Dec. 9, 1924. 1,518,630

F. N. BROWN, JR

CASTING MACHINE

Filed Aug. 13, 1923 2 Sheets-Sheet 1

Fig. 1.

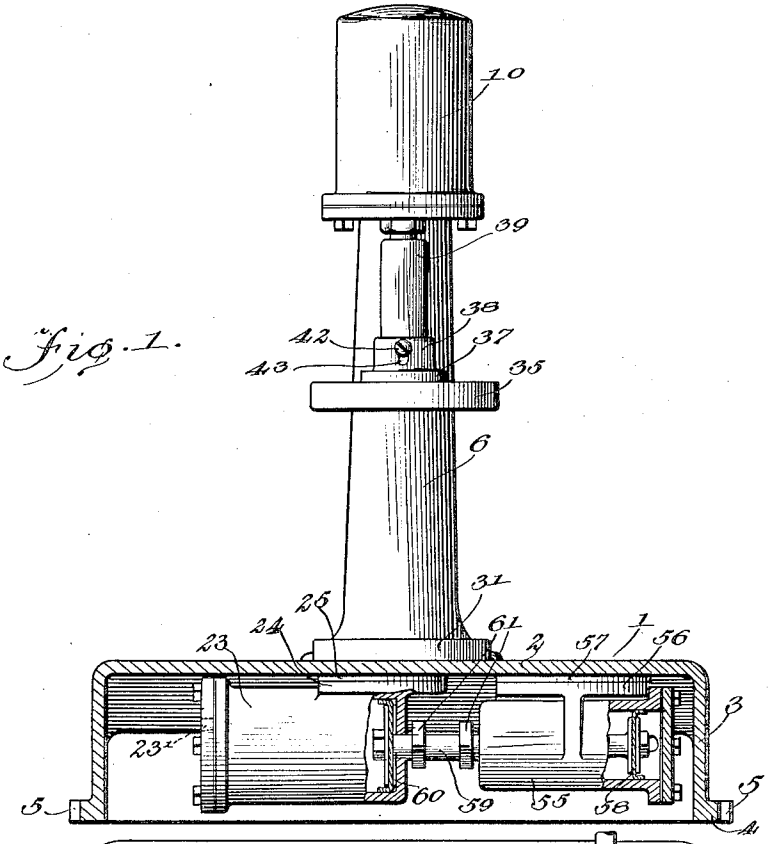
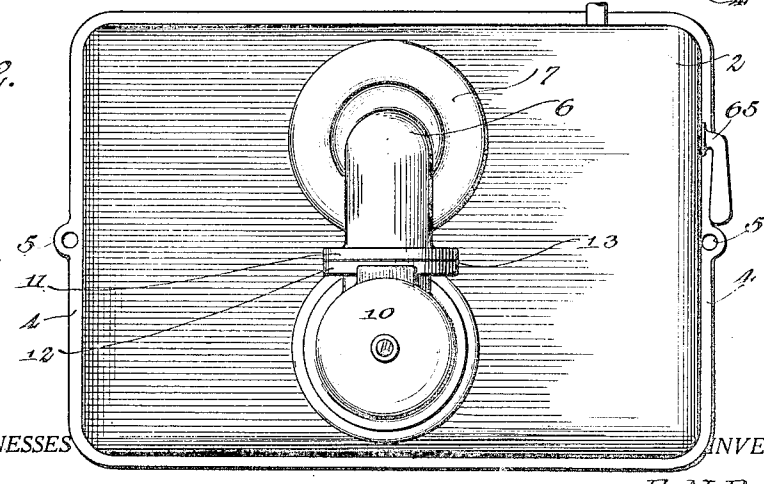


Fig. 2.



WITNESSES

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Fig. 3.

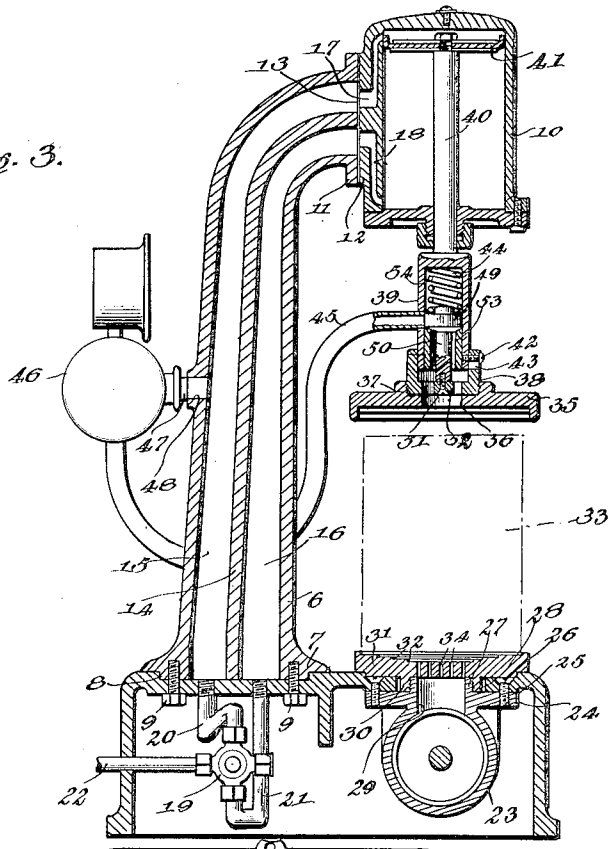
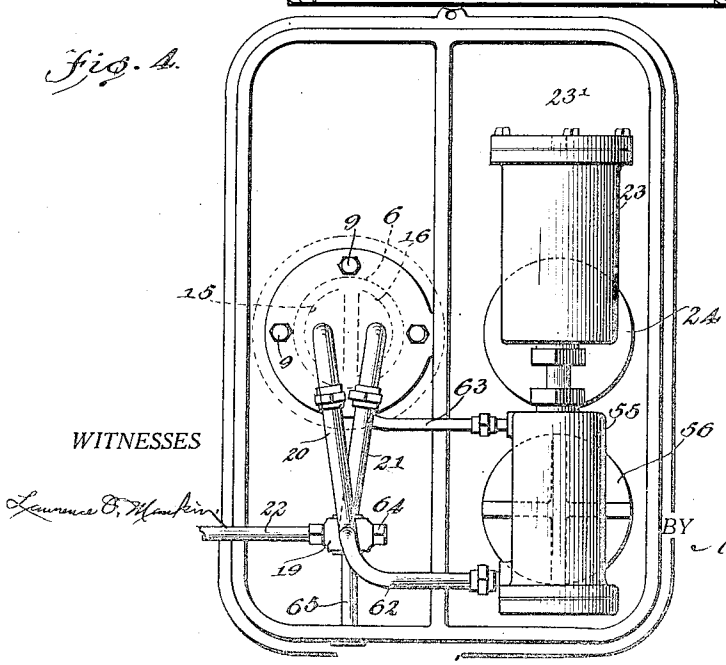


Fig. 4.



WITNESSES

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Patented Dec. 9, 1924. 1,518,630

UNITED STATES PATENT OFFICE.

FRANK NATHANIEL BROWN, JR., OF EL PASO, TEXAS.

CASTING MACHINE.

Application filed August 13, 1923. Serial No. 657,126.

To all whom it may concern:

Be it known that I, FRANK N. BROWN, Jr., a citizen of the United States, and resident of El Paso, in the county of El Paso and State of Texas, have invented certain new and useful Improvements in Casting Machines, of which the following is a specification.

My invention relates generally to improvements in casting machines, more particularly to improvements in casting machines of the kind which are adapted to be used in forming small castings, such as those adapted to be used in dental work, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of the invention is to provide a device of the character described which affords facilities for subjecting a mass of molten metal to pressure to form a metallic object of any desired shape and which also embodies means operable to draw air from the space surrounding the mass of molten metal, whereby castings compact in form and free from the imperfections which ordinarily result from the presence of air therein will be formed.

A further object of the invention is to provide a casting machine of the character described in which the means for imposing pressure upon the mass of molten metal in a mold or investment and the means for withdrawing air from the space surrounding the metal are adapted to function at the same time.

A further object of the invention is to provide a machine of the character described which is relatively simple in construction, not likely to get out of order easily, and thoroughly practical commercially.

Other objects and advantages will be apparent from the following description, considered in conjunction with the accompanying drawings, in which—

Figure 1 is a view mainly in front elevation and partly in vertical section, showing a machine embodying the invention.

Figure 2 is a top plan view of the machine.

Figure 3 is a vertical section through the machine, and

Figure 4 is a bottom plan view of the machine.

Referring now to the drawings, it will be observed that the supporting structure comprised in a practical embodiment of the invention includes a base designated generally 1. The base 1 comprises a substantially flat top 2 which is integral with a substantially vertically disposed continuous wall 3. The latter serves to support the top 2 in spaced parallel relation to a supporting surface and is provided at its lower end with an outwardly extending flange 4 having bolt receiving openings 5, whereby the base 1 may be secured upon a supporting surface.

A tubular standard 6 is upstanding from the base and preferably is fashioned with an externally enlarged lower end portion 7 interfitting a socket or recess 8 in the upper face of the top 2 and being firmly secured to the latter by means of cap bolts 9 or the like, whereby the standard 6 will be in fluid tight contact at its lower end with the top 2. The standard 6 is secured upon the base adjacent to one side thereof so that a vertically disposed cylinder 10 which is carried at the extremity of the laterally turned upper end portion of the standard 6 will overlie a portion of the top 2 of the base. As illustrated to advantage in Figure 3, the laterally turned upper end portion of the standard 6 is provided with a flange 11 which is adapted to cooperate with an "embossed" portion 12 of the side wall of the cylinder 10. The arrangement is such that the flange 11 may be secured by any suitable fastening means, none being shown, to the "embossed" portion 12 so that a fluid tight joint is provided between the cylinder 10 and the standard 6 at the upper end of the latter, a gasket 13 being interposed between the flange 11 and the "embossed" portion 12, if desired.

The standard 6 is hollow, as hereinbefore stated, and is divided interiorly by a partition 14 which extends the entire length of the standard into two passages 15 and 16 respectively. The passage 15 is in open communication at its upper end with a passage 17 extending in the side wall of the cylinder 10 and opening at one of its ends into the interior of the cylinder 10 at the upper end of the latter. The passage 16 communicates with the interior of the cylinder 10 through a passage 18 in the side wall of the cylinder 10. The passage 18 opens through the inner wall of the cylinder 10 at the lower end of the latter.

The passage 15 is in communication at its lower end with the four-way cock or distributor valve 19 through a conduit 20. The passage 16 is in communication at its lower end with the four-way cock or distributor valve 19 through a conduit 21. The four-way cock is housed within the base 1 and is provided with a supply tube 22 which extends exteriorly of the base for connection with any suitable source of pressure fluid supply.

A suction cylinder 23 is provided with a flat attaching portion or flange 24 which has threaded openings 25 therethrough adapted to be engaged by screws 26 which are threaded through the top 2 of the base so that the flange 24 will be held against the under side of an "embossed" portion of the top 2 and a vertically extending tubular extension 27 on the flange 24 will be received in an opening 28 through the "embossed" portion of the top 2 and will be positioned in axial alignment with the cylinder 10. A vertical passage 29 through the upper side of the cylinder 23 and through the flange 24 is continuous with the bore of the tubular extension 27. It is to be observed at this point that the opening 28 is diametrically larger than the outer diameter of the tubular extension 27, thus providing an annular space between the outer wall of the tubular extension 27 and the inner wall of the opening 28 for the reception of a depending tubular extension 30 to the lower wall or face of a substantially flat rest plate 31. The tubular extension 30 is shown as being in threaded engagement with the tubular extension 27, whereby the rest 31 will be attached to the cylinder 23 and held in overlying relation to the passage 29.

The rest plate 31 is shown as being circular in configuration and the depending tubular extension 30 thereto is concentric with the plate 31, whereby the latter will be disposed in axial alignment with the cylinder 10. The rest plate 31 is formed with a series of concentric recesses or seats 32 in its upper face adapted for the reception of cylindrical investment holding rings, such as that indicated diagrammatically at 33 in Figure 3, of any one of a plurality of sizes. The rest plate 31 also is provided with a plurality of apertures 34 through the central portion thereof for establishing communication between the passage 29 and the interior of a suitable investment, not shown, which may be held within the particular investment holding ring which is disposed upon the rest plate 31 at a given time.

A lid or cover 35 for any one of the investment holding rings which are adapted to be placed upon the rest 31 is provided with a central opening 36 surrounded by an internally threaded upstanding tubular boss 37. A sleeve connector 38 is in threaded engagement at its lower end with the threaded boss 37 and is adapted to slidably engage the lower end portion of an elongated valve casing 39 which is carried at the lower end of the stem 40 of a piston 41 which works within the cylinder 10. The sleeve connector 38 is supported for limited sliding movement vertically relatively to the valve casing 39 by means of a screw 42 which is threaded through a side wall of the valve casing and works in a vertical slot 43 in the sleeve coupling. The valve casing 39 is shown as being integral with the stem 40 and in axial alignment therewith and also as being fashioned to provide a chamber 44 which is open at the lower end of the valve casing and thus is in open communication with sleeve coupling 38. The valve casing is provided with a lateral opening in which is fitted one end of a conduit 45 which leads to the valve casing from a source of pressure fluid supply, such as a pressure regulating device which is shown more or less diagrammatically and indicated at 46. The pressure regulating device may be of any suitable known type of construction and is shown as being provided with an inlet in the form of a nipple 47 interfitting an opening 48 in a side wall of the standard 6 and in communication with the passage 15. Flow of pressure fluid from the conduit 45 through the lower part of the valve casing 39 to the interior of the sleeve coupling 38 is controlled by a valve 49 which is carried at the upper end of a stem 50, the stem being secured at its lower end as at 51 upon an arm 52 which is integral with the sleeve coupling 38 at the lower end of the latter and extends radially inward from the inner wall of the sleeve coupling, as shown. A bushing 53 which interfits the lower end portion of the valve casing 39 and is held against movement relatively to the latter by means of the screw 42 terminates at its upper end at the approximate level of the lowest side of the opening in which one end of the conduit 45 is received so that the valve 49 will be supported in position to close the open end of the conduit 45 when the valve rests upon the upper end of the sleeve 53. The valve 49 is adapted to seat closely against the upper end of the sleeve 53, as by being ground thereto, and is normally held against its seat at the upper end of the sleeve 53 through the action of an expansion spring 54 which is disposed between the valve 49 and the upper end of the valve chamber. The arrangement is such that when the screw 42 is in engagement with the upper end of the slot 43, the valve 49 will rest upon the upper end of the sleeve 53 and will close the adjacent end of the conduit 45.

The cylinder 23 is in axial alignment with a power cylinder 55 shown as having a flat

attaching portion 56 integral with a side wall thereof and being adapted to be secured in underlying relation to a depending enlargement 57 on the under side of the top 2 by any suitable fastening means. A piston 58 which is adapted to reciprocate within the power cylinder 55 is connected by a piston rod 59 with a piston 60 which is adapted to reciprocate within the suction cylinder 23. The piston rod 59 extends through stuffing boxes 61 at the adjacent ends of the cylinders 23 and 55. A conduit 62 extends from the conduit 20 and communicates with the interior of the cylinder 55 adjacent to the end of the latter which is remote from the cylinder 23. A conduit 63 leads from the conduit 21 and communicates with the cylinder 55 adjacent to its opposite end. The conduits 20 and 21 are connected with the four-way cock or distributor valve 19 as hereinbefore stated. The latter includes an exhaust conduit 64, and an operating handle 65 which may be manipulated exteriorly of the base 1 to establish communication between the intake conduit 22 and the conduits 20 and 21 selectively, as well as to establish communication between the conduits 20 and 21 selectively with the exhaust port 64.

When a mass of molten metal has been introduced into the investment held within a particular investment holding ring on the rest 31, the valve 19 is operated to establish communication between the supply conduit 22 and the delivery conduit 20. Pressure fluid then passes along the latter into the passage 15 and into the upper end of the cylinder 10, forcing the piston 41 downward in the cylinder 10 and thus pressing the cover 35 downward upon the upper end of the investment holding ring. When the cover 35 is positioned upon the investment holding ring, the continued movement of the piston 41 will cause movement of the valve casing 39 relatively to the coupling sleeve 38 and the valve 49 will move against action of the spring 54 from its seat thereby admitting pressure fluid from the conduit 45 through the coupling sleeve and the cover 35 into the investment holding ring at the upper end of the latter. Pressure thus is exerted on the metal in the investment and the metal is pressed into a compact mass of a desired shape. At the same time pressure fluid passes through the conduit 62 into the cylinder 55 at the end of the latter remote from the cylinder 23 and forces the piston 58 toward the cylinder 23, thereby causing a corresponding movement of the piston 60 and thereby creating a suction in the passage 29 which tends to withdraw air from the space within the lower part of the investment which may be held in the investment holding ring, thus precluding the formation of air holes or bubbles within the casting and obviating the defects which ordinarily result from the presence of air within the investment during the operation of forming the same. When the casting has been formed, the valve 19 is operated to cause the pressure fluid to pass through the conduit 21 and from the latter to the lower part of the cylinder 10, thereby causing upward movement of the piston 41 and lifting the cover 35 from the investment holding ring.

From the foregoing it will be apparent that the cover 35 serves as a discharge head for cooperating with an investment holding ring on the rest plate 31. At the same time the piston 41 is moved upward pressure fluid passes through the conduit 63 to the end of the power cylinder 55 which is proximate to the cylinder 23 and the plunger 58 is moved toward the opposite end of the cylinder 58.

The piston 60 is disposed below the lower end of the passage 29 when the piston 58 is at the end of its stroke away from the cylinder 23. When the piston 60 is in this position, the space within the cylinder 23 between the piston 60 and the end of cylinder 23 remote from the power cylinder 55 is filled with air and is in open communication with the atmosphere through an opening 23′ in the end wall of the cylinder 23. The space 29 above the piston 60 up to the rest plate 31 may be filled with a sealing substance, such as glycerine. It will be apparent that a suction in the passage 29 will result from movement of the piston 60 in response to the actuation of the piston 58 moving in the power cylinder toward the cylinder 23.

It thus will be apparent that I provide a device of simplified construction which will be effective for use in forming small castings which will be compact in form and of uniform density throughout, being free from defects which ordinarily result from the presence of air in the mold during the casting operation.

Obviously, my invention is susceptible of embodiment in forms other than that disclosed in the accompanying drawing and I therefore consider as my own all such modifications and adaptations of the form of the device herein described as fairly fall within the scope of the appended claims.

Having thus described the invention, what is claimed is:—

1. A casting machine comprising a base having a rest plate thereon adapted to support in vertical position an investment holding ring, a hollow standard on said base, said standard having two separate passages therein, a vertically disposed cylinder closed at its ends and supported by said standard in overlying spaced relation to the rest plate, one of said passages of the standard being in communication with said cylinder at the upper end of the latter and the other of said passages of the standard being in

communication with the cylinder at the lower end of the latter, a piston reciprocable in the last named cylinder and having a piston rod depending below the lower end of the cylinder, a valve casing at the lower end of the piston rod and having a lateral outlet, a cover for the investment holding ring slidably supported at the lower end of the valve casing and having an opening therethrough, a valve carried by said cover and supported within said valve casing, said valve closing said lateral outlet when the cover is at the limit of its downward movement and said cover being adapted to be moved upwardly upon engagement with the investment holding ring to open the lateral outlet, a conduit connecting the lateral outlet with the first passage of the standard, and means for supplying pressure fluid to the passages of the standard alternately.

2. A casting machine comprising a base, a hollow standard carried thereby and having two separate passages therein, a vertically disposed cylinder carried by the standard in overlying relation to a portion of the base, said cylinder being in communication at its upper end with one of said passages of the standard and in communication at its lower end with the second passage of the standard, a piston reciprocable in the cylinder and having a piston rod depending below the cylinder, a discharge head supported upon the piston rod at the lower end of the latter, a conduit establishing communication between the first passage of the standard and the discharge head, means operable to supply pressure fluid to said passages of the standard alternately, means on said base for supporting a vertically disposed investment holding ring in position to be engaged and closed at its upper end by said discharge head when said piston rod is near the end of its downward stroke and to then hold the discharge head against further downward movement during the continued downward movement of the piston rod, said means associated with said discharge head for preventing flow of pressure fluid through said discharge head when the latter and the piston rod move downwardly as a unit and for permitting flow of pressure fluid through the discharge head into said investment holding ring when said piston rod moves downwardly after the discharge head engages with the investment holding ring.

3. In a casting machine, a horizontal rest plate adapted to support an investment holding ring, a vertically movable valve casing open at its lower end and supported above said rest plate, said valve casing having a lateral port adapted for connection with a source of pressure fluid supply, a cover for the investment holding ring, said cover being slidably supported on the valve casing at the lower end of the latter and having an opening for establishing communication between the valve casing and the investment ring, and a valve within said valve casing normally closing said lateral port and being operable on relative movement between the valve casing and the cover to open said lateral port.

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