

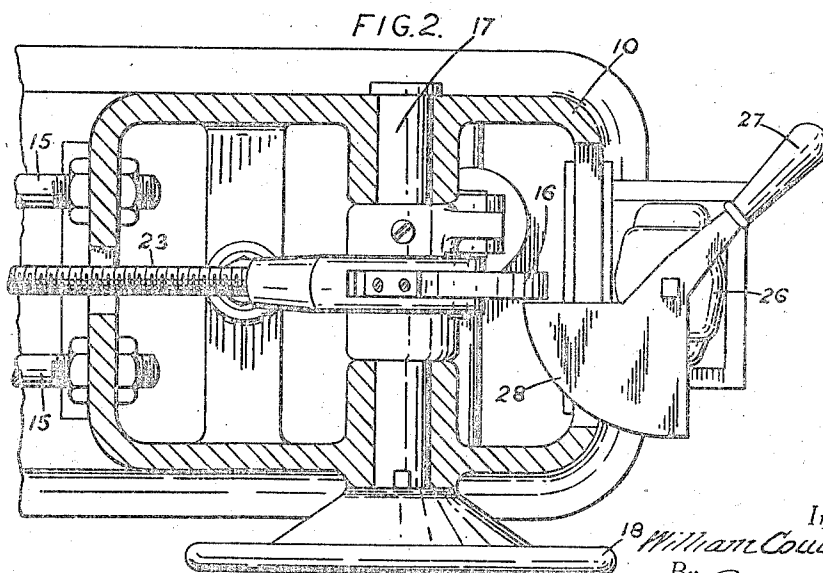
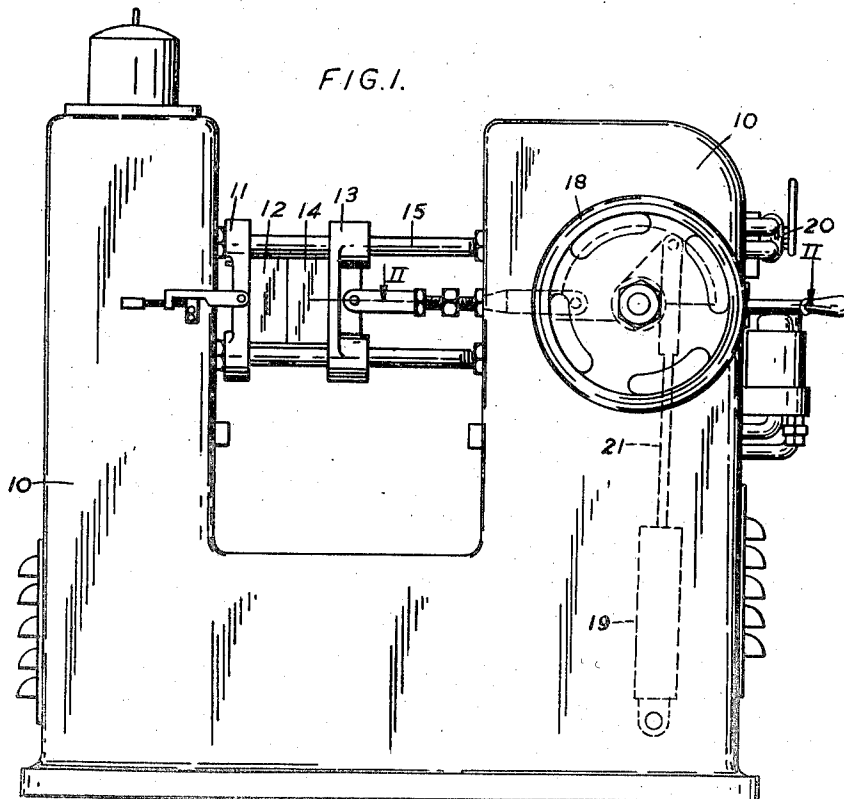
Sept. 14, 1948.

W. COULTHARD
DIE CASTING MACHINE

2,449,280

Filed June 19, 1946

2 Sheets-Sheet 1



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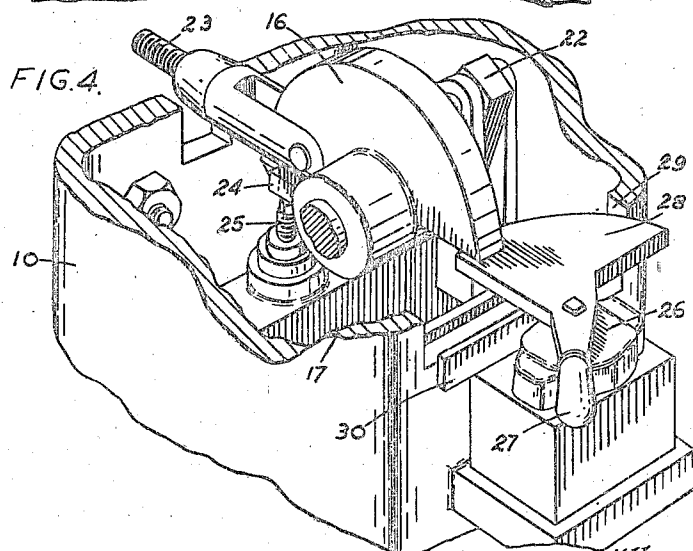
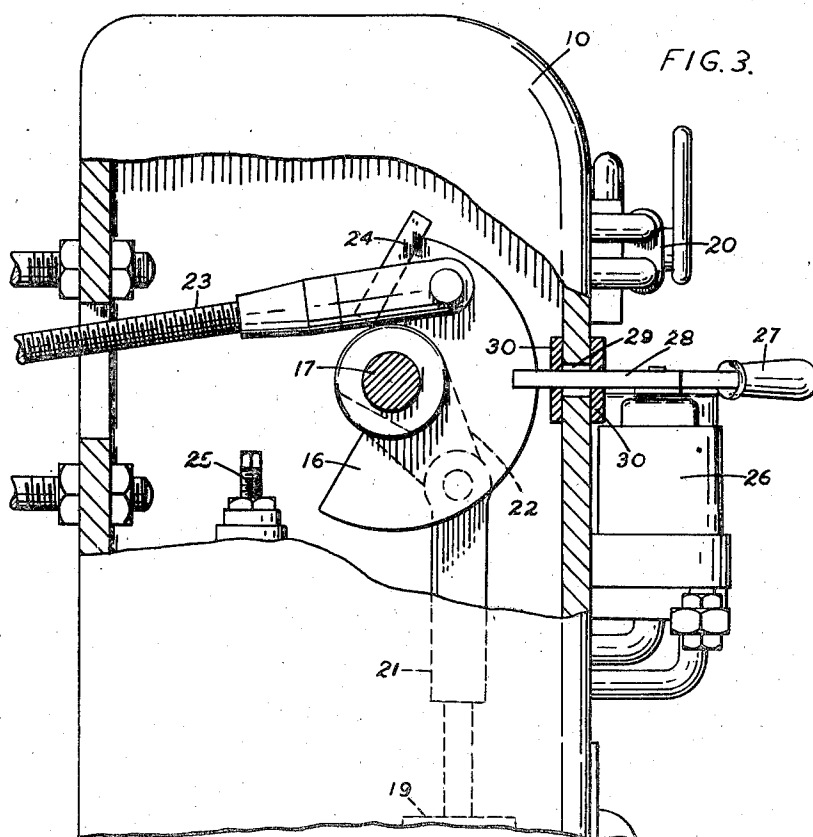
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DIE CASTING MACHINE

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3 Claims. (Cl. 22-69)

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This invention is for improvements in or relating to die casting, moulding and like machines of the well known kind comprising a die having at least one part which is movable for opening the die, the molten metal or other mouldable material being forced into the die when it is closed by, for example, pneumatic or hydraulic pressure.

Heretofore no satisfactory provision has been made for preventing the opening of the die whilst the metal is under pressure (i. e. is being forced into the die), or for preventing the hydraulic or pneumatic pressure, forcing molten metal into the die, being applied whilst the die is open. The result is that there is always a risk of molten metal being squirted from the open or improperly closed die to the danger of the operator.

One object of the present invention is to provide a satisfactory means for preventing the opening of the die when the pneumatic or hydraulic pressure operated means, feeding the metal into the die, is in action and also for preventing such pressure being turned on whilst the die is open.

Accordingly the present invention provides, in or for use in, a die casting, moulding or like machine, an interlock arrangement between the means controlling the application of pressure to the molten metal or other mouldable material and the movable part of the die or the means for effecting or controlling the opening and closing of the die, said interlock arrangement being effective to prevent the opening of the die during application of pressure to the molten metal and also preventing the application of such pressure when the die is open.

In cases where the molten metal is forced into the die by pneumatic or hydraulic pressure, which is the usual arrangement, the present invention may be carried into effect by providing an interlock arrangement between the valve controlling the hydraulic or pneumatic pressure and the means for opening and closing the die so that the die cannot be opened when said valve is open and furthermore when the die is open the said valve cannot be turned on again until the die has been closed.

One specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings. On the drawings:

Figure 1 is a side elevation of the machine with the die in the closed position,

Figure 2 is a sectional view, to an enlarged scale, on the line II-II of Figure 1,

Figure 3 is a fragmentary side elevation, partly in section showing the die operating mechanism in the open position, and

Figure 4 is a fragmentary perspective view showing the mechanism in the die closing posi-

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tion and the air valve open to cause molten metal to be fed into the die.

Briefly the machine comprises a frame or casing 10 having a fixed support 11 for one half 12 of the die and a carriage 13 for the other half 14, the carriage being movable to open and close the die on guides 15 mounted on the frame or casing. The movement of the carriage to open and close the die is effected by a semi-circular crank-like member 16 mounted on a transverse shaft 17 provided with an operating hand-wheel 18. It is preferable to effect the opening and closing of the die by hand means because the closing operation can be "felt" and thereby carried out in such a manner as to prevent damage to the delicate cores. The die may, however, be opened and closed pneumatically by a piston and cylinder device 19, the operation of which is controlled by an air valve 20. The piston of the device 19 is connected by a connecting rod 21 to an arm 22 on the shaft 17. The crank-like member 16 is connected by an adjustable connecting rod 23 to the movable die carriage. One radial edge of the crank-like member is provided with a hard steel abutment 24 adapted to engage an adjustable stop 25, on the frame of the machine, to limit the throw of the crank in the die closing direction (see Figure 4) at a point just beyond its dead-centre position. In this position the crank and connecting rod are best able to take the thrust on the movable part of the die.

An air control valve 26 controlling the pneumatic pressure operating a plunger mechanism by which the molten metal is forced into the die, is mounted on the frame of the machine and is provided with an operating hand lever 27. One arm 28 of the lever 27 is of quadrant-like form and projects through a slot 29 in the machine casing so as to obturate the path of movement of the aforementioned crank-like member 16. The quadrant-like arm 28 of the valve operating lever 27 is of hardened steel and opposite sides of the slot 29 in the machine casing through which this part of the hand lever projects are provided with bearing plates 30 to take the pressure applied to the valve operating lever by the movable die part through its operating crank when the die is closed and metal is being fed into it.

The mechanism above described operates as follows:

Presuming that the die is open (as shown in Figures 2 and 3) the quadrant-like arm 28 of the valve operating lever 27 lies to one side of the path of movement of the crank-like member 16 operating the movable die carriage so that this crank is free to move in a vertical plane to close the die. At the same time the valve operating lever 27 and its quadrant-like arm 28 cannot

move in a horizontal plane to open the air valve 26 because the path of movement of the quadrant-like arm 28 is obturated by the crank-like member 16. In other words, if an attempt is made to open the air valve 26 such attempt will be frustrated by the quadrant-like arm 28 of the valve operating lever coming up against one side of the crank-like member 16. To close the die the crank 16 is moved angularly by its hand operating wheel 18, or by operation of the piston and cylinder device 19, and this movement of the crank carries it clear of the path of movement of the quadrant-like arm 28 of the air valve lever 27. Once the die has been properly closed it is possible to open the air valve 26 and apply pressure to the molten metal and make a cast. At the same time it is not possible to open the die until the air valve 26 has been closed again because the quadrant-like arm 28 of the valve operating lever 27 now obturates the path of movement, in a vertical plane, of the crank-like member 16 as shown in Figure 4. Before the die can be opened the air valve 26 must be closed. It will be appreciated that the dimensions and length of the path of movement of the crank and the quadrant-like arm of the valve operating lever are correlated so that the required interlocks take place at the appropriate times.

I claim:

1. In a die casting, molding or like machine, wherein a fixed die portion and a movable die portion cooperate to form a die cavity, an oscillatable crank is pivotally mounted on a support and is connected with said movable die portion to effect movement thereof relative to said fixed die portion, a valve having a pivotal stem and controlling means for feeding plastic material to the die cavity is mounted on the support with the axis of its valve stem at an angle to the axis of said crank, and a lever is fixed on said valve stem for operating said valve, the combination with the afore-mentioned elements of an abutment on said crank for movement therewith through a path in the plane in which the crank moves, and an arm on said lever for movement therewith through a path in a plane transverse the plane of said abutment path, said crank and said valve being mounted adjacent each other on said support to position said abutment and arm paths in intersecting relationship, said crank being mounted on the support to position said abutment to intercept the arm path when said die is open, and said valve being mounted on the support to position said arm to intercept the abutment path when said valve is open, whereby said abutment and said arm are selectively movable between positions free of the respective intersecting path and positions transverse the respective intersecting path so that said abutment will prevent opening of the valve when the die is open and said arm will prevent opening of the die when said valve is open.

2. In a die casting, molding or like machine, wherein a fixed die portion and a movable die portion cooperate to form a die cavity, an oscillatable crank is pivotally mounted on a support and is connected with said movable die portion to effect movement thereof relative to said fixed die portion, a valve having a pivotal stem and controlling means for feeding plastic material to the die cavity is mounted on the support with the axis of its valve stem at an angle to the axis of said crank, and a lever is fixed on said valve stem for operating said valve, the combination

with the afore-mentioned elements of an abutment on said crank for movement therewith through a path in the plane in which the crank moves, an arm on said lever for movement therewith through a path in a plane perpendicular to the plane of said abutment path, said crank and said valve being mounted adjacent each other on said support with their axes at right angles to position said abutment and arm paths in perpendicularly intersecting relationship, said crank being mounted on the support to position said abutment to intercept the arm path when said die is open, and said valve being mounted on the support to position said arm to intercept the abutment path when said valve is open, whereby said abutment and said arm are selectively movable between positions free of the respective intersecting path and positions transverse the respective intersecting path so that said abutment will prevent opening of the valve when the die is open and said arm will prevent opening of the die when said valve is open, and a bearing portion rigid on said support and having a surface slidably supporting said arm in opposition to the direction of the die opening movement of said abutment.

3. In a die casting, molding or like machine, wherein a fixed die portion and a movable die portion cooperate to form a die cavity, and oscillatable crank is pivotally mounted on a support and is connected with said movable die portion to effect movement thereof relative to said fixed die portion, a valve having a pivotal stem and controlling means for feeding plastic material to the die cavity is mounted on the support with the axis of its valve stem at an angle to the axis of said crank, and a lever is fixed on said valve stem for operating said valve, the combination with the afore-mentioned elements of an abutment on said crank extending substantially perpendicular to the axis of said crank for movement therewith through a path in the plane in which the crank moves, an arm on said lever for movement therewith through a path in a plane perpendicular to the plane of said abutment path, a housing in which said crank is journaled, an opening in said housing, and bearing plates supported by said housing above and below said opening to define a slot in a plane perpendicular to the plane of said crank movement, said valve being mounted on said housing with said arm extending through said slot and slidably supported by said bearing plates for movement through a path perpendicular to and intersecting the path of movement of said abutment, whereby said abutment and said arm are selectively movable between positions free of the respective intersecting path and positions transverse the respective intersecting path so that said abutment will prevent opening of the valve when the die is open and said arm will prevent opening of the die when said valve is open.

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