W. H. SHORTELL.

BLOCK PRESS.

APPLICATION FILED NOV. 22, 1918.

1,336,164.

Patented Apr. 6, 1920.

5 SHEETS—SHEET 1.

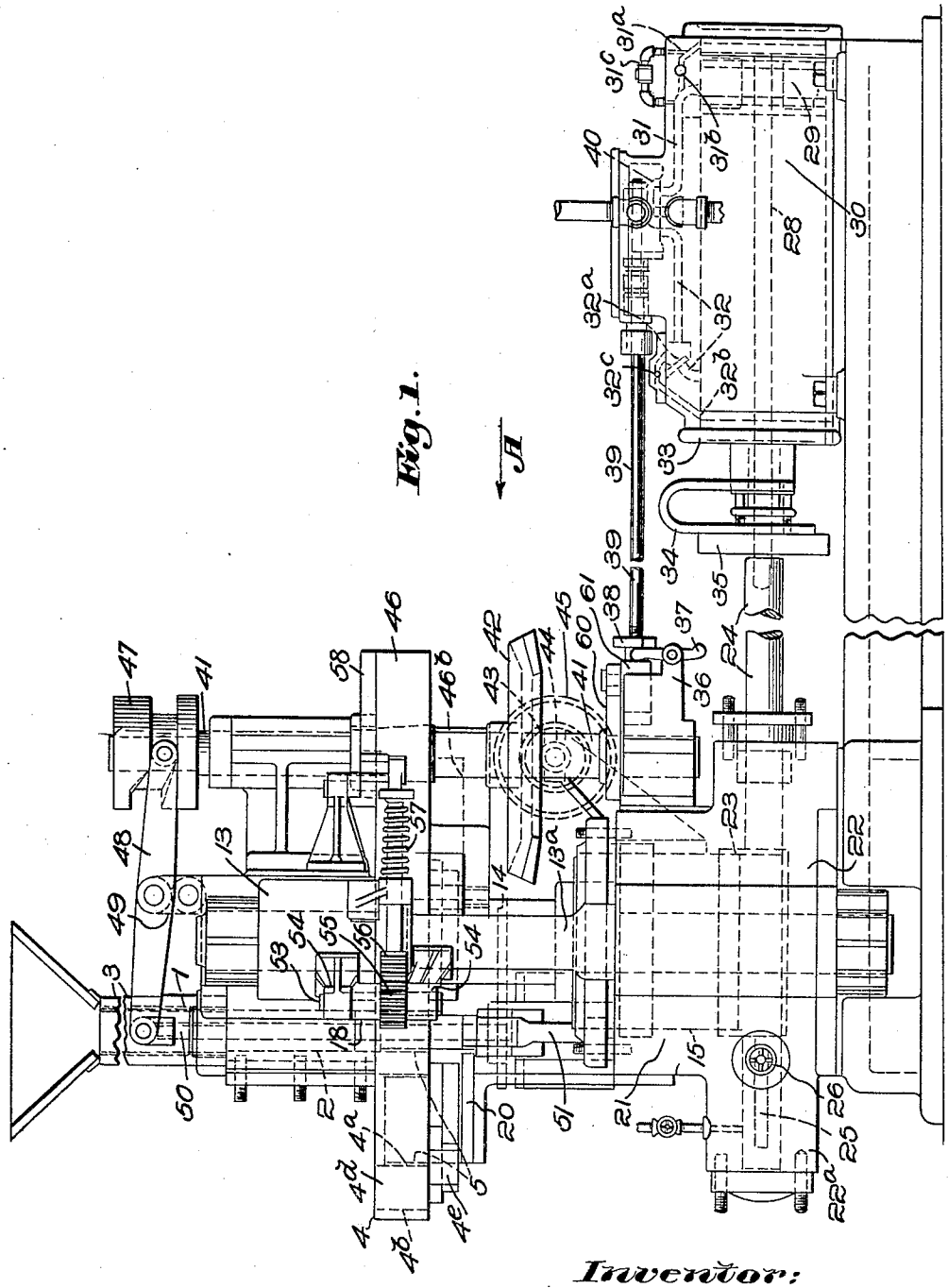


Fig. 1.

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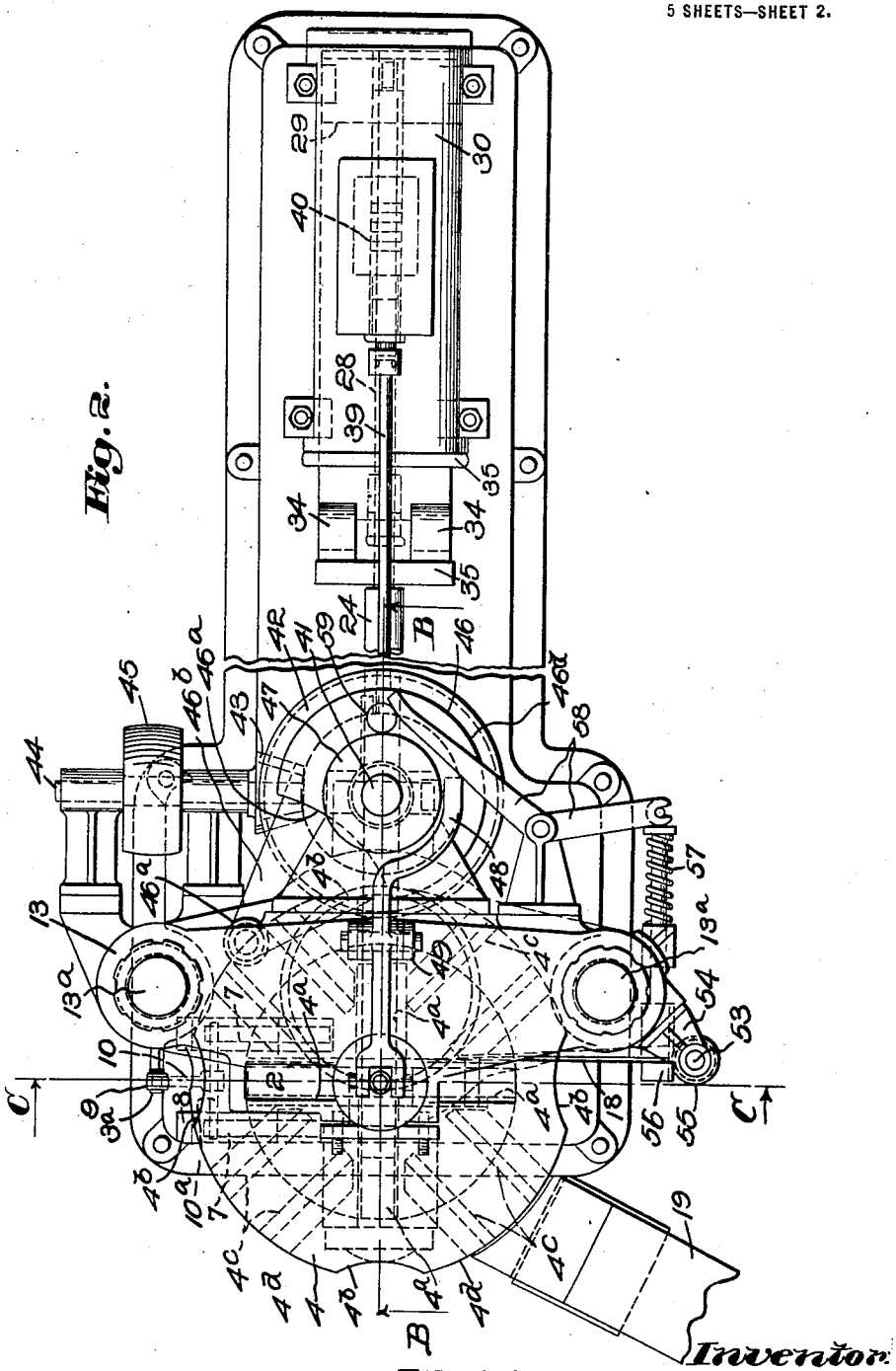
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5 SHEETS—SHEET 2.

Fig. 2.



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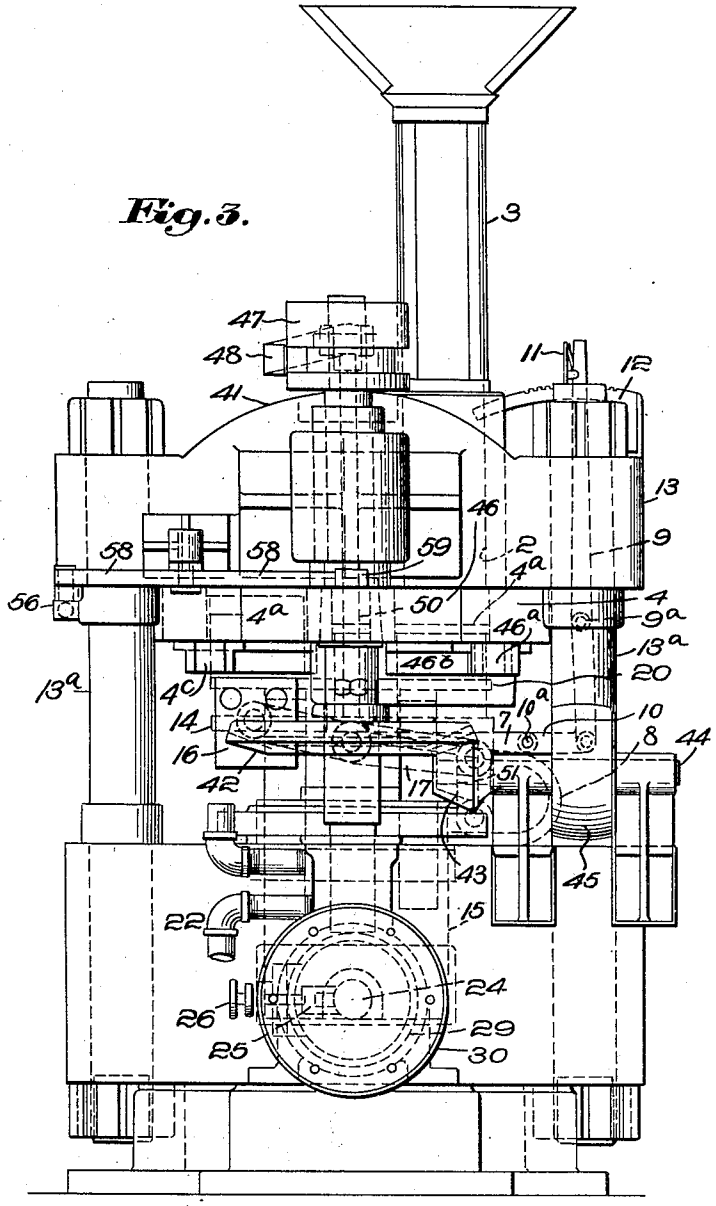
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5 SHEETS—SHEET 3.

Fig. 3.



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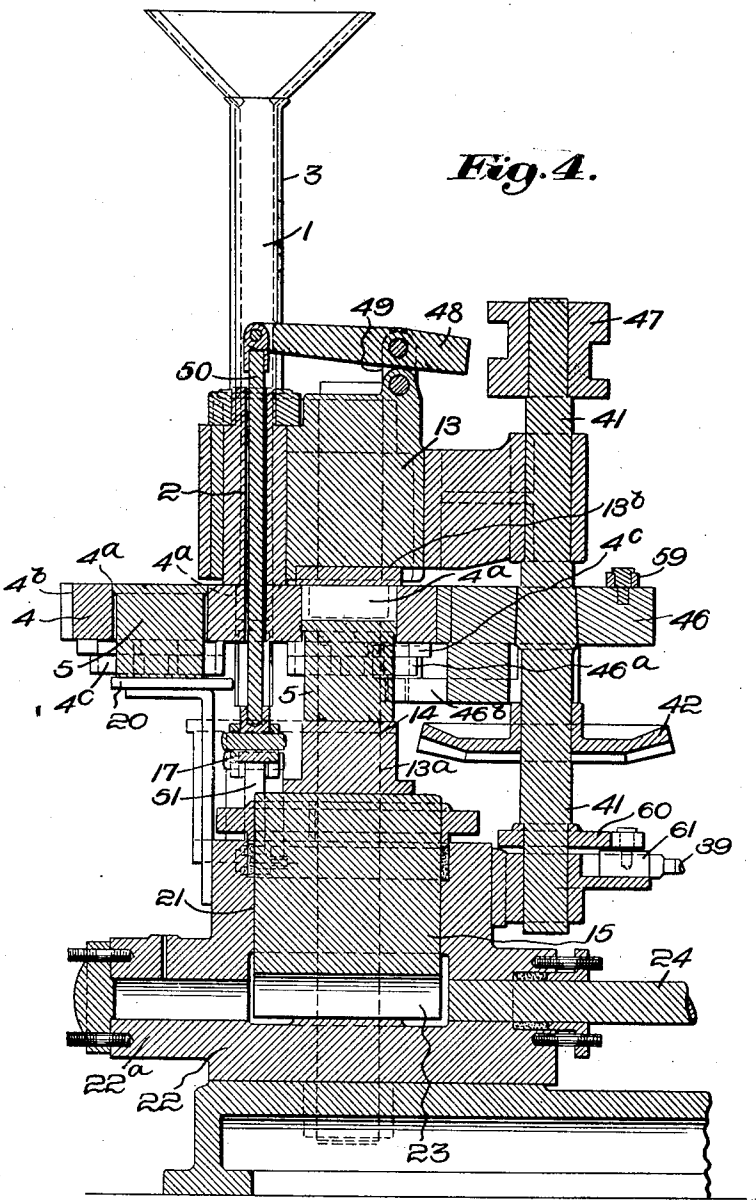
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5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

Fig. 6.

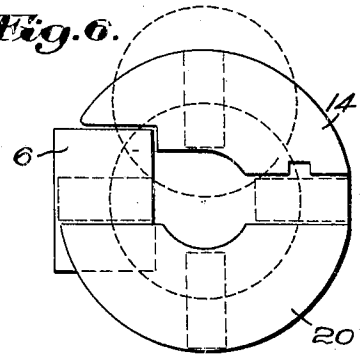


Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM H. SHORTELL, OF WEST HAVEN, CONNECTICUT, ASSIGNOR TO HARLEM CONTRACTING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BLOCK-PRESS.

1,336,164. Specification of Letters Patent. Patented Apr. 6, 1920.

Original application filed May 21, 1914, Serial No. 840,038. Divided and this application filed November 22, 1918. Serial No. 263,729.

To all whom it may concern:

Be it known that I, WILLIAM H. SHORTELL, a citizen of the United States, and a resident of West Haven, in the county of New Haven and State of Connecticut, have invented an Improvement in Block-Presses, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This application is a division of my co-pending application, Serial No. 840,038 for improvements in block presses, filed May 21, 1914.

In the drawings:—

Figures 1 and 2 represent respectively side and plan views of the complete press foreshortened by breaking a portion from the center thereof;

Fig. 3 is an end view of the press looking in the direction of the arrow A shown in Fig. 1;

Fig. 4 is a partial vertical sectional view of the press taken on line B B of Fig. 2, looking in the direction of the arrows;

Fig. 5 is a vertical section on the line C C of Fig. 2 looking in the direction of the arrows; and

Fig. 6 shows a detail plan view of the supporting plates for the plungers.

The press comprises five distinct parts all of which are carried by the frame of the machine, namely,

First—the feeding or filling mechanism constructed to hold therein a mixture or plastic composition.

Second—the mechanism for molding or shaping and compressing blocks from the mixture or plastic composition, which mechanism comprises a movable molding plate or member having molding holes, openings or cavities therein into which the mixture or plastic composition from the feeding or filling mechanism is forced and which movable plate or member segregates that portion of the mixture or composition in the molding holes from that in the feeding or filling mechanism by a movement of the plate or member relative thereto; said molding and compressing mechanism also comprising as elements thereof a stationary bulkhead or resisting member located above the movable plate, vertically movable pressing members which are slidably mounted in the holes in the movable block and capable of being forced upward whereby the material in the molding holes can be compressed between the stationary bulkhead and one of the vertically slidable pressing members and means for forcing the desired slidable members upward to carry out the compressing action;

Third—the ejecting mechanism which is arranged to cause an upward movement at the proper time of each of the sliding members sufficient to eject from the molding holes in the movable plate the material or work after it has been shaped and compressed;

Fourth—the discharging mechanism for engaging the work and removing it from the movable plate after it has been ejected from the molding holes therein; and

Fifth—the driving or operating mechanism which in the particular embodiment shown has a common vertical driving shaft 41 for causing the movement of the plate, the operation of the ejecting mechanism, the operation of the discharging mechanism and for controlling the operation of the forcing means for pressing upward at the proper time one of the sliding members.

The means for forcing the sliding member upward to carry out the compressing action comprises the vertical hydraulic jack or ram having the vertically moving plunger which is forced upward by the inward movement of a horizontal hydraulic ram connected to a steam or elastic fluid operated piston in a cylinder.

The feeding or filling mechanism comprises a vertical standpipe 1 provided with a hopper at its upper end and a neck portion 2 at its lower end. The standpipe is steam jacketed as shown at 3 so that the material therein can be maintained hot if it is of such character that it is advantageous that it be in a heated condition while being worked. This standpipe is generally rectangular in cross section but this feature is often dependent upon the contour of the article which is to be formed. The cross sectional area of the opening in the standpipe gradually increases as the material passes downward in order to prevent a sticking of the material to the sides and a

clogging of the material therein. The height of the standpipe is sufficient to cause a partial compression of the material at the bottom by the weight of the material therein.

Below and coöperatively related with the neck end of the standpipe is rotatable molding plate or movable member 4 having four molding holes or openings 4^a, therein indicated in plan in Fig. 2 and shown more clearly in Figs. 4 and 5 which are slightly larger than the neck end of the standpipe and arranged so as to receive the material from the standpipe when in alinement therewith. The walls which define these molding holes or openings serve as means for shaping the sides of the article to be formed therein. In each of the holes there is slidably mounted a vertically movable pressing member 5 which when supported in position under the standpipe serves as a means to regulate the amount of material into the mold cavities or holes 4^a. The vertically movable slidable member 5 is supported, when in the position above referred to, by the horizontal supporting plate 6 which is vertically adjustable by the wedges 7 carried by the upper leaves of the yielding spring means 8 secured to the frame of the machine. The position of the wedges is under the control of the operator by means of a lever 9 fulcrumed on the frame at 9^a, the lower end of which lever is connected to the wedge by means of a link 10 and a bar 10^a extending between the wedges. At the upper end of the lever there is provided a spring catch 11 which engages the notch segment 12 carried by the frame and this serves as a means for holding the wedges in any desired position. The object in moving the wedges is to elevate or lower the feed plate, to allow a greater or lesser amount of material to enter the mold, thereby producing the required thickness of compressed block. Should it be desired to change the thickness beyond the range of the wedges, it can be quickly and easily accomplished by putting on a plate of different thickness.

By turning the molding plate or member 4 a quarter of a revolution one of the molding holes and the vertically movable plunger therein passes from the initial or first position in alinement with the standpipe to the second or compressing position which is below the stationary bulkhead or resisting member 13 carried by the bolts 13^a secured to the frame. During this movement the vertical movable sliding member 5 has passed from the supporting plate 6 to the plate 14, the top of which when in its lowest position is slightly below the top of the plate 6 and these plates serve as means to support the vertically movable sliding member in position in the hole during the entire movement. The plate 14 is carried by the upper end of a vertical movable plunger 15 which can force it upward sufficient to cause a proper compression of the material in the molding holes between the vertical movable member which occupies its second position and the resisting member 13. It will be observed that the resisting member 13 is provided with a hardened piece 13^b which forms the top of the mold and this is capable of being changed when worn or replaced by another plate if desired.

After the compressing operation has been carried out the molding plate or member is given another quarter of a turn so that the molding hole above referred to passes from its second or the position in which the compressing action is carried out to its third position or the position which it occupies when the work is being ejected therefrom. In passing from the second to the third position the vertically movable sliding member moves from engagement with the supporting plate 14 to position where it can rest upon a vertical movable block 16 (see Fig. 5) carried by the free end of a lever 17 which is a part of the means for ejecting the work piece previously referred to. By raising the block 16 to the position shown in Fig. 5 it will be observed that the sliding member 5 will be raised until it is flush with the top of the rotatable plate or molding block and in this manner the work is ejected from the molding hole therein.

As soon as the ejecting operation is finished the discharging arm 18 (see Figs. 2 and 5) passes over the plate and sweeps the work or article which has been formed, from the molding plate to a conveyer 19. The mold block is now given another quarter of a revolution so that the molding hole or cavity in question with the vertically movable member therein passes to a fourth position. During this movement the vertical sliding member 5 while still in the raised position slides from the block 16 to the fixed supporting plate 20 (see Figs. 3 and 6) and in the fourth position the vertical movable member can be inspected and prepared for the subsequent series of operations.

In order to repeat the above described cycle of operations the molding plate is given another quarter of a revolution which takes the molding hole with the vertically movable member 5 therein from the fourth or inspecting position to the first or initial position and in passing from the fourth to the first position it will be noted that the vertical slidable member is dropped from the supporting plate 20 to the adjustable supporting plate 6 previously described and it is to ease the shock of the dropping of the slidable member upon the adjustable supporting plate that the spring or yielding means has been provided.

The vertically movable plunger 15 previously referred to as a means to cause the compressing action of the work to be effected is a part of the vertical hydraulic or fluid operated jack 21 the cylinder 22 of which is carried by the frame. The lower portion of the plunger is channeled at 23 (see Figs. 4 and 5) to permit the passage thereunder of the horizontal ram 24 whose inward movement effects the upward pressing movement of the plunger 15. The cylinder 22 is also provided with a projection 22^a having a horizontal bore for the horizontal ram to enter in order to increase the effective lift or compressing movement of the plunger 15 over that which would be obtained if the horizontal ram could travel a distance equal only to the interior diameter of the cylinder. The horizontal bore of the jack cylinder 22 is slightly larger than the diameter of the horizontal ram and has a longitudinal groove 25 through which the liquid passes to the main or vertical ram bore, when displaced by the horizontal ram. This groove has a gate 26 (Fig. 1) controlled or adjusted from the outside for the purpose of regulating the speed of the horizontal forward movement of the horizontal ram.

The outer end of the ram 24 is connected by means of the rod 28 to the piston 29 in the steam or elastic fluid cylinder 30. This cylinder is so constructed that when the piston is at the extreme end of the backward stroke as shown in Fig. 1 the main passage 31 will be blocked by the piston. Leading from the main passage 31 is the bypass 31^a, which leads to the rear of the piston. This bypass is provided with the plug cock or valve 31^b, for throttling the exhaust at the termination of the backward stroke and in this way regulating the cushioning effect upon the piston. This bypass 31^a is in turn bypassed by bypass 31^c which has a check valve for the purpose of admitting steam freely for the forward movement of the piston and checking it on the return. The termination of the forward stroke of the piston and horizontal ram is controlled in two ways, viz., by the valve 26 which regulates as above described the flow of fluid in the horizontal bore of the cylinder projection 22^a and by the arrangement of ports and valves presently to be described.

The cylinder is provided with a second main passage 32 which has a check valve 32^a to permit a free and easy exhaust on the forward stroke until the forward port 32 is covered by the piston. Communicating with the space between the cylinder head and the piston at the extremity of the forward stroke on the one hand and the main passage 32 between the check valve 32^a and the exhaust discharge end of the other is the bypass 32^b provided with the plug cock or valve 32^c for regulating the cushioning effect on the forward stroke of the piston. This valve 32^c also serves as a means for regulating the starting of the piston on its return stroke if such is desired.

Carried by the cylinder head 33 at the press end of the cylinder is a spring 34 with which the plate 35 carried by the piston rod 28 engages when near the termination of its rearward stroke. This spring serves as a second means for cushioning the piston and horizontal ram near the termination of their rearward movement.

Supported on the frame of the machine by the bracket 36 is the lever 37 the lower end of which is positioned so as to be engaged by the plate 35 near the termination of the forward stroke of the piston, the upper end of which lever is adapted to engage a plate 38 carried by the rod 39 which operates the valve 40 of the cylinder 30. It will therefore be observed that the rearward movement of the piston is automatically effected by the engagement of the plate 35 with the lever 37 through the chain of mechanism above described should the horizontal ram travel too far forward.

It will be observed that the vertical driving shaft 41 is carried in bearings, the upper one being secured to the stationary resisting member or bulkhead, and the lower one being secured to the frame or the cylinder of the vertical hydraulic jack 21. This shaft is itself driven by means of the beveled gears 42 and 43 the latter of which is fastened in place on the horizontal shaft 44 carrying the driving pulley 45.

There is secured to the vertical driving shaft between the bearings a member 46 which serves as a means to cause a partial rotation of the molding plate for each revolution of the shaft. It will be observed that the molding plate is hollowed out or concave at four places 4^b equally spaced apart and the contour of which when adjacent to the vertical shaft 41 is R distance from the axis of said shaft (see Fig. 2). The molding plate is also provided with four sets of spaced angle iron slideways 4^c in which a roller 46^a carried by a crank 46^b of the member 46 travels during a partial revolution of the vertical shaft. The member 46 is also cut out along the line 46^c to provide room for the convex portion 4^d of the molding plate while the roller 46^a carried by the crank 46^b is in engagement with the slideways on the rotatable member. The member 46 is also provided with a circular portion 46^d having a radius R adapted to fit the cutout portions 4^b of the molding plate 4 when the roller 46^a is out of engagement with the slide-ways carried by the molding plate. The construction above described serves as an intermittent means for causing a quarter turn of said plate and for holding the molding plate in the desired positions

for each revolution of the vertical shaft. It will be observed that the construction above described also causes the molding plate to be gradually started, to travel the fastest at the middle of its movement and to be gradually stopped at the termination of its movement thereby preventing any material shocks.

At the upper end of the shaft 41 there is secured a grooved cylindrical cam 47 for operating the ejecting mechanism through the following chain of parts, namely, the lever 48 fulcrummed to the stationary bulkhead or resisting member by means of the link connection 49 and provided at one end with a roller in the cam groove. The other end of the lever has a pivotal connection to the upper end of a vertical movable rod 50 slidably mounted in a bearing carried by the stationary resisting member as is clearly shown in Figs. 4 and 5. The lower end of the vertically movable rod is pivotally connected to the lever 17. One end of the lever supports the block 16, the vertical movement of which causes the ejecting of the work from the mold, and the other end is connected to the frame of the machine by means of the link 51.

The mechanism above referred to for discharging the work from the rotatable plate 4 comprises a swinging arm 18 which sweeps over the movable plate immediately after the work has been ejected from one of the molding holes. This swinging arm is carried on a vertical shaft 53 supported in bearings 54. The shaft 53 also carries a pinion 55 which is engaged by a rack 56 on a longitudinally slidable member held in its normal position by the spring 57. The longitudinally slidable member is caused to be moved from its normal position by the bell crank member 58 whose movement from normal position is effected by the engagement of the pin member 59 carried on the member 46. It will therefore be apparent that for each revolution of the shaft 41 the discharging arm 18 will be swung over the molding plate by the mechanism just described and will sweep therefrom the work or block which has previously been ejected.

The lower end of the shaft 41 carries a cam 60 which operates the valve of the cylinder 30 due to engagement therewith of a roller carried on a slide 61 connected to the valve spindle 39. The cam 60 has three distinct portions, namely, one portion which moves the valve to its first position to cause the forward movement of the piston and ram and which permits the valve to travel in this position for a partial revolution of the shaft 41; another portion which moves the valve from the first to its second position to cause the return movement of the piston and ram and which permits the valve to remain in the latter position for a part of the return stroke and while the shaft is rotating; and another portion which moves the valve to a position in which all the main passages to the cylinder will be closed.

The parts of the press are so arranged that while the vertical shaft 41 is making one revolution the molding plate will first be given a quarter of a revolution. Then after the rotatable plate has come to rest, and during the subsequent movement of the shaft 41, one of the mold cavities is filled, the steam valve or the valve 40 is moved to let steam or the elastic fluid into the cylinder whereby the compressing operation is effected in the mold occupying its second position, the ejecting mechanism is operated to force the workpiece from the mold occupying its third position and as soon as this is done the discharging mechanism operates to sweep or remove the ejected workpiece from the rotatable plate to the conveyer.

It is obvious that a small pump might be connected to the main hydraulic jack cylinder in order to supply the liquid necessary to compensate for leakage or for any other reason or this amount of liquid might be regulated by direct connection to a high pressure supply in any well known manner.

It is obvious that various forms and modifications may be made without departing from the spirit and scope of my invention.

I claim as my invention:

1. In a press of the class described the combination of a rotatable horizontally disposed plate having molding holes therein, stationary means for feeding material to the holes, means for compressing material in the holes, means including a plurality of slideways connected to and below the plate and a crank supported slideway engaging element for moving the plate so as to perform the entire transfer of a molding hole portion from the feeding means at a regularly increasing and decreasing speed, and means coöperatively related to the means for moving the plate and the compressing means whereby the latter is caused to operate when a molding hole in the plate assumes the proper position relative thereto.

2. A press comprising, in combination, a generally horizontally disposed, rotatable mold table having a plurality of molds therein, each provided with its mold plunger reciprocable in and rotatable with said mold table, a plurality of slideways located intermediate said molds on and below the top of said table, a vertical shaft substantially parallel with the axis of said mold table, said shaft being located substantially at the point of intersection of two planes tangential to a circle drawn through the circumferential extremities of said slideways, an arm or crank on said shaft having a slideway engaging element adapted to engage said slideways successively when said crank

is at substantially 90° to the axis of the slideway to be engaged and to leave said slideways when said crank is at substantially 90° to the axis of the slideway to be disengaged, concave, arcuate locking portions in said mold table intermediate said slideways, and an arcuate convex locking element rotating with said shaft and adapted to enter one of said concave, arcuate locking portions at substantially the same time that said slideway-engaging element disengages from each slideway, whereby intermittent, partial rotation may be imparted to said mold table with gradual and regular increase and decrease of speed while said mold table is held against undesired rotation during its periods of rest.

3. A press comprising, in combination, a rotatable mold table having a plurality of molds therein, a plurality of radial slideways located intermediate said molds and projecting below the bottom face of said mold table, arcuate depressions in the periphery of said mold table, a shaft substantially parallel to the axis of said mold table and provided with an arcuate, convex locking portion adapted periodically and successively to engage said arcuate depressions, and a slideway engaging element located on a lower level than said convex locking portion and adapted to engage said slideway when said locking element is not engaged with said depressions.

4. A block molding press comprising in combination a rotatable turret having a plurality of molds, fluid-actuated compressing instrumentalities, and a single shaft substantially parallel with the axis of said turret having mounted thereon a turret turning element, a turret locking element, and a controlling element for said compressing instrumentalities.

5. A block molding press comprising in combination a rotatable turret having a plurality of molds, mold emptying instrumentalities, block removing instrumentalities, and a single shaft substantially parallel with the axis of said turret having mounted thereon a turret turning element, an actuator for said mold emptying instrumentalities, and an actuator for said block removing instrumentalities.

6. A block forming press comprising in combination a turret having a plurality of molds, each having its mold plunger reciprocable in and rotating with said turret, and mold emptying means effective to raise the top of said mold plungers to the approximate level of the top of said turret, and a hollow central support for said turret through which passes a portion of said mold emptying means.

7. A block molding press comprising in combination the turret 4, a plurality of molds 4^a, each having a mold plunger 5, reciprocable compressing instrumentalities, mold filling instrumentalities, mold emptying instrumentalities, and the platen 14 mounted on and reciprocable with said reciprocable compressing instrumentalities and adapted to support said mold plungers 5 during their travel from the mold filling instrumentalities to pressing position and from pressing position to said mold emptying instrumentalities.

8. A molding press comprising, in combination, a horizontally disposed rotatable mold table having a plurality of open top molds; a mold filling conduit above said mold table and mold table rotating means adapted progressively to present said molds in register with said mold filling conduit, said mold table rotating means including slideways directly carried by said mold table; concave depressions in said mold table intermediate said slideways and rotatable with said mold table; and a rotary shaft having attached thereto an arm carrying a slideway engaging element and above said slideway engaging element a convex depression engaging element, said parts alternately effective to move said table and to lock said table.

9. A press comprising, in combination, a rotatable turret having four equally spaced molds located 90° apart, equally spaced radial slideways located 90° apart intermediate said molds; a substantially vertically arranged bearing support for said turret on which said turret is rotatable; a substantially vertically disposed rotatable shaft having mounted thereon an arm carrying a slideway-engaging element on the upper surface thereof, convex locking depressions formed in said turret and spaced 90° apart intermediate said slideways, and an arcuately shaped, locking element for engagement with said depressions immediately said element leaves each slideway, the axis of said vertically disposed rotatable shaft being located substantially at a point of intersection of two planes, each tangential to the outer ends of the slideways located at opposite sides thereof during the period of rest of the turret, and the distance from the axis of said shaft to the center of said slideway engaging element being substantially equal to the distance from the axis of said shaft to the center of said adjacent slideways during periods of rest of the turret, whereby said turret may be turned 90° during one quarter revolution of said shaft, the turning of the turret being effected in one quarter of a cycle of operation of the press, and leaving three quarters of the cycle of operation of the press during which the turret remains stationary.

10. In a molding press having a rotatable mold table; the combination of mold table operating means for imparting intermittent

partial unidirectional rotation to said mold table; compressing instrumentalities actuated independently of said mold table operating means; timing means providing for automatic alternate operation of said mold table operating means and of said compressing instrumentalities; said mold table operating means including means undetachably interlocked with said mold table during periods of movement of said mold table and positively connected to said timing means, whereby undesired stoppage of said mold table stops said timing means, thereby preventing operation of said compressing means when said mold table is not in proper angular register with said compressing means.

11. A press of the class described comprising, in combination, a generally horizontally disposed rotatable mold table having a plurality of molds therein, each provided with its mold plunger reciprocable in and rotatable with said mold table, pressure applying means below the mold table, a pressure receiving abutment above the mold table, a plurality of slideways located intermediate said molds and closely adjacent the bottom of said table, a vertical shaft substantially parallel with the axis of said mold table, said shaft being located substantially at the point of intersection of two planes tangential to a circle drawn through the circumferential extremities of said slideways, an arm or crank on said shaft having a slideway engaging element adapted to engage said slideways successively when said crank is at substantially 90° to the axis of the slideway to be engaged and to leave said slideways when said crank is at substantially 90° to the axis of the slideway to be disengaged, concave, arcuate locking portions intermediate said slideways, and an arcuate convex locking element rotating with said shaft and adapted to enter one of said concave, arcuate locking portions at substantially the same time that said slideway-engaging element disengages from each slideway, whereby intermittent, partial rotation may be imparted to said mold table with gradual and regular increase and decrease of speed while said mold table is held against undesired rotation during its periods of rest.

12. A press of the class described comprising, in combination, a generally horizontally disposed rotatable mold table having a plurality of molds therein each provided with its mold plunger reciprocable in and rotatable with said mold table, a plurality of radial slideways each having its inner end extending between adjacent molds, said slideways closely adjacent the bottom of said table, a vertical shaft substantially parallel with the axis of said mold table, said shaft being located substantially at the point of intersection of two planes tangential to a circle drawn through the circumferential extremities of said slideways, an arm or crank on said shaft having a slideway engaging element adapted to engage said slideways successively when said crank is at substantially 90° to the axis of the slideway to be engaged and to leave said slideways when said crank is at substantially 90° to the axis of the slideway to be disengaged, whereby intermittent, partial rotation may be imparted to said mold table with gradual and regular increase and decrease of speed from the beginning of each movement to the end thereof.

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

WILLIAM H. SHORTELL.