3 Sheets—Sheet 1.

J. K. CALDWELL.

Machine for Making and Pressing Bricks.

No. 208,566. **Patented Oct. 1, 1878.**

Fig. 1

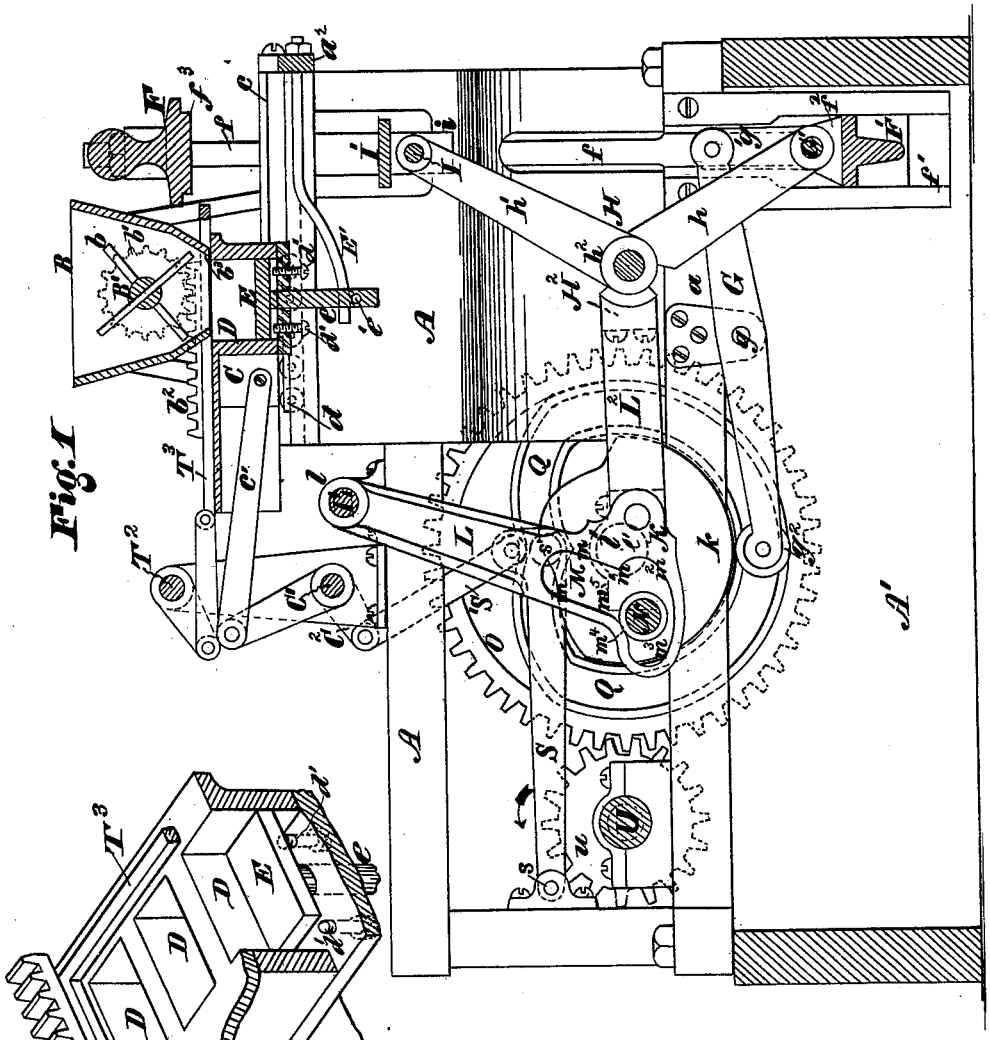


Fig. 2

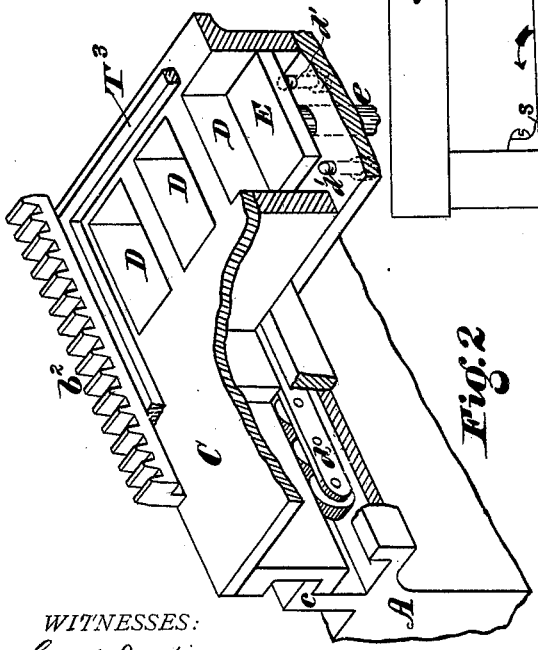
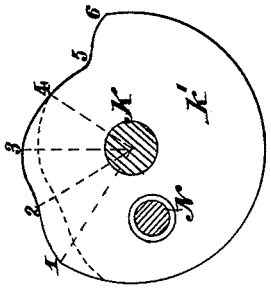


Fig. 3



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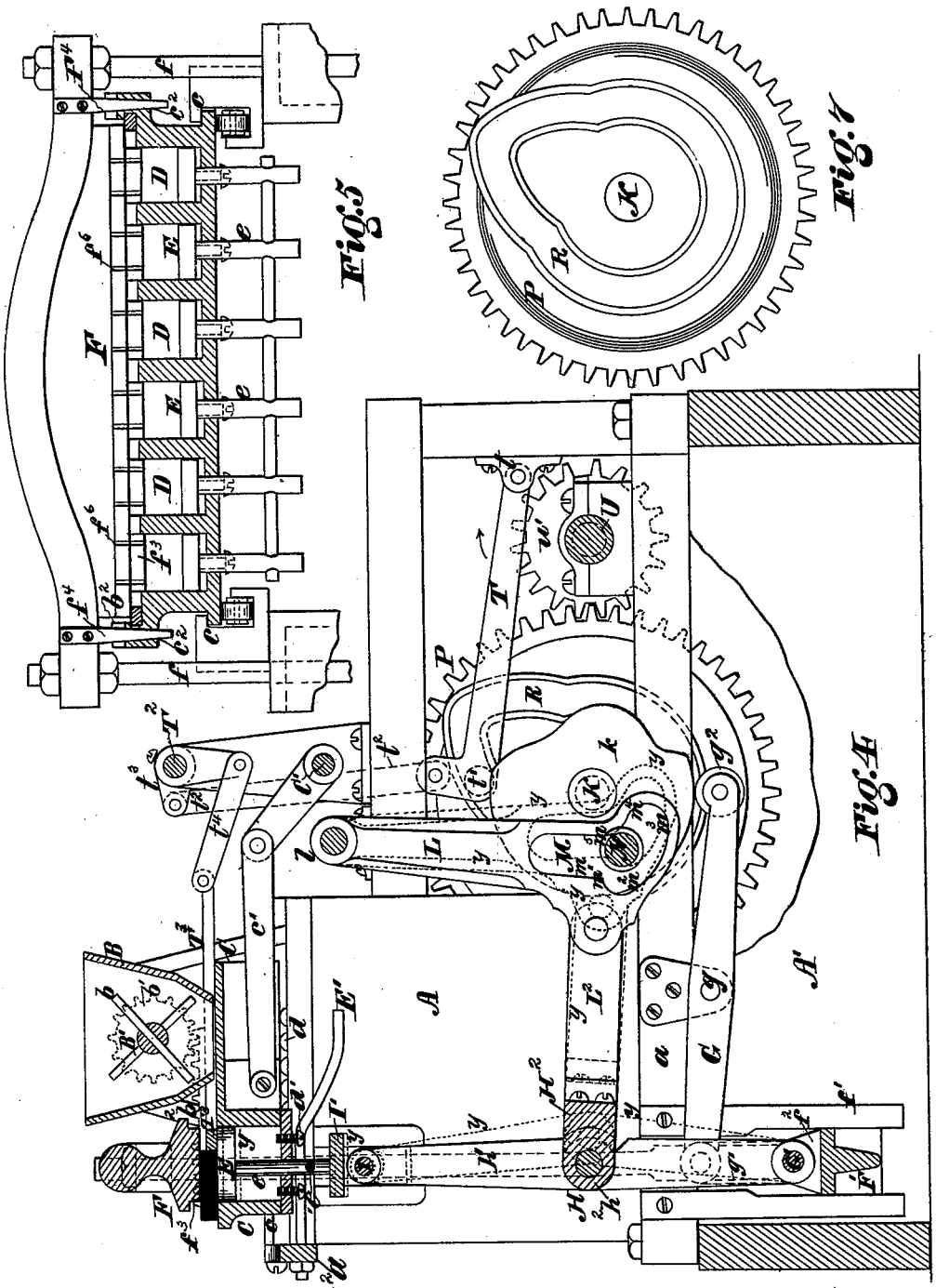

Fig. 5

Fig. 7

Fig. 4

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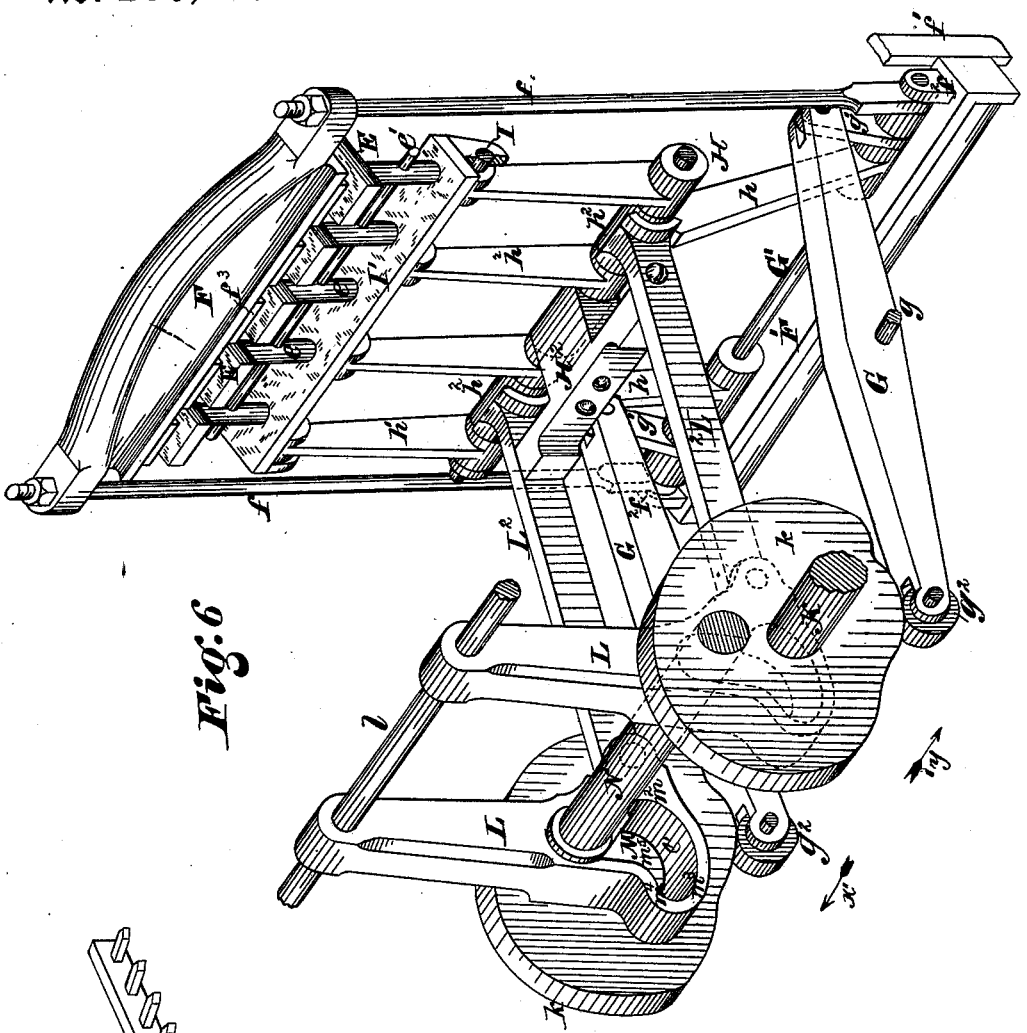

Fig. 6

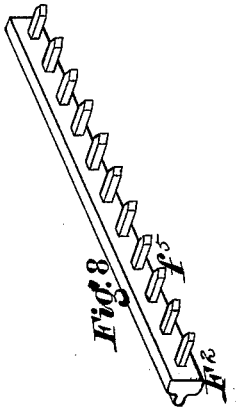

Fig. 8

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UNITED STATES PATENT OFFICE.

JOHN K. CALDWELL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR MAKING AND PRESSING BRICKS.

Specification forming part of Letters Patent No. **208,566,** dated October 1, 1878; application filed July 29, 1878.

To all whom it may concern:

Be it known that I, JOHN K. CALDWELL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Making and Pressing Bricks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figures 1 and 4 are longitudinal vertical sections of my invention, looking respectively in the directions of the arrows x' and y', Fig. 6. Fig. 2 is a broken perspective, partly in section, of the sliding table and mold-boxes; Fig. 3, detail view of lifting-cam; Fig. 5, detail transverse section of the mold-boxes and plungers and an elevation of the upper part of the platen. Fig. 6 is a perspective view of the mechanism for operating the platen and toggles, and Figs. 7 and 8 are detail views.

My invention has special relation to the brick-machine for which Letters Patent of the United States, dated June 19, 1877, No. 192,226, were issued and granted to me; and the object of my present improvements is to improve the construction set forth in said patent, so as to produce a more compact and efficient machine.

The present improvements consist in the peculiar construction, combination, and arrangement of parts hereinafter fully set forth, having special reference to the following features: first, to dispensing with the measuring-chambers shown in said patent, substituting therefor the mold-boxes, the bottoms of said boxes while measuring the clay being the plungers, which subsequently compress such clay; second, to the provision of a horizontally-traveling table containing the mold-boxes, said table being so operated as to be moved under the hopper to receive a charge of clay and then under a platen to obtain compression of the clay in the mold-boxes; third, to the combination, with the traveling mold-box table, of plungers which remain in and travel with said table, said plungers being so arranged with reference to the hopper, platen, and toggle or lifting mechanism that when the molds are directly under the platen the plungers are lifted to compress the clay, but when said molds pass from beneath the platen said plungers will slide downwardly in the mold-boxes, so that when the latter come beneath the hopper there will be space enough in them to receive a full charge of clay; fourth, to the construction of a horizontally-reciprocating mold-box table, so arranged that its end operates to close the opening in the bottom of the hopper when the mold-boxes are not beneath the same; fifth, to the combination, with horizontally-reciprocating mold-box table and a feeding-hopper, of a spider or stirrer within said hopper and rocked connection with said table, so as to feed clay into the mold-boxes of the latter, both on its forward and backward motions; sixth, to the combination, with a horizontally-reciprocating mold-box table, of a vertically-moving platen having its compression-face on its under side; seventh, to the combination, with a horizontally-reciprocating mold-box table and a vertically moving platen, of a wiper, arranged to pass between the mold-boxes and platen when said table is at a state of rest and the platen is elevated; eighth, to the construction of vertically-moving plungers having stems whose ends rest upon a table or horizontal bar on said toggles when compression is being exerted, and move off said table or bar when the mold-boxes pass from beneath the platen; ninth, to the construction of the cam-slots in which the cranks for actuating the toggles move, so that after said toggles are distended to their full extent, and while the plunger-stems still rest upon their bar or table, said toggles will be caused or permitted to collapse or retract slightly, in order to permit the plungers to fall a little and relieve the brick or pressed clay from top and bottom compression when out of the mold-boxes; tenth, to the combination, with the toggles, plungers, and platen, of levers actuated by cams on the crank-shaft, in such manner as to move said toggles, platen, and plunger vertically after the required compression has been exerted on the clay in the molds; eleventh, to the provision of inclined guides, operating to draw down the plungers by a positive motion when the latter have moved from the toggle-table.

Referring to the accompanying drawings, A designates the frame of the machine, and B the

clay-feeding hopper therein. B′ is a spider or stirrer, consisting of a shaft with radial arms *b* and pinions b^1, the latter gearing with racks b^2, which, when slid to and fro, as hereinafter set forth, will cause said shaft to be rocked or revolved first in one direction and then in a contrary direction, to feed the clay from the hopper into the molds beneath. C is a table, fitted in ways *c c* on the frame A, so as to be moved back and forth from beneath the hopper B by means of arms c^1 c^1, connecting with a rock-shaft, C^1. Said table is formed with recesses D D, which constitute mold-boxes. Within the boxes D D are plungers E E, which form the bottoms of said boxes, their stems *e e* projecting downwardly some distance below the latter. When the table C is directly below the hopper, as shown in Fig. 1, the plungers E E are then at their lowest point within said boxes. When said table has been moved from below the hopper it passes to a position below the platen F, as shown in Fig. 4, in which position the plungers E E are elevated, by means presently to be described, so that the clay contained in the boxes will be duly compressed. The platen F is sustained on two posts, *f f*, whose lower ends are connected by a cross-bar, F^1, which moves in vertical guides f^1 f^1, secured to the inside of the base or support A′. G G are walking-beams, pivoted at *g* to the sills *a a*, and having pitman-connections g^1 g^1 with the cross-bar F^1 or rod G′. The opposite extremities of said beams are provided with anti-friction rollers g^2, which impinge against the peripheries of cams *k k* on a crank-shaft, K. H H are toggles, whose lower arms, *h h*, are swung on a rod, G′, extending between and fastened in lugs or slides f^2 on the cross-bar F^1. The upper arms, h^1, of said toggles are swung on a rod, I, which has its ends fastened in lugs or slides *i i*, depending from a table or horizontal bar, I′. On this bar or table the ends of the stems *e* of the plungers E E rest when the mold-boxes are directly beneath the platen F, so that when the toggles are distended said plungers will be moved up in the mold-boxes, and the clay contained in the latter duly compressed. L L are arms, pivoted at *l l* upon a cross-shaft, L^1, and having their lower enlarged ends, l' l', connected by pitmen L^2 L^2 with a cross-head, H^2, secured to the knuckles h^2 of the toggles H. Said enlarged ends l' l' have slots M, of a peculiar formation, their upper parts having straight sides *m m*, while their lower parts form three curves, viz., a short receding curve from m^1 to m^2, a long curve from m^2 to m^3, and a short upper curve, m^3 to m^4, ending in a short reverse curve, m^4 to m^5. N is the crank, which moves in the slots M. O and P are gear-wheels on the shaft K, said gear-wheels having their inner faces formed or provided with cam-grooves Q and R, respectively. S is an arm, pivoted at *s* to the frame A, and bearing at its opposite extremity an anti-friction roller, *s′*, which travels in the groove Q. S′ is a pitman, connecting the end of arm S with a crank, C^2, on the rock-shaft C^1. T is an arm, pivoted at *t*, bearing an anti-friction roller, t^1, which moves in the groove R, and connected by an arm, t^2, with the crank t^3 on rock-shaft T^2, which is connected by the pitman t^4 to the wiper T^3. U is the main driving-shaft, gearing by pinions *u u′* with the wheels O and R.

The operation is as follows: Motion being communicated to the shaft U, the mold-table C is caused to pass beneath the hopper B. As it slides or rolls to that position the stirrer B′ is rocked or rotated by means of the pinions and racks, and caused to feed clay into the boxes D D. The motion of the shaft U continuing, the shaft C^1 is rocked, so as to cause the mold-table C to move from under the hopper B to a position beneath the platen F, the stirrer B′ rocking reversely to its previous motion on the return of the mold-table C and feeding additional clay into the molds D D, if the latter are not already full. The edge b^3 of the hopper acts as a cut-off in the passage of the molds beneath it, removing all surplus clay from said molds. The platen F, which remained elevated while the molds were beneath the hopper, now descends when said molds come beneath it, its downward motion being produced by the initial distension of the toggles H H, which press downwardly on the cross-bar G′, and, through the posts or rods *f f*, exert a pulling-down motion on said platen. The mold-table, in traveling to its position beneath the platen, brought the stems *e* of the plungers E directly over the bar or table I′ on the toggles. Said toggles, continuing to distend, lift up the table, thereby pushing the plungers E E up in the mold-boxes and compressing the clay therein to the required extent to form bricks. Due compression having been exerted, it next becomes necessary to eject the bricks from the molds. This is accomplished by the cams *k* pushing down the adjacent ends of the levers G, lifting said levers at their opposite ends, and simultaneously and equally lifting the toggles H, bar or table I′, plungers E E, and platen F until the tops of said plungers come on a line with the upper surface of the molds. Before the bricks are ejected from the molds they are held on the top and bottom tightly between the platen and plungers. To relieve this top and bottom pressure, so as to avoid causing the clay to spread when the bricks leave the molds, and at the same time permit the easy movement of the bricks by the action of the wiper, the plungers are caused to recede or drop downwardly a short distance. This is brought about as follows: After full pressure has been exerted by the plungers, and just before the platen begins to ascend, the crank N passes downwardly over the curve m^5 to m^4 in the slot M. The arm L is then free to swing backwardly until the curved side m^1 to m^2 of said slot is caused to meet said crank. The tension upon the toggles will produce this movement through the arm L^2, said toggles slightly collapsing or doubling when

the pushing upon their actuating-arm L^2 is relaxed, the collapse of the toggles producing a longitudinal movement of the arm L^2 in the direction of the arms, and permitting the table to slightly drop and the plungers E E to recede a short distance in the mold-boxes. This relaxed position of the toggles is shown by the dotted lines *y y* in Fig. 4. The platen and plungers, with the bricks held loosely between them, ascend together, as already described. The wiper T^3 now swiftly moves over the mold-boxes, pushing the bricks from between the plungers and platen onto any suitable bearing-off mechanism, and at once swiftly returns, the mold-table, platen, and plungers dwelling while this is accomplished, or at least while the wiper is pushing off the bricks, and the return motion of the wiper cleaning the faces of the plungers. The toggles now begin to collapse, owing to the drawing action produced on the arm L by the movement of the crank N through the slot M. At the same time the mold-table C is drawn under the hopper B, permitting the plungers to descend in the mold-boxes, as already described, the motions set forth being then repeated as before.

In the foregoing I have described the platen as having a plain face, in which case the pressure on the bricks is always upward, proceeding from the plungers alone. To obtain a downward as well as an upward pressure, so that the bricks will be pressed equally on top and bottom, I construct the platen with plungers or blocks $f^3 f^3$, which enter the mold-boxes.

In lieu of the cam *k*, already described, I use a cam having the outline shown in Fig. 3; or said cam *k* may be converted into a cam of the shape shown in said figure by face-pieces. While the part of said cam between 1 and 2 is moving in contact with the roller or lever G, the platen is descending rapidly, and the blocks $f^3 f^3$ enter the molds. When moving from 2 to 3 the platen-plungers f^3 continue descending, thus obtaining an initial downward pressure on the bricks. While moving from 3 to 4 the platen-plungers still descend, but move slowing, the plungers E at the same time moving upwardly from 4 to 5. The platen is stationary, or nearly so, while the plungers E are ascending, giving the final upward pressure. The plungers E then relax, as already described, and they and the platen ascend together, the ascent taking place while the roller g^2 travels from 5 to 6 on the cam *k'*, the brick being thereby ejected from the mold.

With this contruction, it will be observed the brick is compressed some distance down in the mold, instead of, as with a plain platen, having its top surface flush with the top of the mold. The result is that in ejecting the brick its upper edge travels some distance through the mold-box, which has the beneficial effect of smoothing said edge, avoiding the ragged or feathered appearance which sometimes results when a plain platen is used.

To adjust the capacity of the mold-boxes, screws *d' d'* may be employed, said screws limiting or controlling the downward movement of the plungers.

If desired, anti-friction carriages *d* may be employed in connection with the mold-table.

To insure the accurate entrance of the platen-plungers to the mold-boxes, the platen should be provided with dowel-pins $f^4 f^4$, which enter guide-openings $c^2 c^2$ in the rack b^2 and mold-table, or either, as shown in Fig. 5.

To permit the escape of air from the molds, the platen-plungers should have grooves f^6 in their edges; and to remove any clay that may work into said grooves, a stationary bar, F^2, as shown in Fig. 8, having projecting pins f^5, may be employed. As the platen rises and lowers, said pins f^5 travel in said grooves f^6, removing any clay which may have lodged therein.

To produce the descent of the plungers E by a positive motion, in the event of their failing to drop by gravity, curved arms E', secured to the cross-piece a^2 of the frame, are provided, said arms bearing down upon a lateral rod, *e'*, which connects the plunger-stems *e* when the mold-table C travels from beneath the platen to a position under the hopper.

What I claim as my invention is—

1. The traveling mold-table C, having mold-boxes D D, in which the bricks are wholly formed and compressed, and arranged to move alternately under the hopper B, to receive a charge of clay in said boxes, and then beneath the platen F, by which such charge of clay is compressed into bricks within said boxes, substantially as set forth.

2. In combination with the traveling mold-table C, the plungers E E, attached thereto and forming the bottoms of the boxes D D, when the latter are beneath the hopper B, whereby said mold-boxes are caused to act as measurers, substantially as set forth.

3. The combination of the traveling mold-table C, provided with boxes D D, in which the bricks are wholly formed and compressed, and hopper B, said table being arranged and operating to form a bottom to said hopper when the mold-boxes are moved from beneath the latter.

4. The combination, with hopper B and sliding mold-table C, provided with boxes D D, in which the bricks are wholly formed and compressed, having racks b^2 thereon, of stirrer or spider B', having pinions, substantially as shown and described.

5. In combination with the horizontally-moving table C, holding the plungers E E and the vertically-moving platen F, the reciprocating wiper, arranged to move horizontally between said table and platen, substantially as shown and described.

6. In combination with the vertically-opening toggles H H and table or cross-bar I', the plungers E E, whose stems *e* rest upon said

table when the mold-boxes, wherein said plungers are located, are beneath the platen F, substantially as shown and described.

7. The combination of horizontally-traveling mold-table C and plungers E E with the vertically-moving platen F and upwardly opening or distending toggles H H, substantially as shown and described.

8. In combination with the toggles H H and pitmen L^2, the swinging arms, having slots M, formed as described, to permit the toggles to collapse by resiliency, so as to permit the plungers to retract slightly within the mold-boxes just after compression has been exerted by said plungers and before the bricks are lifted out of the mold, substantially as set forth.

9. In combination with the cross-bar F^1, the lever G, arm g^1, and cam k, for elevating the toggles and platen after the toggles have been distended and the clay in the mold-boxes compressed, substantially as set forth.

10. In combination with the horizontally-reciprocating mold-table, having the plungers E E, the inclined bars or ways, for causing said plungers to be moved down in the boxes D when the mold-table C is traveling to its position beneath the hopper, as set forth.

11. In combination with the platen F, having plungers f^3 f^3, plungers E, and intermediate mechanism, the cam k, constructed substantially as described, and operating to produce, first, the descent of the platen; second, the continued descent of the platen and simultaneous ascent of the plungers; third, the dwell of the platen and synchronous ascent of the plungers; and, fourth, the contemporaneous ascent of said platen and plungers, as set forth.

12. In combination with the traveling mold-table C, provided with mold-boxes D D, in which the bricks are wholly formed and compressed, the platen F, having plungers or shoes f^3, and the plungers E, whereby bricks are positively pressed on both sides, substantially as described and shown.

In testimony that I claim the foregoing I have hereunto set my hand.

JOHN K. CALDWELL.

Witnesses:

M. D. CONNOLLY,

W. W. DOUGHERTY.