Nov. 11, 1941. N. LESTER 2,262,615

CASTING MACHINE

Filed Nov. 12, 1937 3 Sheets-Sheet 1

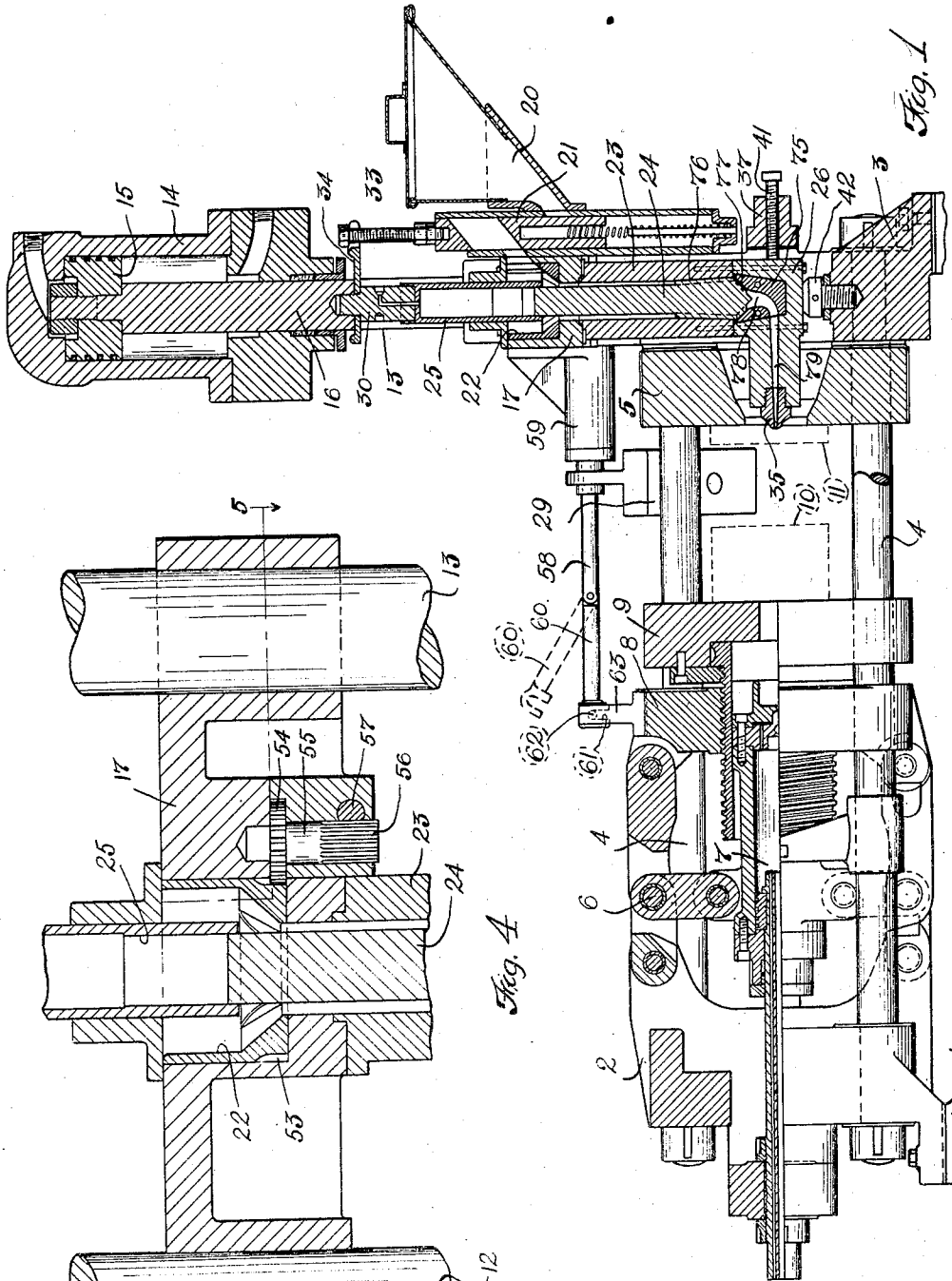


Fig. 1

Fig. 4

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CASTING MACHINE

Filed Nov. 12, 1937 3 Sheets-Sheet 2

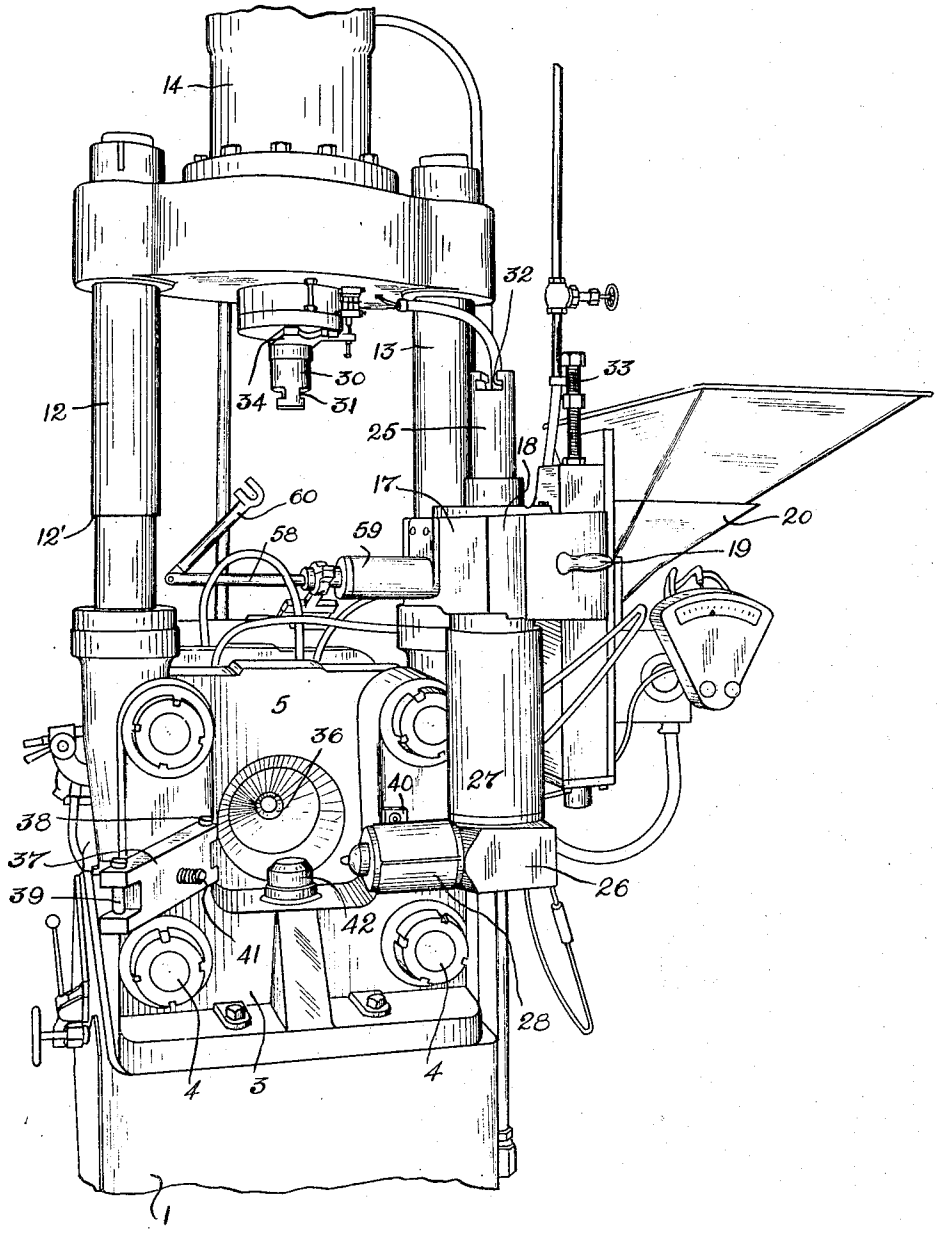


Fig. 2

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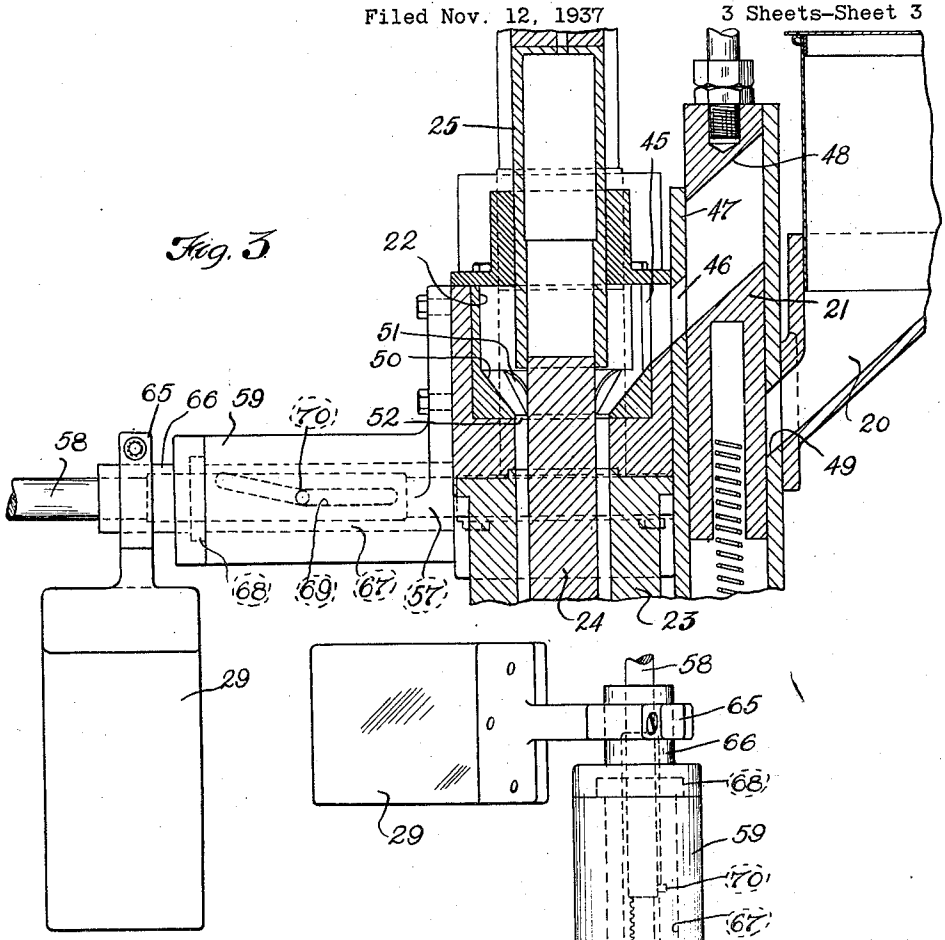
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Nov. 11, 1941. N. LESTER 2,262,615

CASTING MACHINE

Filed Nov. 12, 1937 3 Sheets-Sheet 3

Fig. 3



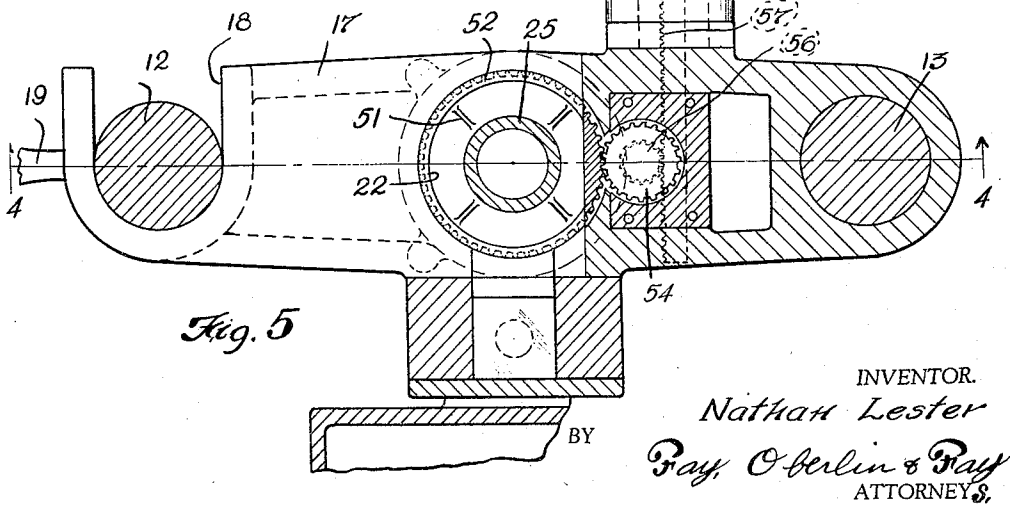


Fig. 5

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UNITED STATES PATENT OFFICE

2,262,615

CASTING MACHINE

Nathan Lester, Cleveland Heights, Ohio, assignor to The Lester Engineering Company, Cleveland, Ohio, a corporation of Ohio

Application November 12, 1937, Serial No. 174,175

8 Claims. (Cl. 18—30)

The present invention relates to a machine for casting material under pressure into a permanent mold. The construction of the machine embodying the principle of my present invention is particularly suited for the pressure casting of materials popularly known as plastics, i. e., a material which is in a dry, finely divided or powdered state, and subsequently subjected to pressure and heating whereby it becomes of a plastic nature and is then injected into the mold. It will be readily understood by those skilled in the art, however, that features of my invention may also be equally well incorporated in a machine for the pressure casting of other materials, such as metals.

The general object and nature of my invention is to provide such a casting machine wherein the material is automatically measured, fed to the pressure casting cylinder and evenly distributed therein, wherein the parts of the machine are readily accessible for the purposes of inspection, adjustment, cleaning and replacement; and wherein the casting is automatically removed from between the die blocks with incident safety to the operator. More particularly outlined, the machine embodying my invention includes an assembly of the material feed, pressure casting cylinder, and injection nozzle or discharge mechanism which is so mounted upon the machine that it can be swung into and out of position with relation to the other parts thereof. In conjunction with this assembly, my invention provides means consisting of a rotatable cup-like member for evenly distributing the material in the interior of the pressure casting cylinder and a knock-out and safety device for removing the casting from the machine, both the rotatable cup-like member and the knock-out device being operated by a single actuating mechanism which is in turn dependent upon the movement of the die plates and thereby rendered automatic. Additional objects and advantages shall become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a sectioned, elevational view of the apparatus embodying the principle of my invention; Fig. 2 is a perspective view of one end of the machine showing the swing assembly of the material feed, pressure casting and injection nozzle apparatus in open position; Fig. 3 is an enlarged, detailed, sectional view of a portion of Fig. 1; Fig. 4 is an enlarged, detailed, sectional view taken upon a plane normal to that of Fig. 3, and substantially along line 4—4 of Fig. 5, which is another detailed, sectional view taken substantially along line 5—5 of Fig. 4.

Now referring more particularly to the drawings, the casting machine shown therein is mounted upon a base 1 and has the two vertical upright end members 2 and 3 which are joined by the tie bars 4. A fixed die plate 5 is mounted adjacent the vertical end member 3. A toggle link mechanism 6 which is actuated by the hydraulic cylinder 7 carries the main movable die plate 8 to which the auxiliary die plate 9 is adjustably attached. The detailed construction and mode of operation of the last mentioned mechanism are to be found more fully set forth in the copending U. S. patent application of William M. Lester, Serial No. 5,438, filed Feb. 7, 1935. The die plates 5 and 9 are adapted to carry die blocks, as indicated at 10 and 11.

A pair of vertical bars 12 and 13 extend upwardly from the vertical end member 3 and support the hydraulic cylinder 14 in which the piston 15 and piston rod 16 are adapted to reciprocate.

A cross member 17 is swingably mounted at one end on the vertical bar 13 and has a U-shaped opening 18 on its other end adapted to engage with the bar 12. The bar 12 has a reduced diameter portion which presents a shoulder 12' for the abutment of the upper surface of the member 17 so as to maintain the latter in locked vertical position. A manipulating handle 19 is provided on the member 17 so that the latter, together with its attached parts, can be swung into and out of position. The member 17 carries as an assembly, the material feed hopper 20, the measuring slide 21, the distributing cup 22, the pressure casting cylinder 23, the spreader 24, the annular casting piston 25, the injection nozzle body 26, and the heating jackets 27 and 28, and the knockout paddle 29.

An extension 30 is mounted on the end of the hydraulic piston rod 16 and has a T-shaped end 31 which is adapted to fit into the T slot 32 in the upper end of the annular casting piston 25. A stud 33 is attached to the upper end of the feed slide 21 and is adapted to fit into the slot

in the end of the plate 34 mounted on the piston rod 16.

The injection nozzle 35 mounted in the end of the nozzle body 26 extends through the stationary die plate 5 and is adapted to contact with the sprue opening 36 in the die block 11. A locking plate 37 is hingedly mounted upon the end member 3 by means of the removable hinge pins 38 and 39 which fit into lugs, such as indicated at 40. A stud 41 threadably engages through the hinge plate 37 and is adapted to contact with the nozzle body 26. A jack screw 42 is threadably mounted in the end member 3 and bears against the bottom surface of the nozzle body 26. The nozzle body 26, of course, is attached to the casting cylinder 23 by means of studs, such as indicated in Fig. 1.

The rotatable distributing cup 22 has an opening 45 in its side which communicates with an opening 46 in the feed slide housing 47. The feed slide 21 in turn has an inclined chamber 48 which is adapted to receive material at the bottom of the stroke of the feed slide from the discharge opening 49 of the hopper 20. On the upper end of the stroke of the feed slide 21, the material passes from the inclined chamber 48 through the opening 46, through the opening 45 and thence into the interior of the distributing cup 22.

The inner walls of the distributing cup 22 are tapered inwardly in their lower portions as indicated at 50 and have a series of inwardly extending vanes 51. The inwardly tapering sides 50 of the distributing cup 22 terminate at their lower ends in the opening 52 adjacent the top of the pressure casting cylinder 23. The lower and outside portion of the distributing cup 22 is in the form of a gear 53 which meshes with the smaller gear 54 on the shaft 55. The shaft 55 in turn has one end in the form of a small pinion gear 56 in mesh with the gear rack 57 on the end of the connecting rod 58.

The connecting rod 58 is slidably mounted within the housing 59. The end portion 60 of the connecting rod 58 is hingedly connected thereto, as will be seen in Figs. 1 and 2, and has a U-shaped or hooked end portion 61 which is adapted to make a latching engagement with a cross pin 62 carried in the bracket 63 on the die plate 8. Thus, by merely raising the hingedly connected portion 60 of the connecting rod 58, the latter can be quickly disconnected from the die plate 8 when the assembly mounted on the member 17 is swung into open position, as indicated in Fig. 2.

The knock-out paddle 29 is attached by means of a clamp bracket 65 to the exterior portion 66 of the rotatable sleeve 67. The sleeve 67 is rotatably mounted in the housing 59 and is locked against longitudinal movement by means of the collar 68. A cam track 69 in the wall of the sleeve 67 engages with a pin 70 on the connecting rod 58. Thus, as the connecting rod 58 reciprocates, the pin and cam connection between the latter and the sleeve 67, operates to swing the knock-out paddle 29 back and forth in the space between the die blocks 10 and 11 when the latter are in open position. The knock-out paddle 29 serves the dual function of removing the casting from the die blocks 10 and 11 and also as a safety device to prevent the operator from inserting his hand between the die blocks 10 and 11 as the latter are about to move to closed position, since it will be seen that the knock-out paddle 29 swings up out of the space between the die blocks 10 and 11 when the die plates 8 and 9 start to move toward the die plate 5.

As the connecting rod 58 reciprocates, it also operates to rotate the distributing cup 22 and thereby to evenly and uniformly distribute the material to be cast around the interior of the cylinder 23.

The nozzle body 26 has a taper walled insert 75 which is located in registry with the bottom end of the spreader 24. The bottom, outer wall portions of this spreader 24 make a tapered fit with the walls of the cylinder 23, as indicated at 76. The bottom of the spreader 24 and the top of the insert 75 also make a tapered fit as indicated at 77. The insert 75 has a central passage 78 which communicates with the passage 79 in the nozzle body 26 leading to the nozzle tip 35. By virtue of this last described construction, the spreader 24 is securely mounted in the cylinder 23 and a tight and effective joint is provided between the bottom of the spreader 24 and the insert 75 in the nozzle body 26. By making that part of the nozzle body 26 which contacts with the spreader 24 in the form of a separate insert, the time and expense of otherwise extremely difficult machining is eliminated.

From the above description, it will thus be seen that the assembly of the material feed mechanism, the pressure casting cylinder, the injection nozzle, and the heating elements can be swung into open position to give access to all of these parts, as well as the die block gate opening, for the purpose of adjustments, replacements, inspection and cleaning, by merely removing one of the pins 38 or 39 from the hinge plate 37 and unlatching the hinge portion 60 of the connecting rod 58.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a pressure casting machine, the combination of a supporting frame, separable die plates, a hydraulic pressure cylinder and piston carried by said frame, a pressure casting assembly means comprising a pressure casting cylinder and plunger therein and material feed and discharge means, means for swingably mounting said assembly means on said supporting frame, means for detachably connecting said plunger to said hydraulic piston, and means for detachably holding said assembly means in operative position on said supporting frame.

2. In a pressure casting machine, the combination of separable die plates, a pressure casting cylinder, a rotatable cup-like member having an opening in its side wall for receiving material to be cast and an opening in its bottom in registry with the top of said cylinder for distributing said material around the interior of said cylinder, and means for rotating said cup-like member connected to one of said die plates whereby movement of the latter is transmitted to, and operates to rotate the former.

3. In a pressure casting machine, the combination of separable die plates, a pressure casting cylinder, a rotatable cup-like member having an opening in its side wall for receiving material to be cast and an opening in its bottom in registry with the top of said cylinder for distributing said material around the interior of

said cylinder, a paddle-like member pivotally mounted adjacent said die plates and adapted to swing through the space between said plates when the latter are in open position, and means connected to one of said plates for rotating said cup-like member and for swinging said paddle-like member.

4. In a pressure casting machine, the combination of separable die plates, a pressure casting cylinder, a rotatable cup-like member having an opening in its side wall for receiving material to be cast and an opening in its bottom in registry with the top of said cylinder for distributing said material around the interior of said cylinder, a paddle-like member pivotally mounted adjacent said die plates and adapted to swing through the space between said plates when the latter are in open position, a connecting rod connected at one end to one of said die plates, cam means connecting said connecting rod to said paddle-like member, and rack and gear means connecting said connecting rod to said cup-like member.

5. In a pressure casting machine, the combination of a fixed supporting frame, separable, vertically disposed die plates and a vertically disposed pressure casting means with a horizontal discharge nozzle carried by said frame, said casting means being swingably mounted in a horizontal direction on said frame whereby it is movable into and out of operative casting position with respect to said die plates.

6. In a pressure casting machine, the combination of a supporting frame, separable, vertically disposed die plates, a hydraulic cylinder and piston, and pressure casting means with a horizontal discharge nozzle carried by said frame, said casting means and said cylinder and piston being in vertical alignment, the latter being fixedly mounted on said frame, and said casting means being movably mounted on said frame whereby it is movable into and out of operative casting position with respect to said die plates and with respect to said hydraulic cylinder and piston.

7. In a pressure casting machine, the combination of a supporting base, fixed, vertically disposed supporting frame members on said base, a pressure casting assembly means including a pressure casting cylinder and plunger therein and material feed and discharge means, means for swingably mounting said assembly means in a horizontal direction on said frame members, and means on said base for contacting the bottom of said assembly means when the latter is in operative position.

8. In a pressure casting machine, the combination of a supporting frame, separable, vertically disposed die plates, a hydraulic cylinder and piston, and pressure casting means with a horizontal discharge nozzle carried by said frame, said casting means and said cylinder and piston being in vertical alignment, the latter being fixedly mounted on said frame, said casting means being movably mounted on said frame whereby it is movable into and out of operative casting position with respect to said die plates and with respect to said hydraulic cylinder and piston, and a jack screw on said frame adapted to bear against the bottom of said nozzle when said casting means is in operative position.

NATHAN LESTER.