Aug. 10, 1965 H. C. WERNECKE 3,199,159

DIE CASTING MACHINE

Original Filed Jan. 2, 1958 2 Sheets-Sheet 1

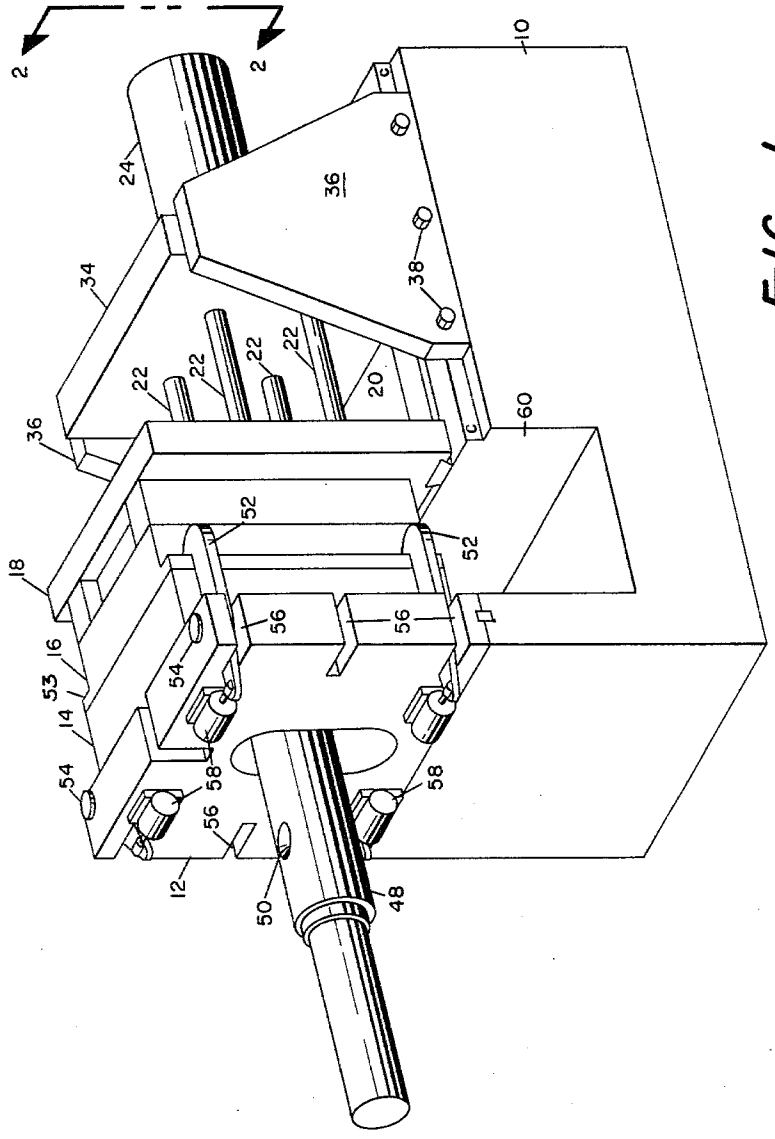


FIG 1

INVENTOR.
HEINZ C. WERNECKE
BY Allen M Krass
ATTORNEY

Aug. 10, 1965 H. C. WERNECKE 3,199,159

DIE CASTING MACHINE

Original Filed Jan. 2, 1958 2 Sheets-Sheet 2

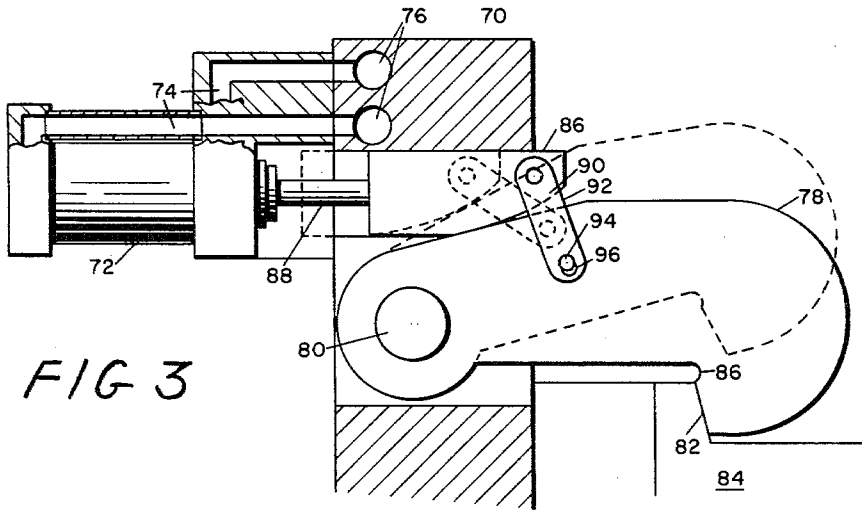


FIG 3

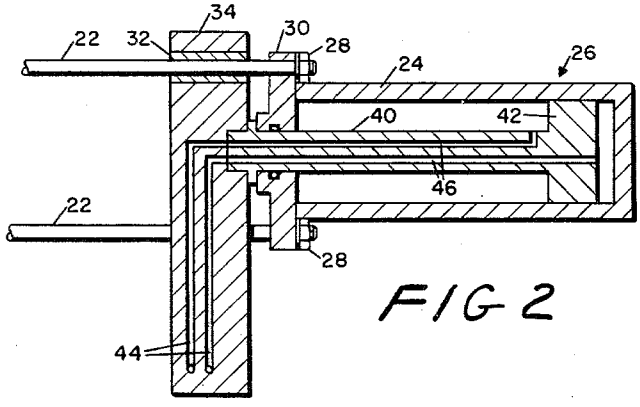


FIG 2

INVENTOR.
HEINZ C. WERNECKE
BY Allen M Krass
ATTORNEY

United States Patent Office

3,199,159

Patented Aug. 10, 1965

3,199,159

DIE CASTING MACHINE

Heinz C. Wernecke, 946 13th Ave., Grafton, Wis.

Continuation of application Ser. No. 706,851, Jan. 2, 1958. This application Feb. 26, 1962, Ser. No. 177,135

2 Claims. (Cl. 22—68)

This application is a continuation of U.S. patent application Serial No. 706,851, filed on January 2, 1958, now abandoned.

This invention relates to die casting machines of the type having two die halves which are separable for the purpose of removing finished workpieces and into which molten casting material is injected under pressure. More particularly this invention relates to special mechanism for opening and closing the die halves and for locking the die halves in a closed position in such a secure manner as to resist the opening forces exerted by the pressured injection of the molten casting material.

Die casting machines generally employ two cooperating die halves, one of which is fixed relative to the machine base and a second which is movable with respect to the first so as to be disposable in a first closed position in which the casting operation is performed and a second open position in which the finished casting may be removed from between the dies. When the dies are in a closed position, molten casting material is injected into the cavity between them under high pressure so as to insure that the cavity becomes completely filled with the material. The injection pressure acts to separate the die halves from one another. If any separating motion does occur during the injection, the dimensions of the finished casting will be affected. Also, die separation during injection may allow the molten casting material to spray out of the die cavity along the parting line so as to endanger the operation. For these reasons, it is essential that the die halves be rigidly locked together during the casting portion of the cycle.

Present casting machines generally utilize a single mechanism for moving the die halves with respect to one another and for locking them in a closed position. Commonly this mechanism includes a linkage which has one end directly connected to the movable die half and the other end connected to the fixed die half through the rods which also act as guides for the movable die half. These tie rods therefore extend from the fixed die half to the far end of the linkage. Because of the length of the connection thus formed between the fixed and the movable die halves, temperature changes often affect the exact positioning of the dies with respect to one another. Additionally, the connections in the linkage make it difficult to achieve exact positioning of the movable die half.

The present invention contemplates a die closing and locking mechanism for die casting machines in which the die moving and die locking actions are accomplished by separate mechanisms so that it is possible to have a short, direct, inflexible connection between the dies when they are in a closed position.

In essence, the present invention provides a unique form of hydraulic cylinder and piston which performs the sole function of transferring the movable die half toward and away from the fixed die half. Additionally, a locking latch is provided which operates directly across the parting line so as to directly connect the die halves.

Because the die opening and closing cylinder is independent of the locking mechanism, it is possible to obtain a cushioned closing motion and a quick opening motion.

An additional advantage of the present invention lies in the fact that the tie bars which pass between the fixed and movable die halves of the present casting machines may be eliminated. The operator is thereby given complete unhampered access to the dies from all angles. This greatly simplifies the problem of removing and replacing the dies from their platens, and also simplifies the design of casting-removing devices which operate in conjunction with the fixed die half.

Other applications and advantages of the present invention are indicated in the following detailed description of an embodiment of the invention. The description makes reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of a die casting machine embodying the principles of the present invention;

FIGURE 2 is a sectional view through the die moving mechanism of the present invention; and

FIGURE 3 is a sectional view of an alternative latching arrangement.

The machine is supported on a base 10 which is preferably formed of welded plate steel. A fixed platen 12 is mounted on the base 10 and is adapted to retain the fixed die half 14. The movable die 16 is supported on a platen 18 which has its lower edge resting on hardened and ground ways 20 that are fixedly attached to the upper surface of the base 10.

Four tie rods 22 each have one end fixed to the movable platen 18 and have their other ends attached to the cylinder end 24 of a hydraulically actuated ram generally indicated at 26. Nuts 28 connect the threaded ends of the rods 22 to a head plate 30 of the ram 26. As is seen in FIGURE 2, the rods 22 pass through bushings 32 which are disposed in a cylinder support bracket 34. The bracket 34 is supported on its outer edges by brackets 36 which are adjustably attached to the base 10 by means of bolts 38.

As is seen in FIGURE 2, the rod 40 of the ram 26 has its outer end fixedly attached to the support plate 34. Therefore, the piston end 42 of the rod 40 remains stationary with respect to the base of the machine while the cylinder end 24 moves as fluid is admitted to the various ram chambers.

Although fluid may be admitted to the ram chambers in the normal manner with lines directly connecting to either end of the cylinder 24, it is preferred that fluid connections be made internally through the plate 34 and the rod 40. For this purpose fluid conduits 44 are cut in the support plate 34 and attached to the outlet ports of the fluid valve (not shown) at one of their ends. At their other ends they connect to two fluid passages 46 in the rod 40. One of the passages 46 outlets on one side of the piston 42 while the other fluid passage outlets on the opposite side.

Cushioning devices which are not shown may be provided to slow down the piston action as it nears either or both ends of its stroke.

Several advantages in operation result from the fact that the movable platen 18 is driven by the cylinder end of the ram 26 rather than by the rod end as is normally the case. First, the maximum forces of the ram are developed when the dies are opened and the casting has to be ejected. This is advantageous since no particular force is required to close the dies and this can be done at a higher rate of speed. The closing stroke is also accomplished with a lower force than the opening so that damage to the dies as a result of their slamming together is minimized.

The molten casting material is injected into the cavity formed by the fixed and movable die halves by a shot cylinder 48. The cylinder and the appended shot sleeve are supported directly in the fixed platen 12. A pore hole 50 is provided through which the molten casting material is inserted into the shot cylinder 48.

It is to be understood that the die closing and locking system herein described could also be applied to a hot

chamber type machine which is used for casting metals having lower melting points and in which the material is melted directly within the machine.

After the die halves have been closed by the action of the ram 26, a plurality of latches 52 which are arranged about the periphery of the dies close over a lip 53 on the edge of the movable die 16. The latches are pivotably supported on trunnions 54 and operate in notches 56 cut in a surface of the fixed platen 12. Notches are provided at regular intervals along side of the platens so that as many latches as are required may be utilized. The latches are actuated by small shot cylinders 58 which are supported on the outer side of the fixed platen 12. The cylinders 58 also receive their hydraulic fluid through lines which are internal of the fixed platen 12.

Because of the short length of these latches 52 and because of the direct connection they afford between the fixed platen and the movable die half, they form a specially rigid connection which maintains the dies tightly closed during the pressured injection.

A cavity 60 is provided in the base directly below the die halves so that the operator has complete access to the dies from all sides.

FIGURE 3 illustrates another embodiment of a die latching mechanism. The latching mechanism is supported on a fixed platen 70 of a die casting machine. The latch is powered by a cylinder 72 which receives and disposes of hydraulic fluid through lines 74 which are connected to passages 76 within the fixed platen 70. A latch 78 is supported in trunnion fashion on a pin 80 that is fixed in the sides of the fixed platen 70 in the same manner that the pins 54 are fixed within the platen 12. The latch 78 includes a flattened portion 82 which is adapted to engage a similar surface on the rear edge of the movable die half 84. A recessed curve 86 on the latch connects the section 82 in such a manner as to obviate the possibility of the latch sticking against the movable die surface.

The latch 78 is energized by a wedged drive 86 which is driven by the rod 88 of the cylinder 72. The wedge 86 contacts the latch 78 on a rounded surface 90 which is also designed to prevent binding. As the rod 88 drives the wedge 86 towards the right in FIGURE 3, the latch 78 has its extended end 82 driven downward. The wedge 86 is also connected to the latch 78 by means of a link 92 which is pin-connected to both members. The connection between the link 92 and the latch 78 is achieved by a pin 94 which moves in elongated slot 96 in the link. Therefore, as the wedge 86 is retracted to lift the latch 78, the latch member lags slightly behind the movement of the wedge. In that manner the wedge has achieved an initial velocity before the latch 78 is moved. This action causes the latch to be opened with a jerk which frees any possible bind between the latch surface 82 and the mating section of the movable die half.

Having thus described my invention, I claim:

1. In a casting machine having

a first fixed die half and a second movable die half, and means for moving said first die into and out of cooperating relationship with said second die, means for locking said first and second die halves in a cooperating position, said means comprising:

a plurality of latch members pivotably supported with respect to said first die half and each having a surface which cooperates with a corresponding surface on the second die half so as to latch said die in a closed relationship;

a plurality of wedges, one associated with each of said latching members, each being operable to maintain said latching members in a locked position when extended;

and a plurality of ram members, one associated with each of said wedge members and connected to its associated latch member and being operable to position said wedge members in an extended or retracted position.

2. In a casting machine having

a first die member fixed with respect to said machine, a second die member movable with respect to said first member, and means for moving said second die member into a closed cooperating position with said first member, locking means operable for locking said first and second die members in a closed cooperating position, said means comprising:

a plurality of latch members pivotably supported with respect to the first die member and each having a surface which cooperates with a surface of said second die member so as to lock said second die member in a closed position with said first die member;

a wedge member associated with each of said latching members and being operable to maintain said latching members in a locked position when extended;

fluid actuated rams associated with each of said wedge members and being operable to extend or retract said wedge members;

and links pivotably supported on each of said wedge members and being coupled with each of said latch members in such a manner that when said wedge member is retracted its motion is communicated to said latch member only after said wedge member has undergone an initial movement.

References Cited by the Examiner

UNITED STATES PATENTS

1,916,495	7/33	Shaw	22—68
2,512,071	6/50	Nolan	22—156
2,684,510	7/54	Muller	22—92
2,848,771	8/58	Eggenberger	22—68
3,046,622	7/62	Wernecke	22—68

WILLIAM J. STEPHENSON, *Primary Examiner.*

RAY K. WINDHAM, *Examiner.*