Dec. 23, 1941. W. T. ANDERSON 2,267,010

CENTRIFUGAL CASTING MACHINE

Filed Dec. 30, 1940 2 Sheets-Sheet 1

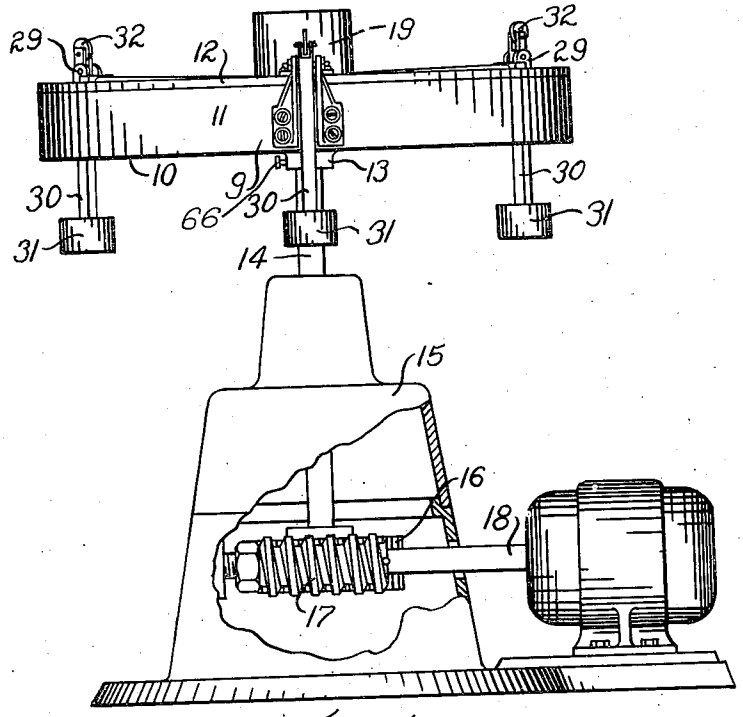

Fig. 1

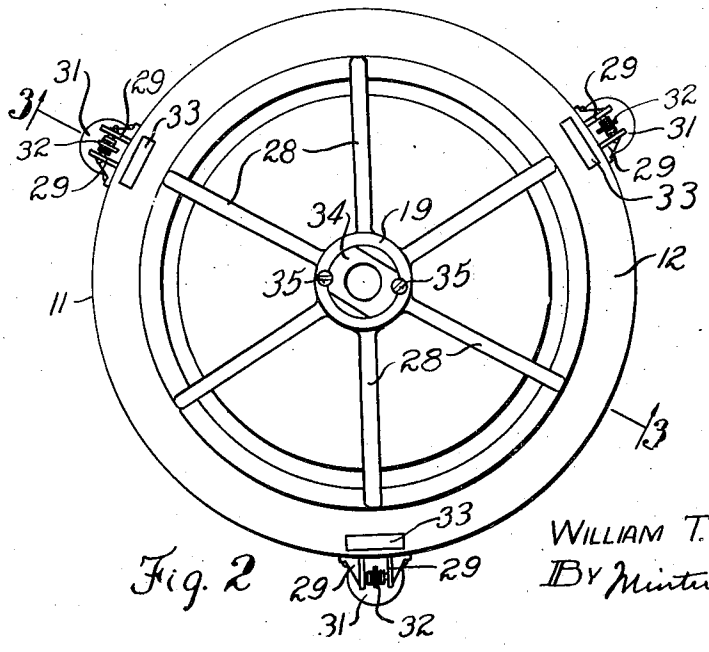

Fig. 2

INVENTOR,
WILLIAM T. ANDERSON,
BY Minturn & Minturn
ATTORNEYS.

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Fig. 6

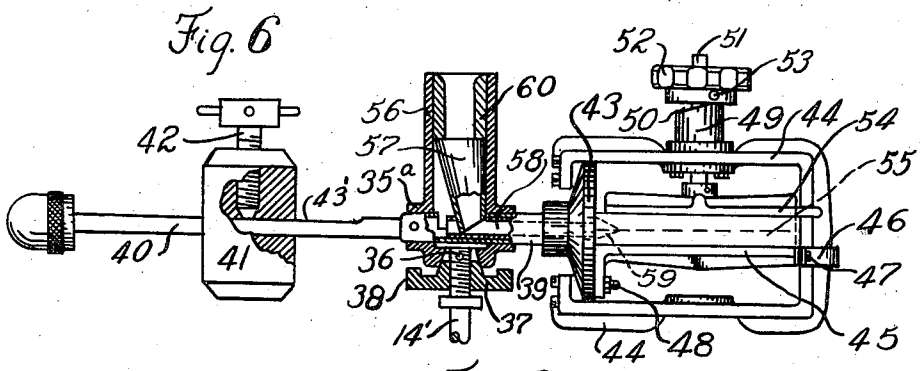

Fig. 8

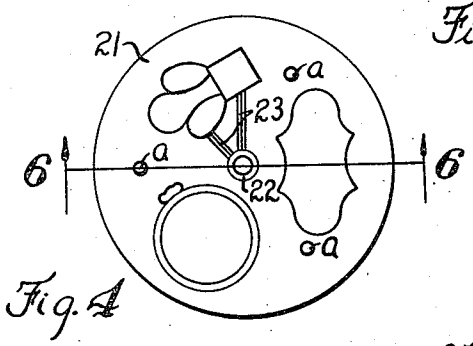

Fig. 4

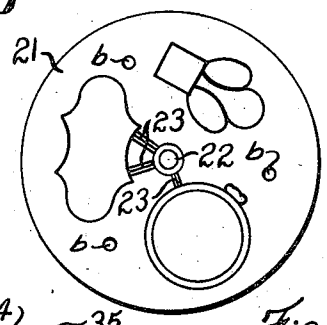

Fig. 5

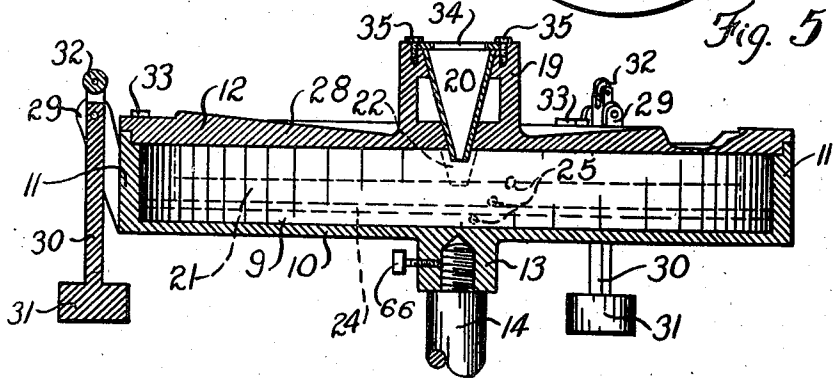

Fig. 3

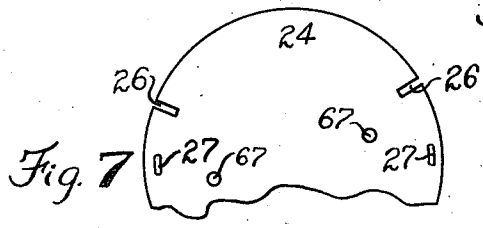

Fig. 7

INVENTOR,
WILLIAM T. ANDERSON,
BY Minturn & Minturn
ATTORNEYS.

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CENTRIFUGAL CASTING MACHINE

William T. Anderson, Indianapolis, Ind.

Application December 30, 1940, Serial No. 372,256

9 Claims. (Cl. 22—65.1)

This invention relates to machines for casting intricate forms in rubber or plaster molds, as required by manufacturing jewelers, dentists, and others.

The object of the invention is to force molten metal by centrifugal action into suitable molds rotating around a receiving funnel located at the center of rotation.

A further object is to provide a casting head for receiving the molds and means for clamping the molds of different thickness in a fixed position in the head during the molding operation.

The object also is to provide the funnel at the center of rotation with a lining of high heat resisting quality, adapted for easy renewal and to provide means for preventing a back flow from the funnel of the melted metal during the rotation of the head.

Another object is to provide means for balancing the mold holding head relative to the center of its rotation in use.

I accomplish the above, and other objects which will hereinafter appear, by the means illustrated in the accompanying drawings, in which—

Fig. 1 is a view in side elevation of my complete machine with a casting head rotating about the center of the head. This view shows the casting head at rest and the base is broken away in part to show the drive from the motor.

Fig. 2 is a top plan view of same.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a top view on a reduced scale of the lower member of a rubber mold used in connection with my casting head.

Fig. 5 is an underside view of the upper member of said rubber mold.

Fig. 6 is a section on the line 6—6 of Fig. 4.

Fig. 7 is a fragment of a false bottom, on a reduced scale, used in the casting head of Fig. 3; and

Fig. 8 is a view in side elevation and partial section of a modified form of my casting machine.

Like characters of reference indicate like parts in the several views of the drawings.

The casting head 9 is circular in form, with a flat bottom 10 and annular sides 11. It is open on top and is preferably rabbeted along the inner top edge of the sides 11 to receive a correspondingly shaped top or lid 12.

The bottom 10 has a hub 13 with a screw-threaded bore into which the threaded end of a rotatable shaft 14 screws until contact is made with the end of the hub against a shoulder on the shaft, as shown in Fig. 3. The shaft is supported in a vertical position by a base 15. On its lower end is a worm wheel 16 which meshes with a worm 17 on an electric motor driven shaft 18, whereby the casting head 9 is rotated, at the will of the operator, in the usual and well known manner. A set screw 66 locks the head to the shaft.

The lid 12 has a middle upper side sleeve extension 19, with a downwardly tapering bore as shown in Fig. 3, in which a funnel-shaped member 20 is seated. Into this funnel the molten metal to fill the molds is poured, and to withstand the heat I have found that crucibles made out of matrix paper used in stereotyping to be durable and cheap, making renewals inexpensive when they become necessary. The funnel preferably extends an appreciable distance below the under side of the lid to insure accurate discharge of metal into the receiving cavity of a mold 21, such as that illustrated in Figs. 4, 5 and 6. These may be formed out of plaster or rubber, preferably rubber on account of its flexibility in removing the finished castings. The mold, as shown, is in two horizontally divided parts for removing the product, with a portion of the molding recess in each part, as shown. Proper registration of the parts is insured by lugs *a* in one part entering recesses *b* in the other part. Both parts have central recesses 22 to receive melted metal from the crucible, which terminates in the upper one, and gates 23 convey the melted metal to the pattern recesses, as shown.

Because of possible variations in the thickness of the molds 21, I provide a false bottom 24 in the casting head 9, which is supported on pins 25, here shown as three in number, circumferentially of the head and also in vertical series, seated in the side 11. The bottom 24 has marginal slots 26 through which the pins are passed, after which the false bottom is rotated past the slot for support on the pins. Lugs or eyes 27 may be provided for finger holds in manipulating the false bottom. The false bottom has lugs 67 to enter corresponding detents in the bottom of mold 21 to hold the mold from rotation upon or sliding edgewise of the bottom 24 and casting head 9, in other words, to keep the mold centered with the funnel 20. The lid is stiffened and strengthened by the top side radial ribs 28.

It is intended that the mold 21 be impinged between the lid 12 and the false bottom 24, and to hold the lid down against the mold I form ears 29 in pairs on the outside of the casting head wall, and to each pair I pivot a lever 30, having a

weight 31 at the end of a long arm and a roller 32 at the end of a short arm, which roller by centrifugal action is brought into bearing contact with the top of the lid 12.

As the casting head 9 and its lid 12 are preferably formed out of aluminum, I fix steel bearing plates 33 to the lid to take the contact of the rollers. To avoid a back flow of the molten metal under centrifugal or other action, I provide a metal plate 34 in a recess formed in the top of the sleeve extension 19, with a central hole sufficiently smaller than the diameter of the adjacent end of the funnel 20 to overhang the end walls of the funnel and arrest the back flow. This plate 34 is held in place by set screws 35 and the plate is flattened on two opposite sides, as shown in Fig. 2, to pass the heads of the screws, after which the plate is partially turned to lock under the heads.

In the operation of my machine, the two-part mold 21 is closed and placed in the casting head 9, with the false bottom 24 positioned so by closing lid 12 the mold will be impinged between the lid and false bottom. Molten metal is poured into the funnel 20 after the motor is started to rotate shaft 14 and head 9. The melted metal feeds into the mold by gravity and is drawn through gates 23 into the patterns by centrifugal action. The rotation of the head 9 and lid causes the weights 31 to rise and contact the rollers 32 against the lid, increasingly as the speed of rotation increases. The funnel 20 may be repeatedly supplied with metal and back flow is prevented by plate 34. As the speed of rotation is lessened, the weights 31 drop, finally releasing the lid automatically. The lid is lifted off and the mold removed, opened and the product removed.

The above described machine is for volume production, as by manufacturing jewelers, but for dentists and others requiring smaller production, the machine is modified as shown in Fig. 8. Here a metal head 35a is rockingly secured to the upper end of the rotating shaft 14' by a pivot pin 36. That end of the shaft is screw-threaded and receives thereon an upwardly tapering nut 37 which screws in and out of a correspondingly tapering socket in the head 35a. The nut has a bottom flange with a knurled rim 38 by means of which the nut is lowered to allow the head to be rocked and raised to prevent rocking. A hollow shaft 39 is seated in the head 35a passing transversely through it above the end of the rotating shaft 14'. A solid shaft 40 is secured to the hollow shaft 39 and extends outwardly on one side of head 35a. Slidable on it is an adjustable counterweight 41 having a set screw 42 by which the weight is fixed in a given position. The shaft 40 is preferably flattened at 43', where the set screw contacts it on a bevel longitudinally of the shaft deepest at its inner end, to increase the contact and friction of the screw and additionally arrest the weight against the tendency to displace it centrifugally.

On the end of hollow shaft 39, on the other side of head 35a, is a disk 43 to which a U-shaped frame 44 is bolted. This frame 44 supports and guides one end of a lower clamping plate 45 by means of a clip 46 surrounding the crossbar of the yoke and secured by bolts 47 to the plate 45. The other end of the plate 45 is adjustably secured to disk 43 by bolts 48 passing through slots in a flanged end of the clamping plate. The top leg of the frame 44 has an upward sleeve extension 49 with a cam slot 50. A shaft 51 has longitudinal and rotary movement in the bore of sleeve 49. Mounted on the outside of sleeve 49 is a hand wheel 52 having a pin 53 which passes through the cam slot 50 in sleeve 49 and is seated in shaft 51 so that shaft 51 and wheel 52 move together.

Swiveled to the lower end of shaft 51 is a clamping plate 54, guided and held from rotation by frame 44, so that by rotating hand wheel 52 the plate 54 can be speedily moved toward or from the companion clamping plate 45.

A two-part mold 55, similar to mold 21, but smaller, is clamped between the plates 45 and 54.

The head 35a has a sleeve extension 56 and the hollow shaft 39 has an opening into the sleeve 56, through which a funnel of matrix paper 57 discharges into a gate 58, that in turn discharges into a cavity 59 in the end of the mold 55.

The funnel 57 is preferably supported by contact with the wall of the sleeve 56 as shown, and back flow of molten metal from the funnel is prevented by an overhanging sleeve 60, held down by gravity against the end of the funnel.

In the operation of this modified form of my machine, the mold is locked in its operative position as shown in Fig. 8, then the nut 37 is screwed down to free the head 35a for oscillation on pivot 36; then the weight 41 is moved on shaft extension 40 into balance with the mold and its connections on the other side of head 35a, and is held there by set screw 42. The funnel is filled as before with the molten metal while the assembly is rotated, driving the metal centrifugally into the mold and pattern.

While I have herein shown and described my invention in the best form now known to me, it is obvious that structural variations may be employed without departing from the spirit of the invention and I, therefore, do not desire to be limited to that precise form beyond the limitations as may be imposed by the following claims.

I claim:

1. In a centrifugal casting machine, a mold moving around an axis, said mold having article forming depressions and gates leading to the depressions, a mold holder having members adjustable to the mold, a removable funnel at the axis having a discharge into the gates and a removable member located at the mouth of the funnel and extending thereacross in part to prevent back-flow of molten metal from the funnel.

2. In a centrifugal casting machine, a mold moving around an axis, said mold having article forming depressions and gates leading to the depressions, a mold holder having members adjustable to the mold, a replaceable funnel at the axis formed out of matrix paper and having a discharge into the gates, and a baffle at the mouth of the funnel retaining the funnel and removable for funnel renewal.

3. In a centrifugal casting machine, a mold moving around an axis, said mold having article forming depressions and gates leading to the depressions, a mold holder having members adjustable to the mold, a replaceable funnel at the axis formed out of matrix paper and having a discharge into the gates, and a removable metal funnel retaining member located at the mouth of the funnel and extending therein for less than a complete closure to also prevent back-flow of molten metal from the funnel.

4. In a centrifugal casting machine, a revoluble shaft, a casting head centered with and rotating with the shaft, a mold in the head having article forming depressions and gates leading to the de-

pressions, means for holding the mold in a fixed position in the head, and a funnel in the axis of rotation receiving molten metal and discharging the metal axially of the mold into a central depression of the mold.

5. In a centrifugal casting machine, a revoluble shaft, a casting head comprising a bottom, sides and a removable lid centered with and rotating with the shaft, centrifugally operated means for holding the lid in a closed position, a mold in the head having a central depression and article forming depressions away from the center, and gates leading from the central depressions to the article forming depressions, means for holding the mold in a fixed position with its central depression in the axis of rotation of the shaft, and a funnel in the axis of rotation extending through the lid, receiving molten metal and discharging the metal into the central depression of the mold.

6. In a centrifugal casting machine, a revoluble shaft, a casting head comprising a bottom, sides and a removable lid centered with and rotating with the shaft, centrifugally operated means for holding the lid in a closed position, a mold in the head having a central depression and article forming depressions away from the center, and gates leading from the central depressions to the article forming depressions, means for holding the mold in a fixed position with its central depression in the axis of rotation of the shaft, and a funnel in the axis of rotation extending through the lid, receiving molten metal and discharging the metal into the central depression of the mold, and a plate removably fixed at the crucible inlet extending for less than a complete closure over the crucible to prevent back-flow of molten metal from the crucible.

7. In a centrifugal casting machine, a revoluble shaft, a casting head comprising a bottom, sides and a removable lid centered with and rotating with the shaft, centrifugally operated means for holding the lid in a closed position, a mold in the head having a central depression and article forming depressions away from the center, and gates leading from the central depressions to the article forming depressions, means for holding the mold in a fixed position with its central depression in the axis of rotation of the shaft, and a funnel in the axis of rotation extending through the lid, receiving molten metal and discharging the metal into the central depression of the mold, the means for holding the mold in a fixed position comprising the centrifugally closed lid and an adjustable false bottom between which bottom and the lid the mold is clamped by the centrifugal operation of the lid.

8. In a centrifugal casting machine, a rotating casting head comprising a horizontal bottom, sides and horizontal lid, a false bottom in the head between the sides, and means for supporting the bottom at different heights above the other bottom of the head.

9. In a centrifugal casting machine, a rotating casting head comprising a bottom, sides and lid, a false bottom in the head, and means for supporting the bottom at different heights above the other bottom of the head comprising a series of pins seated in the sides of the head and extending inwardly therefrom.

WILLIAM T. ANDERSON.