

Feb. 21, 1933.

W. M. LESTER

1,898,671

DIE CASTING MACHINE

Filed Sept. 8, 1931

3 Sheets-Sheet 1

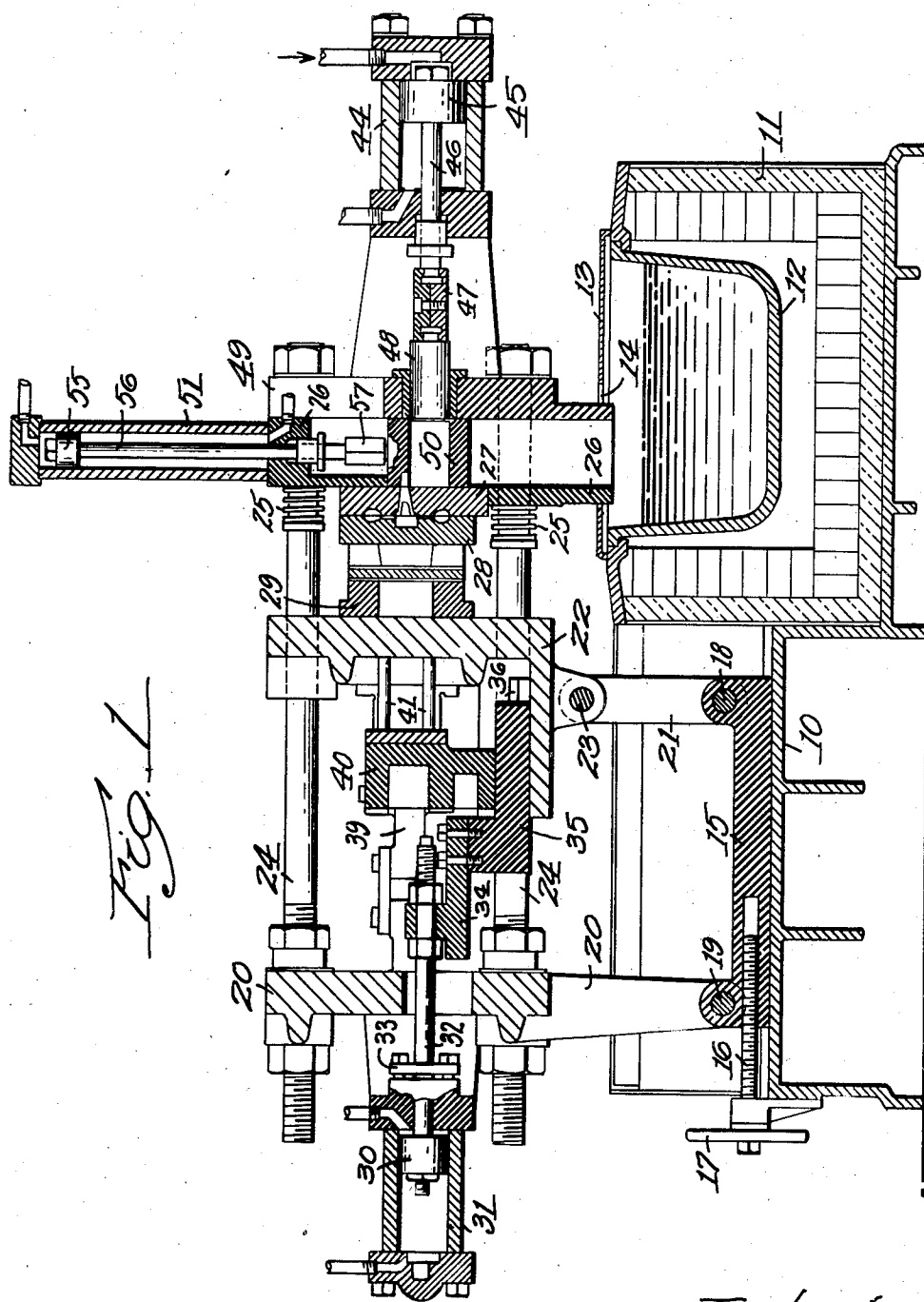


Fig. 1

Inventor
William M. Lester
By *Samuel F. Pay & Son*
Attorneys

William M. Lester

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W. M. LESTER

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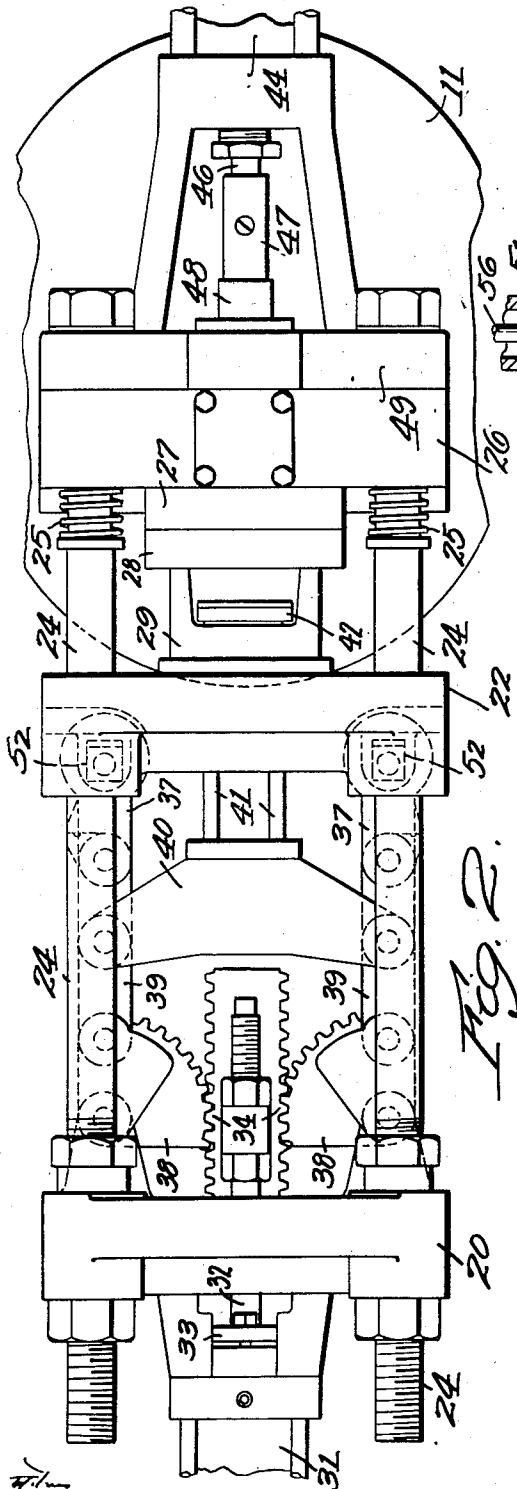


Fig. 2.

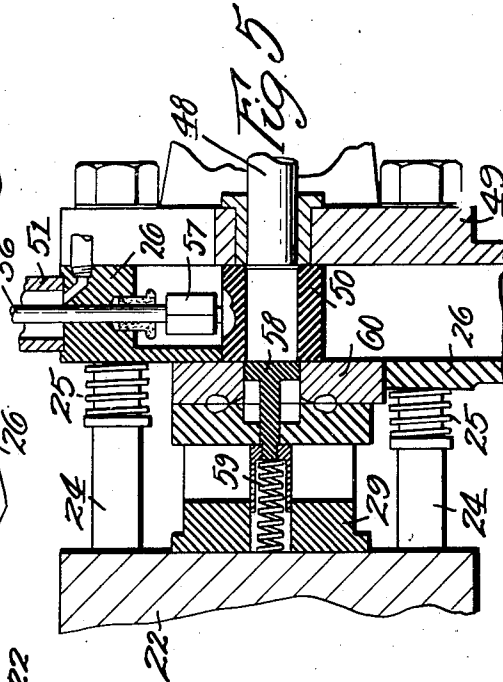


Fig. 5.

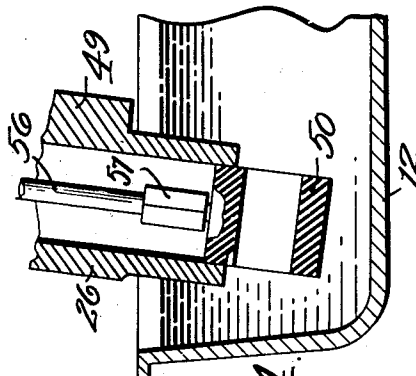


Fig. 4.

Inventor
William M. Lester
By atty. *Santhorne*
Ray & Stanley

Feb. 21, 1933.

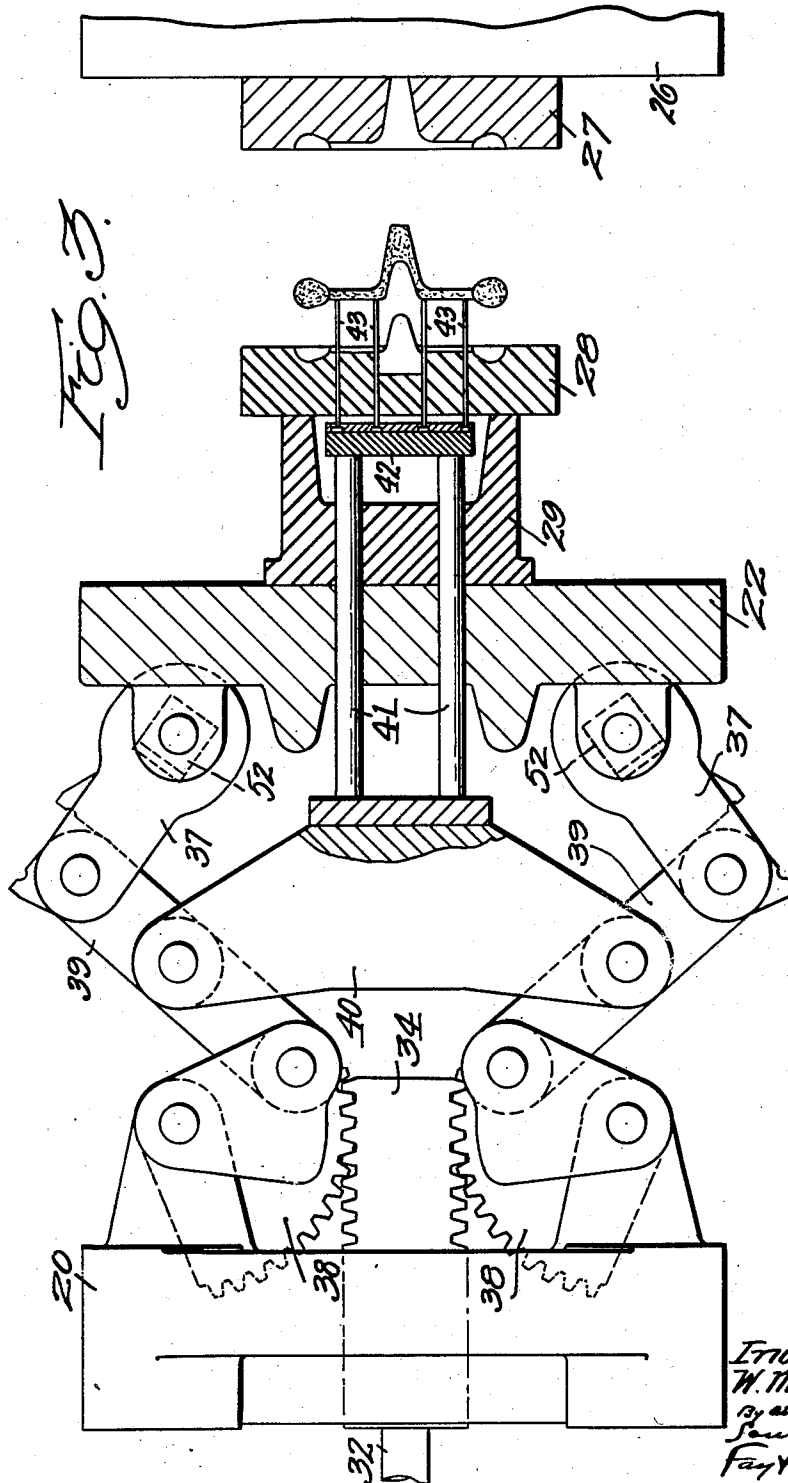
W. M. LESTER

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UNITED STATES PATENT OFFICE

WILLIAM M. LESTER, OF SHAKER HEIGHTS, OHIO

DIE CASTING MACHINE

Application filed September 8, 1931. Serial No. 561,676.

The principal objects of this invention are to provide a reservoir for molten metal movable from the melting pot in position to have the metal forced therefrom by a plunger into the die; to provide means for filling said reservoir by immersing it in the melting pot; to provide a pair of elements holding the said reservoir between them and means for lowering them, with the reservoir, into the melting pot so that the reservoir can be projected between them into the molten metal for filling; to provide a motion for the casting apparatus to accomplish the last-named object; to provide a construction in which the gate will be sheared off by the motion of a reservoir toward the melting pot; to provide a construction for removing the surplus metal with the gate, following the casting operation, and to provide simple means for closing the die and holding it closed.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a central longitudinal sectional view of a die casting machine, showing a preferred embodiment of this invention;

Fig. 2 is a plan of the same;

Fig. 3 is a horizontal sectional view of the same with the die open;

Fig. 4 is a sectional view of the melting pot, similar to Fig. 1, showing the reservoir and a part of the machine lowered into the metal in the melting pot, and

Fig. 5 is a sectional view similar to Fig. 1 showing a modification.

The machine is designed with a base 10 having a part on which the melting furnace 11 is located containing the melting pot 12. The furnace can be of such construction as to burn any kind of liquid or solid fuel. The machine is adapted to cast any non-ferrous metal or alloy having melting points at or below that of brass. If alloys having melting temperatures above 1300° Fahrenheit are to be melted, or those requiring minimum contamination with iron, the melting pot can be made of graphite instead of iron, or any similar crucible, resting on four legs. The melting pot is covered by a plate 13 to pre-

vent excessive oxidation of the molten metal. It is provided with an opening 14 for a purpose to be described.

On the base is mounted in ways a slide 15 adapted to be adjusted by a screw 16 and hand wheel 17. This slide is provided with two transverse pins or shafts 18 and 19 which constitute pivots. Pivoted on the shaft 19 is an upright frame end 20. Supported by links 21, pivoted on the shaft 18 is a movable die plate 22 pivoted to the links 21 by a cross shaft 23. Through the end frame 20 and the die plate 22 pass four rods 24 securely fixed to the frame 20 but the die plate 22 is slidable on them. The frame of which the casting machine is made up consists of the end frame 20, the rods 24 and another end plate 49. The plate 49 has an extension carrying a cylinder 44. The parts 20, 24, 49 and 44 constitute a rigid frame after the bolts on the rods 24 are tightened. This frame is pivoted to swing about the axis 19. These rods are provided with springs 25 against which is located a front die-plate 26. These springs press the die plate away from the end frame 20. Supported on this die plate is one die member 27 and the other die member 28 is connected with the die plate 22 by a support 29.

The die plate 22 is moved along the rods 24 by the action of a piston 30 in a cylinder 31. Oil is admitted behind this piston to force the die-plate 22 forward and afterwards it is moved back by oil admitted on the front side of the piston. The piston rod 32 passes through a packing nut and guide 33 and is adjustably secured to a double rack 34, which in turn is secured to a slide 35 sliding in ways 36 on the die plate 22 to guide it. The opposite racks 34 mesh with pivoted segments 38 which, by links 39, operate links 37 to force the die 28 against the die 27 and hold the die closed.

Assuming the die to be held together in this way, oil is admitted to a cylinder 44 behind the piston 45. The piston rod 46 is connected through a double plate connector 47 with a plunger 48. This connection is made by collared heads on the rod 46 and plunger 48. This plunger passes through the

end plate 49 and into a horizontal metal reservoir 50 which it fits perfectly and it forces all of the metal out of that reservoir into the die. Then the piston 45 is withdrawn by
 5 forcing oil in at the other side of the cylinder. Thus the casting operation is completed.

This casting is performed under high pressure. Oil is now admitted, as stated, to the
 10 rod end of the cylinder 31 and it is also admitted to the head end of a cylinder 51. Since the reservoir 50 is very tightly wedged by the piston 30 between the two plates 26 and 49 the piston 55 will not operate until the
 15 locking tension in the link mechanism for opening the die has been relieved. By means of a sliding bearing 52 for the link pin connecting link 37 and the movable die plate 22 the locking tension is relieved before the die
 20 starts to open. The piston 55 with its piston rod 56 in the cylinder 51 is then released and the pressure behind it forces the reservoir downwardly. The rod 56 and reservoir 50 are connected by a connector 57 like the
 25 one 47.

The system of links at the left will gradually open the die. The mechanism is so designed as to cause the cross head link 40 carried by the links 39 to approach the half
 30 of the die fastened to the plate 22 before the full die opening has been secured. This link 40 carries bumper pins 41 for operating an ejector plate 42 carrying ejector pins 43. The opening of the die causes the ejector pins
 35 to eject the casting as the die opens.

Furthermore as the die opens, the machine frame and melting pot are moved relatively toward each other. Preferably this is accomplished by dropping the machine frame
 40 by the link 21 which is rigidly held in the slide 15 by the shaft 19 so as to swing about this shaft as the die plate moves on the opening stroke. The whole frame 20, 24 and 22 swings as a unit about the shaft 19 so as to
 45 lower the two plates 26 and 49, both secured to the rods 24.

The metal reservoir 50 is clamped between the plates 26 and 49 until the pressure is released. Then the pressure of the springs 25
 50 only applies. Now the pressure of the oil on the piston 55 forces the reservoir 50 down between the plates 26 and 49 to shear the surplus from the gate. At the same time the whole frame swings on the shaft 19 so that
 55 these parts move downwardly into the position shown in Fig. 4. Here it will be seen that the plates 26 and 49 both dip into the metal in the melting pot, while the reservoir 50 is projected down below their lower ends.
 60 Thus any metal left therein is immediately melted by the large body of molten metal surrounding it and this reservoir is completely filled with molten metal. Therefore on the next upward stroke, produced by the introduction of oil under pressure on the rod side

of the piston 55, the reservoir will first pull up into the space between these two plates and then, by the action of the piston 30, the plates will be raised as the frame moves back to the horizontal position shown. Of course
 70 everything supported by the frame moves with the frame.

The parts are now in position for oil to be again admitted in the cylinder 31 on the outer end of the piston and for the locking
 75 pressure to again seal the ends of the reservoir 50. The machine therefore has now been through a complete cycle of operations.

In the modified form shown in Fig. 5, a slight deviation in the entire construction and minor changes in the machine are shown to permit the removal of the surplus metal following the casting operation. In this case an auxiliary gate or dam 58 is pressed by a spring 59 against the end of the plunger
 80 48 or rather against the molten metal between the two. When the plunger 48 is forced inwardly to fill the mold, this is done by the pressing back of this dam 58. The cylinder 44 must have sufficient stroke to permit the piston 48 to enter the cover half 60 of the die. This plunger is now withdrawn and the die opened by the link, cylinder, and mechanism previously described. The metal cylinder will be lowered and the reservoir dipped simultaneously as shown in Fig. 4. The operation is the same as in the other case.

It will be seen therefore that this reservoir 50, which is designed to hold just the amount of metal necessary to fill the die, is located in position for the metal to be forced
 100 out of it into the die and is properly held by positive pressure during the casting operation and then released and afterwards held only by spring pressure while it is lowered. It shears off the gate when moving down toward the melting pot.

Although I have illustrated and described only two forms of the invention, I am aware of the fact that modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to all the details of construction herein shown and described,
 110 but what I do claim is:—

1. In a casting machine, the combination with a melting pot, of a mold located substantially above the melting pot, a reservoir adapted to register with the mold, a plunger adapted to enter the reservoir and force the metal out of it into the mold, and means for moving the reservoir from casting position into the molten metal in the melting pot to fill it and then moving it back again into registration with the mold and plunger.

2. In a casting machine, the combination with a melting pot, of a frame having an end piece and a die plate spaced from each other, a mold supported by said die plate, means
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whereby the frame comprising the die plate and end piece are movable downwardly together into the melting pot, a reservoir for metal located between the die plate and the end plate, and means for moving the reservoir into the melting pot with the die plate and end plate and beyond the bottom thereof to fill the reservoir with molten metal in the melting pot and for moving the reservoir back up between said two plates into a position for casting.

3. In a casting machine, the combination of a frame comprising a pair of opposite end plates, one being pivotally mounted, a die plate carried by the frame for supporting the mold, a reservoir mounted between one of the end plates and the die plate, means for moving the reservoir between said plate out of and into a melting pot to fill the reservoir with metal and bring it to a position for casting, positive means for holding the die plate against the reservoir and that against the end plate to secure the reservoir in position, and yielding means for holding the die plate against the reservoir when the positive means is inoperative.

4. In a casting machine, the combination of a frame comprising a pair of opposite end plates, one being pivotally mounted, a die plate carried by the frame for supporting the mold, a reservoir mounted between one of the end plates and the die plate, means for moving the reservoir up and down between said plates out of and into a melting pot to fill the reservoir with metal and bring it to a position for casting, positive means for holding the die plate against the reservoir and that against the end plate to secure the reservoir in position, and yielding means for holding the die plate against the reservoir when the positive means is withdrawn, a hydraulic piston connected with the reservoir for moving it, whereby, when the liquid is turned on to move the piston and reservoir, the reservoir will not move until the positive pressure is released from the reservoir so as to permit it to be moved by the piston.

5. In a casting machine, the combination of a frame for supporting the dies, a reservoir movable into and out of registration with the dies and carrying a charge of metal therein, a piston and cylinder carried by the frame for closing the dies rigidly and holding the reservoir in casting position, a second piston and cylinder carried by the frame for forcing the metal out of the reservoir into the dies, a piston and cylinder carried by the frame for moving the reservoir into casting position and also into a position to receive a charge of molten metal.

6. In a die casting machine, the combination of a separable mold, a melting pot, a reservoir movable from said melting pot to a point of registry with said mold, and a plunger insertable in said reservoir and

adapted to force the metal therefrom into said mold.

7. In a die casting machine, the combination of a separable mold, a reciprocable plunger, and a reservoir positioned in alignment with said mold and said plunger, the latter being insertable through the interior of said reservoir, and a melting pot positioned substantially below said mold, and means for moving said reservoir from alignment with said mold and said plunger to a position of immersion in said melting pot.

In testimony whereof I have hereunto affixed my signature.

WILLIAM M. LESTER.

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