Nov. 4, 1941. J. N. SMITH 2,261,592

DIE CASTING MACHINE

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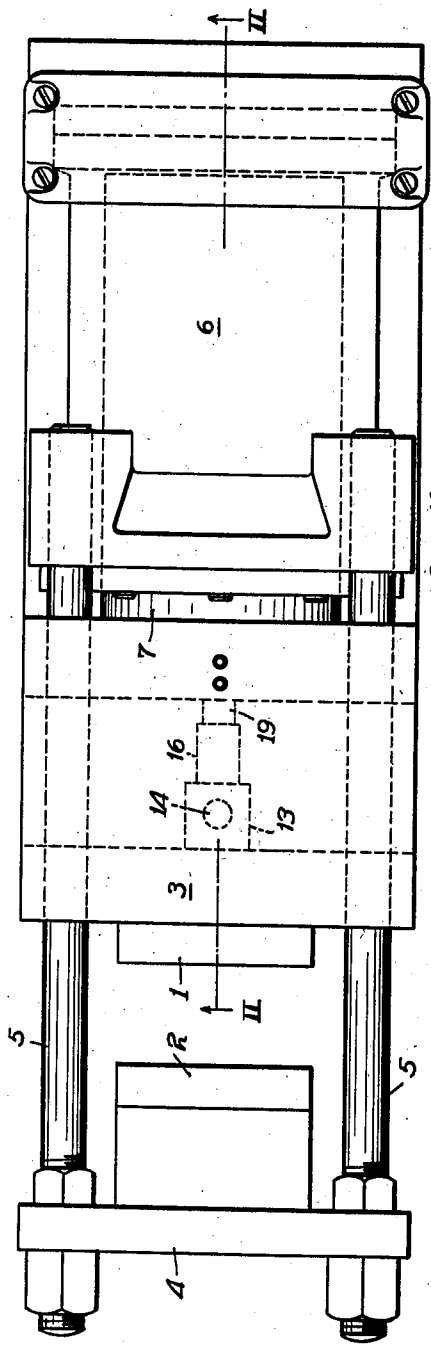


Fig. 1.

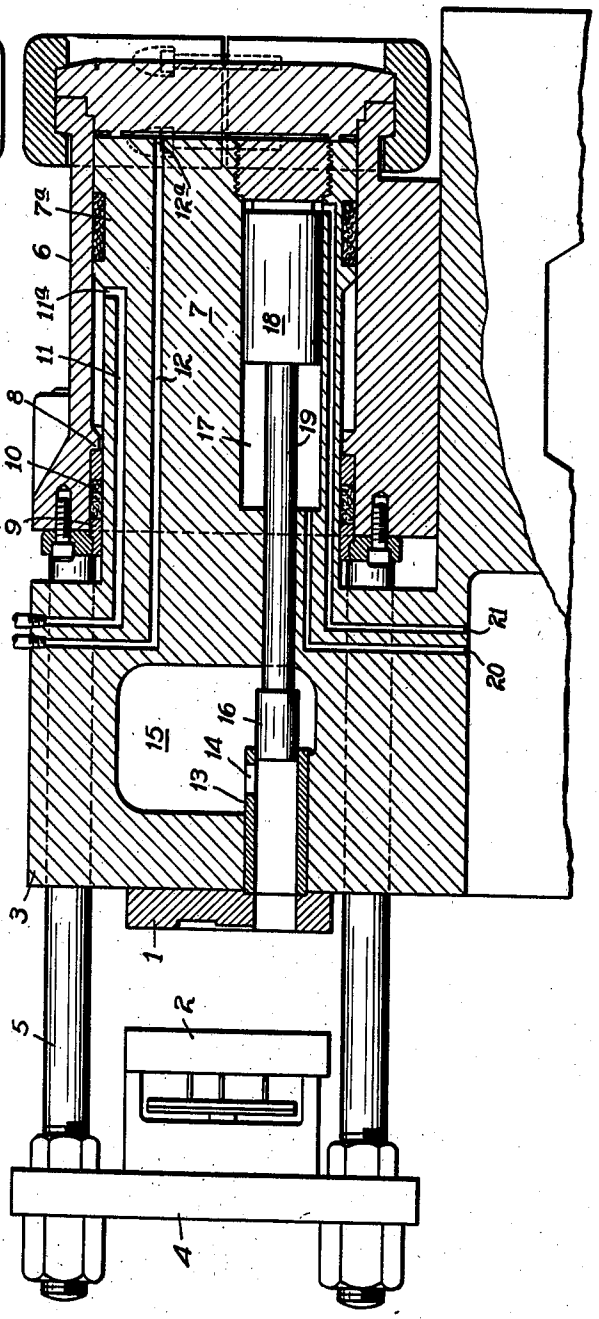


Fig. 2.

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DIE CASTING MACHINE

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4 Claims. (Cl. 22—68)

This invention relates to die casting machines, and particularly to die casting machines designed to cast metal at relatively high pressures.

In die casting machines employing a fixed and a movable die to form a mold cavity, and especially in those machines employing a reciprocable plunger to force the material to be cast into the mold cavity under high pressures, such as pressures of from 1000 to 7500 pounds per square inch, the mechanism for injecting the material into the mold cavity is usually positioned on one side of the die-parting line, and the mechanism for moving the movable die to and from the fixed die is located on the opposite side of the die-parting line. With the plunger type of machine, the plunger and the movable die are ordinarily actuated by suitable hydraulic pressure apparatus. Such an arrangement of the injecting apparatus and the die-operating mechanism results in the machine's requiring a considerable amount of floor space, and this is particularly true with respect to the plunger type of machines in view of the large size of the apparatus required to operate the metal-injecting plunger and the movable die.

It is an object of this invention to provide compact and economical die casting apparatus in which both the mechanism for injecting material into the dies, and the mechanism for moving the movable die to and from the fixed die, lie on the same side of the die-parting line, and a portion of the mechanism for injecting material into the dies is telescoped into the mechanism for actuating the movable die.

It is a further object of this invention to provide die casting apparatus in which the movable die is actuated by a pressure cylinder reciprocable over a fixed ram, and a plunger adapted to force molten metal into the mold cavity is reciprocated by mechanism located in the fixed ram. It is a further object of this invention to provide die casting apparatus having hydraulic mechanism for opening and closing the dies, and a hydraulically-actuated plunger adapted to force molten metal into the dies, in which the hydraulic mechanism for actuating the plunger is located within the mechanism for opening and closing the dies.

Other objects of this invention will be apparent from the following specification and claims, and from the accompanying drawing, in which:

Fig. 1 is a plan view of a die casting machine constructed in accordance with my invention; and

Fig. 2 is a view, partly in side elevation and partly in vertical section, taken on the line II—II of Fig. 1.

Referring to the drawing, the fixed die 1 and the movable die 2, which cooperate to form the mold cavity, are carried by the fixed die plate 3 and the movable die plate 4 respectively. The movable die plate 4 is carried by the pillar bars 5 which are fixedly attached to the pressure cylinder 6, which cylinder is slidably mounted on the machine frame for reciprocation along the fixed ram 7. The fixed ram 7 is attached to the fixed die plate 3, and is provided toward one end thereof with a portion 7a of enlarged diameter with which the interior side wall of the cylinder 6 has a sliding fit. Likewise, the interior side wall of the cylinder 6 is provided with an annular packing seat 8 which cooperates with the bushing 9 to hold the packing 10 which has a sliding fit over the fixed ram 7. The fluid passage 11 in the fixed ram communicates with a source of hydraulic pressure, and also communicates with the space between the cylinder 6 and the ram 7 defined by the enlarged portion 7a of the ram and the packing 10, through the port 11a. The fluid passage 12 communicates with a source of hydraulic pressure, and also communicates with the interior of the pressure cylinder 6 through the port 12a.

The receptacle 13 for material to be cast has a pouring hole 14 therein and extends through the face of the fixed die plate 3 to which the fixed die 1 is attached, and projects into a transverse opening 15 in the fixed die plate 3, which opening permits access to the pouring hole 14 of the receptacle so that molten metal to be cast can be poured into the receptacle from a ladle or the like. The bore of the receptacle 13 communicates with the mold cavity when the dies are closed through a gate opening in the fixed die 1.

A plunger 16 is reciprocable lengthwise of the bore of the receptacle 13 to force molten metal or the like from the receptacle and into the dies. A pressure chamber 17 having a piston 18 reciprocable therein is provided in the fixed ram 7, the piston 18 being connected to the plunger 16 by the piston rod 19. The fluid passages 20 and 21 communicate with the pressure chamber 17 and with a suitable source of hydraulic pressure to actuate the piston 18 and the plunger 16.

The apparatus described above operates as follows:

With the dies separated, as illustrated in Figs. 1 and 2, pressure fluid is introduced into the pressure cylinder 6 through the passage 12, forcing

the pressure cylinder to move away from the fixed die 1 and thereby drawing the movable die 2 against the fixed die to form the mold cavity. With the dies in that position, the material to be cast is ladled into the receptacle 13 through the pouring hole 14, after which pressure fluid is introduced into the pressure chamber 17 through the fluid passage 21 to move the piston 18 toward the fixed die 1 and thereby impart an injecting stroke to the plunger 16 which forces the molten material in the receptacle into the mold cavity formed by the fixed and movable dies. When the casting in the mold cavity has hardened sufficiently to permit its removal from the dies, pressure fluid is forced into the pressure cylinder 6 through the fluid passage 11 and, as the pressure cylinder 6 advances under the influence of that pressure, the movable die 2 is carried away from the fixed die 1 by the pillar bars 5. To cause retraction of the plunger 16 and the piston 18, pressure fluid is admitted into the pressure chamber 17 through the fluid passage 20.

Various modifications can be made in the apparatus described above without departing from the spirit of the invention nor from the appended claims.

I claim:

1. In a die casting machine, a fixed die and a movable die adapted to cooperate to form a mold cavity, a fixed die plate carrying said fixed die and having a transverse opening therein, a receptacle for metal to be cast, said receptacle being carried by said die plate and having a substantially horizontally disposed bore communicating with said fixed die, a plunger reciprocable in said receptacle, a substantially horizontally reciprocable pressure cylinder, means carried by said pressure cylinder for supporting said movable die, a fixed ram attached to said fixed die plate and extending into said pressure cylinder, means for supplying pressure fluid to the interior of said pressure cylinder to actuate said cylinder and said movable die, said receptacle having a pouring hole therein communicating with said transverse opening in said die plate, and means within said fixed ram for actuating said plunger.

2. In a die casting machine, a fixed die and a movable die adapted to cooperate to form a mold cavity, a fixed die plate carrying said fixed die and having a transverse opening therein, a receptacle for metal to be cast, said receptacle being carried by said die plate and having a substantially horizontally disposed bore communicating with said fixed die, a plunger reciprocable in said receptacle, a substantially horizontally reciprocable pressure cylinder, means carried by said pressure cylinder for supporting said movable die, a fixed ram attached to said fixed die plate and extending into said pressure cylinder, means for supplying pressure fluid to the interior of said pressure cylinder to actuate said cylinder and said movable die, said receptacle having a pouring hole therein communicating with said transverse opening in said die plate, a pressure chamber within said ram, a piston reciprocable within said pressure chamber and adapted to actuate said plunger, and means for supplying pressure fluid to said pressure chamber to actuate said piston.

3. A die casting machine comprising a fixed die and a movable die adapted to cooperate to form a mold cavity, a substantially horizontally reciprocable pressure cylinder, means carried by said pressure cylinder for supporting said movable die, said fixed die being intermediate said movable die and said pressure cylinder, a fixed ram within said pressure cylinder, means for supplying pressure fluid to the interior of said pressure cylinder which is effective to actuate said pressure cylinder and said movable die, a receptacle for metal to be cast having a substantially horizontally disposed bore communicating with said mold cavity when said dies are closed, said receptacle being disposed intermediate said fixed die and said fixed ram, a plunger reciprocable in the bore of said receptacle, and a piston reciprocable within said ram and adapted to actuate said plunger.

4. A die casting machine comprising a fixed die and a movable die adapted to cooperate to form a mold cavity, a substantially horizontally reciprocable pressure cylinder, means carried by said pressure cylinder for supporting said movable die, said fixed die being intermediate said movable die and said pressure cylinder, a fixed ram within said pressure cylinder, means for supplying pressure fluid to the interior of said pressure cylinder which is effective to actuate said pressure cylinder and said movable die, a receptacle for metal to be cast having a substantially horizontally disposed bore communicating with said mold cavity when said dies are closed and lying wholly below the horizontal axis of said fixed ram, said receptacle being disposed intermediate said fixed die and said fixed ram, a plunger reciprocable in the bore of said receptacle, and a piston reciprocable within said ram and adapted to actuate said plunger, said plunger and said piston lying wholly below the horizontal axis of said fixed ram.

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