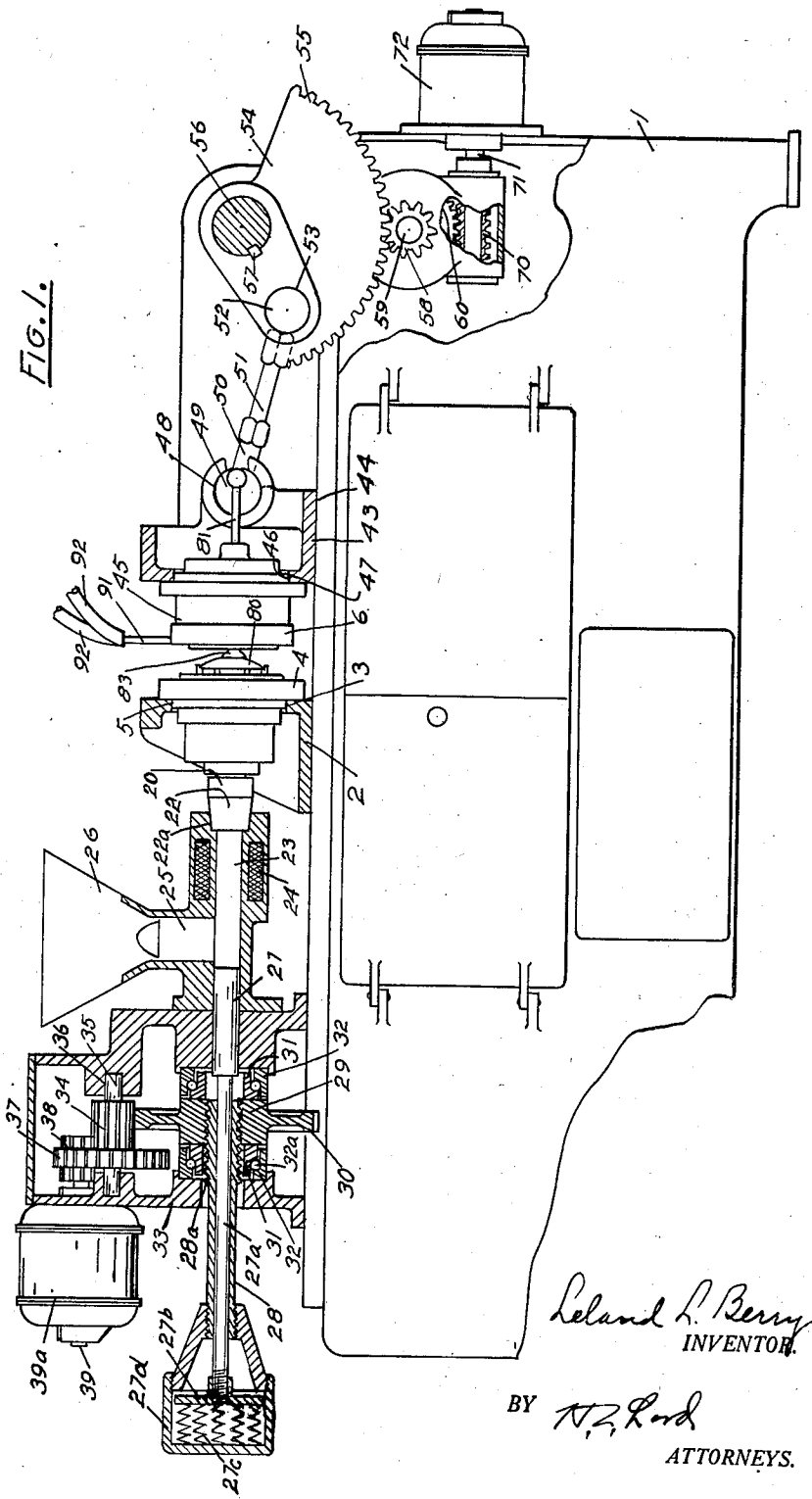
March 19, 1940. L. L. BERRY 2,193,787

MACHINE FOR DIE-CASTING FRAMES ON FRAGILE INSERTS

Filed Sept. 17, 1936 3 Sheets-Sheet 1

FIG. 1.



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Filed Sept. 17, 1936 3 Sheets-Sheet 2

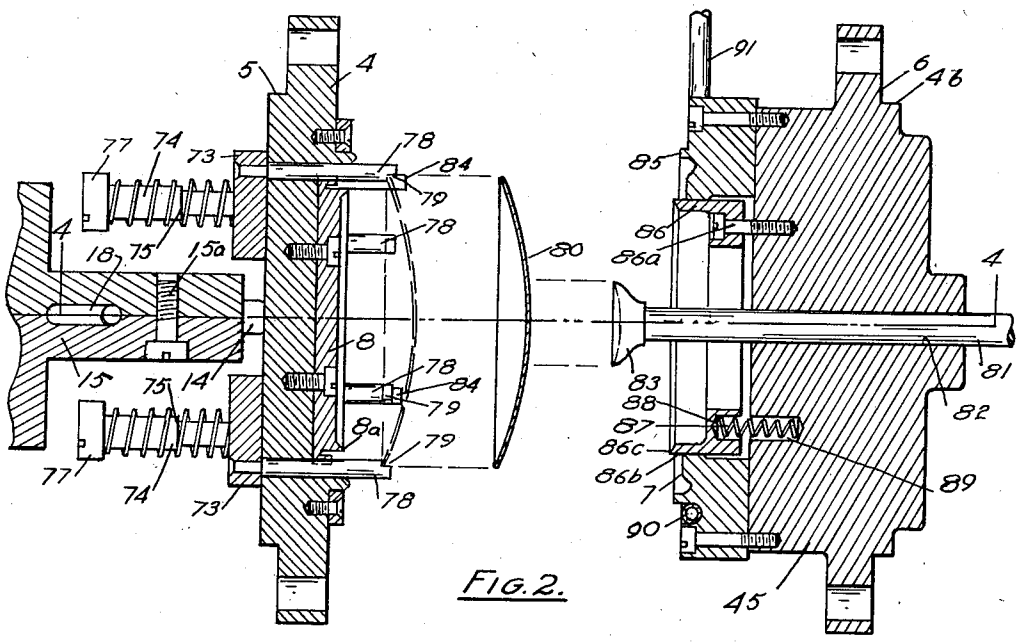

FIG. 2.

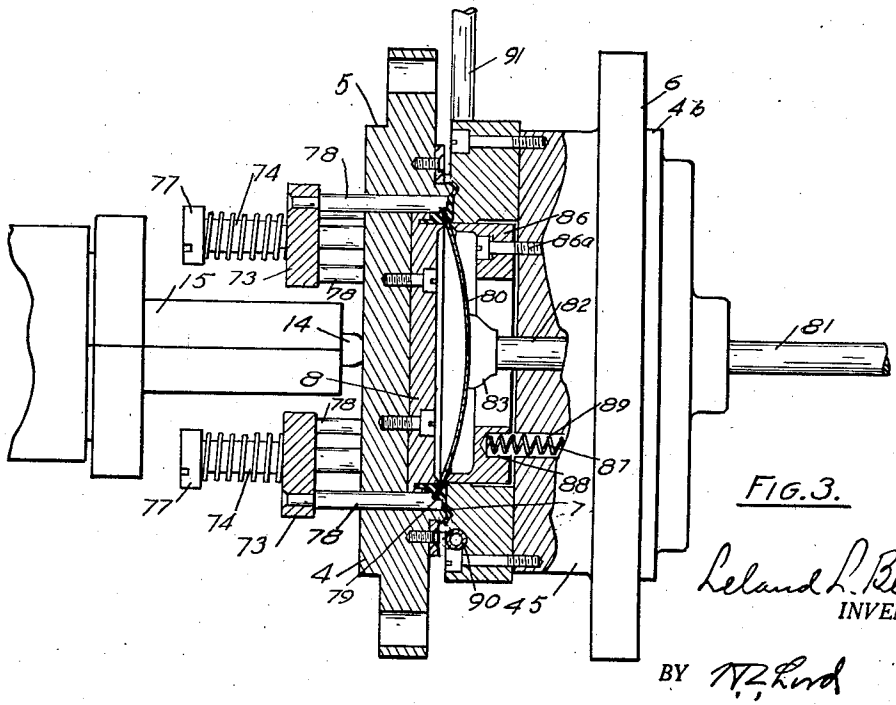

FIG. 3.

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Filed Sept. 17, 1936 3 Sheets-Sheet 3

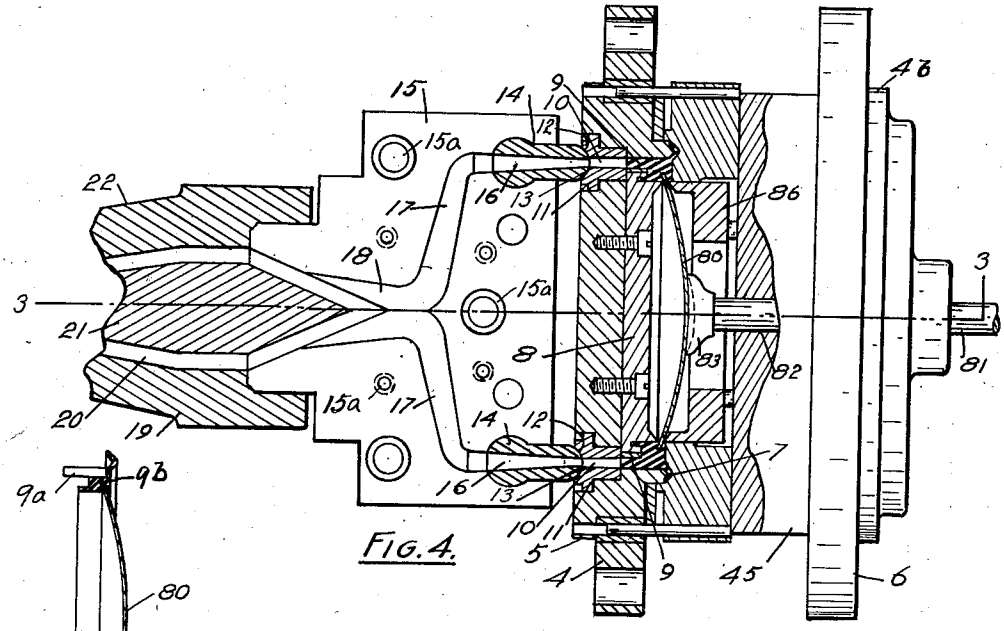

FIG. 4.

FIG. 6.

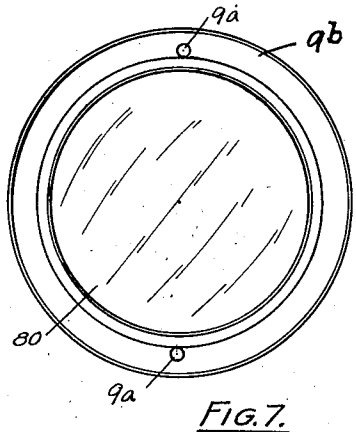

FIG. 7.

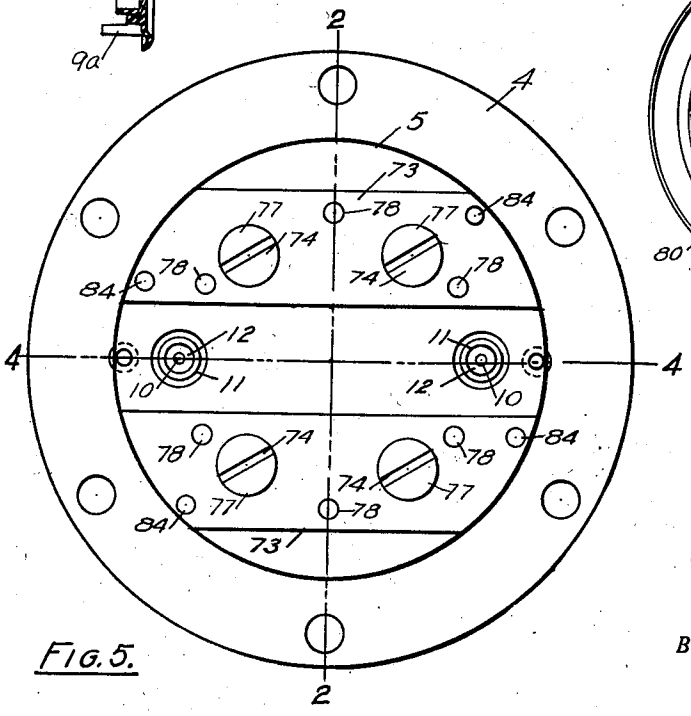

FIG. 5.

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UNITED STATES PATENT OFFICE

2,193,787

MACHINE FOR DIE-CASTING FRAMES ON FRAGILE INSERTS

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Application September 17, 1936, Serial No. 101,291

2 Claims. (Cl. 18—30)

Many articles, such as dial faces for instruments, are provided with glass covers, usually slightly spherical, and are mounted in a surrounding frame or support. The machine of the present invention is designed to die-cast this frame or bezel of a plastic material such as cellulose acetate, one of the commercial varieties being "Tenite," and include in the casting the fragile insert so that upon the completion of the casting the frame or bezel will include the fragile insert permanently set in the bezel.

Among the difficulties of this operation is the effecting of a closure for the mold cavity without breaking the fragile insert, and one of the purposes of the present invention is to accomplish this. Features and details of the invention will appear from the specification and claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings whereby the invention is exemplified as follows:

Fig. 1 shows a side elevation of the machine.

Fig. 2 a section of the mold dies opened, on the line 2—2 in Fig. 5.

Fig. 3 a similar view with the dies closed, a section on the line 3—3 in Fig. 4.

Fig. 4 a section on the lines 4—4 in Figs. 2 and 5.

Fig. 5 a rear view of the stationary die.

Fig. 6 a sectional view of the finished article.

Fig. 7 a rear view of the finished article.

1 marks the frame of the machine, 2 a bracket for the stationary die secured to the frame. This bracket has the opening 3, and a stationary die block 4 has an annular shoulder 5 adapted to set in the opening 3, the die being secured to the bracket by screws, not shown. A movable die block 6 is arranged opposite the stationary block, and a mold cavity 7 is arranged between the block 6 and a die insert 8 in the die block 4.

A plurality of sprue openings 9 are arranged in the die plate 8, as shown two of such openings, and these openings communicate with sprue passages 10 in a nozzle fitting 11 secured in the mold block. The fittings 11 have seats 12 against which seating ends 13 of nozzles 14 seat. The nozzles 14 have passages 16 communicating with passages 17 in a manifold 15. The manifold is made in halves and secured together by screws 15a. The passages 17 are united in a passage 18 which is connected with a passage 20 in a connecting sleeve 19. The passage 20 is spread by a central member 21. The sleeve has a tapered end 22 which extends into a socket 22a at the end of a plunger compression chamber 23. The chamber 23 is surrounded by a heating element 24. A passage 25 extends upwardly from the chamber 23 to a hopper 26 and material is deposited in the hopper in granular form and feeds by gravity to the chamber. With each operation, material is forced through the several passages just described and delivered under die-casting pressure to the mold cavity.

The plunger 27 has an extension 27a with a head 27b. This head engages cushion springs 27c in a case 27d. A sleeve 28 having the screw thread 28a surrounds the shaft 27a and is threaded intermediate its ends and extends through a screw threaded hub 29 of a gear 30. The gear 30 has bearing extensions 31 which cooperate with the races 32, and forming with the balls 32a the ball bearing for taking the thrust of the plunger. The races are secured to a gear box 33 mounted on the frame. The sprue openings 9 and passages 10 are made of a length to leave a sprue extension 9a on the finished article which forms securing studs for securing the bezel frame 9b on a support, the sprue being separated by the withdrawal of the nozzle in each operation. The gear 30 meshes with a gear 34 which is fixed on a shaft 35. The shaft 35 is mounted in bearings 36 in the gear box. The gear 37 is fixed on the shaft 35 and meshes with a gear 38. The gear 38 is fixed on a rotor shaft 39 of an electric motor 39a. This motor is a reversing motor and is provided with overload switches working automatically to force the plunger forward to a predetermined load when the switch is thrown with proper timing for the holding operation to stop the motor and to reverse the same, and to repeat the cycle, the motor movement being automatically stopped through switches, not shown.

The movable die is mounted on a sliding head 43, slidingly mounted on guides 44 on the top of the frame. The movable die is secured on a mold block 45, this block being provided with an annular shoulder 46 fitting into an opening 47 in the head 43. This mold block is secured by screws, not shown, to the head. The head 43 is provided at each side with bearings 48, and pitman bearing ends 49 are arranged in these bearings. Pitman extensions 50 are formed with the ends 49 and adjustably connected with the pitmans 51, it being understood that there were two of these bearings and two of these pitmans, one at each side of the head. The outer ends of the pitmans are secured to a shaft 52 which are journaled in bearing 53 in the body 54 of a gear segment 55. The gear segment is fixed on the shaft 56 with a key 57, and the shaft 56 is jour-

naled in the frame by means of bearings, not shown. The gear segment 55 meshes with a gear 58. The gear 58 is fixed on the shaft 59, and the shaft is journaled in the frame by bearings, now shown. A worm gear 60 is fixed on the shaft 59 and meshes with a worm 70. The worm is fixed with a rotor shaft 71 of an electric motor 72. This electric motor is a reversing motor and is provided with overload switches timed to advance the movable die and retract it in proper time for completing the casting, the reversing of this motor being timed with the plunger rotor so that the continued operation of the machine is automatic.

Pressure plates 73 are slidingly mounted on screws 74 at the back of the die block 4. The screws 74 have stop shoulders 75, and coil springs are arranged around the screws against the pressure plates, said springs being anchored against the heads 77 of the screws. Positioning pins 78 extend from the pressure plates through the mold block into the mold cavity. The pins 78 are notched at 79 to receive the fragile insert or cover 80. A pressure bar 81 extends through an opening 82 in the mold block. A yielding rubber socket 83 is arranged on the end of the plunger in position to yieldingly press against the center of the insert. This bar is provided with a handle or knob at its outer end so that it may be readily engaged by the operator and pressed against the insert as indicated in dotted lines Fig. 2 where the insert is in place in the notched ends of the pins. Spacing pins 84 are secured to the pressure plates 73 and engage the annular face 35 at the outside of the mold cavity. These pins through their engagement carry the pressure plates backwardly as the movable die is advanced to close the mold, thus relieving to some extent the insert of the closing pressure. A closure ring 86 is mounted in the opening in the die block 6 and slidingly secured on screws 86*a*, the screws limiting the forward movement of the ring. The ring is yieldingly pressed forward by springs 87 arranged in the sockets 88 and 89 in the ring and mold block respectively. The ring has a closure surface 86*b* and a closure edge 86*c*, the surface 86*b* forming an inner wall of the mold cavity. As the mold is closed, the closure edge 86*c* engages the surface of the insert and makes the closure on the outer face of the insert, the inner face of the insert making a closure with the sharp closing edge 8*a* of the die plate 8. These sharp closing edges are essential to make a sharp and definite closure of the mold cavity so as to prevent an objectionable fin along these edges, and at the same time engage so little of the surface and with so little pressure as to avoid placing undue strain thereon.

With this structure the die is operated and timed to close, to dwell, to open in proper timing with the plunger which fills the die cavity with each cycle with the plastic material in a viscous state, the heating device being capable of heating the material to the proper consistency. The mold is preferably chilled and this is accomplished by a cooling tube 90 encircling the movable die block, the tube terminating in the ends 91 which are provided with hose connections 92 leading to a source of chilling water supply. By means of this tube, water may be circulated to give the proper cooling temperature.

While I have referred to the bezel or frame, or parts forming the same, as an annulus or ring, I wish to be understood that this has reference to continuity and may be other than a circle.

What I claim as new is:

1. In a plastic die casting machine, the combination of mold parts having a mold cavity; means for opening and closing said parts; means injecting plastic material under pressure to the cavity; yielding posts extending into the cavity for positioning an insert therein; a yielding closure ring carried by one of the parts of the mold and forming a closure on the insert blocking off the mold cavity from a portion of the insert; and a follower extending through the ring into engagement with the insert for maintaining the insert during the closing of the mold.

2. In a plastic die casting machine, the combination of mold parts having a mold cavity; means for opening and closing said parts; means injecting plastic material under pressure to the cavity; yielding posts extending into the cavity for positioning an insert therein; a yielding closure ring carried by one of the parts of the mold and forming a closure on the insert blocking off the mold cavity from a portion of the insert; and a follower extending through the ring into engagement with the insert for maintaining the insert during the closing of the mold, said follower having a cushioned end.

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