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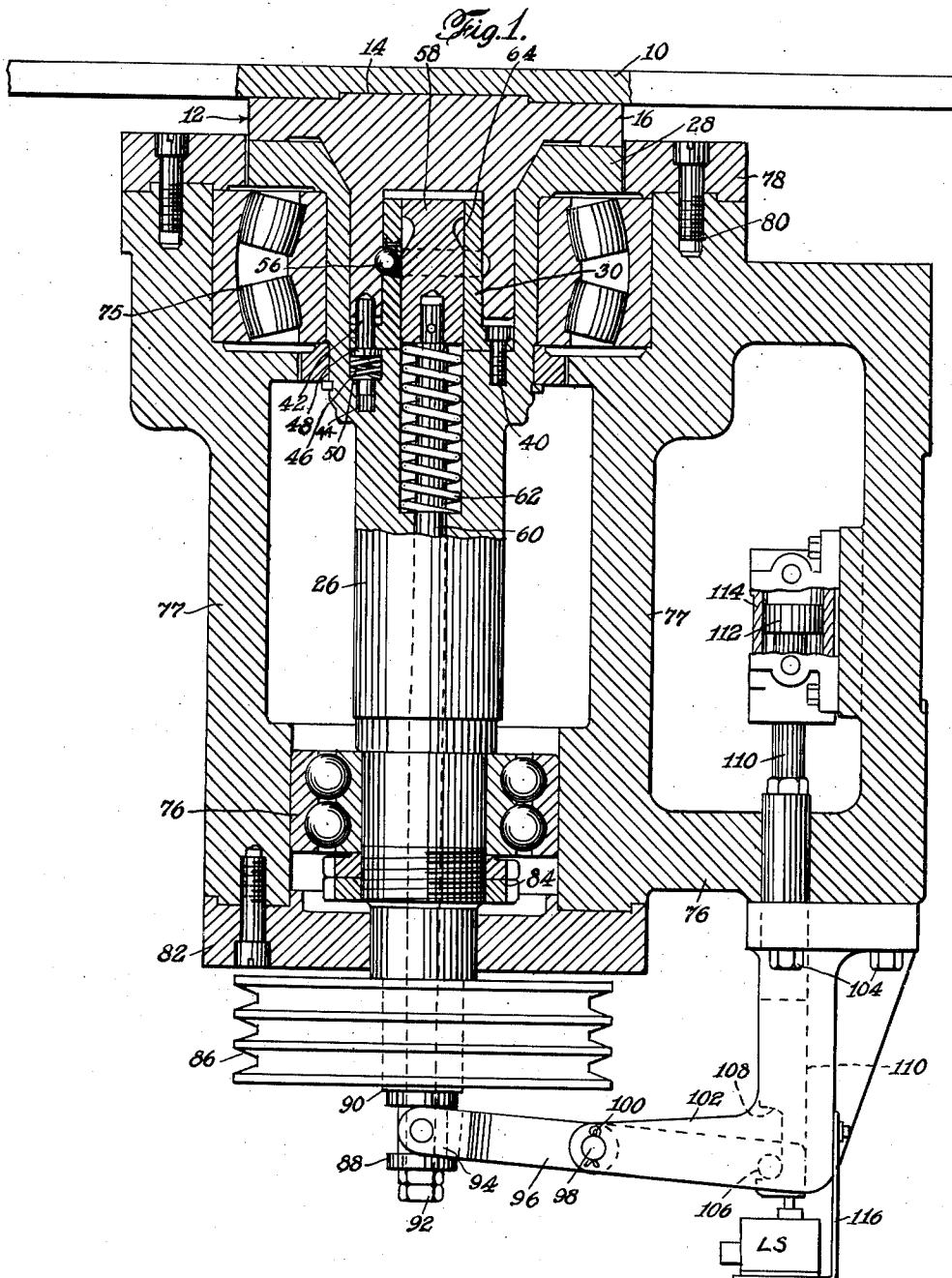
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CENTRIFUGAL CASTING MACHINE

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2 SHEETS—SHEET 1



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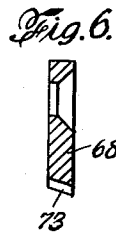
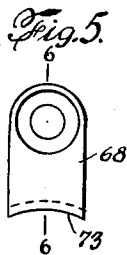
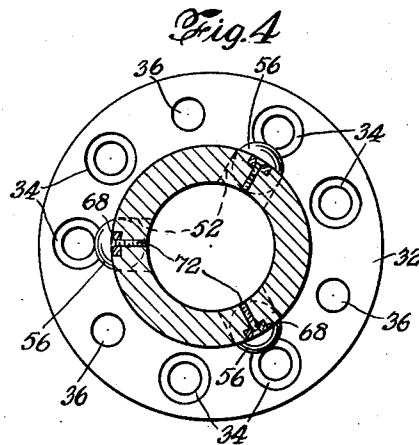
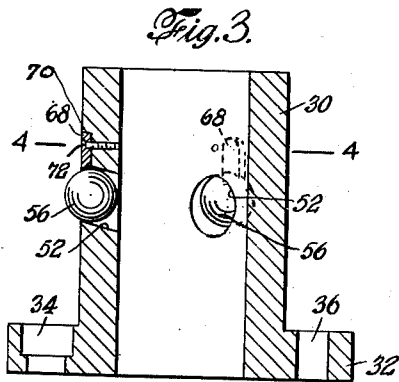
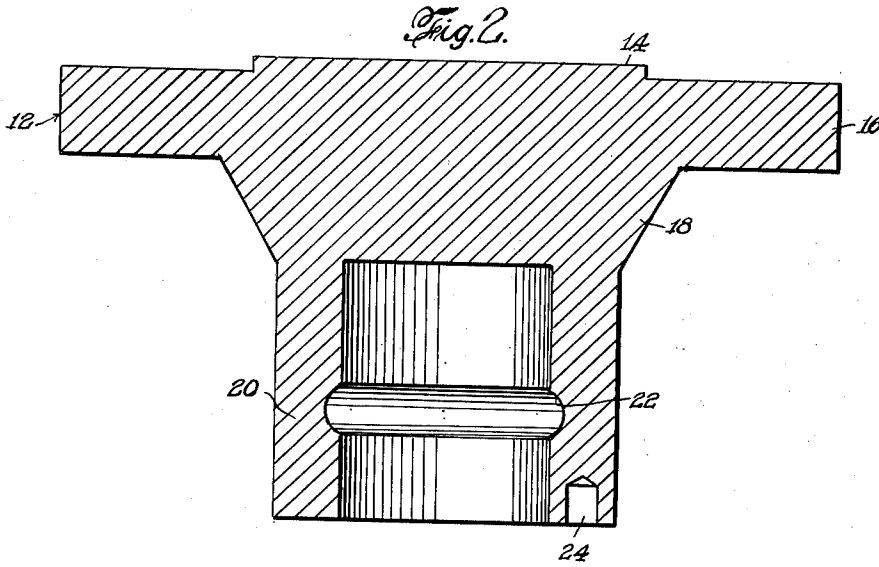
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2 SHEETS—SHEET 2



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CENTRIFUGAL CASTING MACHINE

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1 Claim. (Cl. 287—53)

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This invention relates to centrifugal casting machines. More particularly, it relates to a centrifugal casting machine wherein the flask table together with the fixtures thereon can be quickly attached and removed as a unit from the rotating spindle.

Molten metal has been centrifugally cast and the nature of the centrifugal casting machine depended in part on the size of the castings. When castings of relatively small sizes were desired, flasks containing the molds were arranged radially about a center pour fixture on a rotary table and the molten metal was ladled into the center pour chamber which was provided with openings to distribute the molten metal to the various flasks. When centrifugal castings were cast in relatively large flasks, a single flask was placed on the center of the rotating table with its longitudinal axis vertically disposed on the center of rotation and the molten metal ladled directly into the rotating flask.

In centrifugal machines of both of the above-mentioned types, the table was rigidly and permanently attached to a shaft or spindle which was driven by an electric motor through a suitable drive, such as a belt and pulley. In such arrangements, it was necessary to remove the flasks from the fixture and the table after each casting operation and to replace them with freshly prepared flasks for the next casting operation. The flasks were at very high temperatures and had to be handled with great care. Frequently, where the molten metal for some reason or other overflowed or leaked from the flasks and solidified on the table, it was necessary to chip the metal from the table in order to prepare it to receive the fresh flasks. It is thus apparent that there was considerable idle time for the casting machine between the casting operations.

An object of this invention is to provide a new and improved centrifugal casting machine.

Another object of this invention is to provide a centrifugal casting machine wherein the idle time between casting operations is reduced to a minimum.

An additional object of this invention is to provide a centrifugal casting machine wherein the table together with the flask fixtures, flasks, etc. thereon as a unit can be easily and quickly attached to and released from the spindle of the machine.

A further object of this invention is to provide a centrifugal casting machine having a quick-release mechanism whereby interchangeable flask tables together with the fixtures thereon

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can be quickly attached to and removed from the spindle of the machine.

Other and additional objects will become apparent from the following description, appended claim, and accompanying drawings wherein:

Figure 1 is a vertical section of a centrifugal molding machine embodying the principles of this invention;

Figure 2 is a section of a detail of the machine; Figure 3 is a section of another detail of the machine;

Figure 4 is a plan view of the detail shown in Figure 3;

Figure 5 is a plan view of another detail; and Figure 6 is a section taken on the line 6—6 of Figure 5.

Referring now to the drawings, wherein like reference numerals designate like parts, the reference numeral 10 designates a flask table which is permanently secured in any appropriate manner to a centering adapter 12. The table 10 may be provided with a single flask fixture if the machine is for casting relatively large castings, or with a plurality of (such as two or four) flask fixtures and a center pour fixture if the machine is to cast a plurality of articles. Since the details of construction of the flask fixtures and the center pour are known and form no part of this invention, further description thereof is considered unnecessary.

The adapter 12 is formed on the top thereof with a tongue 14 which is adapted to cooperate with a groove in the table 10. The portion of the adapter extending laterally from the tongue constitutes a flange 16. On the bottom, the adapter is formed with a downwardly tapering portion 18 which terminates in a cylindrical skirt 20. For reasons which will become apparent, the inner surface of the skirt 20 is provided with an annular groove 22, and the bottom end of the skirt is provided with a plurality of holes 24.

The adapter 12 is adapted to be disposed in a central opening at the top of a spindle 26. The spindle 26, at the top of the central opening, is provided with a flange 28, and the inner surface of the flange 28 is inclined at the same angularity as the downwardly tapering portion 18 of the adapter 12. The inner diameter of the central opening of the spindle is such as to receive the skirt 20. As shown in Figure 1, when the adapter 12 is positioned in place on the spindle 26, the flange 16 of the adapter is seated on the flange 28 of the spindle and the tapering portion 18 of the adapter is seated on the correspondingly tapered portion of the flange 28. The skirt 20,

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as shown in Figure 1, terminates in spaced relationship to the bottom of the central opening of the spindle 26.

As shown in Figure 1, when the adapter 12 is positioned on the spindle, a sleeve 30 is disposed interiorly of the depending skirt 20 of the adapter. The sleeve 30 is provided at the bottom thereof with an annular flange 32 which is disposed on the bottom of the central opening of the spindle and extends beneath and in spaced relationship to the lower end of the skirt 20. The flange 32 is provided with two sets of holes 34 and 36 respectively. Screws 40, passing through the holes 34 and into aligned holes in the spindle, secure the sleeve to the spindle.

In order to transmit torque from the spindle 26 to the adapter 12, spring-pressed plungers 42 are attached to the spindle 26 and each plunger extends through a hole 36 which is in alignment with a hole 24 in the adapter. As shown in Figure 1, each plunger extends into a hole 44 in the spindle, and a spring 46 disposed between a collar 48 and a shoulder 50 continually urges the plunger upwardly.

The sleeve 30 is provided with three circular holes 52, the center axis of each being, as shown in Figure 3, inclined to the horizontal. In other words, the wall of each hole 52 slopes downwardly in the direction toward the center axis of the sleeve. The holes 52 are located in the sleeve 30 so each will be in communication with the groove 22 in the adapter. A ball 56 is disposed in each of the holes 52 and a part of each ball is adapted to be received or seated in the groove 22 when such ball is partially displaced by a cam 58 slidably disposed in the sleeve 30. When the balls 56 are disposed by the cam 58 so that part of the balls project from their respective holes 52 into the groove 22 in the adapter, the latter is locked to the spindle. The groove 22 is preferably curved on a radius substantially the same as that of the balls.

The cam 58 is appropriately secured to one end of a connecting rod 60 which is slidably disposed in a bore axially of the spindle. A compression spring 62 continuously urges the cam 58 in the direction so that the adapter 12 is locked to the sleeve 30 as previously described.

The cam 58 is provided with an inclined groove 64 which is adapted to receive the balls when it is in aligned relationship with the holes 52. Thus, when the cam 58 has been retracted so that the groove 64 thereof is in alignment with the holes 52, due to the inclination of the latter and the force of gravity, the balls will slide from and be free of the groove 22 and be disposed in the holes 52 and the groove 64, whereby the adapter will be in unlocked position.

In order to prevent the balls 56 from entirely coming out of the holes 52 in the sleeve, there is provided a separate retaining member which cooperates with each hole. In the form shown, the retaining member 68 is secured in an under-cut 70 by a screw 72. The outer edge 73 of the retaining member is arcuate and downwardly inclined, as shown in Figures 5 and 6 of the drawings, and extends into the hole 52 so as to prevent the ball 56 from passing entirely from the sleeve.

The spindle 26 is rotatably mounted in bearings 75 and 76 in a spindle housing 77. The bearing 75 is disposed opposite the central opening of the spindle, and the bearing 76 is disposed adjacent the bottom of the housing. A cap cover 78 is secured, as by screws 80, to the top of the housing.

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Similarly, a cap cover 82 is secured to the bottom of the housing. It is to be noted that the bearing 76 is maintained in position by the nuts 84 on the spindle.

The spindle 26 extends through a hole in the cap 82 and is provided with a pulley 86 which is driven by belts from a driving motor (not shown). The connecting rod 60, which is slidably disposed in a central bore in the spindle 26, projects beyond the pulley 86 and is provided with a spool 88 which is maintained in position by a shoulder 90 and the nuts 92. A yoke 94 at one end of a lever 96 is secured to the spool 88. The lever 96 is pivotally mounted on a stud 98 and is held in position thereon by a cotter pin 100. The stud 98 is carried on a bracket 102 secured to the housing 77 by means of screws 104.

The lever 96 is provided with a pin 106 which is adapted to cooperate with a hooked member 108 carried on one end of a push rod 110, the other end of which is secured to a piston 112 slidably mounted in and actuated by a fluid, hydraulic or air, in a cylinder 114. It is obvious that when the piston 112 is actuated so that it will move upwardly in Figure 1, the connecting rod 60 will be lowered, with the result that the cam 58 will also be lowered, so that the groove 64 will be located in alignment with the holes 52 and whereby, due to the inclination of the holes, the balls will pass into such grooves and thereby release or unlock the adapter, which, together with the table and flasks, can be removed as a unit from the spindle by raising the same. When the rod 110 is moved in the opposite direction, i. e. lowered, the connecting rod and cam will be moved upwardly whereby the balls will be disposed into position to lock the adapter to the sleeve. A normally open limit switch LS is attached to the bracket 102 by a support 116. The switch LS is attached in series with the motor control relay and, when the machine is positioned for casting, the switch will be closed by the push rod. Alternatively, when the release mechanism is in disengaged position, the switch LS will be open and the motor cannot be started.

In operation, a table provided with the desired flask fixtures, flasks and center pour, if necessary, as a unit is positioned on the spindle with the connecting rod 60 in retracted position. At this stage, the balls are free of the groove 22, the plungers 42 will enter in the holes 24 of the adapter, and the limit switch LS is in open position. Then the piston 112 is actuated so that it will move downwardly whereby the limit switch LS will be closed and the cam 58 will be elevated. During elevation, due to the contour of the groove 64, each ball 56 will be forced from the groove 64 so that it projects from the hole 52 into the groove 22. At this stage, the adapter is locked in position and the motor driving the spindle started. After casting, the piston is actuated to move upwardly, whereby the limit switch is opened stopping the motor, and the connecting rod 60 depressed. As a consequence, the cam 58 is lowered and the balls roll into the cam groove and the adapter released from locking position. The adapter and table with the associated flask fixtures, casting, etc. are removed as a unit and another adapter and table with the associated elements positioned in place. The cycle of operations are then repeated.

The present invention provides a machine wherein the idle time is reduced to a minimum. During the casting operation, when one table is being used another table can be prepared for the

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next casting operation. After the casting operation has been performed with the table in the machine, such table can be removed and the previously prepared table can be positioned in place. The means for securing and releasing the adapter in position on the spindle are quick-acting, and such operations can be performed expeditiously and rapidly.

Since it is obvious that various changes and modifications can be made in the above description without departing from the nature or spirit thereof, this invention is not restricted thereto except as set forth in the appended claim.

I claim:

In combination, a rotatable table to support a work piece, a coupling member permanently secured to said table, said member having a depending cylindrical skirt provided with an annular groove in the inner periphery thereof, a rotatable hollow spindle having at its free end inner and outer concentric cylindrical flanges spaced to form an annular groove therebetween for receiving said skirt, whereby said annular flanges engage and support both the inner and the outer surfaces of said cylindrical skirt, said skirt having holes extending axially and disposed around its lower surface, coupling plungers carried by said spindle, projecting axially into said annular groove and registering with said holes, spring means advancing said plungers into said holes to transmit the torque of the rotating spindle to

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said skirt, the inner cylindrical flange of said spindle carrying a set of balls in registration with the groove in said skirt, and a rod extending axially in said hollow spindle and having a cam surface adapted to advance said balls into the groove in the skirt to lock said skirt against axial movement in said spindle, said rod being shiftable into positions to advance or retract said balls for locking or releasing said skirt.

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