

June 23, 1964

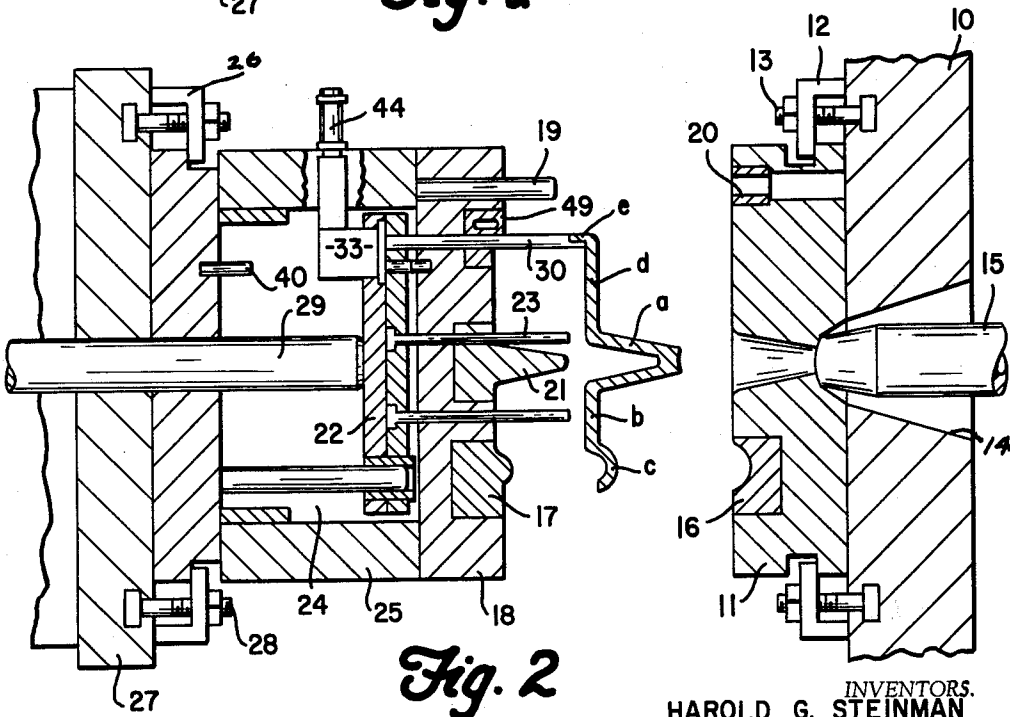
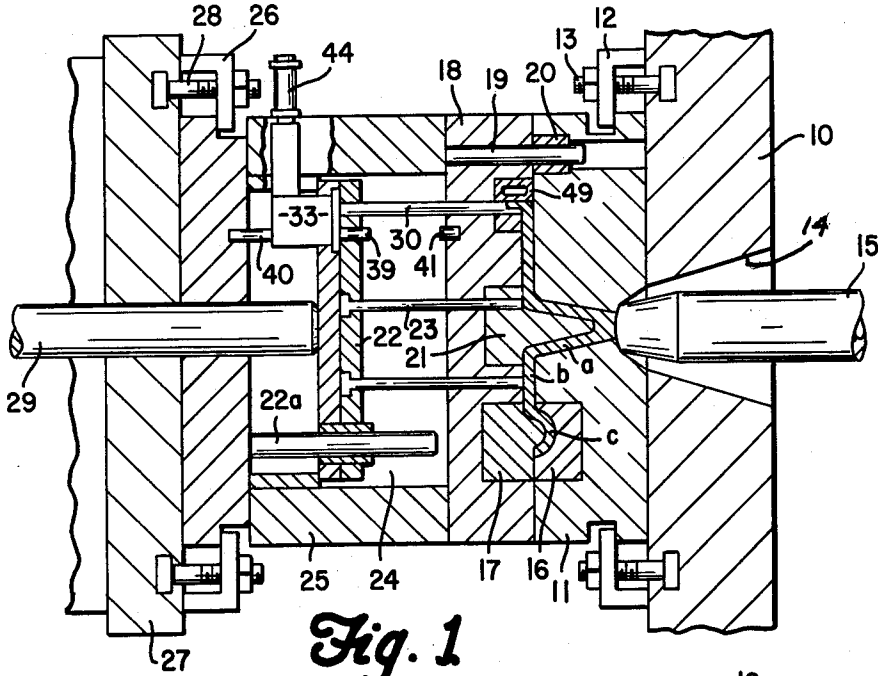
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3,137,905

EJECTING MECHANISM FOR DIE CASTING MACHINES

Filed June 26, 1961

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

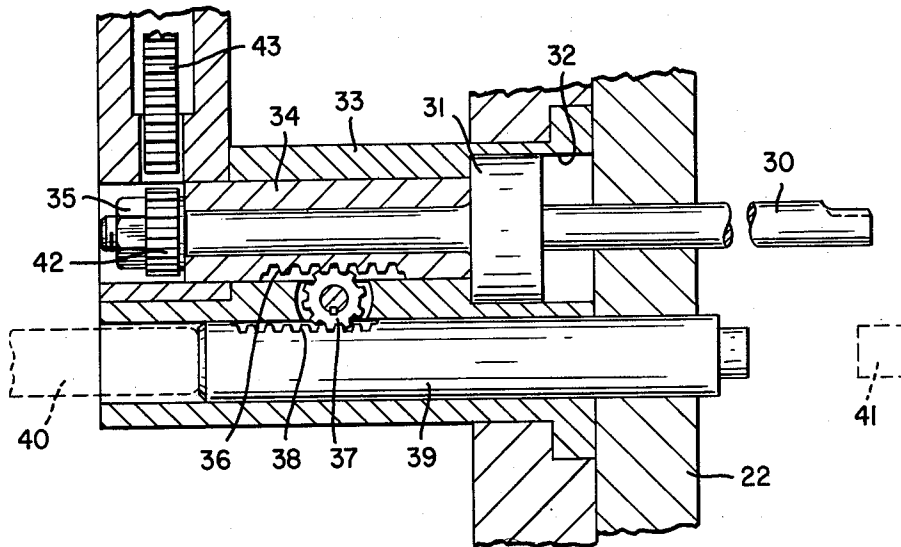


Fig. 3

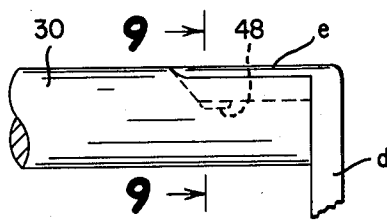


Fig. 4

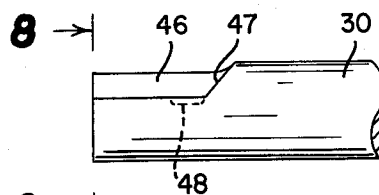


Fig. 5

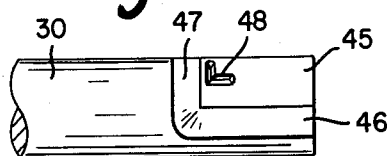


Fig. 6

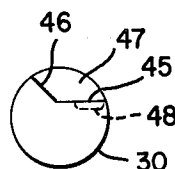


Fig. 8

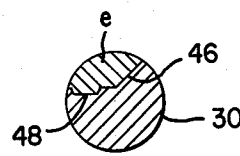


Fig. 9

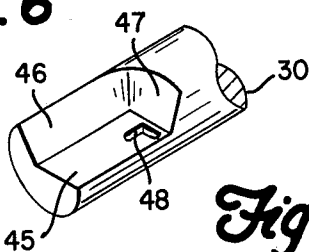


Fig. 7

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3,137,905

EJECTING MECHANISM FOR DIE CASTING MACHINES

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Filed June 26, 1961, Ser. No. 119,468

2 Claims. (Cl. 22-94)

This invention relates to die casting machines, but more particularly to the ejection or discharge of the cast article from the casting machine.

An object is to produce new and improved means for suspending the cast article between the cover die and movable die after they have been relatively moved away from each other and for ejecting such article in such manner and at such position as to clear the dies.

Another object is to provide a die casting machine with simple and efficient automatic means for achieving controlled ejection of the cast part.

A still further object is to produce a means for suspending the cast article and after a predetermined movement thereof sufficient to clear the dies, the suspending means is rotated to release the cast article which is allowed to drop therefrom.

Other objects and advantages of the invention will hereinafter appear and, for purposes of illustration but not of limitation, an embodiment of the invention is shown in the accompanying drawing in which

FIGURE 1 is a fragmentary sectional view somewhat diagrammatic of a portion of a die casting machine, showing the cover die and movable die in closed position, the molten material having been introduced by the injecting nozzle;

FIGURE 2 is a view similar to FIGURE 1, but with the movable die shifted away from the cover die, and with the ejector pin advanced to the position at which the cast article is to be released;

FIGURE 3 is a fragmentary sectional view of the mechanism for imparting linear movement to the ejector pin, and also oscillating movement thereto for effecting controlled ejection of the cast article;

FIGURE 4 is a fragmentary view of the end portion of the ejector pin, showing a part of the casting adhered thereto, and indicating the suspending finger or hook on the casting;

FIGURE 5 is another fragmentary elevation of the end portion of the ejector pin, without the cast finger adhered thereto;

FIGURE 6 is another view of the end portion of the ejecting pin, showing in plan the cavity in which the suspending finger is cast;

FIGURE 7 is a perspective view of the end portion of the ejector pin;

FIGURE 8 is an end view of the ejector pin on the line 8-8 of FIGURE 5; and

FIGURE 9 is a transverse sectional view substantially on the line 9-9 of FIGURE 4.

The illustrated embodiment of the invention comprises a die casting machine, having a relatively stationary platen 10 against which a cover or stationary die 11 flatly abuts. A clamping ring 12 engaging in an annular groove in the cover die 11 secures the same to the platen 10 by a series of stud bolts 13 carried by the platen. Formed in the platen 10 is a sprue opening 14, which receives an injecting nozzle 15 for the molten metal. The cover die 11 has an impression insert 16 contoured for the article to be cast. This insert mates with an impression insert 17 carried by a movable die 18. A guide pin 19 in the movable die projects forwardly there-

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from to enter a bearing sleeve 20 carried by the cover die 11.

Carried by the movable die 18, is a sprue spreader 21, which has a conical nose extending into the venturi through which the molten metal is injected. Within a cavity 24 formed in the movable die 18 and closed by a suitable cover 25, is an ejector plate assembly 22 suitably guided on one or more pins 22a for shifting movement therein. The ejector plate assembly has a pair of ejector pins 23, which project forwardly and extend through the front end portion of the movable die for ejecting the casting from the face thereof, as will be readily understood by those skilled in the art.

The movable die 18 is secured by a clamping ring 26 to a shiftable die base 27, and stud bolts 28 in the die base provide an attachment for the clamping ring. A knock-out bar 29 extends through the die base 27 and into the cavity 24 and is secured to the ejector plate assembly 22 for movement therewith, hydraulic means (not shown) actuates the bar 29 in order to free the casting and then retracts the bar to the position shown in FIGURE 1.

With one end portion disposed within the cavity 24 of the movable die is an ejector pin 30 for effecting controlled ejection of the casting, as will hereinafter appear. At the inner portion of the ejector pin 30 is an enlarged piston-like cylindrical head 31, which has limited to and fro movement within a cylinder 32. The cylinder 32 is within a housing 33, which is secured to and is movable with the ejector plate assembly 22. Fixed within the housing 33 and through which the end portion of the ejector pin 30 extends, is an axially shiftable sleeve 34. The sleeve 34 is clamped against the adjacent face of the cylindrical head 31 by a clamping nut 35 on the threaded end of the pin 30. The sleeve 34 has on its underside a series of rack teeth 36, with which a pinion 37, rotatably carried by the housing 33, meshes. The pinion 37 also meshes with rack teeth 38 on a rack bar 39, which is disposed beneath and parallel to the sleeve 34.

When the ejector plate assembly is disposed at the left of FIGURE 1, the rack bar 39 will have encountered a stationary strike pin 40 to advance the rack bar 39 sufficiently to cause the ejector pin 30 to retract or move to the left of the figure. On the other hand, when the ejector plate assembly 22 is disposed forwardly, as in FIGURE 2, the front end of the rack bar 39 will have engaged a fixed strike pin 41 carried by the movable die 18. The rack bar 39 is thus moved to the left of FIGURE 3 so that the ejector pin is advanced forwardly beyond the ends of the ejector pins 23, particularly as shown on FIGURE 2.

Fixed to the inner end of the ejector pin 30 and secured in place by the clamping nut 35 is a pinion 42 with which a rack bar 43 is adapted to mesh for effecting oscillatory movement of the ejector pin 30, through an arc of approximately 170°. As shown, the rack bar 43 is carried by a lateral extension of the housing 33, and, as shown, is actuated by an air cylinder 44, through suitable controls (not shown) to enable rotation of the pinion 42 in one direction and then in the opposite direction in timed relation to the movement of the associated parts.

The free or exposed end of the ejector pin 30 is cut away for a portion of its free end portion to provide a recess having a flat bottom wall 45 disposed in a plane parallel to a horizontal line extending through the axis of the pin. Inclining from the inner end of the bottom wall 45 is an inclined side wall 46, which forms an angle of about 45° with a horizontal line extending through the pin axis. Manifestly the front end of the recess is open and the inner end has a wall 47 which

inclines rearwardly away from the free end of the pin at an angle of approximately 30° to the bottom wall 45. It will be noted that the side wall 46 merges into the end wall 47 by a curved connecting wall.

For insuring the retention of the casting in the recess, in the end portion of the ejector pin 30 is a substantially L-shaped notch 48 arranged adjacent the inner end of the recess adjacent the rear wall 47. This L-shaped recess receives the molten metal and provides additional anchorage for retaining the casting in suspended position as will more fully hereinafter appear.

During the casting operation, the recessed end portion of the ejector pin 30 is disposed within a water-cooled bushing 49 having a cylindrical bore, the bushing being carried by the movable die 18 thereby quickly to chill and harden the molten metal which fills the space between the pin recess and the adjacent walls of the bushing.

It will be understood that, in practice, when the dies are moved together, molten metal is injected through the nozzle 15, and flowing through suitable gates, fills the space provided between the dies, forming the sprue *a*, lower runner *b*, and a cast part *c* formed by the impression inserts 16 and 17. Above the sprue *a* is an upper runner *d* and at the upper end of the runner *d*, in the recess in the end of the ejector pin 30 is formed a suspending finger or hook *e*, some of the metal flowing into the L-shaped notch 48, assisting in retaining the hook in engagement with the ejector pin.

As the movable die 18 moves away from the cover die 11, the ejector pins 23 push the casting away from the sprue spreader 21 and adjacent parts, and then, due to the racks 36, 38, and pinion 37, and upon engagement of the rack bar 39 with the strike pin 41, an additional advancing movement is imparted to the ejector pin 30 to move the same substantially to the position shown in FIGURE 2, in which the casting is completely free of the dies and the associated parts. Thereupon, and by suitable controls (not shown), the air cylinder 44 operates to impart rotary motion to the pin 30. After rotation thereof through an arc of the order of 170°, the sus-

pending finger *e* breaks away from the ejector pin and the casting drops therefrom. The casting may drop into a tank of water to enable it to cool. In this manner, the casting is ejected in a controlled manner, and in a position completely free from the dies or associated parts, so as to militate against any damage to the casting.

Numerous changes in details of construction, arrangement, and operation may be effected without imparting from the spirit of the invention, especially as defined in the appended claims.

What we claim is:

1. In a die casting machine having relatively movable dies between which the casting is formed, an elongate horizontally disposed pin mounted for to and fro axial sliding movements in one die, a cut-away portion on the outer end of said pin and on the upper portion thereof when the pin is in casting position, said pin being disposed above the casting cavity in the dies and a gate being provided to enable molten metal to flow to said recess for casting a suspending finger on the end portion of said pin at the upper end of the main casting when the latter is cast, means to axially advance said pin to dispose and suspend the casting in a free position between the dies when the latter are separated, and means to rotate the pin whereby the casting drops off the pin.

2. The organization as claimed in claim 1 in which the cut-away end portion is arranged at one side of the axis of the pin and consists of a wall disposed in a plane parallel to an axial line through the pin, a wall inclining from the inner end of said first wall and forming an obtuse angle therewith, and notch means in one of said walls and arranged at the inner end portion thereof for receiving molten metal and thereby providing additional anchorage for retaining the casting in suspended position.

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