Nov. 10, 1936. F. LANNERT 2,060,224

DIE CASTING MACHINE

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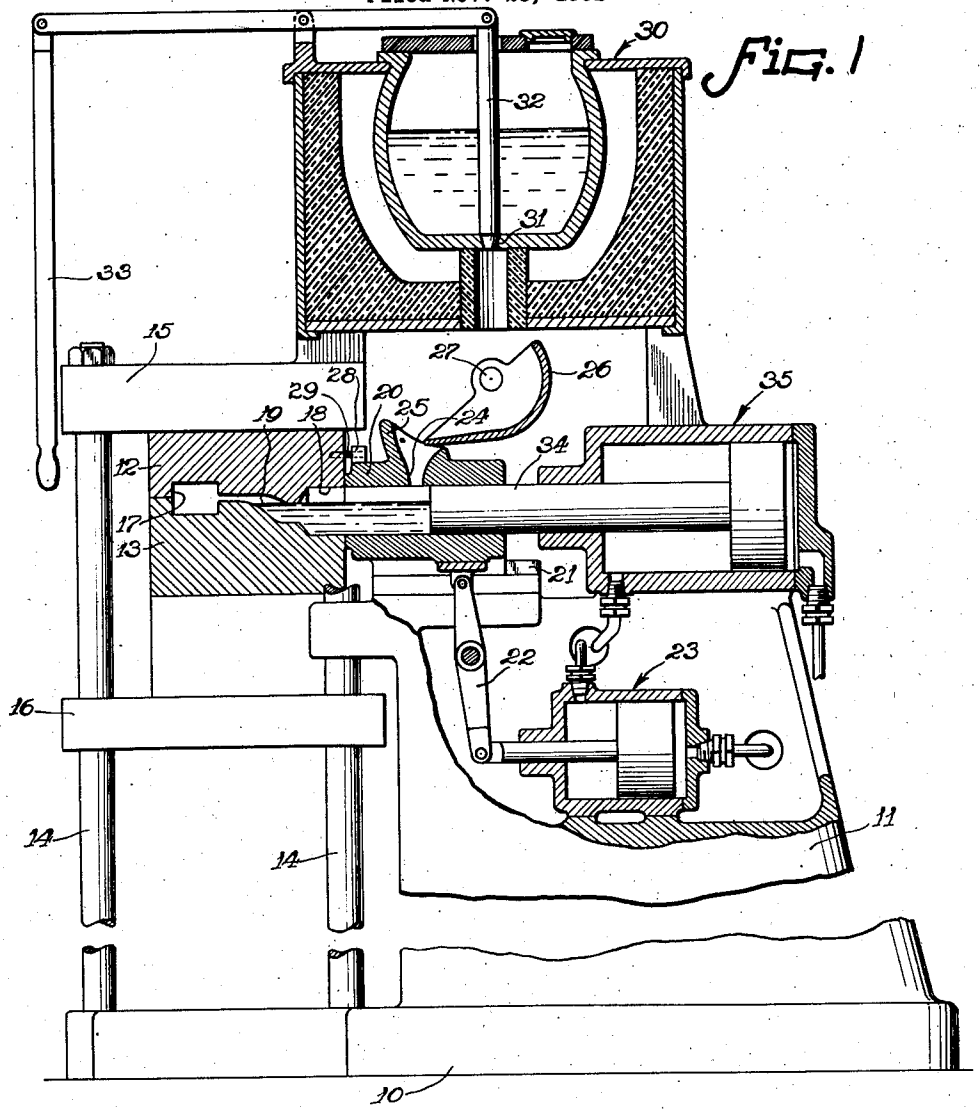


Fig. 1

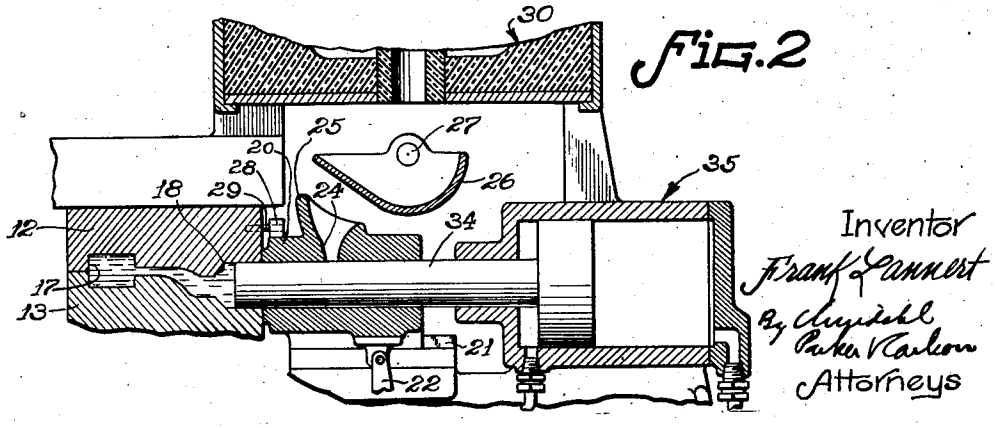


Fig. 2

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Fig. 3

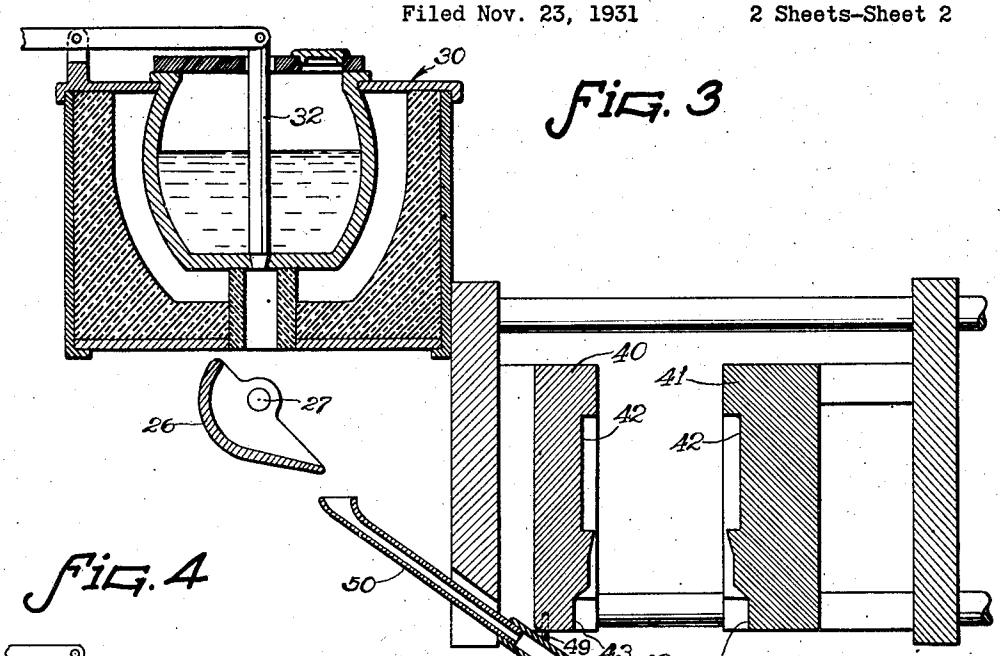


Fig. 4

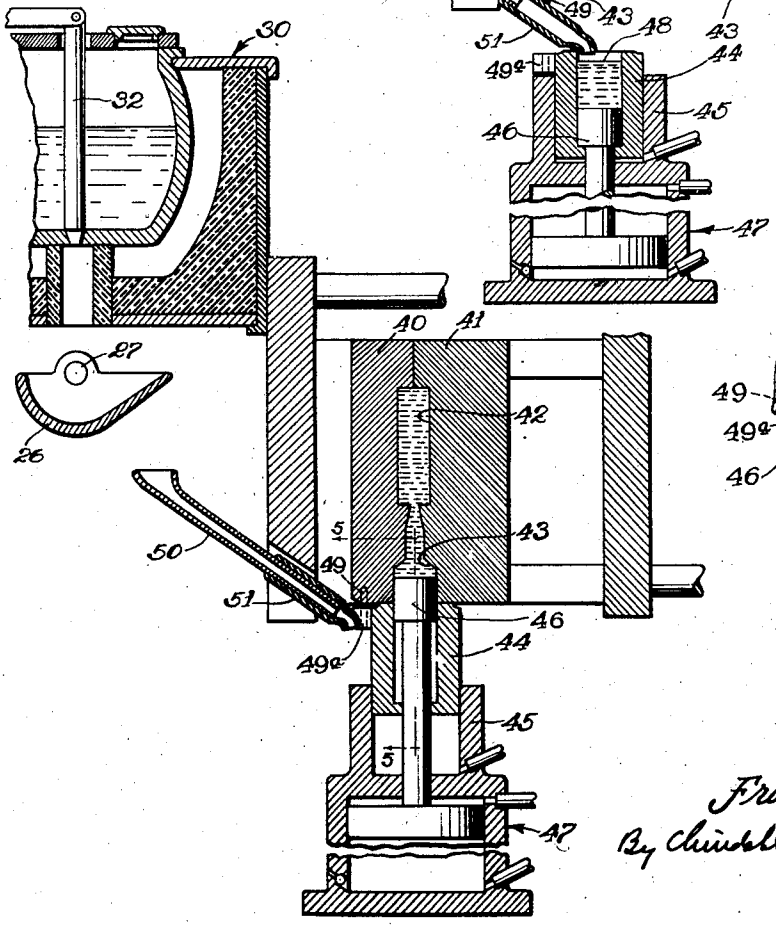
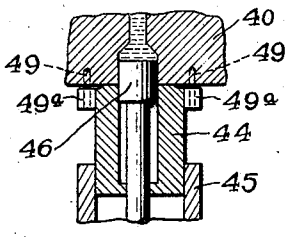


Fig. 5



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2,060,224

DIE CASTING MACHINE

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4 Claims. (Cl. 22—68)

The invention relates generally to die-casting machines and more particularly to a machine for making die-castings of brass and other metals of relatively high melting points.

The general object of the invention is to provide a die-casting machine of either the horizontally moving die type or the vertically moving die type having novel means for feeding a measured quantity of molten metal to the dies.

Another object is to provide a machine of this character in which said feeding means places all of the measured quantity of metal within the dies so that, as it cools and solidifies, there is no surplus metal to be cut off from that within the dies.

A further object is to provide a machine of this character in which the feeding means is so constructed that it tends to prevent the formation of a solidified portion of the metal which has to be broken through when the metal is forced into the die.

Still another object is to provide a new and improved method of feeding molten metal to the dies.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation, partially in section, of a machine of the vertically moving die type embodying the features of the invention and showing the position of the parts when the molten metal is ready to be forced into the dies.

Fig. 2 is a fragmentary view similar to Fig. 1 but showing the position of the parts after the metal has been forced into the dies.

Fig. 3 is a fragmentary vertical section of a horizontally moving die type of machine showing the position of the parts when the metal is ready to be forced into the dies.

Fig. 4 is a view similar to Fig. 3 but showing the position of the parts when the metal has been forced into the dies.

Fig. 5 is a fragmentary sectional view taken along the line 5—5 of Fig. 4.

The preferred embodiment of the invention comprises generally a set of relatively movable dies. Positioned adjacent the dies is an open-end container which is movable into contact with the dies with its open end in alinement with a gate therein. Means is provided for pouring a measured quantity of molten metal into the container, the latter being positioned so that none of the metal will flow into the impression in the dies until forced therein. Within the container is a plunger which is movable to a position where its end extends into the gate so that the entire quantity of metal will be forced out of the container and into the dies.

In Figs. 1 and 2 of the drawings, a machine of the vertically movable die type is shown which comprises a base 10 supporting a column 11. Mounted preferably on the base 10 is a means for supporting a set of relatively movable dies which, as illustrated, comprises a stationary die 12 and a vertically movable die 13, said means, as illustrated, comprising a plurality of vertically extending rods 14 supporting a stationary die holder 15 and slidably supporting a movable holder 16. While the lower die is shown as movable, either or both of said dies may be movable. Any preferred means may be utilized to cause relative movement between the dies. The dies are formed on their adjoining faces to provide an impression 17 and a gate 18.

To feed molten metal to the dies, a container is provided which is movably mounted so that it may be moved into communication with the gate in the dies and permit the metal to flow from the container into the dies. When so moved, it is positioned with a substantial part of its interior space below the level of the opening of the gate 18 into the impression 17 so that when the container is partially filled with molten metal, the latter cannot freely run into the impression but rather must be forced thereinto. To this end, the parting line of the outer portion of the gate is lower than the parting line of the impression.

In the machine shown in Figs. 1 and 2, the container comprises a cylinder 20 mounted with its axis horizontal and in alinement with the gate 18. The cylinder 20 is slidably suported for movement into and out of contact with the dies, preferably on ways 21 formed on the column 11. To move the cylinder 20 back and forth, a lever 22 may be provided which may be actuated by means such as a piston and cylinder device 23 operated by pressure fluid.

To secure accurate alinement of the cylinder 20 with the gate 18, a pair of lugs 28 may be provided on the cylinder 20. Each lug is provided with a hole adapted to receive a liner pin 29 secured in the stationary die 12.

In order that metal may be supplied to the cylinder 20, it is formed with an opening 24 in its upper side wall intermediate its ends. Around the opening 24, a funnel 25 is constructed so that the molten metal may be conveniently poured therein. Immediately over the funnel 25 is a

means for supplying a measured quantity of molten metal, which comprises, in the present instance, a ladle 26 supported on a horizontal pivot 27 and adapted to be turned from the upright position shown in Fig. 2 to a position where the metal will pour into the funnel 25, as shown in Fig. 1.

The main supply of molten metal is preferably held in a crucible 30 which is provided with an opening 31 in its bottom controlled by means such as a valve stem 32 operated by a hand lever 33, the opening 31 being vertically over the ladle 26 so that when the valve stem 32 is lifted, the metal will pour into the ladle.

As mentioned above, the cylinder 20 is positioned so that a substantial part of its interior space is below the level of the opening of the gate 18 into the impression 17 in the dies. This is clearly shown in Fig. 1 where the molten metal is shown as retained in the interior space of the cylinder 20 and in the outer part of the gate 18 without flowing into the impression, providing a surface 19 (Fig. 1) from which the metal will later be forced into the impression. Said surface 19 is not cooled by contact with the metal of the dies and, thus, conditions are favorable to the surface remaining liquid until the metal is injected into the impression.

To force the metal into the impression, a plunger 34 is movably mounted in the cylinder 20 and is operated by means such as a piston and cylinder device 35. The stroke of the plunger 34 is regulated so that at its withdrawn position, it is beyond the hole 24 and the molten metal may be poured into the interior space of the cylinder.

To force all of the metal in the cylinder 20 into the die so that none remains in the cylinder to be broken off from the casting when the cylinder is moved out of contact with the die, the stroke of the plunger 34 is regulated so that at its forward position, the front end of the plunger may extend a short distance beyond the open end of the cylinder. Since the plunger 34 enters the gate 18, the latter may be viewed as a part of or a prolongation of the bore of the cylinder 20.

The machine shown in Figs. 3 and 4 is of the type having horizontally movable dies. In this instance, the set of dies are illustrated as comprising a stationary die 40 and a movable die 41 having an impression 42 and a gate 43 opening down through the bottom side face of the dies. The parting plane 43a is vertical, and the gate 43 is arranged in said plane.

To feed molten metal to the dies, a cylinder 44 is provided which is movably mounted on a vertical axis in alinement with the gate 43 when the dies are closed. The upper end of the cylinder 44 is open to provide communication with the gate 43 when the cylinder 44 is moved into contact with the lower face of the dies. Means is provided for moving the cylinder 44, which in the present instance comprises a second cylinder 45 operated by pressure fluid with the first cylinder 44 acting as a piston therein. When molten metal is placed in the cylinder, a surface 48 (see Fig. 3) is provided, which is not cooled by contact with cooler metal and, thus, tends to remain liquid until the molten metal is forced into the impression.

To secure accurate alinement of the cylinder 44 with the gate 43, a pair of lugs 49a may be provided on the cylinder 44. Each lug is provided with a hole adapted to receive a liner pin 49 secured in the stationary die 40.

A plunger 46 is slidably mounted in the cylinder 44 and is adapted, when the cylinder 44 is moved into contact with the dies, to be raised until its upper end extends a short distance into the gate 43 so that the entire quantity of metal in the cylinder 44 will be expelled into the dies. The gate 43 is constructed similarly to the gate 18 so that the end of the plunger 46 may be received therein. Inasmuch as the plunger 46 enters the gate 43, said gate is virtually a part of or an extension of the bore of the cylinder 44. The axis of said cylinder lies in the parting plane 43a. Means is provided for actuating the plunger 46 which is illustrated as a piston and cylinder device 47.

To carry molten metal to the cylinder 44 from the ladle 26, a tube 50 is provided, on the lower end of which a telescoping nozzle 51 is mounted. The nozzle 51 is movable from a position directly over the cylinder 44, when the latter is withdrawn from the dies as shown in Fig. 3, to an out-of-the-way position so that the cylinder 44 may be moved into contact with the dies, as shown in Fig. 4.

It will be seen that the cylinder member 44, although located directly below the dies, is so related to the dies that molten metal may be introduced into said cylinder member from below the impression 42, thus obviating the trouble experienced in the prior art in keeping the molten metal out of the impression during the cylinder-charging operation.

In the operation of the machine by which the method claimed herein may be performed, the dies 12 and 13 in the machine shown in Figs. 1 and 2, are closed, and the cylinder 20 is forced into contact with the side face of the dies. While the cylinder 20 may be constantly held in its forward position, that is, in the position where it is in contact with the dies, and the movable die 13 may be slid past the cylinder, it is preferable to move the cylinder into contact with the dies after they are closed in order that a tighter fit may be had between the cylinder and the side face of the dies to prevent or minimize leakage of the molten metal therebetween.

With the plunger 34 in its withdrawn position, shown in Fig. 1, the required quantity of molten metal is drained from the crucible 30 into the ladle 26, which is then in its upright position, by raising the valve stem 32. The metal in the ladle 26 is poured into the cylinder through the funnel 25 and opening 24. It will be noted that the portion of the gate 18 and the interior space of the cylinder 20 which is filled with the molten metal lies below the level of the opening of the gate into the impression 17 so that the metal will not enter the impression until forced therein.

To force the metal into the impression, the plunger 34 is moved forward preferably so far that its front end extends into the gate 18 a short distance. Thus, the entire quantity of metal is expelled from the cylinder 20 into the dies.

When the plunger 34 is withdrawn, the cylinder 20 is free to be moved out of contact with the dies, since no metal remains in the cylinder. This also reduces the amount of metal required to make each casting since no metal remains in the cylinder 20 to be wasted. The dies are then opened and the casting is removed.

In the machine shown in Figs. 3 and 4, the cylinder 44 is held in its lowered position and the telescoping nozzle 51 is moved to a position di-

rectly over the cylinder. A measured quantity of molten metal is drained from the crucible 30 into the ladle 27 from where it is poured into the tube 50 and into the cylinder. The nozzle 51 is then withdrawn to an out-of-the-way position, the dies having meanwhile been closed, and the cylinder 44 is moved into contact with the dies. Since the impression 42 in the dies is above the cylinder, no metal enters the impression until the plunger 46 is moved upwardly when the metal will flow from the surface 48. The plunger 46 is arranged to move to a position where it extends into the gate 44, as in the machine shown in Figs. 1 and 2.

From the above description, it will be apparent that I have provided a die-casting machine of either the horizontally movable die type or the vertically movable die type, having novel means for feeding a measured quantity of molten metal to the dies. It will also be apparent that the entire quantity of metal is placed in the dies, leaving no surplus in the feeding means to be cut or broken off from the casting as the feeding means is withdrawn from the dies, since the plungers are so arranged that the metal is entirely forced into the dies. The metal does not enter the impression in the dies until forced therein. It will also be evident that a new and improved method of feeding molten metal to the dies of a die-casting machine is provided.

I claim as my invention:

1. A die casting machine comprising, in combination, a frame, a set of relatively movable dies mounted on said frame, means for feeding molten metal to the dies, and means for supplying a measured quantity of metal to said feeding means, said feeding means comprising an open end cylinder movable into contact with said dies with the open end of said cylinder alined with the gate of said dies, means for alining said cylinder and said gate comprising a liner pin secured in one of said dies and a lug on said cylinder having a hole adapted to receive said pin, and a plunger movably mounted in said cylinder and arranged to extend into the gate of said dies when at one end of its stroke to force the entire quantity of metal in said cylinder into said dies.

2. A die casting machine comprising, in combination, a frame, a set of relatively movable dies mounted on said frame, and means for feeding molten metal to said dies comprising an open end cylinder movable into and out of contact with a face of said dies and positioned in alinement with the gate in said dies, said cylinder being mounted in a second cylinder and constituting the piston thereof whereby said first cylinder may be moved, means for pouring a measured quantity of molten metal into said first cylinder when out of contact with the dies, and a plunger mounted in said first cylinder for expelling the entire quantity of metal from said first cylinder and into said dies when the first cylinder is in contact therewith.

3. A die casting machine comprising, in combination, a frame, a set of relatively movable dies having a gate in its lower face, a vertical cylinder having its upper end open and movable vertically into contact with the lower face of the dies and in alinement with the gate thereof, means for pouring a measured quantity of molten metal into the open end of said cylinder when out of contact with said dies including a nozzle movable from a position directly over said cylinder to an out-of-the-way position, and a plunger mounted in said cylinder and movable to a position where its upper end enters said gate whereby the entire quantity of metal in said cylinder will be forced into said dies.

4. Apparatus for the pressure casting of metals comprising a separable mold parted in a substantially vertical plane and gated from below, a pressure cylinder positioned below the mold and adapted to receive molten metal for introduction into the mold and connected with said gate in casting position, the location of the cylinder below the gate enabling the leading end of the molten metal in the cylinder to have a free surface, and a plunger operating in said pressure cylinder and entering said gate to force all of the metal into the die, the axis of the pressure cylinder lying substantially in the plane of parting of the mold.

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