

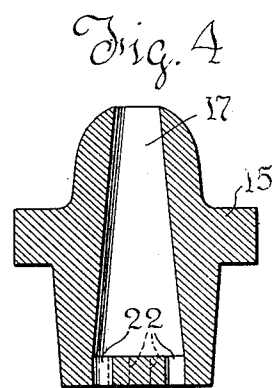
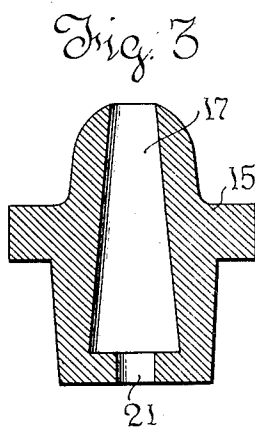
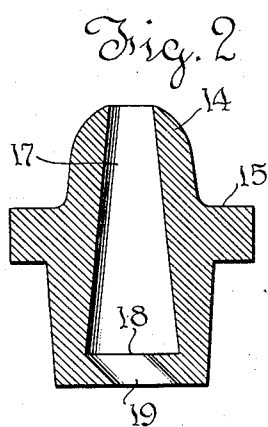
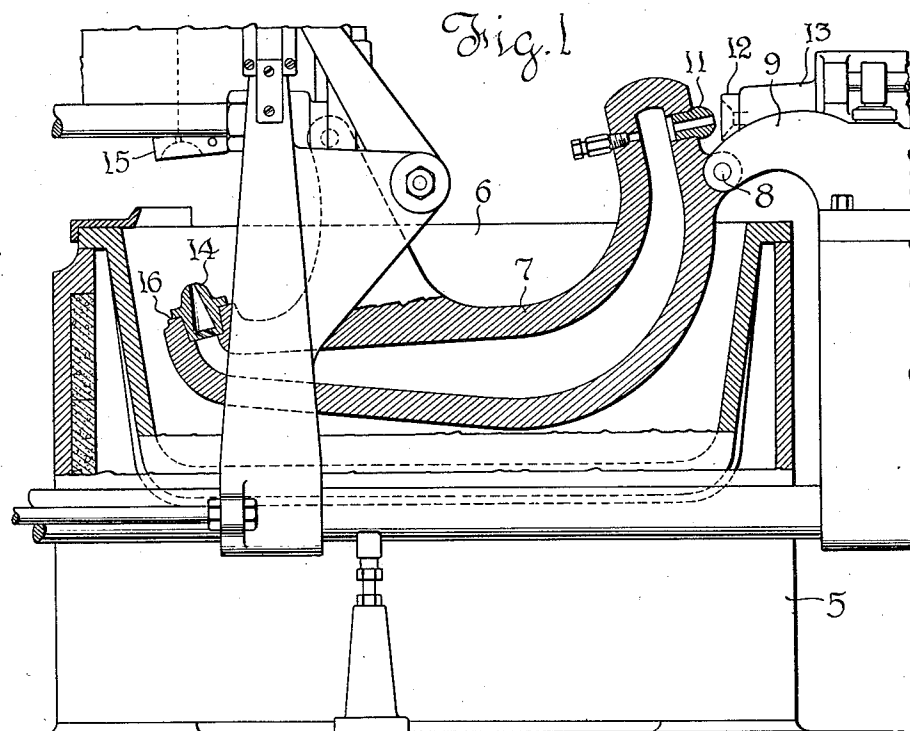
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DIE CASTING MACHINE

Filed May 27, 1929



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UNITED STATES PATENT OFFICE

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DIE CASTING MACHINE

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This invention relates to die casting machines and particularly to the goose neck or ladle which delivers the molten metal to the die.

5 In the operation of machines of this type the ladle or goose neck is raised from the molten metal pot so that its discharge nozzle is brought against either the die or a nozzle plate associated therewith. Air under pressure, or other equivalent means, is then rendered effective to displace a part of the molten metal from the goose neck or metal-delivering chamber into the die cavity. At the termination of such action the ladle or goose neck is lowered into the metal pot.

15 The movements of the goose neck commonly cause a surging motion of the molten metal in the goose neck and at times this results in a sudden discharge or spurring of molten metal from the nozzle while the latter is out of contact with the die. This discharge often occurs with sufficient force to throw the molten metal onto the nozzle plate, or the lower face of the die, or even into the die itself, where it freezes. When this occurs it is commonly necessary to shut down the machine and clean the metal off.

25 The present invention checks such discharging action and comprises the features described and shown in the accompanying drawings and indicated by the claims.

In the drawings,—

35 Fig. 1 is a side elevation, partly in section, of a portion of a die casting machine showing a goose neck embodying my invention.

Fig. 2 is an enlarged view in section of the goose neck nozzle in its preferred form.

40 Figs. 3 and 4 are similar views of modified forms in which the nozzle portion of the goose neck may be made.

Referring to Fig. 1 of the drawings, 5 indicates the furnace of a die casting machine upon which is supported the melting pot 6. The goose neck or pressure chamber is indicated at 7, being suspended within the melting pot 6 and pivoted at 8 upon bracket 9. The goose neck 7 is provided with an air nozzle 11 which contacts and establishes air connection with the air chamber nozzle seat 12 for the purpose of admitting air under pres-

sure to the goose neck. At 13 is the air chamber which receives its air supply from any suitable source (not shown).

At the other end the ladle or goose neck includes a slender tapering spout or neck terminating in a nozzle 14. This nozzle rises and contacts nozzle plate 15 when the ladle is moved or rocked to raise the spout, such movement being accomplished by mechanism, parts of which are shown in the drawings, and whose exact form is immaterial to the present invention.

55 In Figs. 1 and 2, which illustrate the preferred form of the invention, there is shown a goose neck nozzle, the exterior configuration of which is substantially the same as those at present in use. This nozzle is provided with the usual seating flange 15 which seats upon the exterior rim surrounding the mouth of the goose neck as indicated at 16. The nozzle is provided with a passage 17 preferably tapered toward its upper end. This passage, as shown, does not extend entirely through the nozzle, but terminates short of the lower end leaving a thickness of metal to form a baffle 18. Through this baffle 18 and connecting the passage 17 with the interior of the goose neck proper, is a second passage 19 which, as shown, is substantially one half the diameter of the lower end of passage 17. This enters passage 17 at approximately a 45° angle.

65 It is to be understood that while the form of the goose neck nozzle above described is preferred, changes in the shape, size and proportioning may be made within the scope of the invention. For example, the forms shown in Figs. 3 and 4 may be used.

70 In Fig. 3 a single restricting passage 21 axially aligned with passage 17 is shown, thus permitting the molten metal to enter passage 17 in an axial direction.

75 In Fig. 4 a plurality of still smaller passages 22 are shown in place of a single passage. These serve to discharge the metal against the tapered bore of the nozzle.

80 It is also to be understood that while there is shown and described a specific form of goose neck or pressure chamber and associated mechanism, other forms are equally suscep-

tible to the application of this invention. In the form shown air pressure is utilized in displacing the molten metal from the goose neck, this being a familiar and satisfactory method. It might be desirable, however, under some conditions to use other pressure fluids for this purpose, or to use known displacing means not dependent on the use of fluid pressure. With such forms the present invention would be effective. It is not essential that the nozzle be a separate piece from the goose neck, but such construction facilitates replacements, and as the nozzles have a shorter life than the goose neck, results in economy. When the nozzle is formed as a separate, removable part of the goose neck, baffle 18 may be located in the nozzle, in the goose neck proper, or between these parts. If the nozzle is to form an integral part of the goose neck, in accordance with the earlier practice, it is necessary only that the baffle be located properly in the metal-discharging or nozzle portion of the goose neck bore in order to check effectually the undesirable spurting or discharging action of the metal. While the exact cause for the desirable results secured is immaterial to the invention, it is believed to be as follows:

When a considerable mass of molten metal surges toward the nozzle of the goose neck, and this is apt to occur when the nozzle moves downward, the flow of the metal is checked as the advancing wave of metal flows into the neck and approaches the nozzle. At such time the momentum of the metal is gradually converted into a pressure-head. In the old type of nozzle and particularly in that common type having a simple tapered bore, this pressure head is converted into a relatively high velocity head without substantial loss of energy, because the change of cross section of the passage through which the metal flows is gradual. Consequently the metal spurts from the nozzle with considerable velocity. With the forms of nozzle shown in Figs. 1 and 2 there is a sudden change of cross-section of the passage when the metal enters and again when it leaves the passage 19. The same action occurs with reference to the passage 21 of Fig. 3 and passages 22 of Fig. 4. The result is violent eddy flow, which absorbs the pressure head and thus limits the derived velocity head. Furthermore, in the forms of Figs. 1, 2 and 4, the metal is discharged against the walls of the tapered passage 17, with an increased eddying and energy absorption.

The combined actions of suddenly reducing the flow path of the metal and then suddenly increasing it, have been found to produce most efficient results. However, it is conceivable that the feature of suddenly increasing the flow path with the resultant dissipation of the force of the metal stream might be used alone.

Whatever the theory, the effect is to suppress the spurting to a degree which eliminates all harmful action.

What is claimed is,—

1. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port and a constriction in said bore formed to effect an abrupt contraction and an abrupt expansion of the flow path of the metal.
2. A pressure chamber for use in die casting machines of the type in which the metal containing pressure chamber is moved while disconnected from the die, said pressure chamber having a bore leading to a metal discharge port and a constriction in said bore formed to effect an abrupt contraction and an abrupt expansion of the flow path of the metal.
3. A metal-delivering pressure chamber for die casting machine, said pressure chamber having a bore leading to a metal discharge port; and means in the bore for producing a sudden decrease and then a sudden increase in the cross sectional area of the flow path of the metal through said bore.
4. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port and a constriction in said bore formed to effect an abrupt decrease and an abrupt increase in the cross sectional area of the flow path of the metal and to direct the metal against the side walls of the bore between the constriction and the metal discharge port.
5. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port; and means located in the bore for effecting an abrupt increase in the cross sectional area of the metal flow path therethrough.
6. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port; and a baffle in said bore having a plurality of openings therein for the passage of metal to the discharge port, said baffle serving to effect an abrupt increase in the cross sectional area of the metal flow path on the discharge side of the baffle.
7. A pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port and an annular baffle located in said bore forwardly of the discharge port and having its sides disposed substantially at right angles to the axis of the bore.
8. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port and a constriction in said bore formed to effect an abrupt decrease and then

an abrupt increase in the cross sectional area of the flow path of the metal and to direct the metal towards the discharge port obliquely to the axis of the bore.

5 9. A metal-delivering pressure chamber for die casting machines, said pressure chamber having a bore leading to a metal discharge port and a baffle arranged in the bore to produce an abrupt contraction and
10 an abrupt expansion of the metal flow path together with abrupt changes of direction of flow.

10. A metal-delivering pressure chamber for die casting machines, said pressure
15 chamber having a bore which includes a metal-containing portion and a contracting tapered portion leading to a port through which the metal is discharged; and a baffle
20 intermediate said metal-containing and tapered portions of the bore for effecting first a sudden reduction and then a sudden expansion of the cross sectional area of the metal flow path through the bore.

25 11. A demountable metal discharge nozzle element for die casting machines, of the type including a shiftable metal delivering pressure chamber, said nozzle having a bore leading to a port through which the final metal
30 discharge takes place, and the inner end of the nozzle being closed by a wall having an inlet port for effecting a sudden expansion of the metal flow path through the nozzle.

35 12. A demountable metal discharge nozzle element for die casting machines, of the type including a shiftable ladle, said nozzle having a contracting tapered bore through which the final discharge takes place, and an entrance passage coaxial with said bore and
40 of an area materially smaller than the large end of said bore.

13. A demountable metal discharge nozzle element for die casting machines, of the type including a shiftable ladle, said nozzle having a contracting tapered bore through which
45 the final discharge takes place, and a constricted entrance passage to said bore arranged to direct the entering metal against the side walls of said tapered passage.

50 14. A demountable metal discharge nozzle element for die casting machines, of the type including a shiftable ladle, said nozzle having a contracting tapered bore through which the final discharge takes place, and a
55 plurality of entrance passages to said bore approximately tangent with the periphery of the larger end of said tapered bore.

In testimony whereof I have signed my name to this specification.

ALVIN SIMEON KIDD.

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