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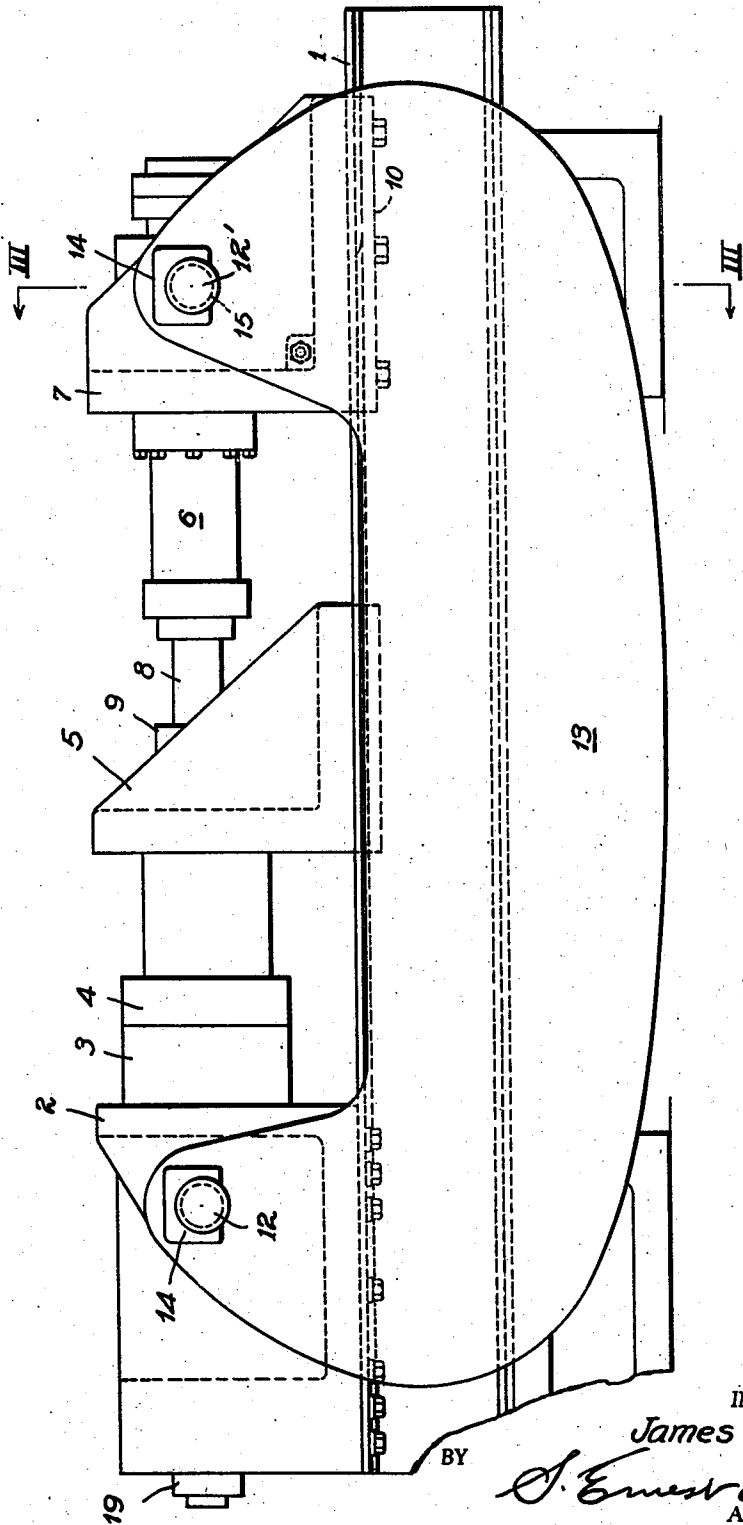
2,220,776

PRESSURE CASTING APPARATUS

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2 Sheets-Sheet 1

Fig. 1.



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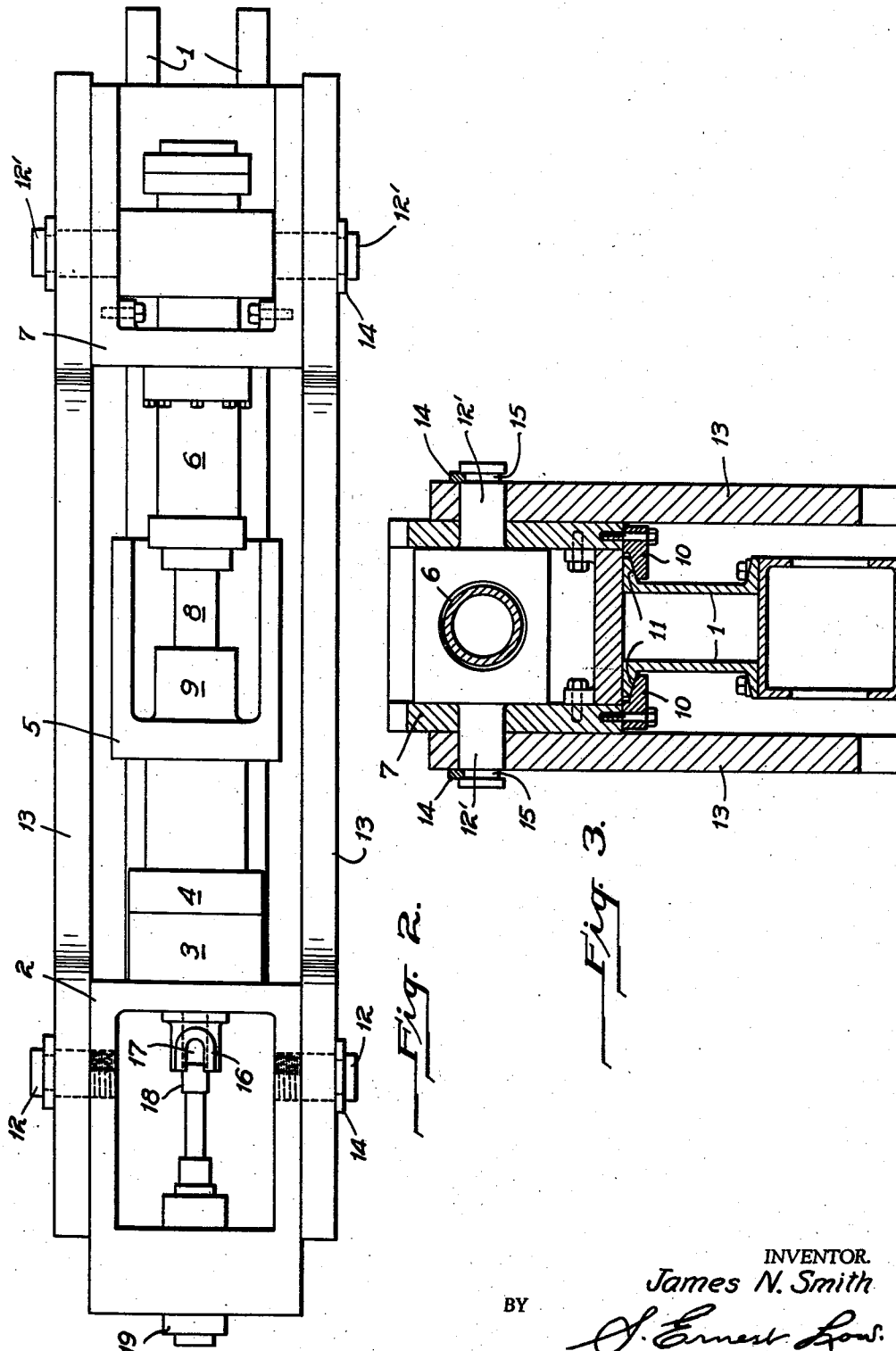
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PRESSURE CASTING APPARATUS

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2 Claims. (Cl. 22—68)

This invention relates to pressure casting machines, and more particularly to pressure casting apparatus designed to inject molten metal into a mold cavity formed by separating dies.

5 In pressure casting apparatus the mold cavity is ordinarily formed by a fixed die and a movable die mounted on a fixed platen and a movable platen respectively, the movable die being adapted to cooperate with the fixed die to form
10 the mold cavity when moved into contact with the fixed die. After a casting is made in the mold cavity, the movable die is withdrawn from the fixed die, and the casting is removed. In order that castings produced in the apparatus may
15 have the desired form, and also in order that the dies may open and close properly, it is essential that the dies be maintained in proper alignment while they are in a closed position, and also during the opening and closing movements of the
20 movable die.

Because of the pressures required to close and open the dies, and the pressure within the mold cavity due to the injection of molten metal, forces of considerable magnitude are set up
25 which may upset the alignment of the dies if those forces are permitted to be transferred to the means provided for aligning the dies, and this is particularly true when those forces are relatively high, as in machines applying pressures of between 1500 pounds per square inch to
30 10,000 pounds per square inch on the molten metal in forcing it into the mold. Any deformation in the means for supporting and aligning the dies as a result of such forces tends to interfere with the alignment of the dies, and consequently is to be avoided.

It is an object of this invention to provide pressure casting apparatus in which the dies are maintained in proper alignment at all times, regardless of the magnitude of the forces created by opening and closing them or by the injection
40 of molten metal into the die cavities. It is a further object of this invention to provide pressure casting apparatus in which forces created by closing and opening the dies, or resulting from the process of filling the mold cavities, are absorbed independently of the means for aligning
45 the dies.

It is a further object of this invention to provide pressure casting apparatus in which the dies and the means for actuating the movable die are mounted on a machine frame, and the alignment of the dies is unaffected by the forces created by opening and closing the dies or those resulting
50 from the process of filling the mold cavities.

It is a further object of this invention to provide pressure casting apparatus in which the means for actuating the movable die to move it to and from a locking position with the fixed die are slidably mounted on the means for aligning
5 the dies, and are connected to the fixed platen, which supports the fixed die, by tension members adapted to absorb independently of the die-aligning means substantially all of the stresses created by closing and opening the dies and those
10 resulting from the process of filling the mold cavities.

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

Fig. 1 is a side elevation of a pressure casting machine constructed in accordance with my invention;

Fig. 2 is a plan view of the pressure casting machine shown in Fig. 1; and

Fig. 3 is a vertical section taken on the line III—III of Fig. 1;

Referring to the drawings, the machine frame 1, consisting of a pair of parallel channel members, supports the fixed platen 2, which is bolted
25 or otherwise fixedly attached to the machine frame 1 and carries the fixed die 3. The movable die 4 is carried by the movable platen 5, which is movable on the machine frame 1 toward and from the fixed die 3, the machine
30 frame 1 serving to align the dies.

Means for moving the movable die 4 to and from a locking position with the fixed die 3 are provided in the form of a hydraulic cylinder 6, carried by a support 7, which cylinder is adapted
35 to reciprocate a rod 8 having one end attached to a boss 9 at the rear of the movable platen 5. It is to be understood that other conventional means for reciprocating the movable platen may be substituted for the hydraulic cylinder 6 and the rod 8. Likewise, a suitable toggle mechanism
40 may be carried by the support 7 and connected to the movable platen 5 for moving the movable die 4 against the fixed die 3, in which case the rod 8 operates the toggle mechanism, rather than
45 being attached directly to the platen 5.

The support 7 is mounted on the machine frame 1 and positioned thereon by the guides 10 (Fig. 3) attached to the base of the support, the guides 10 having sliding engagement with the
50 flanges 11 of the machine frame 1 with the result that the support 7 is slidably mounted on the machine frame and, so far as its attachment to the machine frame is concerned, is free to slide longitudinally thereof.

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The pins 12 and 12' project from the sides of the fixed platen 2 and the support 7 respectively, in line with the dies, and carry the tension members 13, which are in the form of C-shaped plates having an aperture in each arm thereof through which one of the pins 12 or 12' extends. In the case of the pins 12', the pins are part of a reinforcing block which extends between the legs of the support 7. The above-mentioned apertures in the tension members are preferably just large enough to accommodate the pins 12 and 12' without permitting play between the pins and the tension members. The tension members 13 should be strong enough to absorb the stresses created by operation of the movable die 4 and by the injection of metal into the dies, and may be adjustably mounted in order to control the amount of flexure desired. The locking plates 14, which are removably attached to the sides of the tension members 13, cooperate with a groove 15 in each of the pins 12 and 12' to hold the tension members 13 in place on the pins. With the C-shaped tension members described, the dies 3 and 4 are intermediate the points at which the tension members 13 are attached, yet the tension members do not cross the space occupied by the dies, and consequently do not interfere with the dies or obstruct access to them.

A receptacle 16, having an aperture 17 therein to permit molten metal to be poured into the receptacle, is carried by the fixed platen 2 and communicates, by means of a sprue in the fixed die 3, with the mold cavity formed by the dies. A plunger 18, actuated by the hydraulic cylinder 19 is adapted to reciprocate in the receptacle 16 to force molten metal from the receptacle 16 and into the mold cavity.

The hydraulic cylinder 6 and the rod 8 are arranged with respect to the support 7 and the movable platen 5 to exert on the support 7 substantially only forces paralleling the upper surface of the machine frame 1 longitudinally thereof during the opening and closing of the dies and during the period of injecting the molten metal. The support 7 being slidably mounted on the machine frame 1, as described above, all longitudinal stresses imparted to the support 7 are absorbed by the tension members 13; and since substantially no stresses other than longitudinal stresses are created by the closing and opening of the dies and the procedure of injecting the molten metal, substantially no stresses are imparted to the machine frame 1 by the operation of the machine which would tend to deform the machine frame and throw the dies 3 and 4 out of alignment. The tension members 13 may spring or distort without in any way deforming the machine frame or otherwise affecting the alignment of the dies.

The above-described apparatus operates as follows:

Beginning with the dies 3 and 4 separated, the movable die 4 is moved toward the fixed die 3 by the rod 8 until the dies are pressed tightly together, as shown in the drawings. Molten metal is then poured into the receptacle 16 and injected into the mold cavity by means of pressure exerted on the metal by the plunger 18. When the metal in the mold cavity has solidified, the movable die 4 is retracted to its original posi-

tion, and the casting is removed from the dies. The forces created by the opening and closing of the dies, and those created by injecting the metal into the dies, are absorbed by the tension members 13, and as a result of the support 7 being slidably mounted on the machine frame 7, are not transmitted to the machine frame, but only to the tension members.

Although the invention has been described with reference to a machine in which the receptacle from which the molten metal is forced into the mold cavity is horizontally disposed, it may also be embodied in machines of the type employing a vertical receptacle and a vertically reciprocating plunger. Likewise, it may be embodied in machines employing pneumatic pressure to inject the metal into the mold. Also, the support for the die actuating apparatus may be held in alignment with the machine frame by means other than guides of the type illustrated on the bottom of the support.

The references herein to the metal to be cast as "molten" metal will be understood to include metal in what is sometimes referred to as a "pasty" condition, i. e. the condition obtaining when the metal is very close to its melting point.

I claim:

1. In pressure casting apparatus including a fixed platen, a fixed die carried by said platen, a movable platen, a movable die carried by said movable platen, means for aligning said dies, said fixed platen and said movable platen being mounted on said aligning means; die-actuating means for moving said movable die to and from a locking position with said fixed die, said die-actuating means being slidably mounted on said aligning means, and means connecting said fixed platen and said die-actuating means, and separate from said aligning means, for absorbing forces created by opening and closing said dies and by injecting molten metal into the dies, said connecting means comprising at least one C-shaped member, and said dies being disposed intermediate the arms of said member, the portion thereof being below substantially the lowermost surface of said dies.

2. In pressure casting apparatus including a fixed platen, a fixed die carried by said platen, a movable platen, a movable die carried by said movable platen, means for aligning said dies, said fixed platen and said movable platen being mounted on said aligning means; die actuating means for moving said movable die to and from a locking position with said fixed die, said die actuating means being slidably mounted on said aligning means, and means connecting said fixed platen and said die actuating means, and separate from said alignment means, for absorbing forces created by opening and closing said dies and by injecting molten metal into said dies, said connecting means comprising at least one C-shaped member, and said dies being disposed intermediate the arms of said member, the portion of said C-shaped member intermediate the arms thereof being below substantially the lowermost surface of said dies, and the arms of said C-shaped member being pivotally mounted on said fixed platen and on said die actuating means.

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