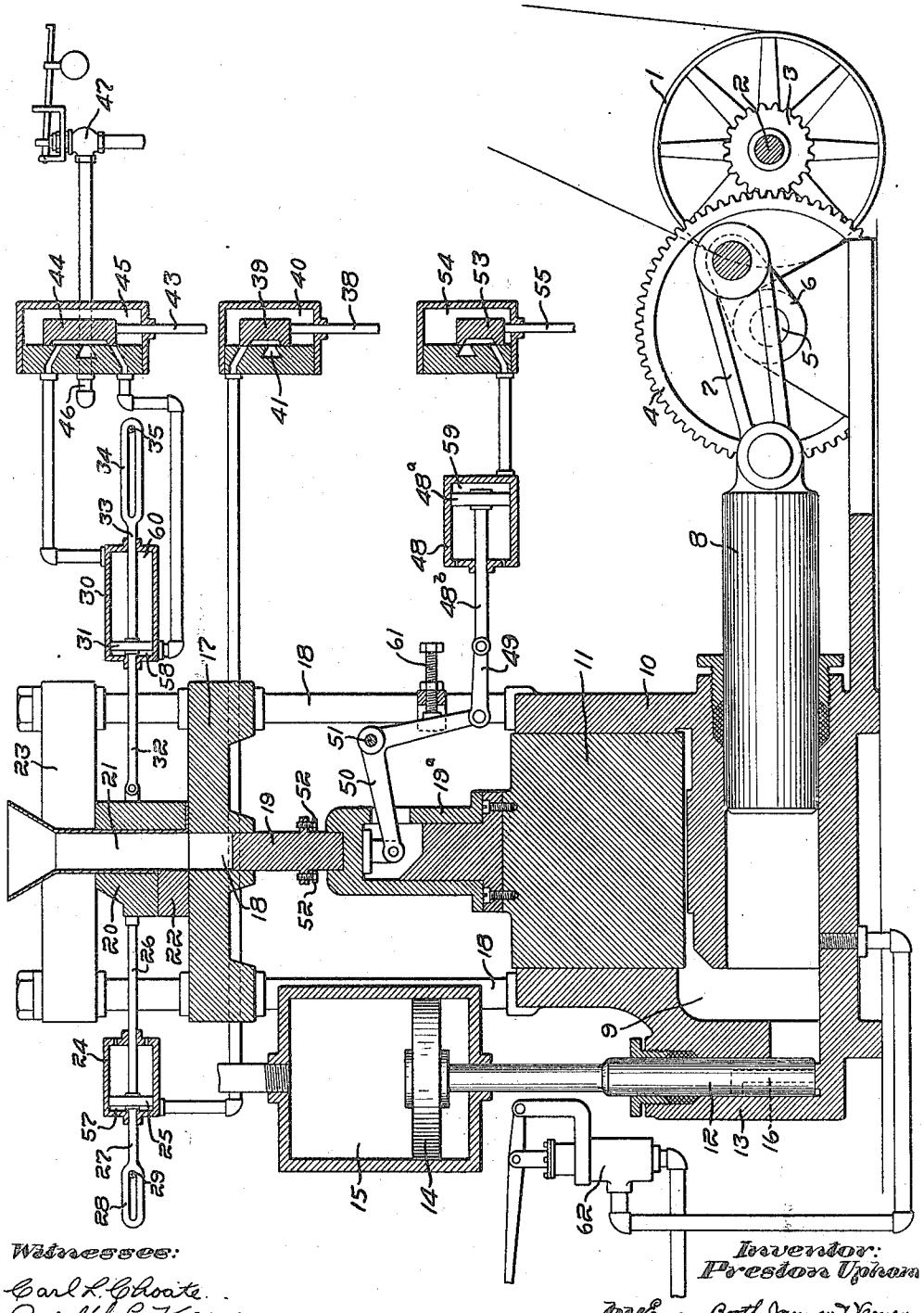
P. UPHAM.

PRESS.

APPLICATION FILED AUG. 21, 1911.

1,202,616. Patented Oct. 24, 1916.



Witnesses:

Carl L. Choate.

Adolph C. Traise.

Inventor:

Preston Upham

by Emery, Booth, Janney & Varney.

Att'ys.

UNITED STATES PATENT OFFICE.

PRESTON UPHAM, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO INTERNATIONAL PAVEMENT COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

PRESS.

1,202,616. Specification of Letters Patent. Patented Oct. 24, 1916.

Application filed August 21, 1911. Serial No. 645,056.

To all whom it may concern:

Be it known that I, PRESTON UPHAM, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Presses, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention, one embodiment of which is illustrated in the accompanying drawings and herein described, relates to certain improvements in presses, which improvements possess many features of novelty and invention which are useful either in combination with each other as disclosed, or as used separately in any type of press.

One of these features is my pressure creating and pressure transmission system.

Another is my improved construction for operating my mold opening, filling, and closing means.

Many other features of novelty will be explained hereinafter.

The drawing shows a diagrammatic view of the press.

In the embodiment of my invention disclosed in this drawing, the driving pulley 1, driven by a belt from any suitable source of power, is shown keyed on the shaft 2, to which is keyed the pinion 3. The pinion 3 meshes with the gear 4 keyed on the timing shaft 5, so the said belt and gearing constitute one type of motor for said shaft 5. The timing shaft 5 is provided with a crank 6. A connecting rod 7 connects said crank with a displacing plunger 8 which reciprocates in a part of a chamber 9 of the hydraulic cylinder 10. In lieu of the crank 6, I may, without departing from the spirit of my invention, use any other suitable pressure actuator, preferably one having a fixed throw, as, for example, an eccentric or cam, altering the connection with the plunger 8 to correspond. The hydraulic cylinder 10 is provided with pressure responsive means herein shown as a ram 11 although a diaphragm may be used without departing from the spirit of my invention. The receptacle or chamber between the displacing plunger 8 and the ram 11 is filled with a normally substantially constant body or fixed quantity of liquid. It will readily be seen that revolution of the timing shaft 5 will produce reciprocation of the ram 11 and that the pressure applied to the displacing plunger 8 will be multiplied when transmitted to the ram 11 in the same ratio as the respective areas of the displacing plunger and ram.

In order that excessive resistance to compressive movement of the ram may not stall the timing shaft or break any of the parts, and also herein to provide a dwell or period of high compression, I have provided automatic pressure determining or controlling means, which, in the embodiment herein disclosed, comprises a pressure determining or controlling plunger 12, reciprocable in a cylinder 13 connected with, or opening into, the chamber 10. I have herein shown the pressure determining or relief plunger 12 as resisted by or receiving pressure from a piston 14 in a fluid pressure cylinder 15, though any yielding method of imparting resistance to my controlling plunger, such as a spring, weight, or the like may be used. Steam or other fluid pressure is admitted to one end of this cylinder in such a way as to hold the controlling plunger 12 in its inmost position with relation to the chamber 9, except when a predetermined pressure on the liquid in the chamber 9 has been reached. This, as may be readily seen, will be reached only when a predetermined resistance is opposed to compressing movement of the ram 11. When this occurs, the pressure determining or controlling plunger 12 will be forced back in its cylinder 13 against the pressure of the fluid in the fluid pressure cylinder 15.

The cylinder 13, the plunger 12, the fluid pressure cylinder 15 and the amount of liquid in the chamber 9 are all so proportioned that the pressure at which the controlling plunger begins to operate may be normally reached before the displacing plunger 8 reaches the end of its stroke. They are also so proportioned that the controlling plunger will, under normal conditions, merely recede in its chamber during the further displacing stroke of the displacing plunger without allowing any

liquid to escape. If, in exceptional cases of abnormal obstruction or accident, the liquid reached the predetermined pressure substantially earlier in the stroke of the displacing plunger than is normally the case, I may, to prevent breakage, allow some liquid to escape. To accomplish this, I may provide the controlling plunger with a passage 16 so arranged that one end of the passage may be forced from the cylinder before the controlling plunger is entirely forced from its cylinder, thus allowing some liquid to escape and thus preventing complete ejection of the controlling plunger from the cylinder or breaking of the parts.

The pressure system, one form of which is herein disclosed, is designed primarily to coöperate with an automatically operating mold, for the compression of blocks, bricks, tiles and the like, made from asphaltic or other plastic material.

I have shown in the drawings a mold containing member 17 having a mold 18 and connected to the hydraulic cylinder 10 by bolts 18, and a plunger 19 operable by the ram 11 through the member 19ª. To fill this mold 18, to cover it when the material therein is being pressed and to uncover it when said mold is being emptied, it is necessary to provide operating means to change the relative position of the mold and mold cover. In the embodiment herein described, I have shown a sliding head 20 containing the filling neck 21 and the mold cover or pressure receiving block 22. It is immaterial however whether the mold cover is moved relative to the mold or whether the mold is moved relative to the mold cover. The sliding head is held from upward movement by a bulkhead 23 secured to the bolts 18. In the embodiment shown, it is necessary that the sliding head 20 should be automatically movable into three positions, respectively, for filling as shown in the drawing, for pressing with the pressure receiving block 22 covering the mold and for ejection with the head removed from over the mold entirely.

So far as I am at present advised, in all presses heretofore constructed which require three relative positions of the mold and mold cover, movement of the moving member in one direction at least has been occasioned by positive mechanical means as distinguished from fluid pressure means. One object of the present invention is to provide fluid pressure mold operating means for producing all such movements. In the embodiment herein disclosed, I accomplish this by the use of two fluid pressure cylinders. Of these, one shown at 24 contains the piston 25 operating the piston rod 26, the piston 25 having stroke limiting means herein shown as the tail rod 27, the link 28 and the fixed pin 29 attached to any suitable and convenient support. I may use a crank or any other suitable stroke limiting device without departing from the spirit of my invention. In the embodiment of my invention shown, the piston rod 26 is not attached to the sliding head but abuts against it. Another fluid pressure cylinder 30 is provided with a piston 31, a piston rod 32 connected to the head, and the tail rod 33 provided with stroke limiting means herein shown as the link 34 and the fixed pin 35 attached to any suitable support.

The operation of the head moving means may be timed as follows: On the timing shaft 5 which preferably also operates as the crank shaft of the press are mounted any suitable cams or the well known mechanical device means. Of these, one, through any suitable connection, a part of which is shown at 38, operates the slide valve 39 in the valve chest 40 which controls the inlet and outlet of steam or fluid pressure from the cylinder 24. Fluid pressure is preferably admitted to one end of this cylinder only. Any suitable inlet may admit steam to the valve chest 40, and any suitable exhaust port 41 may serve to exhaust steam from the cylinder 24. Another cam or the like on the shaft 5, through any suitable connection, a part of which is shown at 43, operates the slide valve 44 in the steam valve chest 45. This slide valve 44 controls the admission and exhaust of steam from the opposite ends of the cylinder 30. The exhaust pipe 46 is preferably provided with a safety valve 47 so that when one end of the cylinder is exhausting, a relatively low pressure will still be maintained therein. This serves to maintain a low pressure in the end 60 of the cylinder 30 when the steam pressure in the cylinder 24 is moving the sliding head into pressing position and prevents any momentum acting to continue movement of said head after the piston 25 has completed its stroke. After the compression of the block in the mold and the uncovering of the mold, I provide ejection or mold emptying means preferably operated by fluid pressure. In the embodiment of my invention herein disclosed, I accomplish this by a fluid pressure operated ejecting cylinder 48 having a piston 48ª and the piston rod 48ᵇ operating through the connecting rod 49 on the bell crank 50 pivoted on the shaft 51 which operates to lift the member 19ª and the plunger 19. The point to which the plunger is to be raised by this fluid pressure cylinder is determined by any suitable stroke limiting device herein shown as lugs having set screws 52 which may be adjusted to allow the plunger to be elevated to such a height only as to be flush with the top of the mold containing

member 17. Steam is admitted and exhausted from the ejecting cylinder 48 by means of a slide valve 53 located in any suitable valve chest 54. This slide valve 53 is operated through any suitable connecting mechanism typified by a cam or any other suitable device located on the timing shaft 5.

The operation of the press is as follows. In the position shown in the drawing, the mold has just been filled. Fluid pressure is now admitted to the end 57 of the fluid pressure cylinder 24 by movement of the slide valve 39. The pressure in the cylinder 30 being low, the sliding head 20 is pushed by the rod 26 until the pin 29 stops the link 28. As explained before, if desired, a relatively low pressure may be maintained in the cylinder 30 to prevent the momentum of the sliding head from carrying it past the desired pressing position. The crank 6 which revolves clockwise now starts the displacing plunger 8 on its inward travel, starting the ram 11 on its upward travel. This continues until the predetermined pressure upon the contents of the mold is reached, when the pressure determining or controlling plunger 12 responds and allows the displacing plunger 8 to finish its inward stroke without substantial further movement of the ram 11.

It is manifest, in the embodiment of my invention herein shown, that normally from the instant the displacing plunger causes movement of the pressure determining or controlling plunger until that plunger resumes its starting position after the displacing plunger has made the necessary part of its return stroke, a substantially uniform predetermined pressure will be maintained upon the contents of the mold through the compressing plunger and ram. This pressure will be thus applied for a period which is believed to be approximately twice the length of time that a uniform pressure can be maintained upon any positively actuated hydraulic press of like capacity of the safety valve, liquid expulsion type. This increased dwell or period during which a high compression is maintained is valuable to effect a more perfect compression of the material in the mold.

The controlling plunger and the inward pressure applied thereto should be so proportioned to the other elements of my pressure transmission system that it will not normally allow any liquid to escape from the chamber but will take up the surplus movement of the displacing plunger by receding in its own cylinder 13. Should, however, the ram 11 be stopped abnormally early in its travel and hence the controlling plunger be forced farther back in its chamber than is normally the case, the passage 16 will permit the excess of liquid to escape. This passage however is intended only to operate in an emergency. The pressing operation being completed when the displacing plunger has receded sufficiently to relieve all pressure from the material in the mold, it is necessary to uncover the mold so that the compressed material may be ejected therefrom. To perform this, steam is admitted to the end 58 of the cylinder 30 by moving its slide valve 44 into proper position by means of its cam. This causes the head to be moved to its position at the extreme right as allowed by the link 34 and the pin 35. The mold is now uncovered. The slide valve 53 is now moved by its cam to a position such that fluid pressure is admitted to the end 59 of the cylinder 48. This, through the connections before explained, causes the block to be ejected from the mold. Fluid pressure is now admitted by the action of its cam on slide valve 44 to the end 60 of the cylinder 30. This causes the sliding head to move to the extreme left position allowed by the link 34 and pin 35 in which position the neck 21 registers with the mold 18, the fluid pressure in the cylinder 24 having first been exhausted by the action of its cam on the slide valve 39. The fluid pressure is now exhausted from the end 59 of the cylinder 48 and if necessary, other fluid pressure may be admitted to the opposite end of the cylinder 48 to assist gravity in causing the plunger 19 and the member 19ª to fall and cause the mold to be again filled with unpressed material from the neck 21. Any suitable device as shown at 61 may be used to vary the downward stroke of the plunger and hence the amount of material admitted to the mold and the thickness of the resultant block.

As will be readily seen by the construction shown in the present embodiment of my invention, the pressure creating means is actuated independently of my mold operating means. By this arrangement, in case of any obstruction to the sliding head moving or block ejecting means, the pressing power which is very great is not effective to break any of the parts, yet they are all relatively timed together.

My hydraulic transmission system obviates the necessity for constantly supplying new liquid as is the case with the usual types of mechanically actuated hydraulic presses which are supplied with safety valves to permit escape of the liquid when a predetermined pressure is reached. By my system, I prevent a predetermined pressure being exceeded normally without loss of liquid. The construction shown, as before explained, also prolongs the dwell during which the material is subjected to its maximum pressure because, the maximum pressure is contained during the stroke of the relief plunger in both directions nor-

mally continuing during a part of the stroke of the displacing plunger in both directions. I preferably provide a replenishing pump 62 adapted to replace any liquid which may leak or escape from the chamber 9.

While I have shown an improvement in mold operating mechanisms, such improvement is not claimed in this application, but is claimed in my copending application, Serial No. 645,794, filed Aug. 24, 1911.

Having thus described one embodiment of my invention, I wish it understood that my invention is not limited to the constructions and combinations herein shown and described but what I desire to claim broadly by Letters Patent is set forth in the following claims.

Claims.

1. An asphalt block-forming hydraulic press comprising in combination a mold; means to open and close said mold; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator for said displacing plunger; a ram to compress the contents of said mold, said ram being normally responsive to movement of said displacing plunger for a portion only of the stroke thereof; and pressure controlling means other than said actuator coöperating therewith to control the pressure imparted to said ram while maintaining said fixed quantity of liquid in said receptacle.

2. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; operating means to change the relative position of said mold and said mold cover; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid having a fixed travel; a fixed-throw mechanical actuator for said displacing plunger; a ram operating a compressing member in said mold, said ram being normally responsive to movement of said displacing plunger for a portion only of the stroke of said displacing plunger; and automatic pressure controlling means to permit said displacing means to complete its displacing stroke while normally maintaining said substantially fixed quantity of liquid in said receptacle.

3. An asphalt block-forming hydraulic press comprising in combination a mold; means to fill and empty said mold; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator for said displacing plunger; a ram to compress the contents of said mold; said ram being normally responsive to movement of said displacing plunger for a portion only of the stroke of said displacing plunger; and automatic pressure controlling means to permit said displacing means to complete its displacing stroke while normally maintaining said substantially fixed quantity of liquid in said receptacle.

4. An asphalt block-forming hydraulic press comprising in combination a mold; mold filling and emptying means; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid having a fixed travel; a fixed-throw mechanical actuator for said displacing plunger; a ram to compress the contents of said ram being normally responsive to movement of said displacing plunger for a portion of the stroke of said displacing plunger; and automatic fluid controlled pressure controlling means to permit said displacing means to complete its displacing stroke normally while maintaining said substantially fixed quantity of liquid in said receptacle.

5. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; mold operating means to change the relative position of mold and said mold cover; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator for said displacing plunger; a ram operating a compressing member in said mold, said ram being normally responsive to movement of said displacing plunger for a portion of the stroke of said displacing plunger; and automatic fluid controlled pressure controlling means to permit said displacing means to complete its displacing stroke normally while maintaining said substantially fixed quantity of liquid in said receptacle.

6. An asphalt block-forming hydraulic press comprising in combination a mold; means to open and close said mold; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid having a fixed travel; a fixed-throw mechanical actuator for said displacing plunger; a ram to compress the contents of said mold, said ram being normally responsive to movement of said displacing plunger for a portion of the stroke of said displacing plunger; and automatic elastic fluid controlled pressure determining means to permit said displacing means to complete its displacing stroke normally while maintaining said substantially fixed quantity of liquid in said receptacle.

7. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; mold operating means to change the relative position of said mold and said mold cover; a receptacle containing normally a substantially fixed quantity of

pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator for said displacing plunger; a ram operating a compressing member in said mold, said ram being normally responsive to movement of said displacing plunger for a portion of the stroke of said displacing plunger; and automatic elastic fluid controlled pressure determining means to allow said displacing means to complete its displacing stroke normally while maintaining said substantially fixed quantity of liquid in said receptacle.

8. An asphalt block-forming hydraulic press comprising in combination a mold; mold emptying means; a liquid displacing plunger; a ram operating a compressing plunger in said mold; a receptacle between said displacing plunger and said ram containing normally a fixed quantity of pressure transmitting and multiplying liquid during the compression and return strokes of said ram; a fixed-throw positive mechanical actuator for said displacing plunger; and automatic pressure controlling means operative when a predetermined resistance to compressing movement of said compressing plunger has been reached, to prevent said predetermined resistance being substantially exceeded normally without any escape of liquid from said chamber.

9. An asphalt block-forming hydraulic press comprising in combination a mold; mold closing means; operating means to change the relative position of said mold and mold closing means; a ram to compress the contents of said mold; a displacing plunger; an actuator for said displacing plunger; normally a substantially fixed quantity of pressure transmitting and multiplying liquid operatively interposed between the said displacing plunger and said ram during the compression and return strokes of said ram; and means to determine substantially the maximum pressure imparted by said ram and to maintain such determined maximum pressure upon said ram during a substantial part of the stroke of said actuator.

10. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; operating means to change the relative position of said mold and mold cover; a compressing plunger for said mold; a ram to move said compressing plunger; a displacing plunger; an actuator for said displacing plunger having a fixed throw; normally a substantially fixed quantity of pressure transmitting and multiplying liquid operatively interposed between the said displacing plunger and said ram during the compression and return strokes of said ram; and means to determine substantially the maximum pressure imparted by said compressing plunger and to maintain such determined pressure upon said mold plunger during a substantial part of the stroke of said actuator.

11. An asphalt block-forming hydraulic press comprising in combination a mold; mold filling and emptying means; a ram to impart pressure to the contents of said mold; a receptacle containing normally a fixed amount of pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator to impart movement to said displacing plunger; and pressure controlling means operative to determine substantially a pre-determined pressure imparted to said ram and to prolong the period during which said pre-determined pressure is imparted to said ram to include a portion of the return stroke of said actuator.

12. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; operating means to change the relative position of said mold and said mold cover; a receptacle containing normally a substantially fixed quantity of pressure transmitting and multiplying liquid; a displacing plunger for said liquid; an actuator for said displacing plunger; a ram operating a compressing plunger in said mold, said compressing plunger being normally responsive to movement of said actuator for a portion of the compressing stroke of said actuator and automatic pressure determining means other than said actuator to permit said actuator to complete its compressive stroke without corresponding movement of said compressing plunger while maintaining said substantially fixed quantity of liquid in said receptacle.

13. An asphalt block-forming hydraulic press comprising in combination a mold; a mold cover; mold operating means to change the relative position of said mold and said mold cover; a mold plunger reciprocable in said mold; a hydraulic ram to impart compressing movement to said mold plunger; a ram cylinder for said ram; a liquid containing receptacle operatively connected with said ram cylinder; a liquid displacing plunger to displace liquid in said chamber, whereby pressure may be imparted to said ram; pressure controlling means coöperating with said chamber and comprising a plunger; a cylinder for said plunger and a passage in said plunger, whereby pressure ejection of said plunger from its cylinder is prevented.

14. An asphalt block-forming hydraulic press comprising in combination a mold; mold closing means; mold operating means to move relatively said mold and said mold closing means; a mold plunger reciprocable in said mold; a hydraulic ram to impart compressing movement to said mold plunger; a ram cylinder for said ram; a liquid containing chamber operatively connected with said ram cylinder; a liquid dis-

placing plunger to displace liquid in said chamber, whereby pressure may be imparted to said ram; an actuator for said displacing plunger; a normally fixed quantity of pressure multiplying liquid in said liquid containing chamber and pressure controlling means comprising a controlling plunger; a cylinder for said plunger; pressure means operating on said controlling means to determine the pressure imparted to said liquid by said displacing plunger, whereby pressure may be maintained on said liquid and on the contents of said mold after the commencement of the non-displacing stroke of said displacing plunger.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

PRESTON UPHAM.

Witnesses:

ROBERT H. KAMMLER,

F. IRENE CHANDLER.