inlays, onlays, cusps, facings, tooth-crowns, dummies, and other dental structures; second, to add and attach to any such reproductions in the relation desired and simultaneous with the making of said reproduction and by the same operation pins, porcelain carrying-pins, bands, plates, crowns, clasps, special anchorages, and other dental structures of gold, gold alloy, platinum, or similar substance; third, to enable a plurality of operations, as mentioned before specifically, to be performed at one time and practically in one operation; fourth, to dispense with the use of solder in backing up porcelain facings, reinforcing-cusps, uniting-cusps, and bands, and for many other unions and restorations where solder has been heretofore used; fifth, to facilitate the adaptation of the inner surface of the cusp of a shell-crown to the surface of the root to be crowned and of a backing to a porcelain facing; sixth, to dispense with swaging in a great many cases; seventh, to enable the employment of scrap gold in many places where gold in more expensive form has been used heretofore. I accomplish these objects by the process herein described and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of the molding-machine used in carrying out my process. Fig. 2 is a plan of the machine. Fig. 3 is a perspective view of

a gold band used in forming a gold crown. Figs. 4, 5, and 6 are views illustrating different steps of my improved process.

I have illustrated and will explain my process applied to making a gold shell-crown.

In the drawings the gold band 6, made in a suitable manner, is fitted to the cervix of the tooth 7, which has been properly prepared for the reception of a crown. The band is then properly contoured. With the band in place on the tooth a suitable impression material 8, such as modeling compound, is forced into the band and the jaws brought together, forcing the compound against the root within the band and against the occluding surfaces of the opposing teeth 9. The jaws may be opened and closed several times in such various positions as the jaws may assume, and by carving or forcing away any interfering compound the surface thereof is made to conform as closely as possible without interference to the opposing occlusal surfaces in all of the various positions that the jaws may naturally assume. The band, with compound in place, is now removed from the root, and the cavity formed by the root is filled with a batter of fyrite 11 or similar material having the properties of an investment as well as a molding material and adapted to withstand high temperatures. When the fyrite is sufficiently hard to maintain the relation of band and compound, the lateral excess of modeling compound is cut away till flush with the sides of the band and any further carving done which in the judgment of the operator may add to the artistic effect or practical use of the finished crown. The band, filled with fyrite or similar substance, is now placed in the cover-cup 12, also filled with same material, and the band is forced into the same approximately to its occlusal edge. When sufficiently hard, the fyrite 11, which shall hereinafter be referred to as "investing material," is trimmed smooth from the edge of the cup to the occlusal edge of the band, leaving the modeling-compound cusp 10 projecting, as shown in Fig. 5. Like investment material in a plastic state is then placed in the base-cup 13 and the two cups are brought together, as shown in Fig. 1, and a clamp 14, secured to base-plate 15, is brought over the end of the handle 16 of the cover-cup, so as to hold the two cups together until the investment ma-

terial in base-cup has hardened, after which
 the cups are separated and modeling com-
 pound 10 is removed. The handle of the
 cover-cup is pivoted at 17 in the standards
 5 18, secured to the base-plate, as best shown
 in Fig. 2. The end of the handle of the
 cover-cup projects rearwardly of the pivotal
 connection with the standards and is adapted
 to engage with the detent-bar 19, so that the
 10 cover-cup may be held separated from the
 base-cup, as hereinafter explained. A rest-
 bar 20 provides a support for the cover-cup
 when it is desired to fill the same. Portions
 of the space which it is undesirable to fill with
 15 the metal to be used for formation of the cusp
 are also filled with investment material. If
 the natural root is so short as to make it un-
 desirable to have the inner surface of cusp in
 contact with it, I fill the inside of band with
 20 investment material and carve to any de-
 sired depth or form. I now carve away
 enough investment from either or both cups
 in the manner shown in dotted lines to allow
 for escape of the excess of metal, but without
 25 encroaching on the band or the edge of the
 mold of the base-cup. In special cases, how-
 ever, I sometimes cut gateways, connecting
 mold with the space provided for excess of
 metal.
 30 One or more buttons of gold or gold alloy,
 as desired, and somewhat in excess of the
 actual amount required to fill the space for-
 merly occupied by the modeling compound
 10, are placed in the mold in the base-cup.
 35 If desired, flux may be applied to the ex-
 posed portions of the band. The cover-cup
 is held by the detent-bar at any desired dis-
 tance above the base-cup, as shown in Fig. 5.
 In this position the base is suitably support-
 40 ed over a Bunsen-burner flame, which,
 through the apertures 23, plays up around
 the cups. When the investment has become
 thoroughly dry and when the band has be-
 come sufficiently hot, but without fusing, ad-
 45 ditional heat by means of a blowpipe, if re-
 quired, is applied to the gold button until it
 fuses, when the cover-cup is brought down
 upon the base-cup, as shown in Fig. 6, when
 the fused metal 22 is forced into the cover-
 50 mold, thereby completing the desired struc-
 ture, and held in place, and heat is with-
 drawn and case allowed to cool. Other meth-
 ods of applying and distributing the heat are
 used in different cases; but the essential fea-
 55 ture is to have the band in cover-cup heated
 to a sufficiently high temperature without
 melting and when in this condition to bring
 it in contact with the molten metal in base-
 cup.
 60 When the case is sufficiently cool, the
 crown is removed and will be found to have
 the cusp correspond to the form of the mold
 securely united to the band. In the usual

way excess around the line of juncture be-
 tween cusp and band is removed and the 65
 crown polished and set.

It is obvious that by varying the form of
 the mold, the form and composition and rela-
 tions of the metals or alloys used by includ-
 ing porcelain parts or porcelain-carrying 70
 metals into portions of the mold, by varying
 the size and form of the base and cover cup,
 by varying the means and methods of apply-
 ing and distributing heat, by varying the use
 and distribution of flux the same process de- 75
 scribed in detail with respect to gold shell-
 crowns is likewise applicable to the making
 of inlays, onlays, other crowns, bridges, arti-
 ficial dentures, and other dental structures
 and certain parts of the foregoing, as well as 80
 the performance of a plurality of such opera-
 tions at one time.

Having described my invention, what I
 claim as new, and desire to secure by Letters 85
 Patent, is—

1. The herein-described process of making
 metal-containing structures which consists of
 forming a mold of a predetermined part of
 such structure in suitable molding, investing,
 heat-resisting material contained in one of 90
 the registerable parts of a separable molding-
 machine, of placing a previously-formed part
 of such structure in the other registerable
 part of the molding-machine, of then fusing
 in the mold sufficient metal to form with the 95
 previously-formed part the completed struc-
 ture, of then bringing the fused metal into
 contact with the formed part and allowing
 the same to solidify while in such contact.

2. The herein-described process of forming 100
 certain dental structures, which consists in
 embedding in material contained in one of
 the parts of the molding-machine one of the
 parts of the dental structure; then taking an
 impression in another part of the molding- 105
 machine in like investment material of the
 form of the other part of such dental struc-
 ture and after the material has hardened
 separating the parts of the molding-machine,
 then forming up the investment material for 110
 casting, then fusing material in one of the
 parts of the molding-machine to form the
 other part of the dental structure, then
 bringing the non-fused portion into engage-
 ment with the fused material; and then per- 115
 mitting the fused material to solidify.

3. The herein-described process of making
 metal-containing structures, which consists
 of making a mold in separable registerable
 parts and consisting of a suitable molding, 120
 investing, heat-resisting material, and cer-
 tain previously-formed parts to be included
 in the completed structure: of then separat-
 ing the parts of the mold and removing parts
 of the form not to be included in the com- 125
 pleted structure; of then fusing in one por-

tion of the mold sufficient metal to fill the
entire mold when its parts are caused to reg-
ister: of then causing the parts of the mold
to register, whereby the fused metal in the
5 mold and the heated unfused metal forming
part of the mold are united; and then allow-
ing the fused portion to solidify.

In witness that I claim the foregoing I
have hereunto subscribed my name this 22d
day of August, 1905.

JOHN A. LENTZ.

Witnesses:

G. E. HARPHAM,
EDMUND A. STRAUSE.