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J. N. SMITH
DIE CASTING APPARATUS
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Fig. 1.

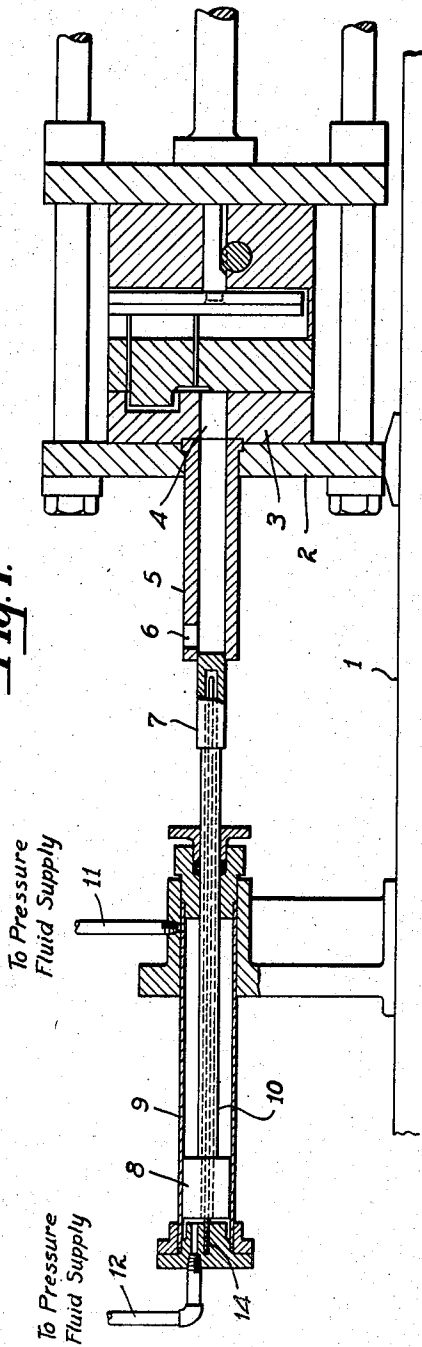


Fig. 3.

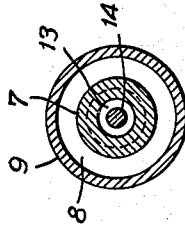
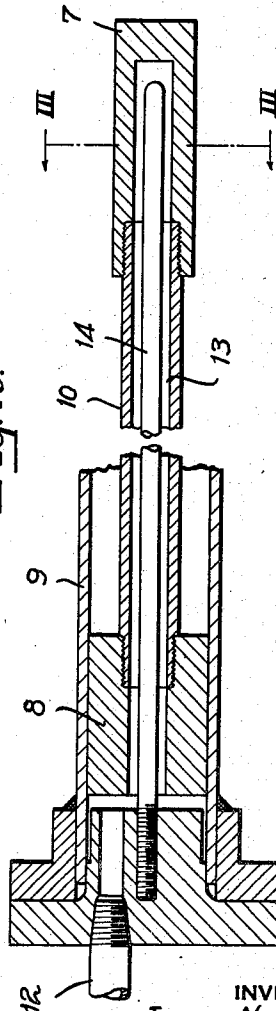


Fig. 2.



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DIE CASTING APPARATUS

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4 Claims. (Cl. 22—68)

This invention relates to die casting apparatus, and more particularly to die casting machines in which the material to be cast is forced into the mold cavity by means of a plunger reciprocable in a receptacle for the material to be cast.

In some types of die casting machines, and particularly those employing relatively high pressures to force the material to be cast into the mold cavity, a plunger adapted to reciprocate in a suitable receptacle is used to inject the material to be cast into the dies. The plunger is usually actuated by fluid-pressure means, such as a hydraulic cylinder having a piston therein which is connected to the plunger. In some instances it is desirable to regulate the temperature of the plunger by cooling it, chiefly for the purpose of checking deterioration of the plunger resulting from contact with the hot material being cast. Such deterioration of the plunger is particularly likely to occur in machines for die casting the higher melting point metals, such as aluminum alloys or brass.

It is an object of my invention to provide die casting apparatus of the type employing a reciprocable plunger to force the material to be cast into the mold cavity, and pressure-fluid means for actuating the plunger, in which the temperature of the plunger is regulated by the pressure fluid which actuates it.

It is a further object of my invention to provide die casting apparatus of the type employing a reciprocable plunger to force the material to be cast into the mold cavity, and pressure-fluid means for actuating the plunger, in which means are provided for circulating in the plunger the pressure fluid which actuates it.

It is a further object of my invention to provide die casting apparatus of the type in which a plunger is used to inject the material to be cast into the mold cavity, in which the plunger is actuated by a fluid-pressure cylinder, and the pressure cylinder is provided with means for inducing circulation in the plunger of the pressure fluid used to actuate the plunger.

It is a further object of my invention to provide die casting apparatus of the type employing a reciprocable plunger to force molten metal into the mold cavity, in which the plunger is cooled by pressure fluid employed to actuate it.

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

Fig. 1 shows, partly in side elevation and partly in cross-section, a portion of a die casting ma-

chine constructed in accordance with my invention;

Fig. 2 is an enlarged view of a portion of the apparatus shown in Fig. 1; and

Fig. 3 is a cross-section taken on the line III—III in Fig. 2.

Referring to the drawing, the base 1 supports a fixed platen 2, on which is mounted the fixed die 3 which communicates through the sprue 4 with the cylindrical receptacle 5. The receptacle 5 is adapted to receive, through the pouring hole 6 therein, the molten metal to be cast, the molten metal being poured through the pouring hole from a suitable ladle or the like. The plunger 7 is reciprocable in the bore of the receptacle 5 and has a sliding fit therein.

Reciprocation of the plunger 7 in the receptacle 5 is caused by the piston 8, which is reciprocable in the hydraulic cylinder 9, the piston 8 being connected to the plunger 7 by the piston rod 10. Hydraulic pressure for actuating the piston 8 and the plunger 7 is furnished at each end of the hydraulic cylinder 9 through the pipes 11 and 12 which are connected to sources of hydraulic pressure. Suitable valve arrangements may be used on the pipes 11 and 12 to permit the pressure fluid from the pipes to cause reciprocatory movement of the plunger 7 lengthwise of the cylinder 9. It is to be understood that other types of fluid pressures, such as pneumatic pressure, for example, can be used in the pressure cylinder in place of hydraulic pressure.

A continuous passage or chamber 13 extends longitudinally through the piston 8 and the piston rod 10 and into the plunger 7. The chamber 13 is open at the end of the piston 8 on which hydraulic pressure from the pipe 12 exerts pressure to force the plunger 7 toward the dies and inject metal from the receptacle 5 into the dies. Since the chamber 13 communicates with the pressure cylinder 9 in the manner described, pressure fluid entering the cylinder from the pipe 12 flows into the chamber 13.

In order to cause circulation of the pressure fluid in the chamber 13, a stationary rod 14 is carried by the pressure cylinder and extends into the chamber 13. Preferably the rod 14 is of sufficient length to extend into the portion of the chamber 13 which lies within the plunger 7 when the plunger 7 is in a retracted position, as shown in Figs. 1 and 2. The rod 14 is sufficiently smaller in diameter than the chamber 13 to permit the pressure fluid to circulate around it

freely in the chamber, and is preferably positioned along the longitudinal axis of the chamber.

The apparatus described above operates as follows:

With the plunger 7 in the position shown in Fig. 1, molten metal is poured into the receptacle 5 through the opening 6. Pressure fluid is then admitted to the cylinder 9 through the pipe 12 to cause the piston 8 and the plunger 7 to move in the direction of the die 3, and to force the molten metal from the receptacle 5 into the dies. As the pressure fluid from the pipe 12 flows into the cylinder 9 to actuate the piston 8, it likewise fills the chamber 13 and absorbs heat transferred to the plunger 7 from the material being cast.

After the plunger has completed the injection stroke, pressure fluid from the pipe 11 is admitted to the cylinder 9 to cause retraction of the plunger 7 and piston 8 to their original positions. As this is taking place, the rod 14 advances into the chamber 13 and displaces some of the fluid therefrom. Consequently, circulation of the fluid in the chamber 13 is obtained.

Although my invention is particularly useful in machines in which it is desirable to cool the plunger, it is also applicable to machines in which it is desirable to heat the plunger, such as machines for die casting plastics and the like. In such machines heating of the plunger serves to prevent solidification of the material being cast. In such machines the pressure fluid which actuates the piston in the pressure cylinder should obviously be heated to whatever temperature is required in order to maintain the plunger at the desired temperature.

Various other modifications can be made in my invention without departing from the spirit and scope of the appended claims.

I claim:

1. In a die casting machine including a pres-

sure fluid chamber, a piston reciprocable in said pressure chamber, a reciprocable plunger actuated by said piston, means for supplying pressure fluid to said pressure chamber for actuating said piston; said piston and said plunger being provided with means for conducting into said plunger fluid supplied to said pressure chamber by said means for supplying pressure fluid.

2. In a die casting machine, a pressure-fluid chamber, a piston reciprocable in said pressure chamber, a reciprocable plunger actuated by said piston, means for supplying pressure fluid to said pressure chamber for actuating said piston, and a piston rod joining said piston and said plunger, a continuous passage within said plunger and said piston, said passage communicating with said pressure chamber.

3. In a die casting machine, a pressure-fluid chamber, a piston reciprocable in said pressure chamber, a reciprocable plunger actuated by said piston, means for supplying pressure fluid to said pressure chamber for actuating said piston, and a piston rod joining said piston and said plunger, a continuous passage within said plunger and said piston, said passage communicating with said pressure chamber, and a rod fixedly attached to a wall of said pressure chamber and extending into said continuous passage.

4. In a die casting machine, a pressure-fluid chamber, a piston reciprocable in said pressure chamber, a reciprocable plunger actuated by said piston, means for supplying pressure fluid to said pressure chamber for actuating said piston, and a piston rod joining said piston and said plunger, a continuous passage within said plunger and said piston, said passage communicating with said pressure chamber, and a rod extending into said continuous passage and spaced from the walls thereof, said rod being fixedly attached to a wall of said pressure chamber.

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