W. F. LAWRENZ.

DENTAL CASTING MACHINE.

APPLICATION FILED JUNE 20, 1907.

971,855.

Patented Oct. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

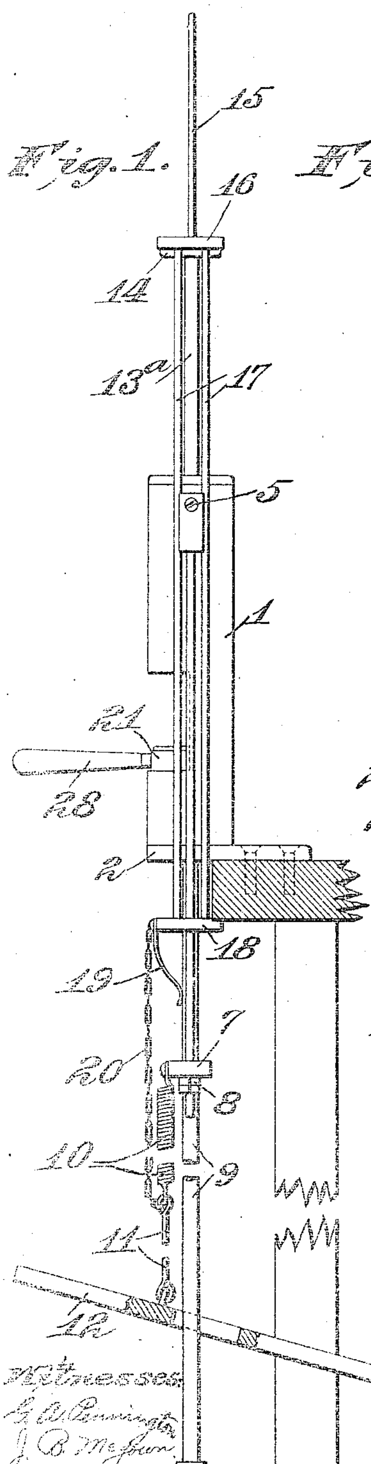


Fig. 2.

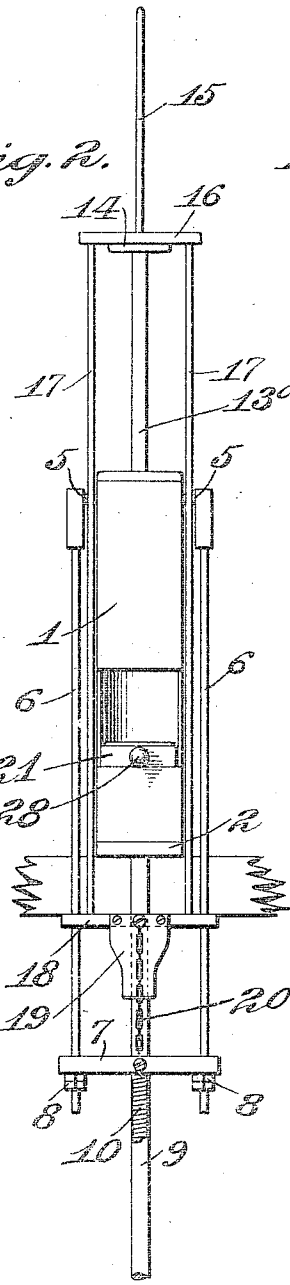
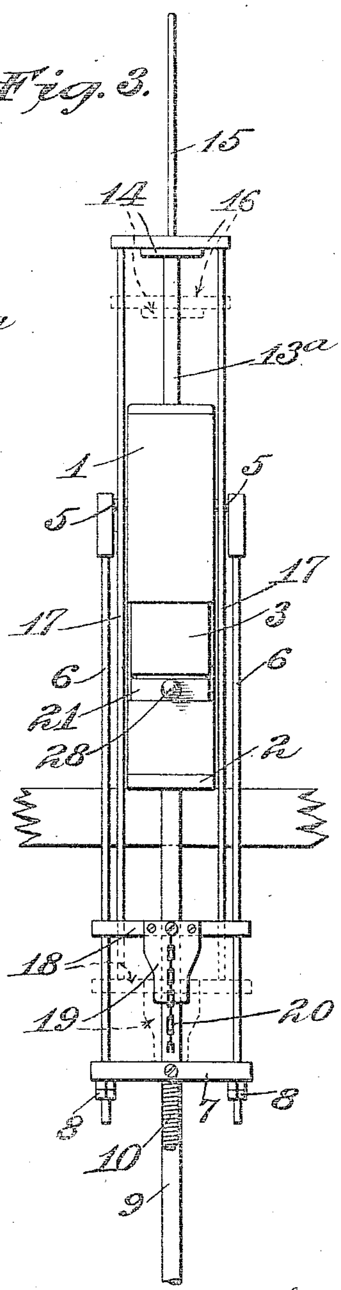


Fig. 3.



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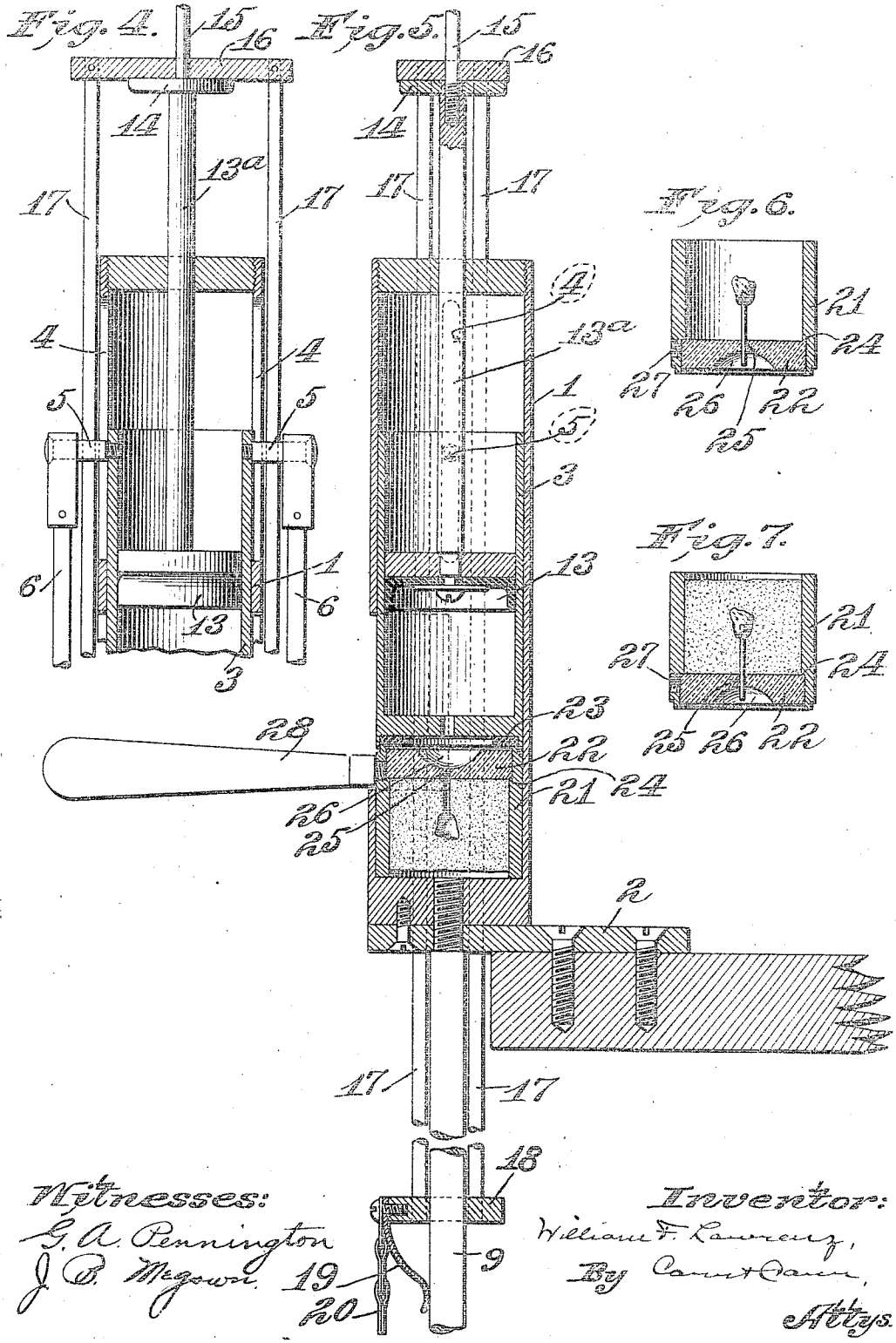

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UNITED STATES PATENT OFFICE.

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DENTAL CASTING-MACHINE.

971,855. Specification of Letters Patent. Patented Oct. 4, 1910.

Application filed June 20, 1907. Serial No. 379,855.

To all whom it may concern:

Be it known that I, WILLIAM F. LAWRENZ, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Dental Casting-Machines, of which the following is a specification.

The principal object of my invention is to facilitate the shaping of plugs for cavities in teeth.

It consists principally in arranging an air compressor adjacent to a crucible and a mold so that the metal on the crucible may be forced into the mold.

It also consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawing, which forms part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side elevation of a machine embodying my invention, with the parts in their highest positions; Fig. 2 is a front elevation thereof with the parts in their highest positions; Fig. 3 is a front elevation of the parts with the pump cylinder in its lowermost position. This view also indicates in dotted lines the lower position of the tappet frame; Fig. 4 is an enlarged vertical sectional detail view through the upper portion of the pump cylinder and adjacent parts; Fig. 5 is an enlarged vertical sectional view through the upper portion of the machine; Fig. 6 is an inverted vertical sectional view through the mold flask showing the wax pattern in position; Fig. 7 is a similar view with the investment material surrounding the wax pattern.

The frame of the machine comprises a vertically arranged cylindrical shell portion 1 provided with a bracket 2 or other suitable means of support. In the upper portion of this cylindrical shell is a pump cylinder 3 which is arranged to reciprocate vertically therein. For this purpose the cylindrical shell is provided with longitudinally arranged slots 4 through which extend pins 5, which are fixed to the pump cylinder and which are connected to downwardly extending rods 6 on the exterior of the cylindrical shell. These rods extend through a cross-plate 7 and have their ends threaded to receive nuts 8 which serve to adjust and hold the cross-piece on the rods. The cross-piece is perforated to slide on a vertical guide 9 and is connected by a helical spring 10 to a link or chain 11 which is connected to a foot lever 12. By this arrangement, the downward movement of the foot lever is transmitted through the chain, the spring, the cross piece and the rods to the pump cylinder to move said cylinder downwardly in the frame.

Inside of the pump cylinder is a piston or plunger 13 whose rod 13^a extends through the upper end of the pump cylinder and the supporting frame and is provided with a shoulder or tappet 14 thereon. The end of this piston rod is extended or provided with an extending member 15 which extends through a reciprocating cross-head 16 constituting a member of a tappet frame. This reciprocating cross-head is connected by downwardly extending side rods 17 to a second cross head 18 arranged to reciprocate over rods 6 and guide 9. Preferably, the tappet frame has two side rods on each side, and each pair of rods is arranged to straddle the guide pin 5 which extends outwardly from the pump cylinder through said cylindrical shell of the device. The lower cross head 18 of this reciprocating tappet frame is perforated to slide on the guide 9 and is provided with a spring clamp 19 or other suitable friction device arranged to bear against the guide and thereby bind and hold the tappet frame at any position to which it may be moved. The lower end of this tappet frame is connected by the link or chain 11 and a chain 20 directly to the treadle or foot lever 12 hereinbefore mentioned. As this tappet frame and the pump cylinder are both actuated by the same foot lever, a certain amount of slack is provided in the chain above its point of connection with the spring so as to insure a downward movement of the tappet frame after the downward movement of the pump cylinder is completed. During the downward movement of the pump cylinder, the pump piston travels therewith on account of their frictional engagement. The downward movement of the piston through its cylinder begins after the cylinder reaches its lowermost position and is caused by the upper cross-head of the tappet frame bearing against the shoulder on the piston rod. The slack in the chain and the extensibility of the helical spring provide for these movements.

The lower portion of the cylindrical shell

or frame of the machine is arranged to receive the mold flask 21 with the crucible end uppermost, and the side of the cylindrical shell or frame is open so as to permit access to the crucible 22. The crucible end of the mold flask is of the same size as the lower end of the pump cylinder and such ends are provided with counterpart bevels or rabbets to form a tight joint. A rubber gasket 23 may be used to insure an air tight fit.

The mold flask is a short tubular or cylindrical shell which is counterbored or otherwise provided with a shoulder 24 upon which rests a thick disk of lava or other suitable refractory material. The middle portion of the outer face of this refractory disk is cupped or concaved to serve as a crucible and a sprue hole 25 extends transversely through said disk from the bottom portion of the concavity 26 therein. Near the crucible end of the mold flask is a threaded hole 27 adapted to coöperate with a threaded handle 28, and while it is connected to the flask, its lower position brings it in contact with the table upon which the flask may be placed and thereby overcomes the tendency to tip the flask which a higher position would occasion.

The mold is prepared in the following manner. A wax model or pattern of the filling for the tooth cavity is first made in the usual way and is then impaled upon a short piece of wire or other suitable material adapted to fit into the sprue hole of the crucible. This wire is then mounted in the sprue hole with the wax pattern inside of the mold flask. The wax pattern is then carefully coated with a thin layer of a suitable investment material and the mold flask (with the crucible end down) is then filled with said investment material. A suitable investment material consists of one part of plaster of paris, one part of silex and one part of powdered soap stone, all mixed with sufficient water to give it a convenient working consistency. The mold is then dried out and subjected to heat sufficient to melt the wax pattern. On account of the porosity of the investment material the molten wax is soon entirely absorbed therein, leaving a cavity of the size and shape of the cavity in the tooth to be filled. The outwardly projecting end of the wire that constituted the support for the wax pattern is then gripped with a suitable instrument and withdrawn from the crucible, leaving the mold and crucible ready for insertion into the casting machine.

The manipulation of the machine is as follows: The parts are manually raised to their highest positions where they are normally held by friction, and the mold flask is inserted in the machine. The gold for the plug is then laid on the crucible which is readily accessible in this position of the parts. The gold is then melted with a blow pipe or other suitable means and the operator presses his foot against the foot lever. The initial portion of the movement of the foot lever is transmitted through the tension spring and the frame connected thereto to the pump cylinder, which moves downwardly and forms a tight joint with the upper edge of the mold flask. As soon as the slack in the chain of the tappet frame is taken up, the tappet frame is moved downwardly, and as soon as it strikes the shoulder of the piston rod, the piston is forced downwardly with the result that it compresses the air confined in the pump cylinder. The pressure of the compressed air acts against the molten gold and forces it downwardly through the sprue hole of the crucible into the mold or cavity formed by the absorption of the wax. On account of the pressure of the air, and the protection of the sprue hole by the lava crucible, there is great certainty of an accurate casting.

As illustrated in the accompanying drawing, the tension of the spring through which the pump cylinder is actuated may be conveniently varied by means of adjusting screws working on the threaded ends of the rods which position the plate to which the spring is connected. By suitably adjusting this plate, the actuation of the pump cylinder can be begun earlier or later in the movement of the foot lever as desired. Other adjustments are equally obvious.

While my device is particularly designed and adapted for the use of dentists and jewelers, it is obvious that it may be used for casting other articles than tooth fillings and other articles of gold, and I do not wish to be restricted to such use. So, too, it is obvious that numerous changes may be made in the various portions of the construction hereinbefore described, and I do not wish to be restricted to the exact construction thereof.

What I claim as my invention and desire to secure by Letters Patent is:

1. A casting machine comprising an integral tubular mold open at one end, a crucible constituting the other end of said mold and having a sprue hole communicating with said mold, an air compressor, and means whereby the pressure of air may be applied directly to the crucible.

2. A casting machine comprising an integral tubular mold flask open at its lower end and having a perforated crucible in its upper end, a vertically movable cylinder arranged to inclose said crucible, and means for compressing air within said cylinder after said crucible is inclosed.

3. A casting machine comprising a mold, a crucible having a sprue hole communicating with said mold, a cylinder movable rela-

tive to said crucible and arranged to seal the same, a piston in said cylinder, means for moving said cylinder and piston simultaneously toward said crucible, and then moving said piston in said cylinder to compress the air therein after said crucible is sealed.

4. A casting machine comprising a frame adapted to receive a mold, an air compressor slidingly mounted in said frame and having a member adapted to form an airtight connection with said mold, and means for moving said compressor into operative position and then actuating the air compressing member thereof.

5. A casting machine comprising a frame adapted to receive a mold, a cylinder mounted in said frame, and movable toward and from said mold, an air compressor in said cylinder, means for forming an airtight connection between said cylinder and said mold, and means for actuating said air compressor after said airtight connection is made, whereby the surface of the mold is subjected to the pressure in said cylinder.

6. A casting machine comprising a frame, a combined mold and crucible therein, an air compressor mounted on said frame and comprising means for forming an airtight connection between said air compressor and said mold outside of the crucible thereof, and means for actuating the air compressing member of said compressor after such airtight connection is made, whereby the mold is subjected to the pressure.

7. A casting machine comprising a frame having a cylindrical shell, a mold flask adapted to fit in said shell, a cylinder slidingly mounted in said shell and adapted to form an air tight joint with said mold flask, a lever having an extensible spring connection with said cylinder, a piston in said cylinder and movable therewith, and a tappet frame connected to said lever to actuate said piston after the cylinder has formed its joint with said mold flask.

Signed at St. Louis, Missouri, this 15th day of June, 1907.

WILLIAM F. LAWRENZ.

Witnesses:

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