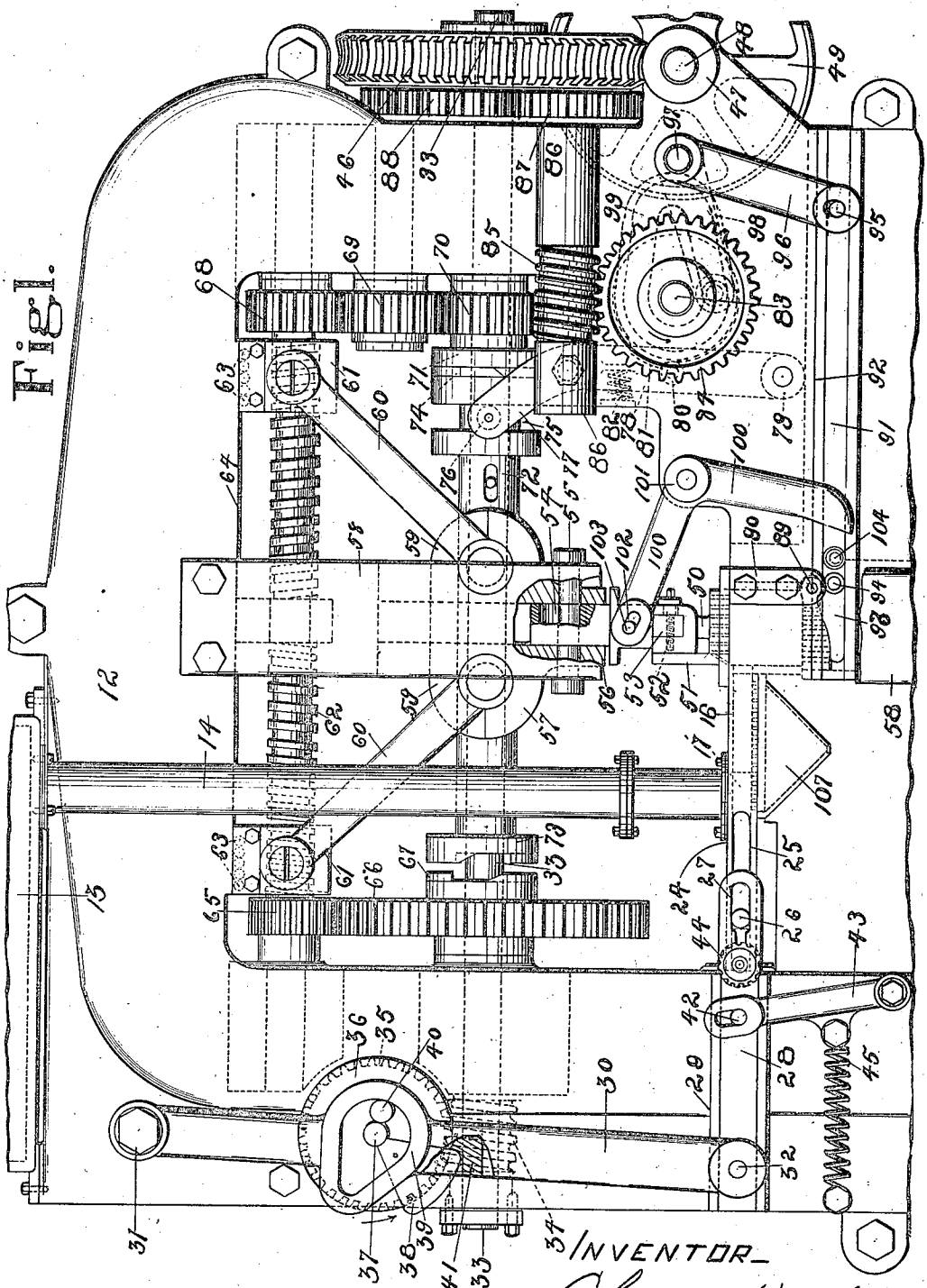
Feb. 13, 1923. 1,444,878.

C. HUNT.

MACHINE FOR MAKING MOLDED COMPRESSED ARTICLES.

FILED APR. 7, 1919. 3 SHEETS—SHEET 1.

Fig. 1.



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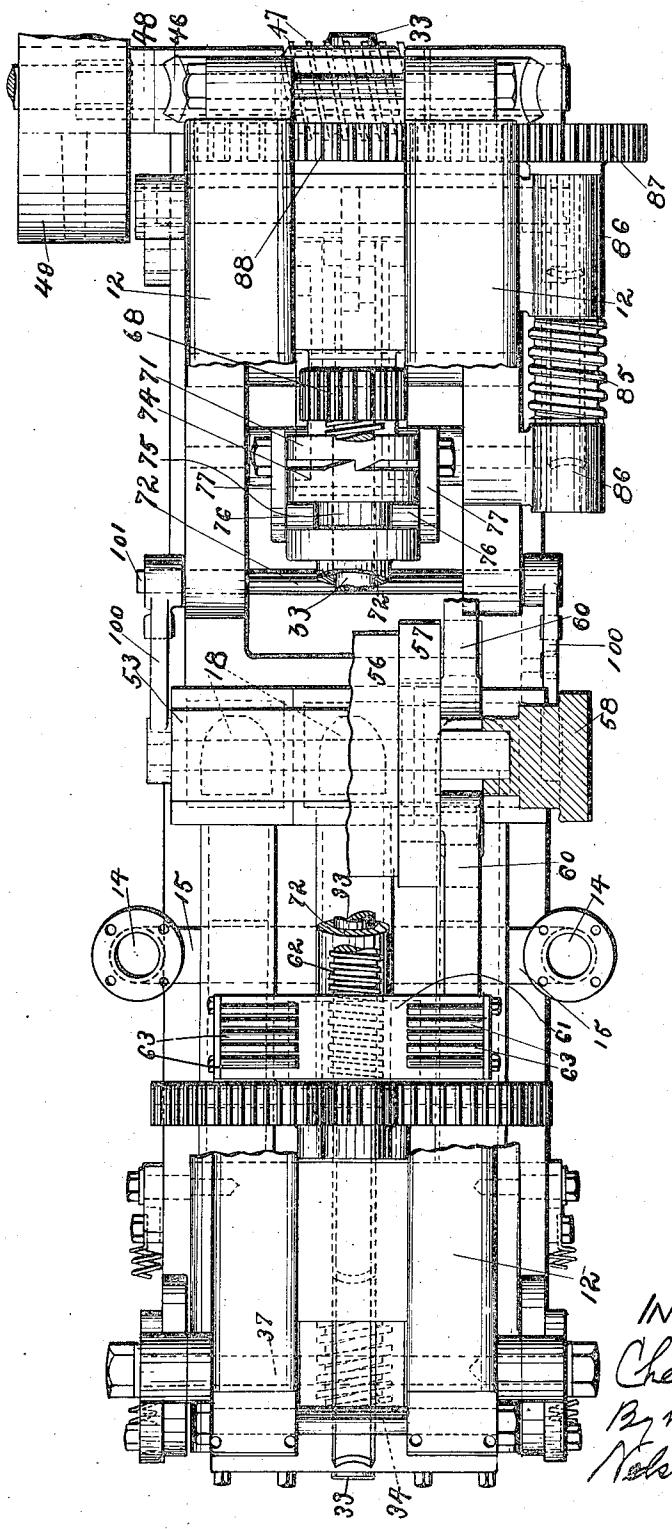


Fig. 2.

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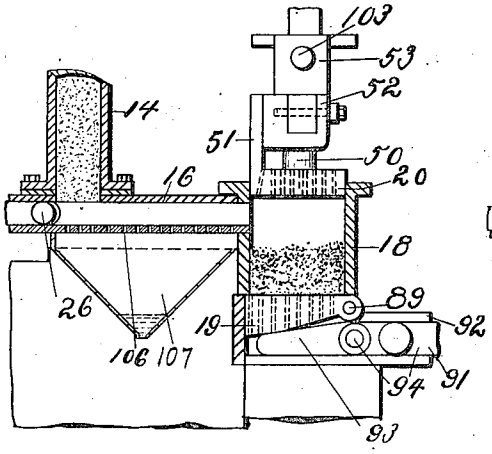


Fig.3.

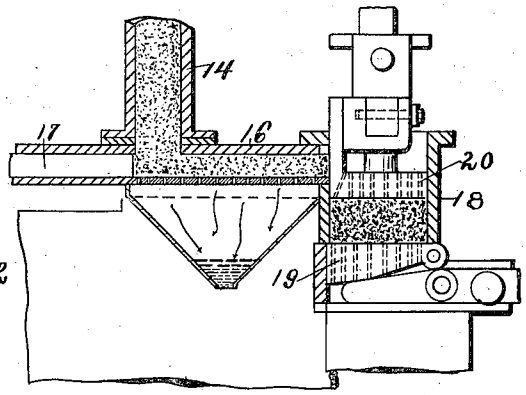


Fig.4.

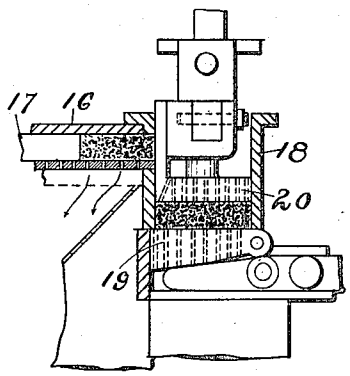


Fig.5.

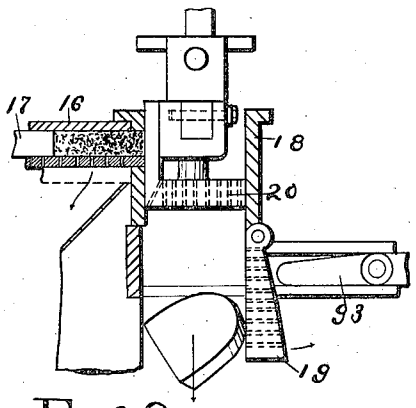


Fig.6.

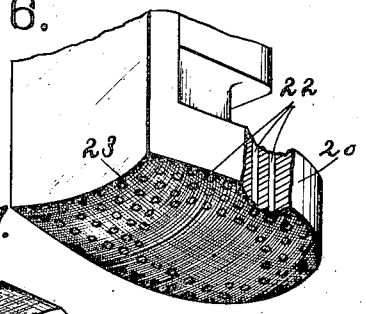


Fig.7.

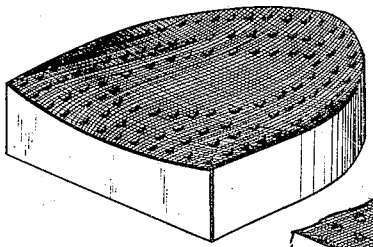


Fig.9.

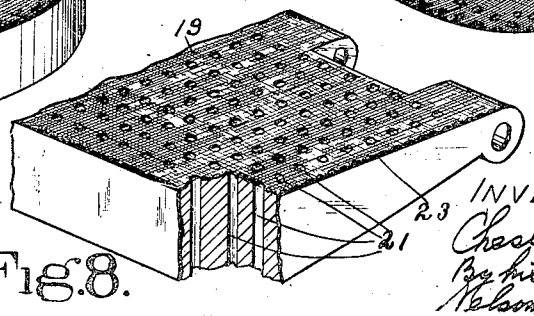


Fig.8.

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Patented Feb. 13, 1923. 1,444,878

UNITED STATES PATENT OFFICE.

CHESTER HUNT, OF LYNN, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR MAKING MOLDED COMPRESSED ARTICLES.

Application filed April 7, 1919. Serial No. 287,973.

To all whom it may concern:

Be it known that I, CHESTER HUNT, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain Improvements in Machines for Making Molded Compressed Articles, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to the manufacture of articles such as boot or shoe heels directly from material broadly termed pulp herein, by which term I mean leather-board or any equivalent plastic material capable of being molded to form heels or other useful articles.

It is well known that in view of the advancing cost of leather, it has become common to make heels largely of leather-board by cutting heel lifts from a sheet of that material and building up a series of such lifts with one or two top lifts to constitute the wear-resisting portions of the heels. This method is not only slow and expensive in labor cost but also requires the use of expensive dies or other cutting implements in producing the cut lifts, and causes a material waste of the stock between those portions which are cut out.

The principal object of my invention is to provide a machine which will produce the body portions of heels, or even complete heels in some cases, rapidly, economically, automatically, and with no waste of stock whatever. To this end an important feature of the invention consists in the provision of a mold into which pulp is intermittently transferred, one portion of the mold being movable and actuated to compress the pulp and an opposite portion being movable to permit the escape of a molded article, means being provided to hold the last-mentioned portion in operative position during the compressing operation.

In the illustrated machine, a pulp supply tank is provided and pulp therefrom passes through one or more pipes to a chamber in which a horizontally sliding pusher separates sufficient pulp for the heel part or heel to be made and places it under preliminary pressure to express therefrom a large proportion of the water which then escapes through perforations in the bottom of the chamber. The mass of pulp thus compacted is fed into a mold of the shape of the heel to be produced. A screw and toggle operated device then acts upon a portion of the mold which is constructed to form a plunger to cause said plunger to descend and compress the mass of pulp, molding it into the form of a heel. Portions of the mold, such as the plunger and the bottom thereof, are perforated to permit the further escape of moisture, and the heel is held under pressure in the mold for such length of time as is requisite. The bottom of the mold is movable, preferably like a hinged trap door, and is supported by a slide which, when the plunger pressure ceases, is withdrawn, permitting the heel to fall, or be ejected, through the bottom of the mold, to be led away. In the particular embodiment of the invention shown, the molding mechanism is in triplicate, receiving pulp from one supply tank, so that three heels are formed simultaneously.

Important features of the invention consist in providing for a preliminary elimination of water from the pulp on its way to the mold or molds to reduce the time of the molding operation and the length of motion required for the plunger or plungers; in providing for a slow compressing movement and rapid return of the plunger or plungers; in providing for the ready escape of moisture from the mold or molds without permitting escape of the fibrous material; and in providing means whereby, when the molding operation has ceased and the molds are opened, a slight further motion is imparted to the plungers to eject the articles.

The above and other features of the invention will now be described and then pointed out in the appended claims.

In the accompanying drawings:—

Fig. 1 is a front elevation of a machine embodying my improvements, said figure being partly broken out or in section;

Fig. 2 is a plan view of the machine, some parts being removed and other parts shown in section;

Figs. 3, 4, 5 and 6 are detail sectional elevations representing different stages of the molding operations;

Figs. 7 and 8 are perspective views of the upper and lower movable members, respectively, of the mold; and

Fig. 9 is a perspective view of a shoe heel which has been formed by means of mold members of the type shown in Figs. 7 and 8.

A suitable machine frame-work is indicated at 12, said frame-work supporting a supply tank or reservoir 13, only the lower portion of such tank being shown in Fig. 1. Leading downwardly from the tank 13 on opposite sides of the machine, as indicated by comparing Figs. 1 and 2 are two conduits 14 both of which communicate at their lower ends with a transverse receiving chamber 15.

The particular machine illustrated in the drawings is designed for simultaneously molding three heels and I have therefore provided three throats 16 leading horizontally from the transverse chamber 15 to three molding devices indicated by dotted lines, in Fig. 2. In each of the throats 16 is mounted a reciprocating feeder or pusher 17, the three pushers being connected at their rear ends to operate simultaneously as hereinafter explained.

Each of the three molds, the vertical walls of which are indicated at 18 in Figs. 3 to 6 inclusive, is provided with a hinged bottom member 19 against which a measured quantity of pulp which has been fed to the mold chamber by a pusher is pressed by a top molding member or plunger 20. The mold members 19 and 20 are formed respectively with small holes 21 and 22 for the escape of moisture, the face of each of said two mold members having a thin wire gauze sheet 23 secured to it, the gauze being fine enough to allow only water to escape through holes on the molding members.

The pushers or feeders 17 are mounted to reciprocate in guides 24, the rear ends of said pushers being suitably connected by a transverse member having at the front and rear of the machine a pin 26 extending through a slot 25 formed in the guide 24. The front and rear pins 26 extend through slots 27 formed in slides 28, there being one of said slides at the front and also one at the rear of the machine. Each slide 28 is fitted to guideways 29 (Fig. 1) and is reciprocated by a lever 30 pivoted at 31 to the frame of the machine and connected to the slide at 32.

I will now describe the mechanism for oscillating the two levers 30 by means of a shaft 33 extending from one end of the machine to the other, as shown in Figs. 1 and 2. Said shaft is provided with a worm 34 engaging a worm wheel 35 carried by a shaft 37 having two disks 36, one of which with its intermediate operating mechanism is shown in Fig. 1. Each disk 36 carries a sector 38 which rotates along side of and behind a cam-shaped loop 39 formed in the lever 30. In other words, the lever 30 is not continuous from end to end but between its ends is open in the form of the loop 39. Carried by the disk 36 is a pin 40 which rotates inside of the loop 39. The lever is formed or provided with a block 41 adapted, when the shaft 37 rotates in the direction of the arrow in Fig. 1, to be engaged and actuated by the sector 38 so as to swing the lever 30 toward the right in said figure. When this occurs the pushers are advanced comparatively slowly and transfer a suitable quantity of pulp to the molds, the lateral extension of the loop 39 in the lever permitting the pin 40 of the disk 36 to pass without obstruction. That is, the lever swings so as to be in a position where the pin 40 will then be in the apex of the opening in the loop when said lever has been swung to the right. After the sector 38 has passed the block 41 of the lever, the said lever is returned to normal position, drawing back the pushers or feeders, by means of the pivoted arm 43 having a slot engaging a pin 42 of the slide 28, a spring 45 being connected to said arm 43. The head 44 of a binding screw is indicated in Fig. 1, said screw passing into the member which connects the three pushers so that by means of the said binding screw and the pin-and-slot connection 26 and 27, the pushers 17 may be adjusted longitudinally relatively to the said slides 28.

The mechanism for operating the shaft 33 comprises a worm wheel 46 carried by said shaft and driven by a worm 47 on shaft 48 having a belt pulley 49.

Referring now to Figs. 3 to 6 inclusive in connection with Fig. 1, each upper mold member 20 has a stem 50 and a flange 51 which provides a wall or abutment against which the pulp is squeezed preliminarily when the pusher 17 moves from the Fig. 4 position to the Fig. 5 position.

The stem 50 is connected at 52 to a transverse bar 53, which latter carries the three upper mold members. The bar 53 is provided with upper extensions which are partly shown in section in Fig. 1, said extensions having vertical slots 54 through each of which a pin 55 passes, said pin being carried by downwardly extending portions 56 of a block 57, the ends of which are guided in vertical frame brace members 58.

Pivotally connected in recessed portions 59 of the block 57 are the lower ends of four toggle links 60. Only two of said links are indicated in Fig. 2 because said figure at its upper portion is intended to illustrate parts below said toggle links. The upper

ends of the toggle links are connected to blocks 61 which are internally threaded at their mid lengths (Fig. 2) to be actuated by the right and left hand screw 62 which is mounted at its ends in suitable bearings in the frame work. Inasmuch as, in the operation of the machine, an excessive strain might be transmitted through the toggle links to the screw 62 I provide the blocks 61 with anti-friction rolls 63 which ride against a portion of the frame formed as a smooth bearing track 64.

At one end the screw 62 is provided with a small gear 65 meshing with a large gear loose on shaft 33, said large gear having its hub formed or provided with a clutch face 67. At the other end of the screw is a small gear 68 meshing with an intermediate gear 69 which in turn meshes with a small gear 70 loose on shaft 33 and having its hub formed or provided with a clutch face 71.

Shiftable longitudinally on the shaft 33 is a sleeve 72, said sleeve being splined or otherwise connected, as by a slot and pin, to the shaft so that said sleeve will be driven by said shaft but be capable of a slight longitudinal movement thereon. One end of the sleeve is provided with a clutch member 73 and the other end with a clutch member 74. The sleeve also is formed or fitted with an enlargement in which is an annular groove 75 receiving the rolls 76 (Fig. 2) of the forked arm of a lever 77 (Fig. 1), pivoted at 78 and having a roll 80 engaging a cam 81 carried by a shaft 83, a suitable spring 82 being employed to return the lever and the sleeve 72 after the cam 81 acts.

Carried by the shaft 83 is a worm wheel 84 driven by a worm 85 carried by a shaft mounted in frame bearings 86, said shaft having a pinion 87 engaging a gear 88 carried by the shaft 33.

Before describing the mechanism further it is to be understood that the plungers, or members which carry the upper mold members, are designed to move slowly downward and to return quickly. This is effected by the mechanism and connections just described, it being understood that the gearing operates in such direction and is so timed that when the cam 81 is acting upon the roll 80 of lever 77, the sleeve 72 is shifted to the left from the position shown in Fig. 1 so that the clutch members 67, 73 will be inter-engaged and the clutch members 71, 74 will be separated. At such time the large gear 66, through the small gear 65, rotates the screw shaft in a direction to separate the blocks 61 and so raise the upper mold members by means of the toggle links 60, then when the cam 81 has passed the roll 80 of lever 77, the sleeve 72 returns to the position shown in Fig. 1 and then the screw shaft 62 is rotated in the opposite direction at a much slower speed, due to the gears 68, 69 and 70, to bring the blocks 61 toward each other at a slow enough speed to insure proper operation of the mold members.

When the downward movement of the upper members of the mold has ceased and the molding operation has been completed, the lower members of the molds are designed to open or swing down (Fig. 6). To this end the bottom mold members 19 are pivoted at 89 to fixed brackets 90 (Fig. 1). At the front and rear of the machine is a slide 91 mounted to reciprocate in guides 92 and carrying wedge members 93 adapted to slide under and support, or to retreat from and release, the swinging mold members 19. The several wedges are connected to the two slides 91 by a transverse pin 94. Each slide 91 has, near the right in Fig. 1, a pin 95 which engages a slot in an arm 96 of a rockshaft 97, such rockshaft having another arm 98 carrying a roll engaging a cam groove 99 in a disk secured to shaft 83 whereby, as the shaft 83 rotates, the slides 91 are reciprocated to cause the wedges 93 to alternately move under the mold members 29 to close them up against the bottom of the molds, as shown in Fig. 3, or to retreat and release the mold members 19 as shown in Fig. 6.

At the front and rear of the machine is an elbow lever 100 pivotally supported at 101 and having its upper arm formed with a slot 102 engaged by a pin 103 projecting from the transverse bar 53. The lower arm of lever 100 is in the path of a pin or roll 104 carried by the slide 91.

The object of this construction is to impart what might be termed a knocking action to the upper mold members after the lower mold members have been swung down, so as to eject the molded articles. It is for this reason that the lost motion connection is provided, as hereinbefore described, consisting of the slots 54 and the pins 55. As seen in Fig. 1, the pin 55 occupies the bottom of the slot 54, it being assumed that the upper die members are about to be pressed down. When the molding operation has been completed and the wedges 93 are about to be withdrawn from below the mold members 19, the cam groove 99 actuates the elbow lever 100 so as to draw the slides 91 backward and of course the pins 104 are then moving backward also. At the same time that the slides 91 are moving backward the elbow levers 100 are being swung so that their lower ends are moving to the right in Fig. 1 and a space still continues between the lower ends of said elbow levers and the pins 104. After the toggle links have acted to carry down the upper mold members to exert the final pressure on the articles, the rockshaft 97 continues to be actuated by the cam groove 99 so as to withdraw the slides

91 a little further or to a sufficient extent to cause the pins 104 to contact with the lower arms of the elbow levers 100 and actuate said elbow levers so that the upper arms thereof act through the pin and slot connections 102, 103 to pull the transverse bar 53 down sufficiently to cause the plunger members 20 to eject the molded articles through the lower openings resulting from the downward swinging of the members 19. Any mechanical equivalent of the slots 54 in the upper part of transverse bar 53 and the pins 55 carried by the toggle block 57 may be employed for providing a lost motion connection to enable this article ejecting operation to be performed.

It is desirable that as much liquid as possible shall be squeezed out from the pulp on its way to the molds. To this end I perforate the floor of the throats 16, as indicated at 106, and provide a funnel 107 to direct liquid so forced out into any suitable receptacle.

The liquid which is pressed from the pulp in the mold will of course drop with the articles when the latter are discharged from the molds. At this time, however, the articles have been so compressed that they will not quickly re-absorb any liquid and I may provide any suitable means for separating the articles from the water which means may comprise a reticulated belt driven horizontally below the molds so as to carry away the articles while permitting the liquid to fall through.

Having now described my invention, I claim:—

1. A machine of the character described comprising a mold adapted to form shoe heels or heel parts, a source of supply of pulp, a measuring conduit leading from the latter to said mold, said conduit having means for permitting the escape of water therefrom, means for forcing pulp along the conduit, and means for exerting pressure on a portion of the mold to express liquid from the pulp.

2. A machine of the character described comprising a mold having a movable member, a measuring conduit for supplying pulp to the mold, said conduit having openings for the escape of water, a pusher in said conduit, and means for actuating the pusher and said movable member alternately.

3. In a machine of the character described, a mold having opposite movable portions, means for intermittently introducing pulp to the mold, means for preliminarily pressing the pulp before it enters the mold, means for actuating one of said portions to compress the pulp, and means for alternately opening and closing the other of said portions.

4. In a machine of the character described, a mold having opposite movable portions, means for intermittently introducing pulp to the mold, means for removing water from the pulp on its way to the mold, means for actuating one of the movable portions of the mold to compress the pulp, and means for alternately opening and closing the other of the movable portions.

5. A machine of the class described having, in combination, a mold, a pulp supply tank, a conduit from the tank to the mold, and means for positively compacting pulp in the conduit and transferring it from the conduit to the mold.

6. A machine of the class described having, in combination, a mold, a pulp supply tank, a conduit from the tank to the mold, and means for positively transferring the pulp from the conduit to the mold in a succession of measured quantities under preliminary compacting pressure.

7. A machine of the class described having, in combination, a mold, a pulp supply tank, a conduit from the tank to the mold, and means for measuring pulp in the conduit and positively transferring the pulp from the conduit to the mold in a succession of equal quantities under preliminary compacting pressure, means being provided to permit the escape of water during said pressure.

8. A machine of the class described having, in combination, a mold provided with a movable bottom and a plunger top, a supply tank and conduit for delivering pulp to the mold, a screw and toggle mechanism for operating the mold plunger, and means for automatically reversing said screw.

9. A machine of the class described having, in combination, a mold provided with a movable bottom and a plunger top, a supply tank and conduit for delivering pulp to the mold, a right and left hand screw, nut blocks on the screw, toggle links connecting said blocks with the plunger, a rigid trackway for said blocks to support the thrust of the plunger and toggle links, and means for actuating said screw.

10. A machine of the class described having, in combination, a mold provided with a movable bottom and a plunger top, a supply tank and conduit for delivering pulp to the mold, a right and left hand screw, nut blocks on the screw, toggle links connecting said blocks with the plunger, and means for rotating said screw faster in one direction than the other.

11. A machine of the class described having, in combination, a mold provided with a movable bottom and having fixed side walls, means for alternately holding said bottom in operative position and releasing it to permit it to open, a molding plunger movable toward and from said bottom, means for supplying pulp to the mold, means for actuating the plunger to a pre-

determined point while the mold bottom is in operative position, and means for actuating the plunger further after the mold bottom is released.

12. A machine of the class described having, in combination, a mold provided with a hinged bottom, means for supplying pulp to the mold, a slide and means for actuating it to alternately close and release said hinged bottom, a plunger and means for reciprocating it relatively to said bottom, provision being made for lost motion between the plunger and its reciprocating means, and an independent plunger actuator to cause the plunger to eject the molded article after the hinged bottom opens.

13. In a machine of the character described, a mold, a pulp conduit communicating with the mold, a plunger movable past the delivery end of the conduit, means carried by said plunger to hold back the pulp in said conduit, and means for subjecting pulp in the conduit to pressure while the plunger is in position to prevent passage of pulp into the mold.

14. In a machine of the character described, a mold, a pulp conduit communicating with the mold, a plunger movable past the delivery end of the conduit, a pusher in said conduit to feed pulp to the mold, means carried by the said plunger to close the delivery end of the conduit and means for actuating said pusher while the plunger is in conduit-closing position, whereby the pulp in the conduit may be preliminarily compressed by the pusher.

15. In a machine of the character described, a plurality of molds, a passageway for pulp leading to each mold, a pusher in each passageway, a single member connected to the several pushers, and means for actuating said single member.

In testimony whereof I have signed my name to this specification.

CHESTER HUNT.