

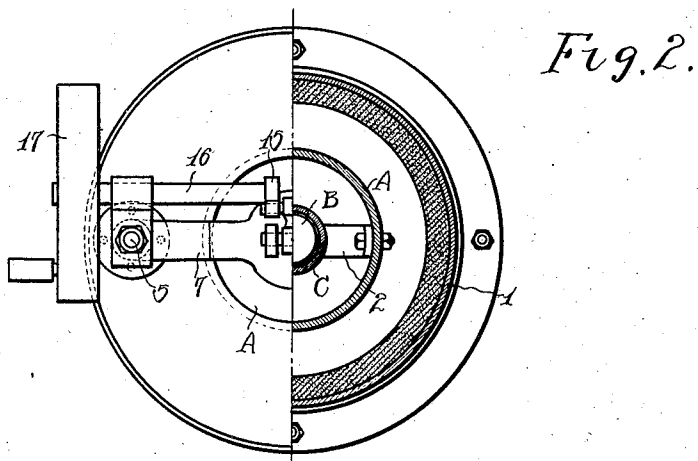
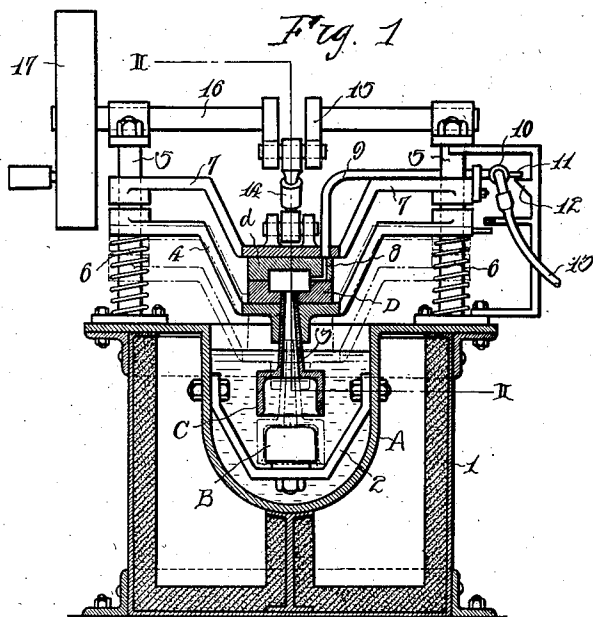
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DIE CASTING APPARATUS

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DIE CASTING APPARATUS

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1 Claim. (Cl. 22—68)

This invention relates to an apparatus for die casting, and comprises a receptacle containing molten metal, a piston fixed to the bottom portion of said receptacle, a movable cylinder immersed in said molten metal in the receptacle and adapted to engage with said fixed piston and to force the molten metal under pressure into a mold space, and means actuated by the downward movement of said cylinder and the mold for expelling air from said mold space.

The object of the invention is to provide a die casting apparatus in which the molten metal is forced with speed into the mold space by applying high pressure thereto and by expelling air from the mold space, whereby preventing the air in the mold from being confined and compressed in the mold space, so that superior products of die casting can be obtained.

The accompanying drawing illustrates the apparatus according to this invention, in which:—

Fig. 1 is a vertical section through the apparatus, and Fig. 2 is a plan view thereof, one half being shown in section taken along line II—II of Fig. 1.

Referring to the drawing, a receptacle A containing molten metal is arranged in a suitable heating furnace 1, and is heated by means of heavy oil or other suitable fuel. A fixed piston B is supported in said receptacle near its bottom by means of a bracket 2. A pressure applying cylinder C is open at the lower end, and it is adapted to slide upwardly and downwardly engaging with said piston B. The upper end of the cylinder C is provided with a molten metal transferring tube 3, and by which it is supported on a bracket 4. Said tube 3 terminates within lower die D which is also supported by said bracket 4. The bracket 4 is slidably mounted at both ends on posts 5, and is supported by springs 6 wound around said posts 5. An upper die *d* cooperating with the lower die D is mounted on the central portion of an upper bracket 7. Said upper die *d* is provided with an air escape port 8 which is in communication with a controlling valve 10 through a discharge pipe 9. Said controlling valve 10 is adapted to move with the bracket 7 along the posts 5, and it is opened when a valve lever 11 is engaged with and actuated by a projection 12. The valve 10 is connected through a flexible pipe 13 to an evacuating pump or to a vacuum tank (not shown). The bracket 7 carrying the upper die *d* is connected by means of a connecting rod 14 to a crank 15 of a drive shaft 16 having a pulley or hand wheel 17, whereby the bracket 7 is reciprocated.

Upon rotating the drive shaft 16 by the hand wheel 17, the bracket 7 is first lowered actuated by the crank 15 and the connecting rod 14, and the upper die *d* engages with the lower die D, as shown in Fig. 1. When the upper die *d* is lowered farther, it presses the lower die D, and the latter moves down together with the bracket 4 along the posts 5, compressing the springs 6, whereby the cylinder C immersed in the molten metal in the receptacle A is moved downwardly in engagement with the piston B. Consequently, the molten metal confined in the cylinder C is subjected to pressure and is forced through the tube 3 into the mold space formed by the upper and lower dies. At the same time, the lever 11 of the controlling valve 10 is actuated by the projection 12, and said valve 10 opens to the vacuum pump or tank, whereby expelling air from the mold space.

With the heretofore employed apparatus for die casting, even though the molten metal was supplied with an elevated pressure, there was a disadvantage that the product of casting was porous and, in some cases, pores appeared on the surface of the casting, considerably injuring the appearance of the product. The greater the pressure of the molten metal, the greater the porosity of the product, due to the fact that more air is confined and compressed within the mold space without being given an opportunity for escaping. On the contrary, according to this invention, the pressure applying cylinder C is rapidly pressed down by the inertia of the downwardly moving upper die *d* engaging the lower die D, the cylinder engaging with the piston B and applying high pressure to the molten metal in the cylinder, and at the same time the air in the mold space is expelled by automatically opening the controlling valve 10, so that the molten metal is introduced into the evacuated mold space under high pressure, without compressing the air therein.

Upon the upward stroke of the upper and lower dies, the cylinder C and the lower die D are returned to the normal position by the action of the springs 6, the cylinder C sucking in the molten metal for next use. Upon downward stroke of the cylinder C, excess amount of the molten metal in the cylinder escapes through the space between the piston B and the lower end of the cylinder C, so that the pressure of the molten metal is automatically regulated. During the upward movement of the dies, when they reach the position shown in Fig. 1, the lower die D stops and the upper die *d* only moves

farther, opening the mold for allowing the product to be discharged. The casting produced in the apparatus of this invention does not possess any porosity, having smooth surfaces, and it is
5 shaped most accurately.

The invention is applicable to the casting of brass or iron as well as for casting of light metal.

What I claim is:—

10 In a die casting apparatus, a pair of recessed die members, forming, when closed, an intervening mold space, means for initially closing said members by the independent vertical movement of one of said members and for then moving both of said members conjointly, a recep-

tacle for molten metal, a fixed piston in said receptacle, a hollow tubular cylinder engaging with said piston on the downward stroke of said cylinder and formed with a channel communicating with said mold space, for the supply of
5 molten metal from the receptacle to said space, means for exhausting air from the mold space by the pressure of the molten metal forced into the mold space from the receptacle, said means, including an exhaust tube leading from the mold
10 space, an exhaust controlling valve and means for automatically operating said valve on the downward movement of the die members.

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