

June 23, 1964

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3,137,904

SPRUE BUSHING MOUNTING FOR DIE CASTING MACHINES

Filed June 26, 1961

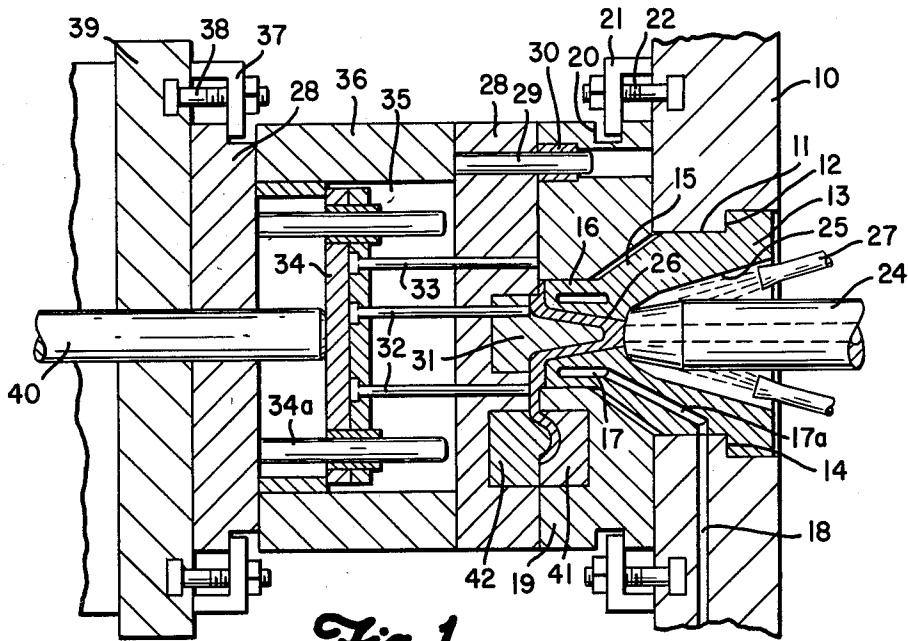


Fig. 1

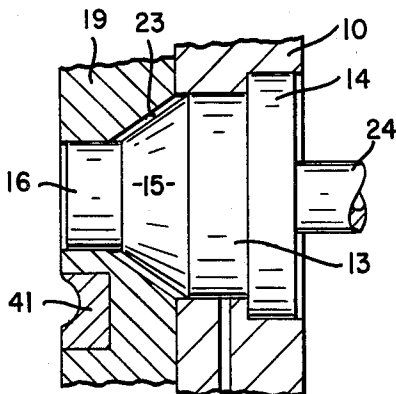


Fig. 3

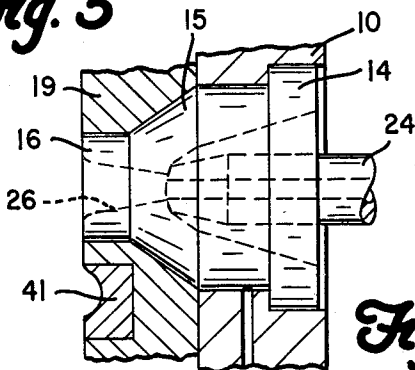


Fig. 4

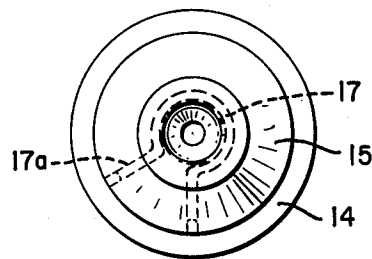


Fig. 2

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3,137,904

SPRUE BUSHING MOUNTING FOR DIE CASTING MACHINES

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Filed June 26, 1961, Ser. No. 119,467

1 Claim. (Cl. 22—68)

This invention relates to die casting machines, but more particularly to the mounting and arrangement of sprue bushings for such machines for increasing the efficiency of the machine and avoiding difficulties heretofore encountered.

Heretofore, the cover or stationary die of die casting machines has been equipped with a sprue bushing which receives the nozzle through which the molten metal is forced to the die parts. To maintain the metal in the desired molten state, one or more burners play upon the sprue bushing and the discharge end of the nozzle so that the heat generated in this region is intense. As a consequence, the metal of the nozzle expands in length to such an extent as to buckle or distort the cover die so that imperfect castings result. It is a desideratum to overcome this difficulty and militate against distortion of the cover die during casting operation.

An object is to mount the sprue bushing so that elongation of the metal carrying nozzle in response to the heat to which it is subjected does not in any way impair or distort the dies, and in particular the cover or stationary die.

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 drawings, in which

FIGURE 1 is a vertical, sectional elevation, somewhat diagrammatic of a portion of a die casting machine, showing in particular the sprue bushing, the cover die and movable die, and associated machine parts;

FIGURE 2 is an end view of the sprue bushing, showing particularly the water jacketing arrangement for same;

FIGURE 3 is a fragmentary sectional view showing a portion of the stationary platen of the machine, the cover or stationary die, and the sprue bushing in its un-expanded position or before the metal conveying nozzle and associated parts are heated, and indicating the spacing between the sprue bushing and cover die; and

FIGURE 4 is a view similar to FIGURE 3, showing how, when the parts are heated, the sprue bushing expands to fill the spaces provided for same.

The illustrated embodiment of the invention comprises a die casting machine which has a stationary platen 10 forming part of the machine frame. The platen 10 has an opening 11 provided with a shoulder 12 to receive a metallic sprue bushing 13. The sprue bushing has a flange 14 which abuts against the shoulder 12, and is formed with an inwardly tapered neck 15 terminating with a cylindrical nose 16. As shown in FIGURES 1 and 3, the tapered neck 15 in its unheated state is spaced as indicated at 23 from the adjacent tapered surface of the cover die. It will also be observed that the front end of the cylindrical nose 16 of the sprue bushing is normally spaced from the adjacent face of the cover die, one thirty-second of an inch being found adequate for the purpose.

The sprue bushing is water-jacketed, and as indicated on FIGURE 2, a channel 17 extends around the nose 16 of the bushing and has a pair of passages 17a which communicate with inlet and outlet water passages 18 respectively in the stationary platen 10. The latter communicate with a suitable source of liquid under pressure, to maintain a constant circulation of water in the nose of the sprue bushing.

A metallic cover die 19 is formed with an annular groove 20 on its outer side to receive a clamping ring 21 which is held in place by a series of stud bolts 22 for retaining the cover die in its stationary position, in abutting relation to the stationary platen 10. Molten metal under pressure is delivered to the sprue bushing from a nozzle 24, which extends into an inwardly flared socket 25 in the bushing. The nozzle is urged tightly against the end of the socket 25 in order to deliver the molten metal to an outwardly flared throat 26 in the sprue bushing. For maintaining the metal flow through the nozzle 24 in the proper fluid condition, a series of flame nozzles 27 direct flame against the discharge end portion of the nozzle.

Adapted to abut flatwise against the cover die 19 is a movable die 28, which carries a suitable guide pin 29 (only one pin being shown) which extends into a bearing sleeve 30 socketed into the cover die 19. Carried by the movable die is a sprue spreader 31, which has a conical nose for loosely entering the tapered throat 26 of the sprue bushing, as will be readily understood by those skilled in this art. A surface pin 33 is slidable transversely through the movable die to engage the face of the cover die, and this pin is carried by an ejector plate assembly 34 which is disposed within a cavity 35 of the movable die, the same being closed by a cover part 36 suitably fixed to and movable with the movable die 28. The ejector plate assembly 34 also carries ejector pins 32 which are arranged to engage the casting for ejecting it from the movable die, as will be readily understood. The ejector plate assembly has horizontal sliding movement on guide pins 34a arranged in vertically spaced relation within the cavity 35.

The movable die 28 is secured by a clamping ring 37, which is engaged by a series of stud bolts 38 to secure it to a die base 39, to which horizontal movement is imparted by any suitable means well known in the art.

Projecting through the die base and the movable die 28, and into the cavity 35 is a relatively stationary knock-out bar 40, against which the ejector assembly 34 abuts when retracting movement is imparted to the movable die 28 for moving the latter away from the cover die 19.

The cover die 19 has an impression insert 41 which cooperates with a complementary impression insert 42 in the movable die 28.

From the above description, it will be understood that the mounting of the sprue bushing is such that any expansion of the nozzle 24 will not be imparted to the cover die 19, but rather will be taken up entirely by the machine frame as represented by the stationary platen 10. The expansion of the sprue bushing will take up the space 23 provided between the tapered neck 15 and the cover die 19. Additionally, the nose 16 of the cover die can expand forwardly as much as one thirty-second of an inch in the form shown, without extending beyond the inner face of the cover die. Importantly, however, in this case the sprue bushing is carried by a stationary part of the die casting machine. It is not a part of the cover or stationary die 19, and with respect to the latter, spacing is provided to afford a certain amount of expansion, which is computed as being satisfactory under the conditions of service. The water jacketing of the nose of the sprue bushing tends to reduce the temperature of this part of the bushing, and militates against metal expansion. Importantly, the arrangement is such as to militate against any warpage or distortion of the cover die due to metal expansion under the high heat necessary in die casting operations, and thereby obviate the production of imperfect castings.

Numerous changes in details of construction, arrangement, and operation may be effected without departing

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from the spirit of the invention, especially as defined in the appended claim.

What we claim is:

In a die casting machine having a cover die and a movable die, a stationary platen against which said cover die abuts, said platen leaving an opening therethrough provided with a shoulder, said cover die having an opening in registry with the opening in said platen and tapering inwardly toward a reduced terminal passage leading to said movable die, a sprue bushing carried by said platen and extending substantially the entire distance through said cover die, said sprue bushing having a socket at the outer end to receive a molten metal delivering nozzle adapted to be urged tightly against same, a shoulder on said bushing cooperating with said platen shoulder for enabling said stationary platen to take up the thrust imposed on said bushing in a direction toward said cover die, a tapered neck on said bushing disposed within the tapered opening of said cover die and normally spaced out of con-

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tact therewith, and a nose on said tapered neck fitting the terminal passage in said cover die, the front end of said nose being spaced inwardly a short distance from the outer end of the terminal passage.

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