

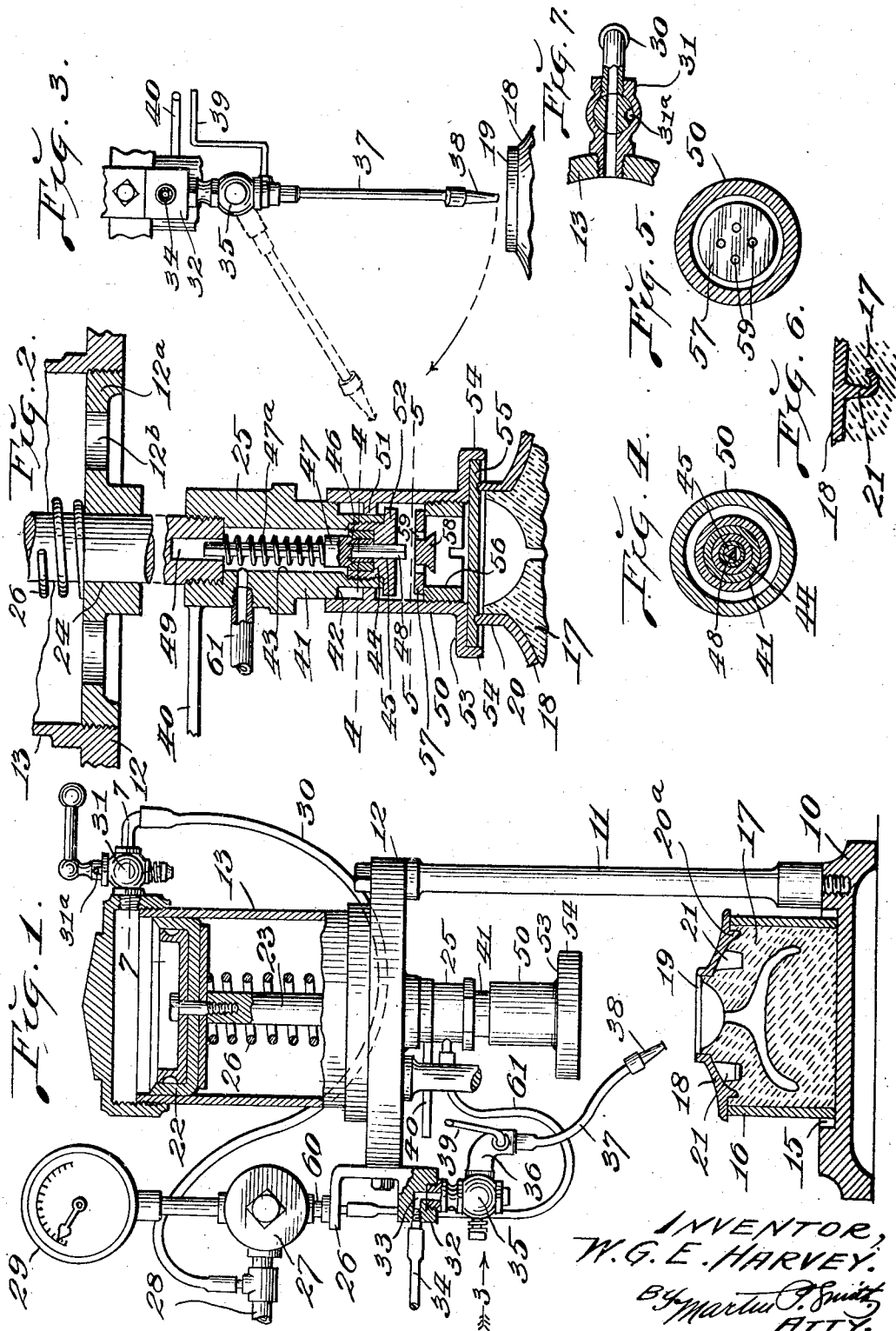
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DENTAL CASTING MACHINE

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DENTAL CASTING MACHINE

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My invention relates to a machine for casting metal and more particularly to a machine that is especially designed for use by dentists and in dental laboratories for casting inlays, plates, bridges, saddles and the like and the structure herein disclosed is an improvement on the casting machine disclosed in U. S. Letters Patent No. 1,320,228, issued to me August 28, 1919, also a somewhat similar dental casting machine that is set forth in my co-pending application for U. S. Letters Patent filed January 15, 1930, Serial No. 420,878.

The principal objects of my present invention are, to generally improve upon and simplify the construction of the dental casting machine disclosed in my aforesaid patent and patent application as well as other similar types of casting machines, further, to provide a dental casting machine that is very compact and which may be conveniently employed for the rapid and economical production of small castings and particularly castings of precious metal that are utilized in dental practice and further, to provide a machine of the character referred to having a blow-pipe arranged so as to direct a jet of burning gas directly against the metal that is to be melted and forced into the mold cavity and which blow-pipe is mounted for swinging movement so that it may be automatically swung out of the path of travel of the valve assembly that moves downwardly into position on top of the casting ring.

Further objects of my invention are, to provide a dental casting machine wherein fluid pressure is utilized for moving the air control valve downwardly unto the casting ring and to utilize the engagement between the lower portion of the air control valve and the casting ring for releasing fluid pressure that is effective in forcing the molten metal into the mold cavity and further, to provide the casting ring with a separately formed top plate that is provided with a relatively small opening through which air is delivered into the mold cavity in the investment material contained within the casting ring and which separately formed top plate is provided with depending hooks or flanges

that are imbedded or anchored in the upper portion of the body of investment material, thereby greatly facilitating and rendering more effective, the casting operation and producing increased density in the finished castings.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical section taken through the center of a dental casting machine constructed in accordance with my invention, parts thereof being in full side elevation.

Fig. 2 is an enlarged vertical section taken through the center of the compressed air control valve and showing the lower end of said valve in contact with the top plate of the casting ring.

Fig. 3 is an enlarged elevational view of the torch or blow-pipe and which view is taken looking in the direction indicated by the arrow 3 in Fig. 1.

Fig. 4 is a cross section taken on the line 4—4 of Fig. 2.

Fig. 5 is a cross section taken on the line 5—5 of Fig. 2.

Fig. 6 is a detail sectional view of a portion of the cover plate for the casting ring and showing one of the hook-shaped plugs that depend from the underside of said plate.

Fig. 7 is an enlarged horizontal section taken on the line 7—7 of Fig. 1.

Referring by numerals to the accompanying drawing which illustrates a practical embodiment of my invention, 10 designates a base plate, 11 posts that project upwardly therefrom, 12 a ring that is supported by said posts and 13, a cylinder that is mounted on said ring.

A plate 12^a is screw seated in ring 12 and forms a bottom for cylinder 13 and formed through said plate 12^a are openings 12^b.

The upper face of base plate 10 is recessed as designated by 15 for the reception of a casting ring 16 that receives the investment material 17 and positioned on top of ring 16 is a separately formed metal plate 18 pro-

vided with a centrally arranged opening 19 that is surrounded by a short upwardly projecting flange 20.

Formed on the underside of the top plate 18, adjacent to its edge, is a depending circular flange 20^a the diameter of which is slightly less than the internal diameter of the casting ring 16 and which arrangement permits the separately formed top plate 18 to automatically adjust itself when positioned on the casting ring and the investment material positioned therein.

Depending from the underside of top plate 18 is a plurality of short hooks 21 which when the plate is positioned on top of the ring, imbed themselves in the upper portion of the body of the investment material, thereby anchoring the top plate to the casting ring when the investment material hardens.

Arranged for reciprocatory movement within cylinder 15 is a piston 22 that is carried by the upper end of a piston rod 23, the latter operating through a bearing 24 in plate 12^a and suitably secured on the lower end of said piston rod is a head 25.

Interposed between piston 22 and the bottom of cylinder 13 is an expansive coil spring 26 that normally holds the piston 22 at the upper end of its limit of movement.

Secured on the side of plate 12^a is a bracket 26 upon which is mounted a pressure regulating valve 27 and leading thereto is a flat pressure supply pipe 28. Connected to the pressure regulating valve 27 is a pressure gauge 29 which is used to indicate the pressure of the air or other fluid that is controlled by valve 26.

Leading from the fluid pressure line 28 that leads to the regulating valve 27 is a flexible tube 30, the same being connected to a manually operable valve 31 that is connected to the cap 30 that closes the upper end of cylinder 13.

Carried by the lower end of bracket 26 is a block 32, through which is formed a duct 33 and connected to one end of said duct is a tube 34 that leads from a suitable source of combustible gas supply.

Secured to the underside of block 32 and communicating with the duct 33 therethrough is a valve 35 and projecting from one side thereof is a tubular arm 36, to which is connected the upper end of a torch or blow-pipe 37 and which is bent so that its lower end occupies a position just above the center of the top plate of the casting ring.

The lower end of this torch or blow-pipe carries a jet nozzle 38.

Secured to tubular arm 36 and projecting outwardly and upwardly therefrom is an arm 39 and the upper portion thereof is adapted to be engaged by the outer portion of an arm 40 that projects outwardly from head 25.

As a result of the construction just de-

scribed the blow-pipe or torch 37 is swung laterally when the head 25 carrying the arm 40 moves downwardly so as to position the compressed air control valve on top of the casting ring as will be hereinafter more fully described.

Depending from head 25 is a cylinder lug 41 and the lower portion of this lug is reduced in diameter, thereby forming a shoulder 42 and formed axially through head 25 and lug 41 is a duct 43, the lower portion of which is internally threaded.

Screw seated in the threaded lower end of the duct 43 is a plug 44, through which is formed an axial opening 45 and formed on top of this plug around the opening there-through is a valve seat 46.

Adapted to rest on seat 46 and to normally close the opening 45 through plug 44 is a valve 47 that is carried by a non-circular stem 48 that passes through opening 45 and the lower end of said stem projects a short distance below the lower end of plug 44.

Stem 48 projects upwardly from valve 47 through opening 43 and the upper end of said stem projects into a recess 49 that is formed in the lower end of piston 23. Positioned on the upper portion of stem 48 and interposed between valve 47 and the lower end of stem 23 is an expansion spring 47^a.

Arranged for sliding movement on the lower portion of lug 41 is the upper portion of a sleeve 50 and projecting inwardly from the upward portion of said sleeve is a flange 51. This flange is positioned above a flange 52 that projects outwardly from the lower end of plug 44 and this arrangement of flanges prevents the sleeve 50 from dropping off the lug 41.

Flange 51 is positioned between shoulder 42 and the flange 52.

Formed on the lower end of sleeve 50 is a ring plate 53 from the edge of which depends a flange 54 and arranged on the underside of said plate within said flange is a disc 55 of asbestos or analogous fibrous material that is adapted to rest on top of flange 20 during casting operations.

Screw seated in the lower end of sleeve 50 is a ring 56 on top of which is loosely arranged a disc 57 and formed on the underside of the center of said disc is a lug 58, having an inclined upper edge. Formed through disc 57 immediately above the inclined upper edge of lug 58 is a series of apertures 59.

Connected to the lower portion of the pressure regulating valve 27 and extending downwardly through the upper portion of bracket 26 is a tube 60 and leading therefrom to the opening 43 through head 25 is a duct 61, a portion of which is flexible.

Under normal conditions spring 23 holds piston 22 and piston rod 23 at the upper ends of their travel and the air control valve

carried by the lower end of the piston rod is likewise retained at the upper end of its travel, as illustrated in Fig. 1.

After the casting ring has been properly prepared it is positioned on base plate 10 and after a pellet of the metal that is to be cast is positioned on the investment material immediately above the sprue, the operator swings blow-pipe 37 inwardly and downwardly so as to position the jet nozzle 38 directly above the metal pellet as illustrated in Fig. 1.

While the blow-pipe is shifted into its out-of-the-way position valve 35 is closed so that the movement of swinging said blow-pipe downwardly into position for use opens valve 35 and the gaseous mixture from supply pipe 34 is thus permitted to flow through the open valve and the blow pipe. As the gas from the jet nozzle 38 is ignited and burns it will melt the metal positioned on the investment material and when the metal has thus been melted the operator manually opens valve 31, thereby admitting fluid pressure from supply line 28 through flexible tube 30 to the interior of cylinder 13 above piston 22 and the pressure of the admitted fluid forces piston 22 and parts carried thereby downwardly.

As head 25, carried by valve stem 23, moves downward, arm 40 that projects from said head, engages the upper end of crank arm 39 and as the downward movement continues the blow-pipe 37 will be automatically swung laterally out of the path of travel of the lower portions of the air control valve carried by the lower portion of head 25 and as the tubular arm 36 that carries the blow-pipe is thus swung laterally the valve that controls the blow of gas through the blow-pipe will be cut off.

As the head 25 and parts carried thereby move downward the asbestos disc 55 will engage the flange 20 on the top plate of the casting ring, thereby preventing said disc and sleeve 50 from moving any further in a downward direction and head 25 will continue to move downward and in so doing it will slide downwardly through the upper portion of sleeve 50.

As the lower end of stem 48 engages the upper face of disc 57 which is at rest, said stem will be stopped against further downward movement and as head 25 continues to move downward valve 47 carried by said stem will leave its seat 46, thus permitting air to pass from regulating valve 60 through duct 61 into axial opening 43 and thus air passes downwardly through opening 45 in plug 44 and which air passes through openings 59 and thence through ring 56 and through the central portion of fibrous disc 55 and such air pressure is effective in forcing the molten metal into the matrix or mold cavity within the investment material 17.

After the casting operation, as just described, has been effected, the operator closes valve 31 and the power stored in coil spring 26 will elevate piston 22 and piston rod 23, thereby elevating head 25 and the air control valve carried thereby. The air previously admitted through valve 31 into cylinder 13 to force the piston 22 downwardly will, when said valve is closed, escape through a port 31^a that is formed in the side of the valve plug and which communicates at its upper end with the atmosphere (see Fig. 7). After the air control valve has been elevated a short distance or a distance sufficient to move fibrous disc 55 away from flange 20 spring 47^a will act to reseat valve 47, thereby cutting off the further flow of air through plug 44 and by gravity sleeve 50 and parts carried thereby will move downward until flange 51 rests on flange 52.

The construction and operation of the air control valve forming a part of my present invention is practically the same as the air control valve disclosed in my aforesaid co-pending application for patent.

Plate 12^a is screw seated in ring 12 in order to form a removable closure for the lower end of cylinder 14 and by removing this plate the entire air control valve and the piston and piston rod associated therewith may be removed from cylinder 13.

The openings 12^b in plate 12^a permits air beneath the piston 22 to discharge from the cylinder as said piston moves downward as a result of air pressure admitted to the cylinder above said piston.

Among the particularly advantageous features of my present invention are the swinging blow-pipe or torch and the casting ring.

The blow-pipe is mounted so that when swung inwardly into operative position the jet nozzle on the lower end of the pipe is positioned directly above the sprue that leads to the matrix or mold cavity in the investment material and this swinging movement automatically opens valve 35 to permit combustible gases to flow through the blow-pipe.

The mounting of the arm 39 on the upper portion of the blow-pipe and the arm 40 on the reciprocating head 25 provides means for automatically swinging the blow-pipe out of the way of the descending air control valve and the lateral swinging movement of the blow-pipe automatically closes the combustible gas control valve 35.

The depending curved lugs or hooks 21 on the top plate 25 of the casting ring are imbedded in the investment material contained within the casting ring so that the top plate is firmly anchored in position during casting operations and prevents the top plate from being accidentally moved or withdrawn from the ring and investment material.

The opening 19 in the top plate 18 of the casting ring is comparatively small and thus

the air that is admitted from the air control valve to force the molten metal into the mold cavity is confined to a comparatively small space with the result that the density of the casting is greatly increased.

Thus it will be seen that I have provided a dental casting machine that is relatively simple in construction, practically automatic in operation and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved dental casting machine may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a dental casting machine, a casting ring, a cover plate therefor, which cover plate is provided with a centrally arranged opening and lugs depending from the underside of said cover plate.

2. In a dental casting machine, a casting ring, a cover plate therefor, a ring flange depending from the underside of said cover plate, the diameter of which flange is less than the internal diameter of said casting ring and lugs depending from the underside of said cover plate.

3. In a dental casting machine, a base, a ring supported above said base, a cylinder supported by said ring, a plate removably positioned within said ring and forming a lower head for the cylinder, a piston arranged for operation within the cylinder, a piston rod extending from said piston downwardly through said plate, a fluid pressure control valve carried by the lower end of said piston rod and a casting ring removably positioned on said base.

4. In a dental casting machine, a base, a ring supported above said base, a cylinder supported by said ring, a plate removably positioned within said ring and forming a lower head for the cylinder, a piston arranged for operation within the cylinder, a piston rod extending from said piston downwardly through said plate, a fluid pressure control valve carried by the lower end of said piston rod, a casting ring removably positioned on said base, means for admitting fluid pressure to said cylinder above the piston therein and means for admitting fluid pressure to said control valve.

5. In a dental casting machine, a base, a casting ring removably positioned on said base, a removable top for said casting ring, a cylinder fixedly supported above said base and casting ring, a piston arranged for operation within said cylinder, an expansive spring arranged beneath said piston and normally tending to elevate the same, a piston rod extending downwardly through the cylinder from said piston, a valve carried by the

lower end of said piston rod, a member mounted for limited vertical movement on the lower portion of the piston rod and adapted when moved downwardly to engage the top of the casting ring and move upwardly to unseat the valve carried by said piston rod, a fluid pressure connection to said valve and a fluid pressure connection to the upper portion of said cylinder.

6. A dental casting machine as set forth in claim 5 and with a valve located in said last mentioned fluid pressure connection, which valve is provided with an outlet port that is open to atmosphere when said valve is closed.

7. A dental casting machine, as set forth in claim 5, and with a valve fixedly supported above the base, a blow pipe connected to the stem of said valve and projecting downwardly and laterally therefrom and means carried by the piston rod for engaging said blow pipe during the downward movement of said piston rod and swinging said blow pipe laterally out of the path of travel of said piston rod and the parts carried thereby.

In testimony whereof I affix my signature.
WALTER G. E. HARVEY.

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