(No Model.) 2 Sheets—Sheet 1.

# D. WOODBURY.

## BRICK MACHINE.

No. 370,173. Patented Sept. 20, 1887.

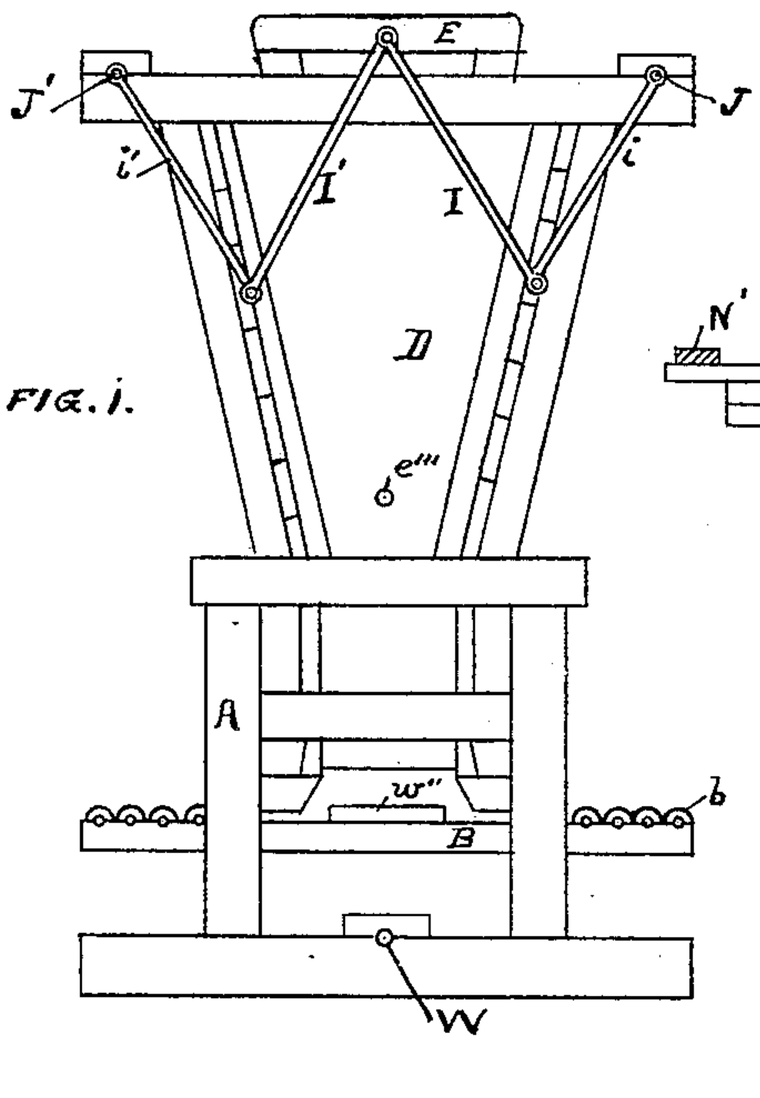


FIG. 1.

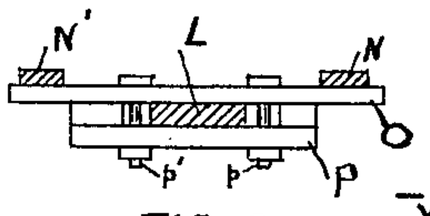


FIG. 9.

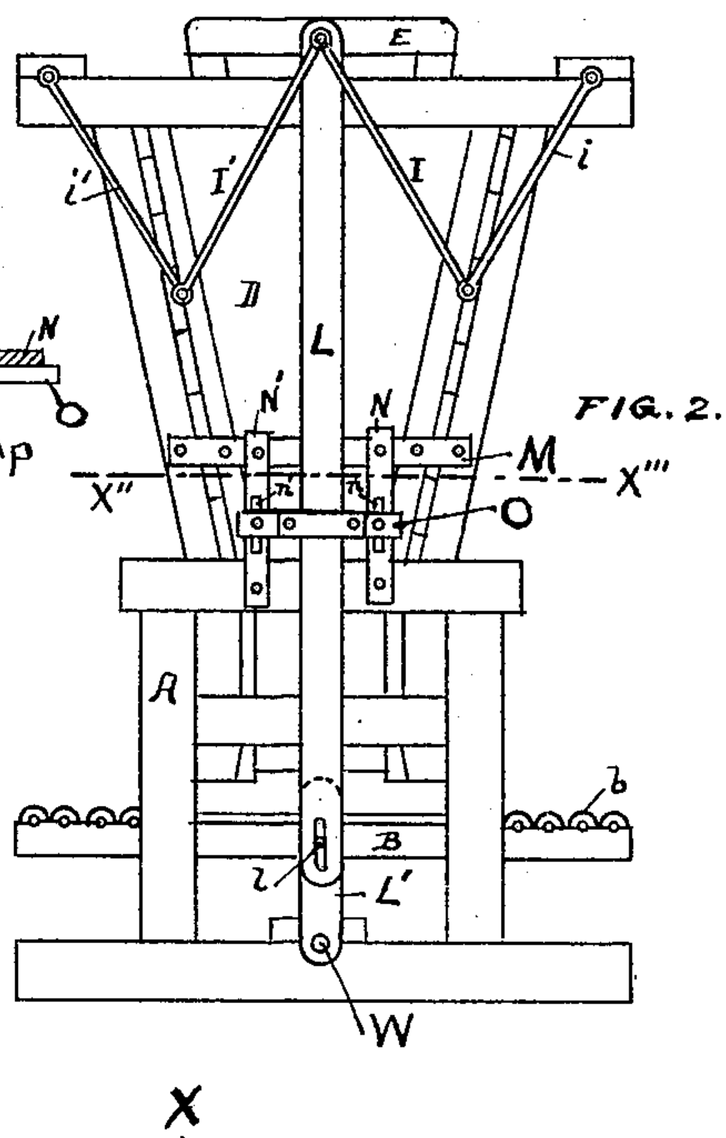


FIG. 2.

X

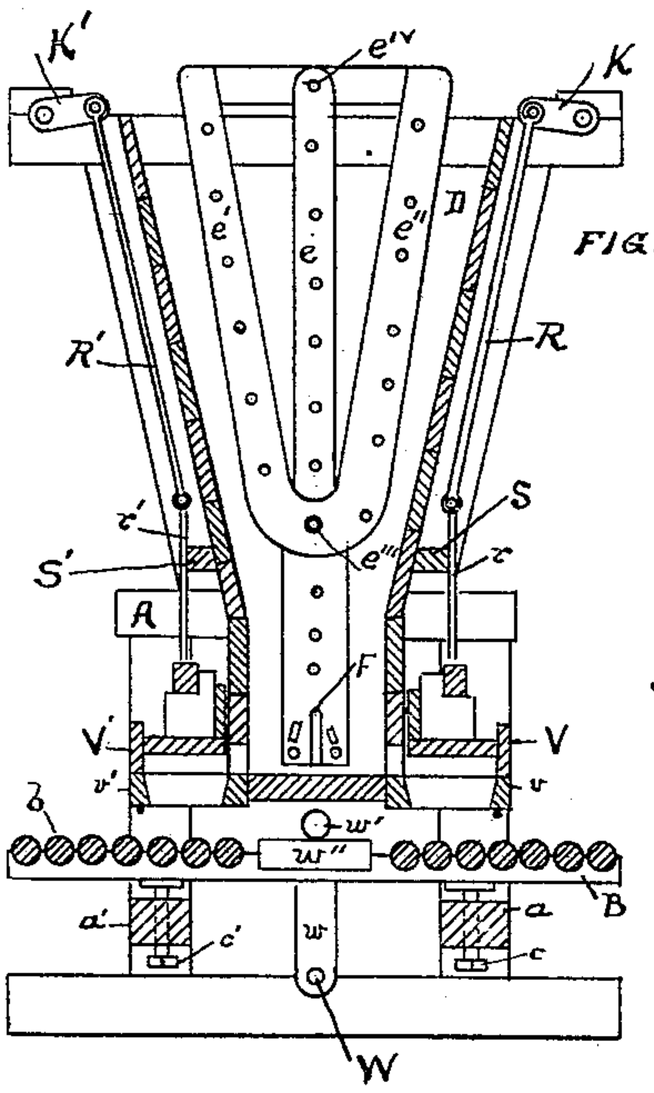


FIG. 4

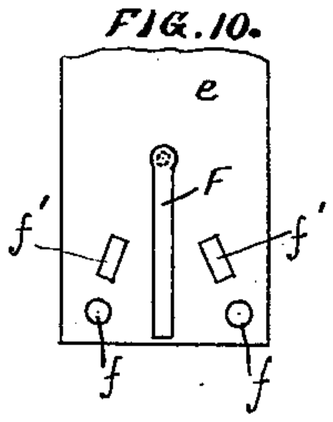


FIG. 10.

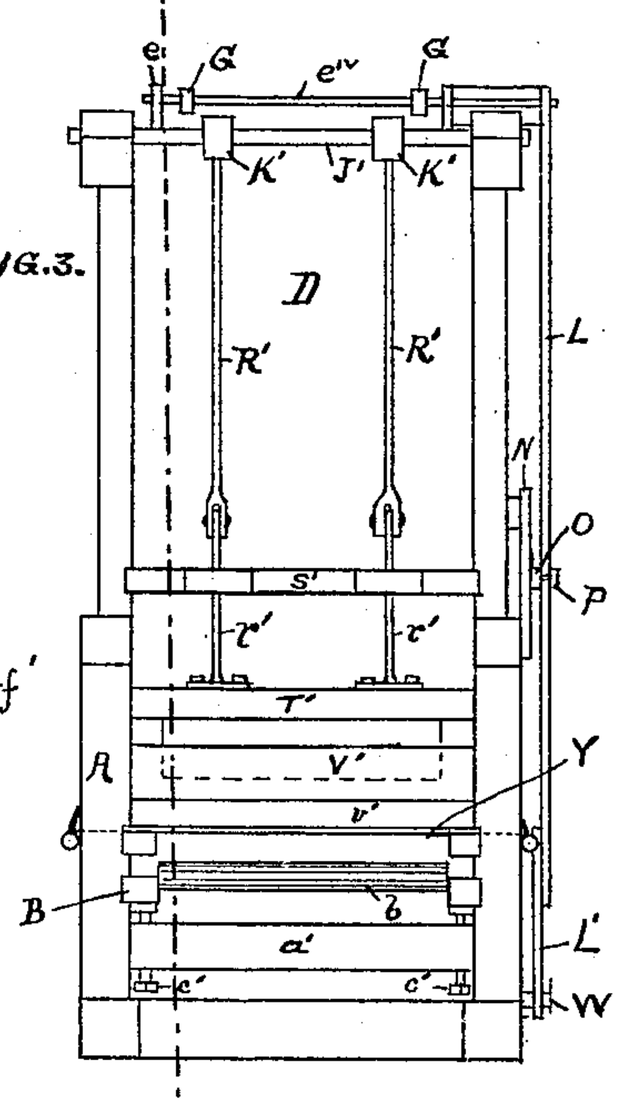


FIG. 3.

X'

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

# D. WOODBURY.

## BRICK MACHINE.

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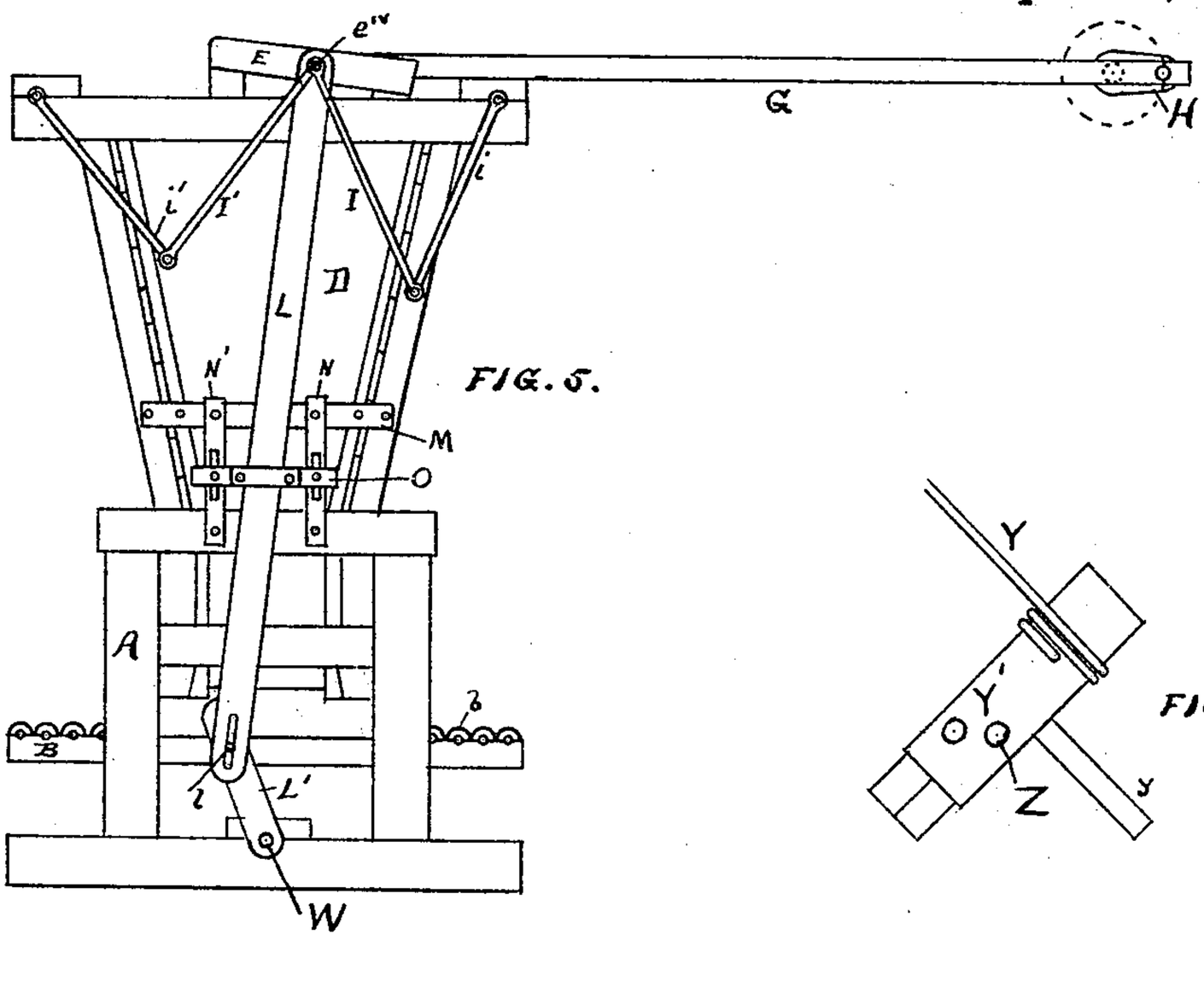
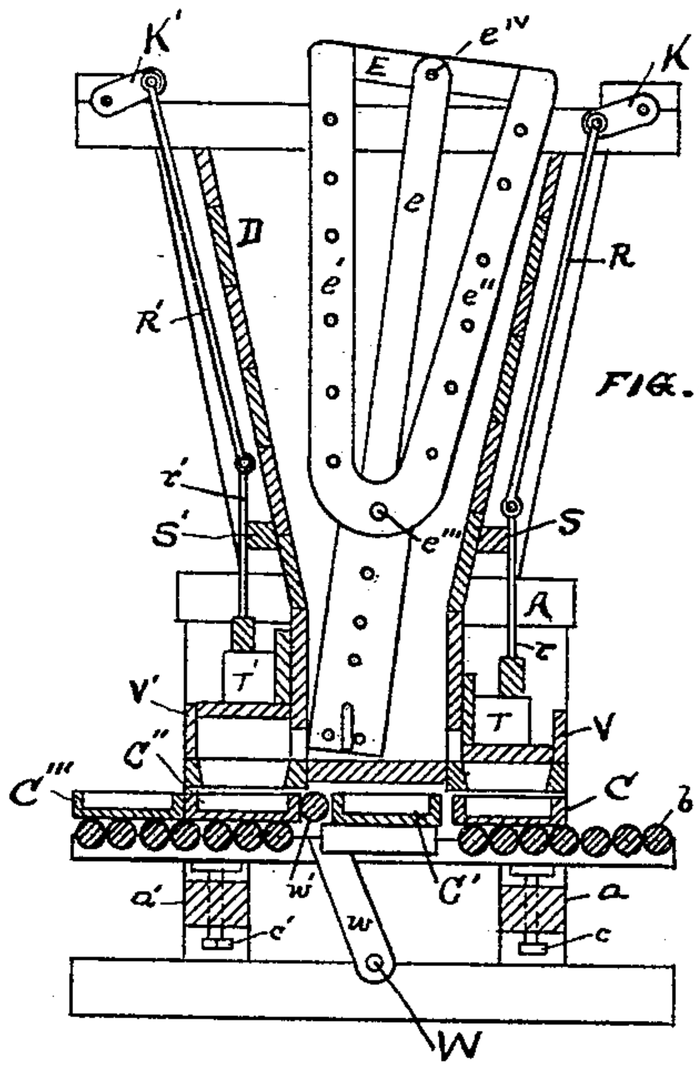



FIG. 5.




FIG. 8.



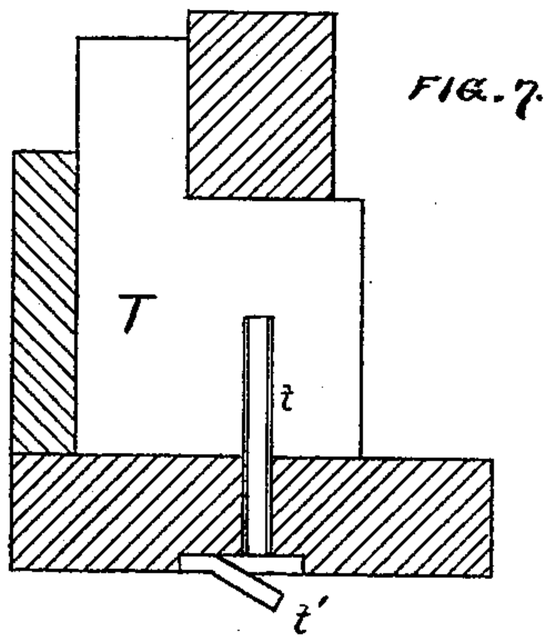




FIG. 7.

WITNESSES

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# UNITED STATES PATENT OFFICE.

DANIEL WOODBURY, OF MINNEAPOLIS, MINNESOTA.

## BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 370,173, dated September 20, 1887.

Application filed October 8, 1886. Serial No. 215,659. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL WOODBURY, a citizen of the United States, and a resident of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented a new and useful Brick-Machine, of which the following is a specification.

My invention relates to the manufacture of common brick, and has for its object to produce the greatest possible number of brick in any given time with the least possible cost.

Machines in general use are complicated in construction, expensive in original cost and in cost of operation, and are wasteful of time and power.

By my invention I organize a machine on an entirely new plan which is extremely simple in construction, comparatively cheap in original cost and cost of operation, and of highly increased efficiency.

It consists of the machine hereinafter described and claimed, reference being had to the accompanying drawings. In a general way, it may be described as a double-acting or compound machine with a single mechanical movement. Two sets of presses fed with clay from a hopper between them are operated by the same mechanism which operates the forced feed in such a manner that while the brick are being molded in one press the clay is being fed to the other, the full molds are removed, and the empty molds are brought into position.

In the accompanying drawings, like letters of reference referring to like parts throughout, Figure 1 is a side elevation showing the side on which the molds are introduced. Fig. 2 is a side elevation of the opposite side. Fig. 3 is an end elevation. Fig. 4 is a vertical section on the line *x x* of Fig. 3. Fig. 5 is a duplicate of Fig. 2 as it appears when the tempering-rack is in its extreme forward position toward the crank-shaft. Fig. 6 is a duplicate of Fig. 4 when the tempering-rack is in its extreme forward position. Fig. 7 is a vertical cross-section of one of the plungers through the center of one of the air-valves. Fig. 8 is a detail of the striker and means for tightening the same. Fig. 9 is a horizontal section through N N′ on line *x″ x‴* of Fig. 2; and Fig. 10 is an enlarged sectional view of feed-bar F, vertical bar *e*, lugs *f′ f′*, and cross-rods *f f* as they appear in Fig. 4. I regard the part facing the crank-shaft as the front of the machine.

A is the frame, which may be of any suitable construction, care being taken to have it firm and strong.

B is a vertically-adjustable frame provided with rollers *b* and *w″* for holding the molds.

C C″ C‴ are molds as they appear in position when the machine is in operation.

*c c′* are screw-threaded bolts working through a nut or plate in a cross-tie, *a*, of main frame for effecting the vertical adjustment of frame B, or working through a screw-threaded hole in cross-tie *a*.

D is the hopper for reception of the clay, and is securely attached to the main frame above the roller-frame B.

E is the tempering and feed rack, composed of vertical bars *e* and the diverging bars *e′ e″* at each side, and a number of cross-rods, the whole constituting a rack of a general shape similar to that of the hopper. It is pivoted on a shaft, *e‴*, below the vertical center of the hopper, and is rocked backward and forward with every revolution of the crank-shaft. The central vertical bars, *e*, are extended below the shaft *e‴* to a point near the bottom of the hopper, and are connected by cross-rods, as above. Pivoted to the bars *e* at each side, and at a suitable distance above their lower extremities, is a feed-plate, F, for forcing the clay into the press-boxes. The lowermost cross-rods *f f* serve as stops, and are re-enforced by the lugs *f′f′*, to insure a stop to F in case of accident to the rods *f f*.

G is a pitman or connecting rod pivotally attached at one end to the crank of the crank-shaft, and at the other to the rack E.

H is the crank on crank-shaft.

I I′ and *i i′* are toggle-levers, of which there are a set on each side of the machine for operating the press-plungers by motion communicated from rack E. I I′ are pivotally attached at $e^{IV}$ to the top of rack E, and extend downward and outward, diverging from each other in the directions of the ends of the machine.

J J′ are shafts resting on the ends of the top side plates of the hopper-frame. *i i′* are rigidly attached at one end to the shafts J J′, re-

spectively, and extend downward and inward, converging toward each other, and are pivotally connected to the lower extremities of I I'.

K K' are cranks, of which there are a set on each side, rigidly attached to shafts J and J', and pivotally attached to the plunger-rods R r R' r', respectively.

r r' are vertical bars or rods rigidly connected to the plungers and pivotally connected to the rods R R'. They pass through guides in the cross-ties s s' of hopper-frame.

L is a long vertical lever-bar attached at top to the shaft $e^{IV}$ of the rack E, and extending downward below the roller-frame B. It is provided with a vertical slot in its lower extremity.

L' is a short bar provided with a lug or pin, l, at its upper extremity. It is rigidly attached at one end to a shaft, W, and at the other is attached to the bar L by pin l in the slot of L.

M is a cross side plate secured to hopper-frame to give points of attachment for N N'.

N N' are short vertical bars provided with vertical slots, attached to M at one end, and to the main frame at the other.

O and P are horizontal plates inclosing the vertical bar L, and adjustably attached to N N'. O and P are rigidly secured together at a fixed distance apart by the bolts and block p p'. This mechanism O P N N' p p' gives a vertically-adjustable fulcrum for lever-bar L, whereby the arc described by its lower extremity may be varied in length.

The shaft W rests on the bottom plates of the main frame and extends from side to side directly under the center of the hopper. w w are cranks rigidly attached to W inside the roller-frame B. w' is a roller journaled in upper extremities of w w for driving the molds into position.

T T' are the press-plungers, and are provided with air tubes and valves t t' for admission of air to press-boxes when the plungers are drawn up.

V V' are the press-boxes. v v' are the dies in bottom of the press-boxes for cutting the clay of size to fill the molds.

Y is a striker-wire for severing the clay at the top surface of the molds. It is stretched tightly directly under the outside plate of the press-boxes, directly under and at right angles to the dies v v', and extends from side to side of the machine. It is passed through the vertical posts of main frame and attached to block y', provided with holes z. By any suitable lever, as y, in holes z, it may be revolved and the wire drawn taut. This wire lies between the molds and the dies. It is shown in position in Fig. 3, and the means of tightening it are shown in the detail, Fig. 8. Its function is to sever the clay from the mold evenly and exactly, leaving a smooth even finish. This dispenses with the necessity of using an evener on the mold after it is removed from the machine, which extra labor is always required where reliance is placed on the press or die frame to separate the clay from the mold.

w'' are rolls in frame B, placed at right angles to rolls b, and placed directly under the center of the hopper.

The roller-frame B is made independent of the frame A, and is provided with means for vertical adjustment. Any suitable means may be employed for the purpose. I use screw-threaded bolts working in screw-threaded holes in the cross-ties a a' of the main frame. This is to compensate for swelling and shrinking with changes of the weather and for any wear on the rollers. The rolls b and w'' are to facilitate the supply and removal of the molds. A workman stands in a pit, facing the mold-entrance, and shoves in a mold over the rollers w'' at every half-revolution of the crank-shaft.

The air valve and tube through the plunger saves lifting the weight of the atmosphere when retracting the plunger. As the plunger fits very closely within the press-box and all sources of air are excluded by the clay, when the plunger is retracted a partial vacuum is formed underneath, and considerable power would be required, if the valves were not used, to raise the plunger against atmospheric pressure. The valve is pivoted in a recess in the under surface of the plunger, and its point of attachment is on the side toward the hopper, thereby insuring the closing of the valve when the clay is forced under the plunger.

The operation is as follows: Motion having been imparted to the crank-shaft from some source of power, it is communicated by the connecting-rod to the rack E, which is thereby rocked on the shaft $e'''$. All the rest of the mechanism is driven from the motion of the rack E. By the toggle-levers the motion is communicated to the shafts J J' in opposite directions and in reverse order. Hence one set of plungers is raised at the same time that the other set is lowered—as, for example, when the rack is in position shown in Figs. 5 and 6, T will be forced into the press-box V and T' will be raised out of press-box V'. By the vertical lever L motion from the rack is imparted to L' and w w' in the opposite direction to movement of the rack and in the same time, thereby driving out the filled mold and substituting an empty mold under V' while the plunger T' is raised and while the mold under T is being filled with clay. The extension of e moving in opposite direction to top of the rack E, the plate F catches the clay in the bottom of the hopper and forces it into the press-box V' while the clay in V is being pressed into the mold. When the rack E is thrown in the other direction—*i. e.*, away from the crank-shaft—all the foregoing is exactly reversed. In a word, all the parts of the machine are complementary, and while the clay is pressed into the molds by one press the materials and all essentials are made ready in the other press. This is at one half-revolution of

crank-shaft, and on the next half-revolution the relations and action of all the complementary parts are exactly reversed. The plate F is always exactly vertical in its extreme forward and backward position, and a forced feed is secured always on right lines to the mouths of the presses. This end is attained, in spite of the arc movement of lower extremity of *e*, by pivoting the plate F at its upper corners and by the horizontal stop-rods *f f* or re-enforcing lugs *f' f''*, so set in plates *e* that they will limit the movement of F on the vertical line in the extreme forward or backward position. The rack E serves chiefly to temper the clay, but also acts as part of the forced feed. The clay, being kept in constant motion by the rack, is forced by its own weight to the bottom of the hopper. Clay is constantly supplied to the hopper by an endless carrier. (Not shown.)

Owing to the peculiar construction by which movement is imparted to bar L', the mold-driving roller *w'* stops for an instant in its extreme outward position at every half-revolution, and then reverses its direction. This is necessary to afford opportunity for the introduction of the empty mold.

All the mechanism takes its motion from the rack E. There is throughout perfect coincidence in time of movements and perfect harmony of co-operation. Every half-revolution of crank-shaft turns out a mold of brick from one press and supplies the clay and empty mold to the other press. I have made my machine for a mold of six brick. At every revolution of crank-shaft, therefore, twelve brick are turned out, and seven to ten thousand brick may be made per hour at a low rate of speed.

Of course the machine may be made larger. The molds may be for ten or twelve or more brick, and the product correspondingly increased; but a mold of six brick is most suitable for convenient and advantageous handling.

It will be seen from the foregoing description that the only limit to the capacity of the machine is the ability to supply the clay and the empty molds.

If found desirable to speed up the machine beyond the capacity of a single workman to supply the empty molds, an automatic device may be easily rigged to supply the molds as rapidly as required.

All the parts of the machine must be of strong material. I make the frames of wood, and the rack, toggles, vertical lever, &c., of the best quality of iron.

The rack E, by bars *e e' e''* on each side and their cross-rods above the shaft *e'''*, approximately fills the clay-hopper, whereby the short swing necessary at the lower extremity is sufficient to pass some part of the rack through the clay. This matter is further controllable, however, by the location of the pivoted shaft *e'''*, or, lowering *e'''* in the hopper, the arcs of movement may be varied. The essential point to it is, that it shall be a rack pivoted at some point within the clay-receptacle and have a rocking motion.

The general organization of the double-acting compound machine as shown and described, the mechanical movement in all its details for operating the same, the tempering-rack, the forced feed, the air-valves in the plungers, the vertically-adjustable roller-frame, the wire striker, and the peculiar mechanism for supplying and removing the molds are all of them of my invention; and in the following claims I desire protection on each of the elements separately and in all their operative combinations.

I claim, broadly, as my invention, and desire to secure by Letters Patent of the United States, as follows:

1. In a brick-machine, in combination, for tempering the clay and assisting in feeding the same to the presses, the clay-receptacle D, the rack E, consisting of the pair of central vertical side bars, *e*, tied together by suitable cross-rods and pivoted within the clay-receptacle on the shaft *e'''*, said bars *e* extending from above top of receptacle D to near the bottom of the same, the pairs of side bars, *e'* and *e''*, attached to the central bars at or near the pivotal point of connection with shaft *e'''* and diverging and extending upwardly to a level with tops of bars *e* and connected by suitable cross-rods, the three bars *e*, *e'*, and *e''* being connected by longitudinal ties at the top, and suitable means, substantially as described, for imparting a rocking motion to said rack.

2. As a forced feed for brick-machines, the combination of a rocking tempering-rack pivoted within the clay-receptacle and a vertical cross-plate secured to the lower extension of said rack on a line with the mouths of the press-boxes, substantially as described.

3. In a brick-machine, the combination of the rack E, pivoted within the clay-receptacle, as at *e'''*, and provided with extensions of its vertical side bars, *e*, below the pivoted shaft *e'''*, the vertical cross-plate F, pivoted between and to the bars *e*, and suitable stops, as *f f f' f'*, for limiting movement of plate F, substantially as described.

4. In a brick-machine, in combination, the rocking rack E, the vertically-adjustable fulcrum O P *p p'*, as described, the lever-bar L, pivoted in said fulcrum, attached at one end to the rack E, and provided at the other end with a vertical slot, the lever L', rigid with shaft W, provided with a pin on its upper extremity working in the slot of lever L, the crank-shaft W, the crank-bar *w*, and the mold-driving roller *w'*, all arranged substantially as described, for the purpose set forth.

5. In a brick-machine, the vertically-adjustable fulcrum described, consisting of horizontal bars O P, bolts and blocks *p p'*, vertical bars N N', provided with vertical slots, and screw-bolts passing through the slots and the bars O P, substantially as described.

6. The toggle-levers I I′ *i i′*, in combination with rack E and shafts J J′, substantially as described.

7. The toggle-levers I I′ *i i′*, the rack E, the shafts J J′, the cranks K K′, the plunger-rods R R′ *r r′*, and the plungers T T′, in combination, substantially as described, for the purpose set forth.

8. In a brick-machine provided with a double set of presses, as described, the roller-frame B, provided with a set of rollers at each end parallel with the press-boxes, and a set of rollers in the center at right angles to the end rollers, in combination with the mold-driver *w′*, crank-arm *w*, shaft W, lever L′, and lever L, substantially as described, whereby empty molds are supplied alternately by the one mold-driver to the opposite presses and the full molds are delivered alternately from the opposite ends of the mold-frame.

9. In combination, for making common brick, a double set of presses, a clay-receptacle between the two sets of presses, a rocking tempering-rack and forced feed within said receptacle, and means for operating the same, substantially as described, for the purposes set forth.

10. In a brick-machine, the combination of two sets of presses, a clay-receptacle between the presses, a rocking tempering-rack and forced feed within said receptacle, and a set of toggle-levers connected at their point of union to the tempering-rack and at their opposite ends rigidly attached to plunger-operating shafts, substantially as described.

11. In a brick-machine, in combination, presses T T′, clay-receptacle D between the presses, rocking tempering-rack and forced feed E *e e‴* F, the toggle-levers I I′ *i i′*, shafts J J′, cranks K K′, and plunger-rods R *r* and R′ *r′*, substantially as described.

12. In a brick-machine, in combination, presses T T′, press-boxes V V′, dies *v v′*, clay-receptacle D between the presses, rocking tempering-rack and forced feed E *e e‴* F, toggle-levers I I′ *i i′*, shafts J J′, cranks K K′, and plunger-rods R *r* R′ *r′*, substantially as described.

13. In a brick-machine, in combination, a double set of presses, a clay-receptacle between the two sets of presses, a rocking tempering-rack and forced feed within said clay-receptacle, means for supplying empty molds and removing the full molds to and from the presses, and means for operating the same, substantially as described, for the purpose set forth.

14. In a brick-machine, in combination, the presses T T′, frame B, provided with rollers *b* and *w″*, mold-driving roller *w′*, cranks *w w*, rock-shaft W, lever-bar L′, provided with pin *l*, lever-bar L, provided with slot in lower extremity, and rocking rack E, substantially as described.

15. In combination, the following elements, constituting the operative brick-machine described, viz: the frame A, crank H, connecting-rod G, tempering-rack and forced feed E *e e‴* F, toggle-levers I I′ *i i′*, shafts J J′, cranks K K′, plunger-rods R *r* R′ *r′*, presses T T′, provided with air-valves *t t′*, press-boxes V V′, dies *v v′*, striker-wire Y, lever L, with slot, lever L′, with pin *l*, shaft W, cranks *w w*, roller *w′*, adjustable frame B, provided with rollers *b* and *w″*, and molds C, substantially as described, for the purpose set forth.

DANIEL WOODBURY.

Witnesses:
JAS. F. WILLIAMSON,
EMMA F. ELMORE.