

Sept. 18, 1945.

H. ANDREWS

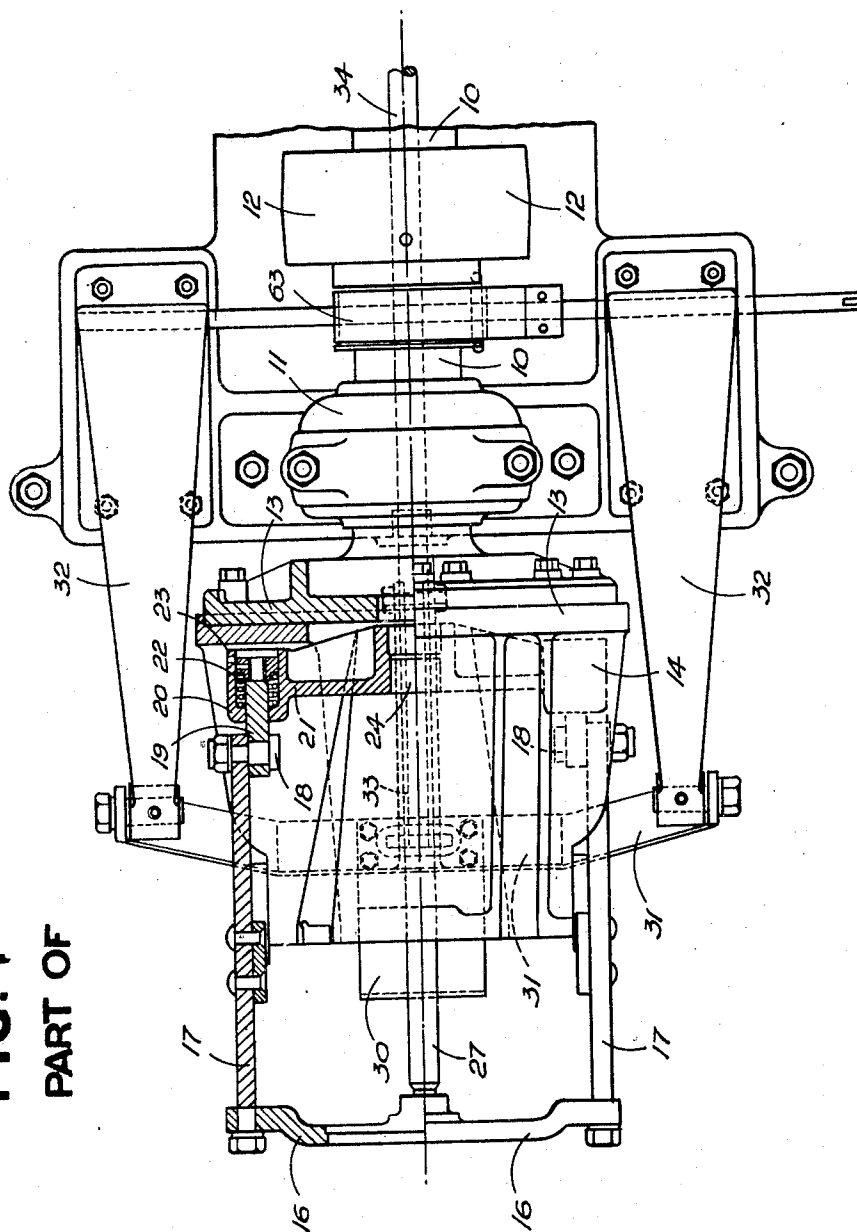
2,385,250

CENTRIFUGAL CASTING MACHINE

Filed Jan. 11, 1943

6 Sheets-Sheet 1

FIG. 1  
PART OF



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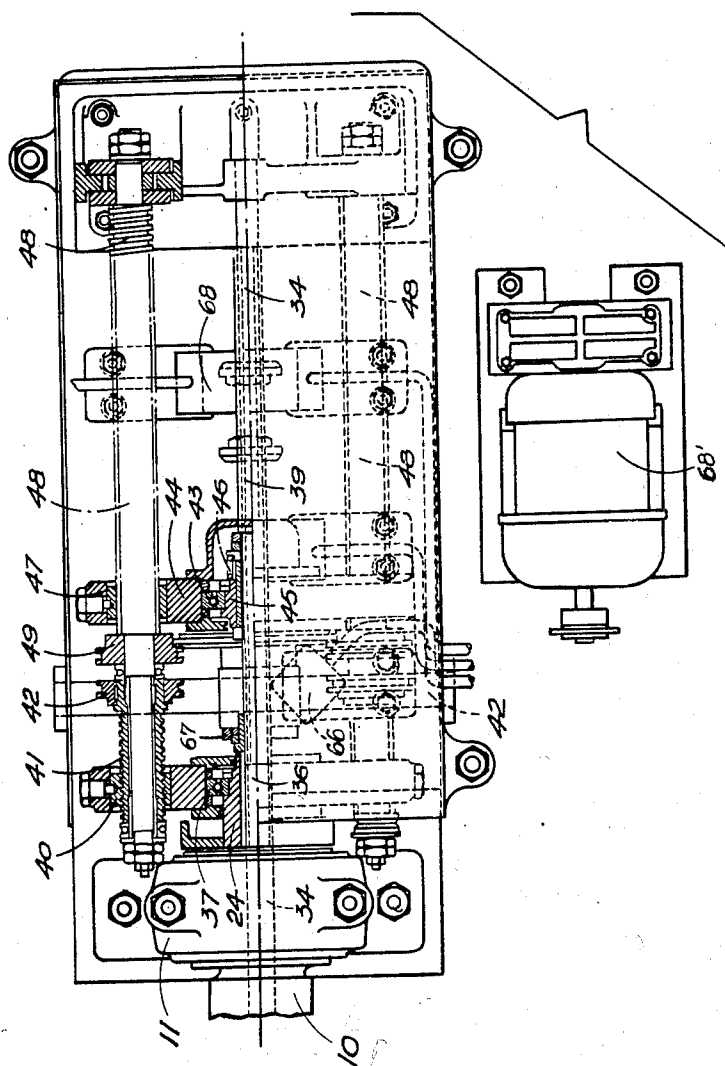
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CENTRIFUGAL CASTING MACHINE

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FIG. 1  
CONTINUED



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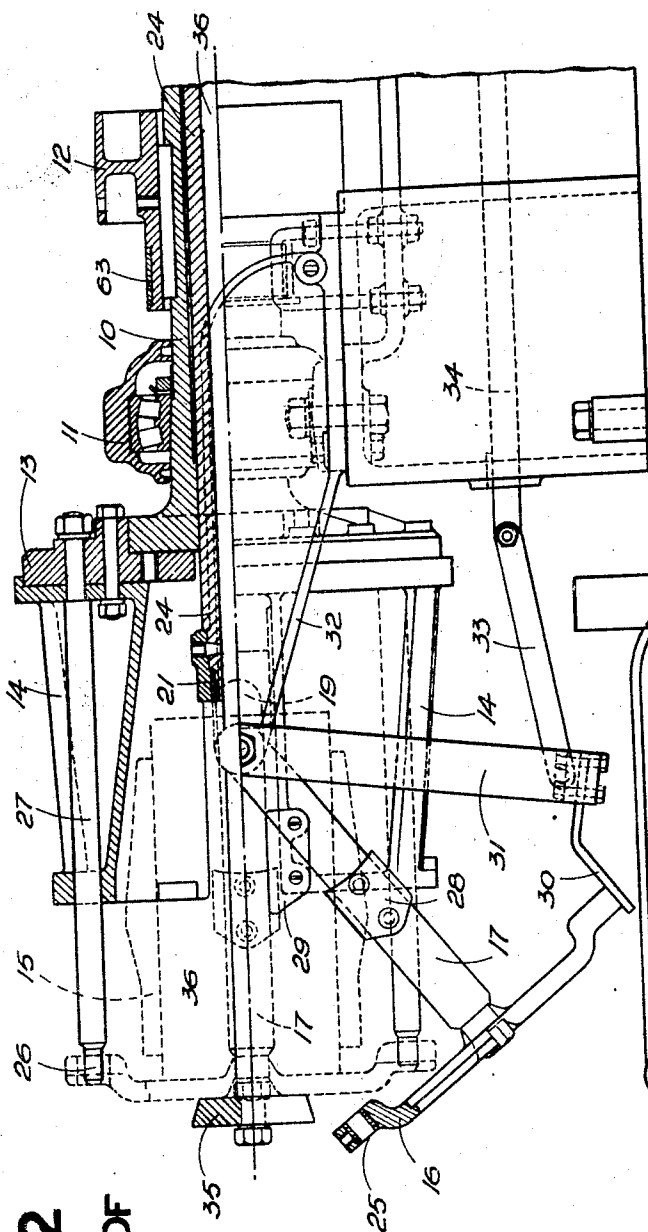
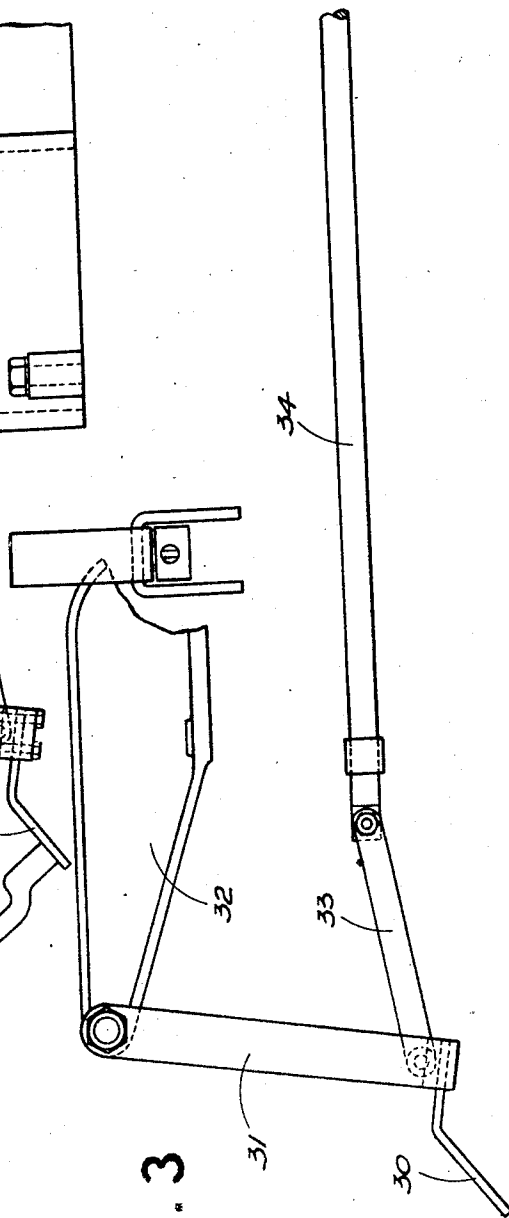


FIG. 2  
PART OF

FIG. 3



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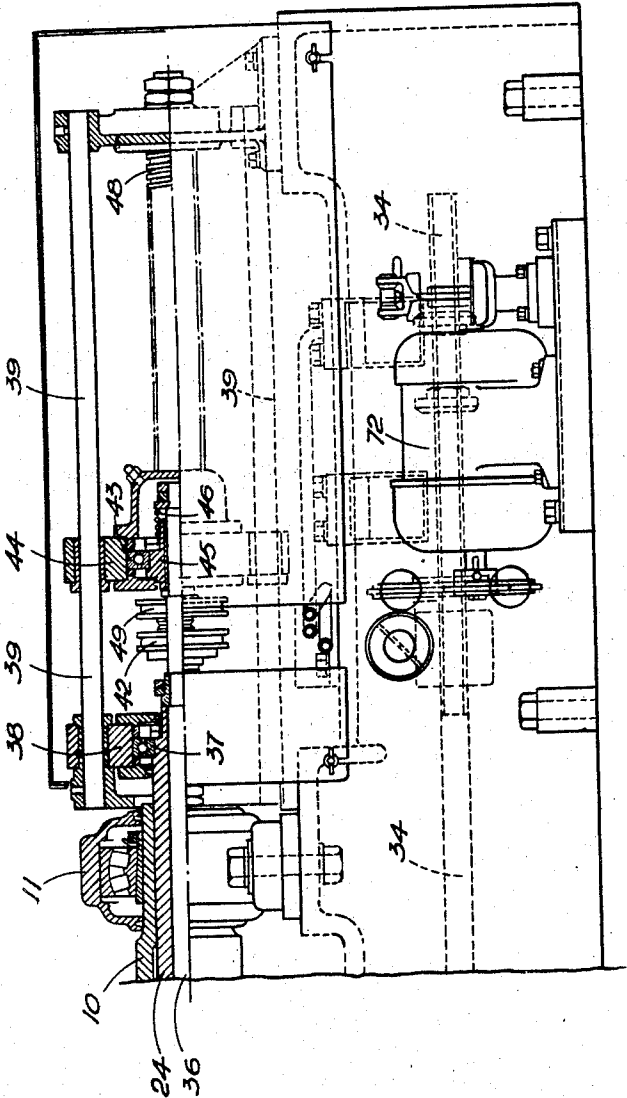
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CENTRIFUGAL CASTING MACHINE

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FIG. 2  
CONTINUED



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CENTRIFUGAL CASTING MACHINE.

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FIG. 5

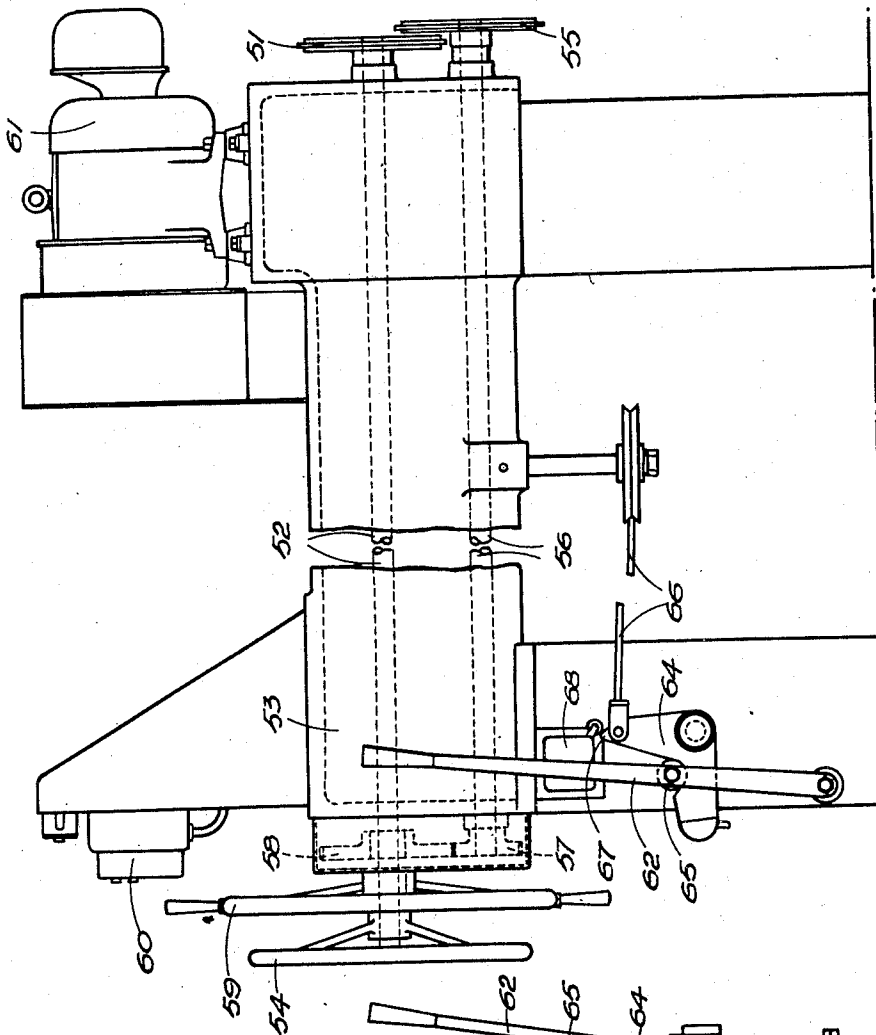
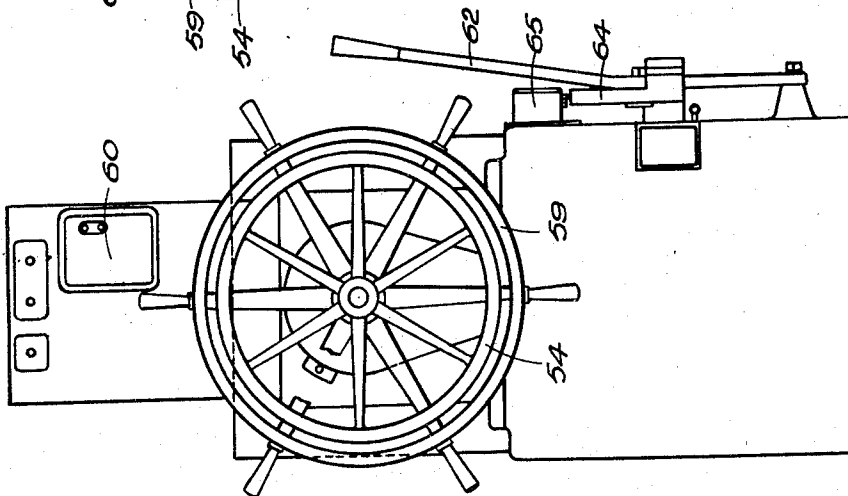


FIG. 4



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## CENTRIFUGAL CASTING MACHINE

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6 Sheets-Sheet 6

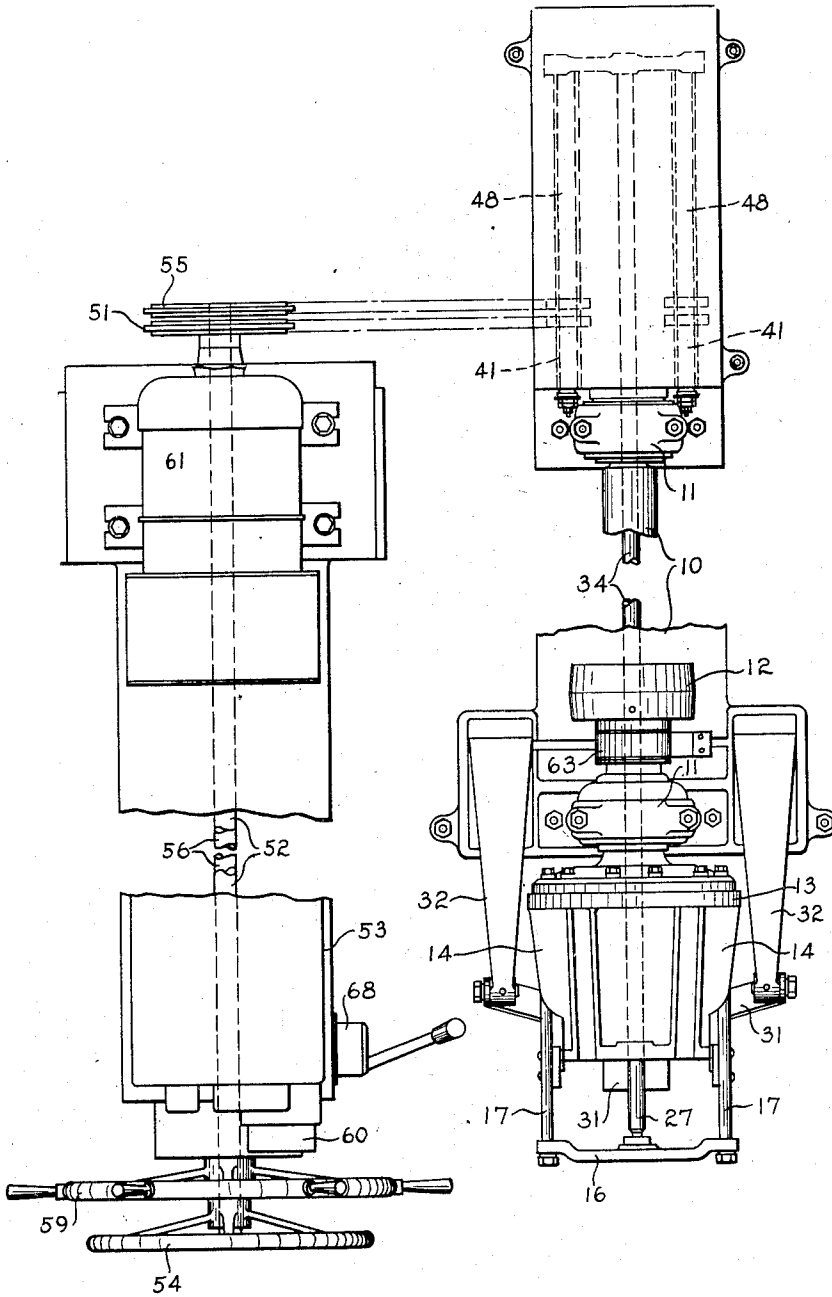


Fig. 6

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# UNITED STATES PATENT OFFICE

2,385,250

## CENTRIFUGAL CASTING MACHINE

Harold Andrews, Halesowen, England

Application January 11, 1943, Serial No. 472,025  
In Great Britain August 1, 1941

2 Claims. (Cl. 22—65)

This invention relates to improvements in centrifugal casting machines of the type in which cylindrical articles, such as cylinder liner castings or piston-ring pots, are cast centrifugally in a mould rotating about a horizontal axis.

In one design of machine of this type described in U. S. patent specification No. 2,023,562, the mould assembly is carried by a face-plate mounted on the forward end of a hollow shaft which is rotatably mounted in spaced bearings and is driven by a motor or other source of power to rotate the mould about its axis during the casting operation. Concentric sleeves or a concentric sleeve or sleeves and a central rod extend axially through the shaft and are axially movable by screw-and-nut mechanism at their rear ends to actuate an ejector for ejecting the finished casting and an end ring which is held against the outer end of the mould during the casting operation and is displaced while the casting is being withdrawn. The screw-and-nut mechanism comprises internally screwed rotatably anchored sleeves which co-operate with external screw-threads on the axially movable sleeves or sleeve and rod and are fitted with hand-wheels by which they can be manually rotated. Where a split mould is used the mechanism which operates the end ring may also serve to open and close the mould.

One object of my invention is to provide an improved centrifugal casting machine of this kind which has a number of advantages in use and in which the amount of time and labour required between casting operations is substantially reduced.

According to my invention in a centrifugal casting machine of the kind described above the actuating mechanism for the end ring and ejector, and also for opening and closing the mould if necessary, which is located at the rear of the mould is geared or coupled to operating or control means located at one side of and adjacent to the front of the mould. Thus when a casting operation has been completed the operator instead of having to go round to the back of the machine to manipulate the hand-wheels for displacing the end ring and advancing the ejector can effect these operations and also the return of the end plate and ejector from the front of the machine without moving appreciably from the position he normally occupies during the casting operation and there is a considerable saving in time.

Another advantage is that the hand-wheels do not rotate with the mould assembly so that their inertia does not have to be considered, this inertia

being considerable since the hand-wheels must be of considerable diameter to give the necessary leverage, particularly for the operation of the ejector.

One preferred practical design of centrifugal casting machine embodying my invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a plan of the machine partly in section.

Figure 2 is a side elevation partly in section.

Figure 3 is a side elevation of the front part of the mechanism for raising and lowering the end ring.

Figure 4 is an end elevation of the control mechanism.

Figure 5 is a side elevation of the control mechanism.

Figure 6 is a top plan view of the machine.

The machine itself need only be described briefly as it is similar in general construction to that described in U. S. patent specification No. 2,023,562, referred to above.

A hollow main shaft 10 rotatable about a horizontal axis is mounted in heavy spaced roller journal bearings 11 and is adapted to be driven by an electric motor through a belt running over a pulley 12 on the shaft. A face-plate 13 on the forward end of the shaft has secured to it a number of forwardly projecting arms 14 forming a carrier adapted to carry a readily interchangeable mould indicated in dotted lines at 15.

During the casting operation the front end of the mould is partially closed by an end ring 16 carried by a pair of arms 17 pivoted at their rear ends by pins 18 on slides 19.

The rear end of each slide enters a spring box 20 on a cross-head 22 and a compression spring 22 is arranged between the front end of the box and a collar 23 on the rear end of the slide. This arrangement allows the end ring to yield under axial expansion of the mould. The cross-head 21 is secured to the front end of a tubular sleeve 24 which extends axially through the shaft 10 and is axially movable therein to draw the end plate against and move it away from the front end of the mould. In the operative position of the end ring shown in dotted lines in Figure 1 the ring is in axial alignment with and is held against the end of the mould and is positively located by the engagement of bushed holes 25 in the end ring with the reduced ends 26 of rods 27 extending forwardly from the face plate 13. When the casting is finished the cross-head 21 is advanced by axial movement of the sleeve 24 which dis-

engages brackets 28 on the arms 17 from slides 29 carried by the face-plate. The end-ring can then swing down into the position shown in full lines in Figure 2 in which it is clear of the end of the mould so that the casting can be withdrawn. The end ring when released from the mould is adapted to be supported and moved up into the operative position again by a yoke formed by a cross-member 30 and a pair of arms 31 pivoted on brackets 32 extending forwardly from the frame of the machine. This yoke is moved angularly by a link 33 pivotally connected to the centre of the yoke and to a longitudinally movable rod 34 below and parallel to the main shaft.

Ejection of the casting is effected by an ejector 35 on the forward end of a plunger 36 coaxial with and axially movable in the sleeve 24.

A collar on the rear end of the sleeve 24 is rotatably anchored by means of a bearing 37 in a transverse crosshead 38 which is held against angular movement by means of a lug on the crosshead engaging slidably with a fixed rod 39. Internally screw-threaded nut members 40 secured in the crosshead adjacent each end engage with parallel screw-threaded spindles 41 which are geared together by a chain connecting the sprockets 42. Thus rotation of the spindles 41 moves the cross-head and the sleeve 24 axially to draw the end plate against or move it away from the end of the mould.

The rear end of the plunger 36 which extends beyond that of the sleeve is similarly rotatably anchored by means of a bearing 43 in a cross-head 44. The bearing is mounted on a short collar or sleeve 45 which has a limited sliding movement on the plunger against the action of a spring 46 to allow for expansion.

Nut members 47 anchored in the ends of the crosshead engage with parallel screwed spindles 48 which are geared together by a chain connecting sprockets 49 so that rotation of the spindles 48 moves the crosshead and the plunger 36 to advance and retract the ejector.

The sprockets 42 on the spindle 41 are coupled by a chain to a sprocket 51 on the rear end of a shaft 52 rotatably mounted in a control frame 53 arranged at one side of the machine. The front end of the shaft which is adjacent the front of the machine as shown in Fig. 6, is fitted with a hand-wheel 54 for rotating the shaft to rotate the spindles 41 and so actuate the end ring.

The sprockets 49 on the spindles 48 are coupled by a chain to a sprocket 55 on the rear end of a parallel shaft 56. At its front end the shaft 56 carries a pinion 57 meshing with a gear-wheel 58 on a sleeve concentric with the shaft 52 and this sleeve is fitted with a handwheel or capstan 59 for rotating the shaft 56 to rotate the spindles 48 and so advance and retract the ejector.

The control frame also provides a mounting for a switch 60 for the motor 61 driving the main shaft 10 and a brake lever 62 actuating a brake 63 for bringing the main shaft to rest after a casting operation. A cam member 64 associated with the brake lever actuates a switch 65 in the main motor circuit to prevent the motor from being energised when the brake is on. A further switch 66 in the main motor circuit is mounted on the frame of the machine and is controlled by a collar 67 on the sleeve 24 to prevent the motor from being energised until the end ring has been drawn back against the end of the mould. A still further switch 68 may be controlled by a collar on the rod 34 to prevent

the main motor from being energised until the yoke 32 has been lowered again after the end ring has been raised and drawn against the end of the mould. The rod 34 may be operated manually or it may be operated electrically through screw-and-nut gearing driven by a small motor 68 controlled by limit switches but this part of the mechanism need not be described further herein as it forms the subject matter of a co-pending patent application.

It is desirable that the screw-and-nut mechanism for actuating the ejector should be manually operable as shown in the drawings as considerable force may be necessary to initiate the movement of the casting from the mould and this force can be applied through the capstan hand-wheel 59. However, the movement of the end ring does not require excessive force at any time and instead of operating this manually it may be operated by an auxiliary motor coupled by chain or other gearing to the screwed spindles 48 or to the spindle 56, the motor being controlled by a main switch adjacent the hand-wheel 59 and by limit switches actuated by collars on the sleeve 24 to stop it when the end ring has reached its two limiting positions. These collars would of course be adjustable to allow for moulds of different lengths.

I claim:

1. A centrifugal casting machine comprising a hollow rotatable main shaft, a mould carrier mounted on the front end of the shaft, an axially movable end ring for closing the front end of the mould during casting, an axially movable ejector for ejecting the finished casting, members axially movable within the shaft for actuating the end ring and ejector and projecting from the rear end of the shaft, collars on said movable members, crossheads engaging said collars, nuts anchored in the crossheads, rotatable screwed shafts parallel to the main shaft and working through the nuts, rotatable spindles parallel to the screwed shafts, gearing connecting the spindles to the screwed shafts, and means at the front ends of the spindles for rotating them.

2. A centrifugal casting machine comprising a hollow rotatable main shaft, a motor drivably connected to said shaft, a brake for said shaft, a mould carrier mounted on the front end of the shaft, an end ring for closing the front end of the mould during casting and axially movable towards and away from the mould, an ejector mounted for axial movement through the mould for ejecting the finished casting from the mould, co-axial members connected respectively to the end ring and the ejector and mounted for axial movement within the shaft for advancing and retracting the end ring and ejector, screw-and-nut mechanisms connected to said co-axial members respectively for individually moving said members axially, rotatable spindles at one side of and parallel to the main shafts, gearing connecting said spindles to the screw-and-nut mechanisms, handwheels on the front ends of said spindles, means mounted adjacent said handwheels for respectively operating said brake and controlling said motor, and means included in the circuit of said motor and actuated by the brake control and by the axially movable member which advances and retracts the end ring for preventing energization of the motor unless the brake is off and the end ring is in position against the end of the mould.

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