June 28, 1927. 1,634,150

L. T. KNOCKE

CONTINUOUS CENTRIFUGAL CASTING MACHINE

Filed March 7, 1923 2 Sheets-Sheet 1

FIG. 1.

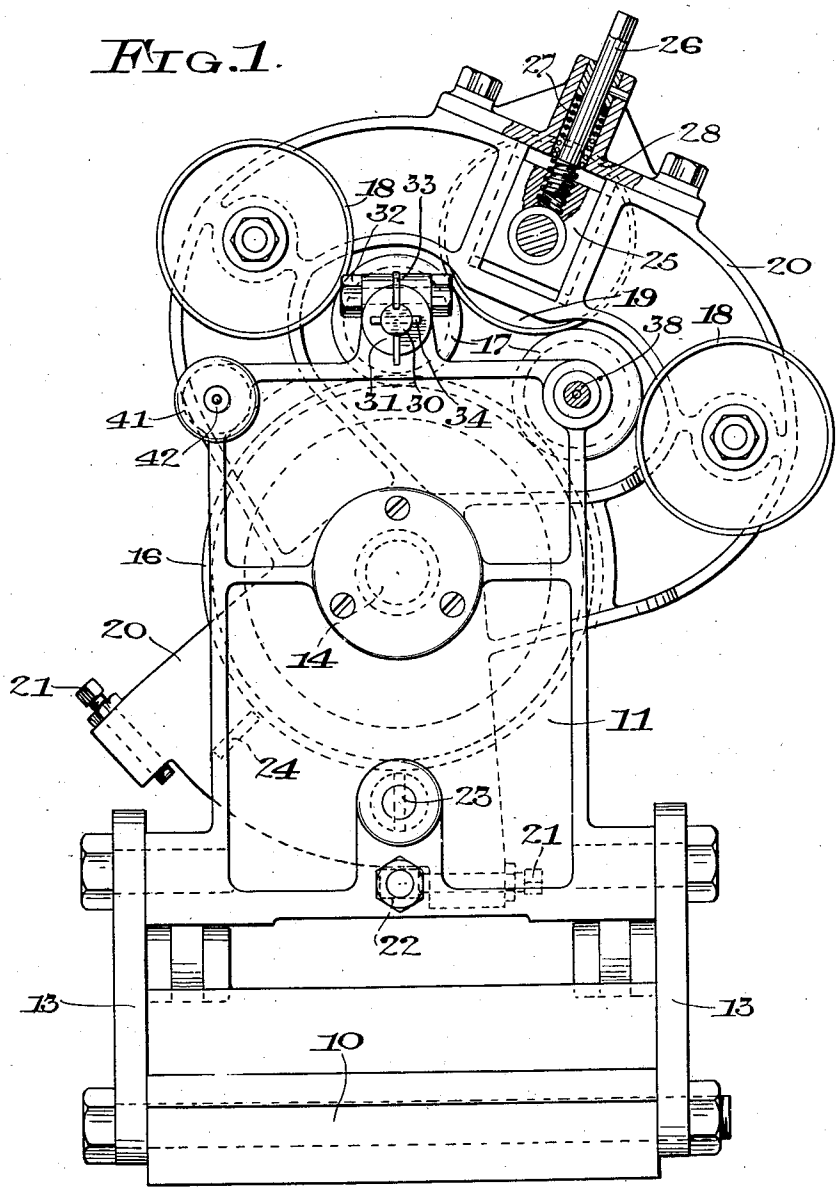
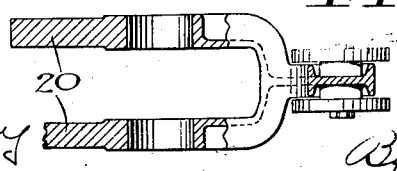


FIG. 4



WITNESSES

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Filed March 7, 1923 2 Sheets-Sheet 2

FIG. 2

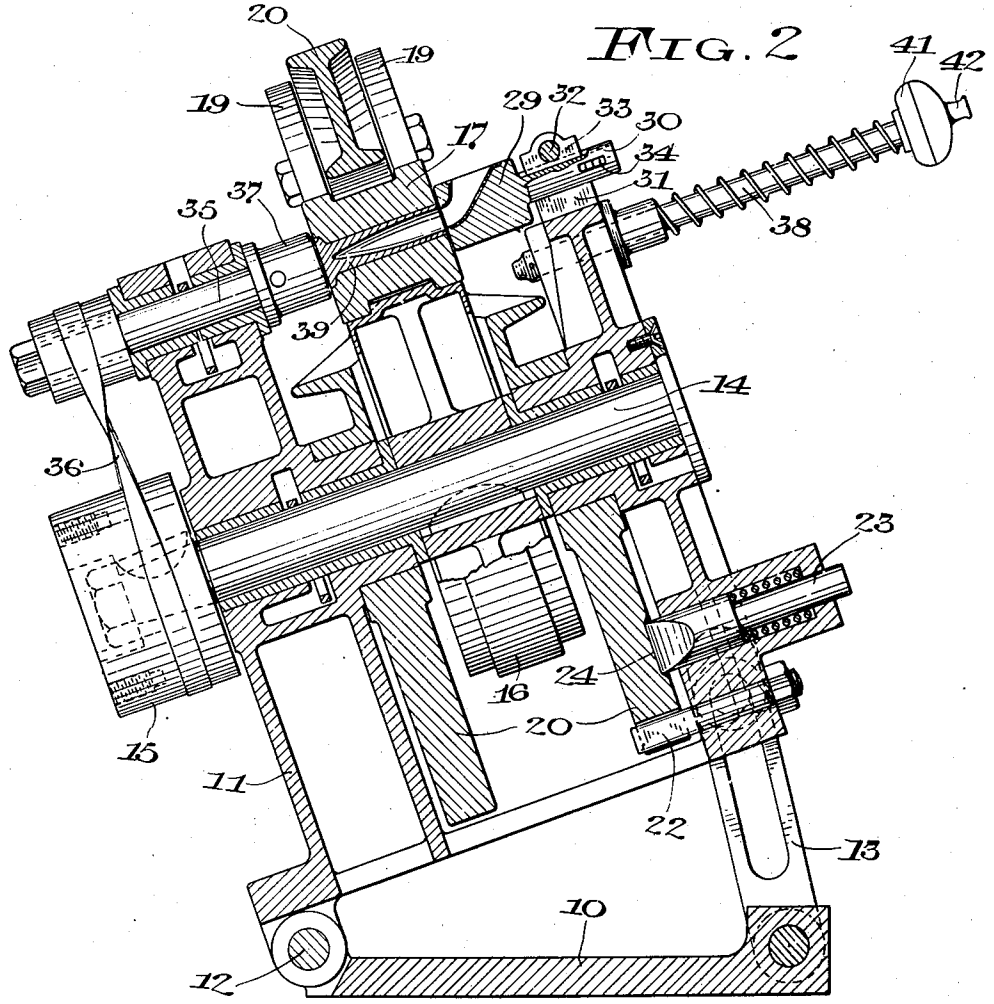
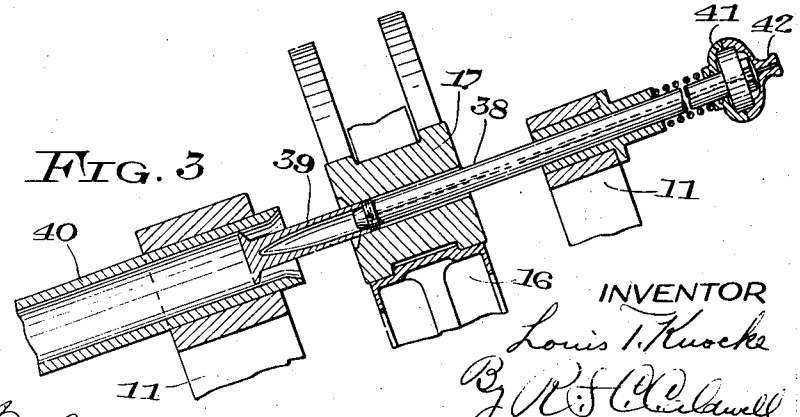


FIG. 3



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CONTINUOUS CENTRIFUGAL CASTING MACHINE.

Application filed March 7, 1923. Serial No. 623,415.

This invention has for its object to provide a casting machine for producing castings in rotary molds in a continuous operation so that the metal may be poured and the finished casting ejected without stopping the rotation of the mold.

Another object of the invention is to provide a centrifugal casting machine adapted to assume a horizontal position for cylindrical casting or an inclined position for closed end casting.

Another object of the invention is to provide a centrifugal casting machine having a plurality of centrifugal molds capable of being shifted in position with respect to filling and ejecting mechanism, whereby one mold may be poured while the casting is being ejected from another mold.

Another object of this invention is to perfect details of construction of a machine of this type.

With the above and other objects in view the invention consists in the continuous centrifugal casting machine as herein claimed, its parts and combinations of parts and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in different views,

Fig. 1 is an end view of a machine constructed in accordance with this invention;

Fig. 2 is a central longitudinal sectional view thereof;

Fig. 3 is a detail view showing the method of ejecting the castings, and

Fig. 4 is a detail sectional view of the rocking frame.

In these drawings, 10 indicates a base or support to which the main frame 11 is pivotally connected at 12 so as to be capable of a horizontal position or an inclined position, as shown, according to whether cylindrical castings, such as bushings, or end closed castings, such as tappets, are produced. Slotted links 13 connect the base 10 with the frame 11 to support and clamp it in the desired angular adjustment and these links may be of such length as to permit of the frame being swung from a horizontal position to a vertical position.

The frame 11 comprises front and rear members forming bearings for a driving shaft 14 which may be driven by a motor in any suitable manner as by means of a connection with a pulley 15 on the end of the shaft.

A drive wheel 16 is fixed on the shaft 14 between the bearings and is provided with a raised shouldered tread to fit within the grooved tread of a pair of spool shaped molds 17, which are driven therefrom.

These molds are held with pressure against the tread of the drive wheel 16 and are oscillated back and forth between a filling position and a mold discharging position by being confined between said driving wheel and pairs of rollers 18 and 19 carried by a rocking frame 20, which is mounted to oscillate on said bearings of the main frame.

The upper part of the rocking frame is, generally speaking, of a heart shape and is of I-beam cross-section, as seen in Figs. 2 and 4, with the pairs of rollers 18 and 19 mounted on opposite sides thereof and bearing on the flanged portions of the tread of the spool shaped molds 17. Just beneath the rollers 18 the rocking frame is forked, as seen in Fig. 4, to straddle the drive wheel 16, and its lower part consists of two relatively heavy sector shaped members constituting counter-weights for counterbalancing it to make it easy to shift it from one position to another, either by hand or by mechanism not shown.

The range of movement of the rocking frame is such that either of the rotary molds 17 may be brought to a central filling position and, when it is occupying that position, the other mold is in a discharge position at one corner of the frame. In order to exactly determine these positions of the rocking frame adjusting screws 21 are provided on the front counterweight thereof to engage a stationary stop 22 on frame 11 and, to firmly hold the rocking frame in its operative positions, a spring pressed bolt 23 mounted in the frame 11 is adapted to engage its knife edge more or less positively in recesses or notches 24 formed in said counter-weight, either requiring force to overcome the latch or a withdrawal of the latch before permitting the rocking frame to be swung. The cam engagement of the latch bolt 23 with its recess is, of course, of such an extent as to permit of the entire range of adjustment of the stop screws 21 and tends to crowd the stop screws against the stop.

The means for exerting pressure against the rotary molds 17 to hold them in driving frictional contact with the surface of the driving wheel 16 may consist in mounting the central rollers 19 in a spring pressed

bearing block 25, slidably mounted in ways in the rocking frame 20. Both molds 17 are thus crowded into the crotches between the driving wheel 16 and the rollers 18. The degree of pressure thus exerted may be varied by turning a screw stem 26, which is threaded in said bearing block 25 and forms a spring seat for a coiled spring 27 housed within the cover plate 28 for the block ways. By extending the screw stem 26 from the bearing block the spring 27 is subjected to greater pressure and consequently the molds are held more firmly against the driving wheel.

Mounted on the front portion of the frame 11 in register with the mold cavity of the mold when it is in its pouring position is a pouring funnel 29 provided with a stem 30 adjustably clamped within and keyed to a split bearing 31 formed on said frame portion. A clamping bolt 32 connects the sides of the split bearing for clamping the stem between them and a key 33 fitting in the slot between the sides of the bearing and in a key groove of the stem prevents the stem from turning, while a wedge pin 34, passing through an opening in the stem and bearing against the end of the bearing, serves to adjust the stem longitudinally, whereby the mold pouring member 29 may be set very close to the end of the mold 17 without interfering with the rotation of the mold and without affording sufficient space to permit the formation of fins on the casting. Similarly positioned on the back of the frame 11 is a spindle 35, rotatably mounted in bearings and driven by a cross belt 36 from pulley 15 at the same speed as the mold and provided with a head 37, also closely positioned with respect to the end of the mold to close the other end of the mold cavity. Suitable means, not shown, may be provided for accurately adjusting the position of the head 37 with respect to the end of the mold to accomplish the purpose of closing the mold cavity without interfering with the shifting movements of the mold.

At the corners of the front portion of the frame 11 are mounted spring pressed ejecting plungers 38 in register with the mold cavities of the molds 17 when they are in their discharged positions and, when they are depressed, their shouldered conical ends are adapted to enter the mold cavities and engage the castings 39 and eject them into receiving tubes 40 mounted on the corners of the rear section of frame 11. A knob 41 is loosely mounted on the headed end of the ejecting plunger 38, so that the plunger is free to turn with the mold while the knob is held in the hand, and this knob is hollow and provided with a hose nipple 42 for connection with an air hose, while the plunger is hollow or tubular to conduct the compressed air to discharge openings in its flanged conical end, thus causing the mold cavity to be cleaned by the jets of compressed air when the plunger passes through it.

In operation measured quantities of molten metal may be poured into the funnel 29, from which it will flow into the mold cavity of the rapidly rotating mold 17 and congeal upon the walls of said mold cavity with a center cavity of its own depending in shape upon the degree of inclination of the machine. When the machine is positioned with its axis horiozntal, said center cavity of the casting will be uniform from end to end thereof and resemble a bore of uniform diameter, but when the machine is inclined the molten metal will tend to flow to the lower end of the mold cavity and such bore of the casting will become tapering and, at suitable inclinations, will actually become closed as with the casting shown, which, in this instance, is a tappet for valve rods of gas engines.

As soon as one mold has been poured, the rocking frame is shifted to its other position, thus bringing the other mold in position to be poured, while the casting is carried into alignment with one of the ejecting plungers and is ejected thereby in the manner shown in Fig. 3, the mold cavity in the meantime being freed from scale or loose particles of metal by the air blast from the plunger. The second mold may be filled while the casting is being ejected from the first mold and then the rocking frame is returned to its original position and the pouring and ejecting operations are repeated, making a continuous operation, while the driving of the molds and the mold cavity closing head 37 is continued without interruption.

Machines of this character are well adapted for casting light tubular or hollow articles of semi-steel, iron, brass, babbitt and other metals, either with cylindrical or tapering outer or inner walls.

It will be appreciated that the position of the molds at all times is fixed against longitudinal displacement by their engagement with the opposite end thrust shoulders of the projection on the driving wheel and the adjustment of the funnel member 29 and the head 37 with respect thereto may thus be made sufficiently close to prevent the escape of metal between them or the formation of projecting fins on the casting.

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

1. In a centrifugal casting machine, a suitably mounted rotary mold having a mold cavity in its center, means for pouring the mold, and reciprocating plunger means for forcing the casting from the mold cavity while the mold is in motion.

2. In a centrifugal casting machine, a suitably mounted rotary mold having a central mold cavity, means for blocking the

opposite ends of the mold cavity, one of said means constituting a pouring means through which molten material is introduced to the mold cavity, and means for moving the mold laterally from between the blocking means while continuing its rotation.

3. In a centrifugal casting machine, a suitably mounted rotary mold having a central mold cavity, blocking means for blocking the opposite ends of the mold cavity, pouring means through which the mold cavity may be supplied with molten material while the mold is rotating between the blocking means, a casting ejector for forcing the casting out of the mold cavity while the mold is rotating, and means for shifting the position of the mold while it is rotating from its filling position between the blocking means to its ejecting position in register with the ejector.

4. In a centrifugal casting machine, a rotary mold capable of moving from one position to another while being driven, a pair of blocking means for closing the ends of the mold cavity in one position of the mold, one of said blocking means rotating with the mold and the other being stationary and constituting a pouring means, and an ejector in the other position of the mold for ejecting the casting therefrom while the mold continues to turn.

5. In a centrifugal casting machine, a drive wheel, a rocking frame, rollers carried by the rocking frame, molds confined between the rollers and the drive wheel and driven thereby, a pouring means with which either of the molds may register, and ejecting means in position to register with whichever mold is not in register with the pouring means and adapted to eject the casting from the mold while it is turning.

6. In a centrifugal casting machine, a driving wheel, a rocking frame, rollers mounted on the rocking frame, rotary molds confined between the rollers and the driving wheel and driven thereby, one set of said rollers being movably mounted in the rocking frame and under pressure to hold the molds against the driving wheel with pressure, and mold pouring and casting ejecting means with which said molds alternately register.

7. In a centrifugal casting machine, a drive wheel having a double shouldered tread, a rotary mold having flanges bearing on the tread of the driving wheel and engaging the shoulders thereof, means for holding the mold in engagement with the driving wheel, and means for pouring the mold cavity and for forcing the casting therefrom while the mold is thus held and driven.

8. In a centrifugal casting machine, a suitably mounted driving wheel, a rocking frame mounted concentric therewith and carrying pairs of rollers, rotary molds confined between the rollers and the driving wheel, an adjustable spring pressure means for holding one pair of rolls with pressure against the molds, pouring and ejecting means in position to register with the mold cavity in the different positions of the rocking frame, counterbalance extensions on the rocking frame, adjustable stops for limiting the position of the rocking frame, and a spring latch for holding the locking frame in its adjusted position.

9. In a centrifugal casting machine, a suitably mounted and driven rotary mold and a casting ejector comprising a spring pressed plunger, adapted to pass through the mold cavity, and means for discharging air through said plunger.

In testimony whereof, I affix my signature.

LOUIS T. KNOCKE.