

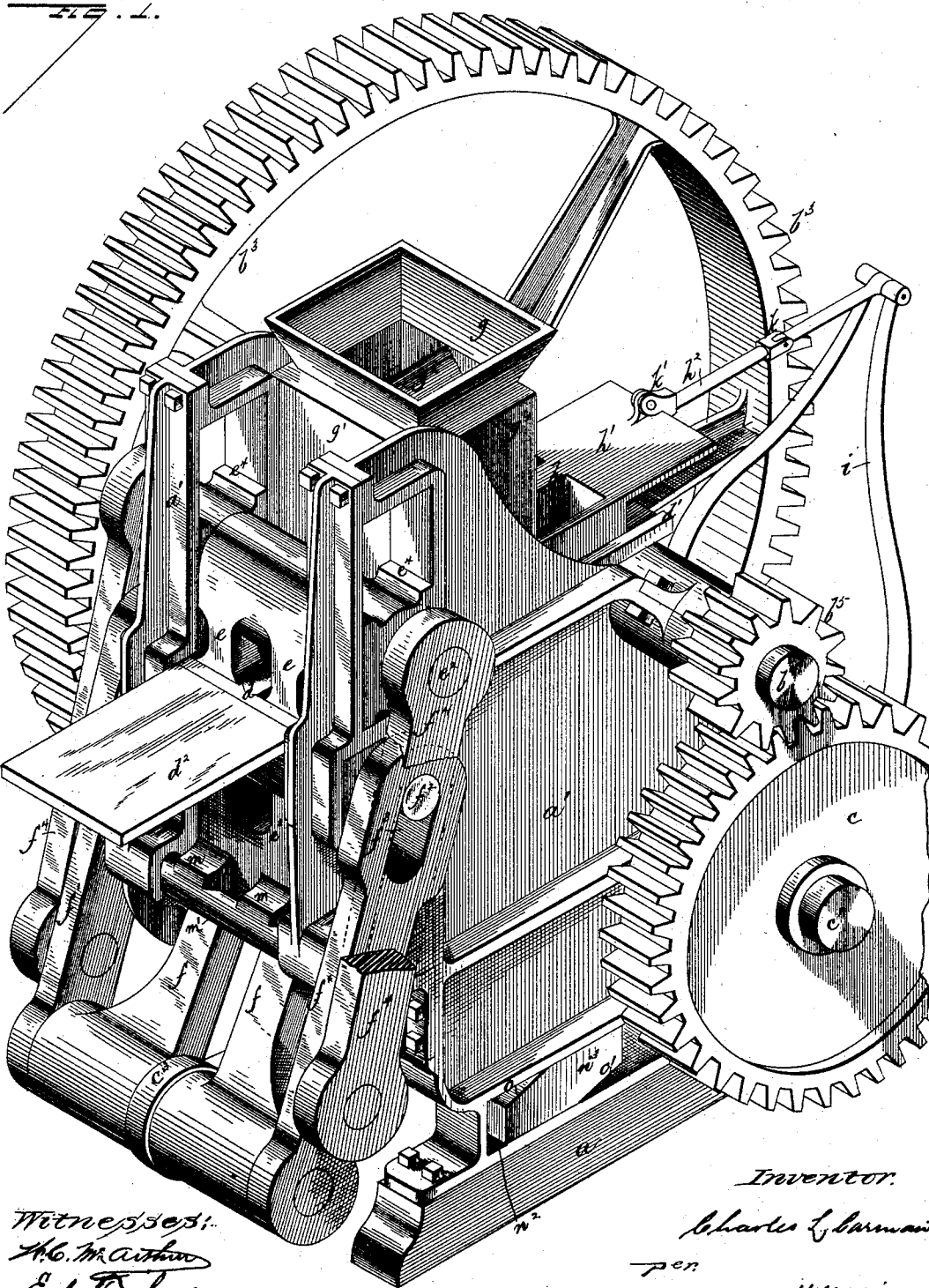
(No Model.)

5 Sheets—Sheet 1.

C. L. CARMAN.
BRICK MACHINE.

No. 374,938.

Patented Dec. 20, 1887.



Witnesses:
W. C. Martin
Ed. Trabel

Inventor.
Charles L. Carman
per
H. Harrison
Attorney.

(No Model.)

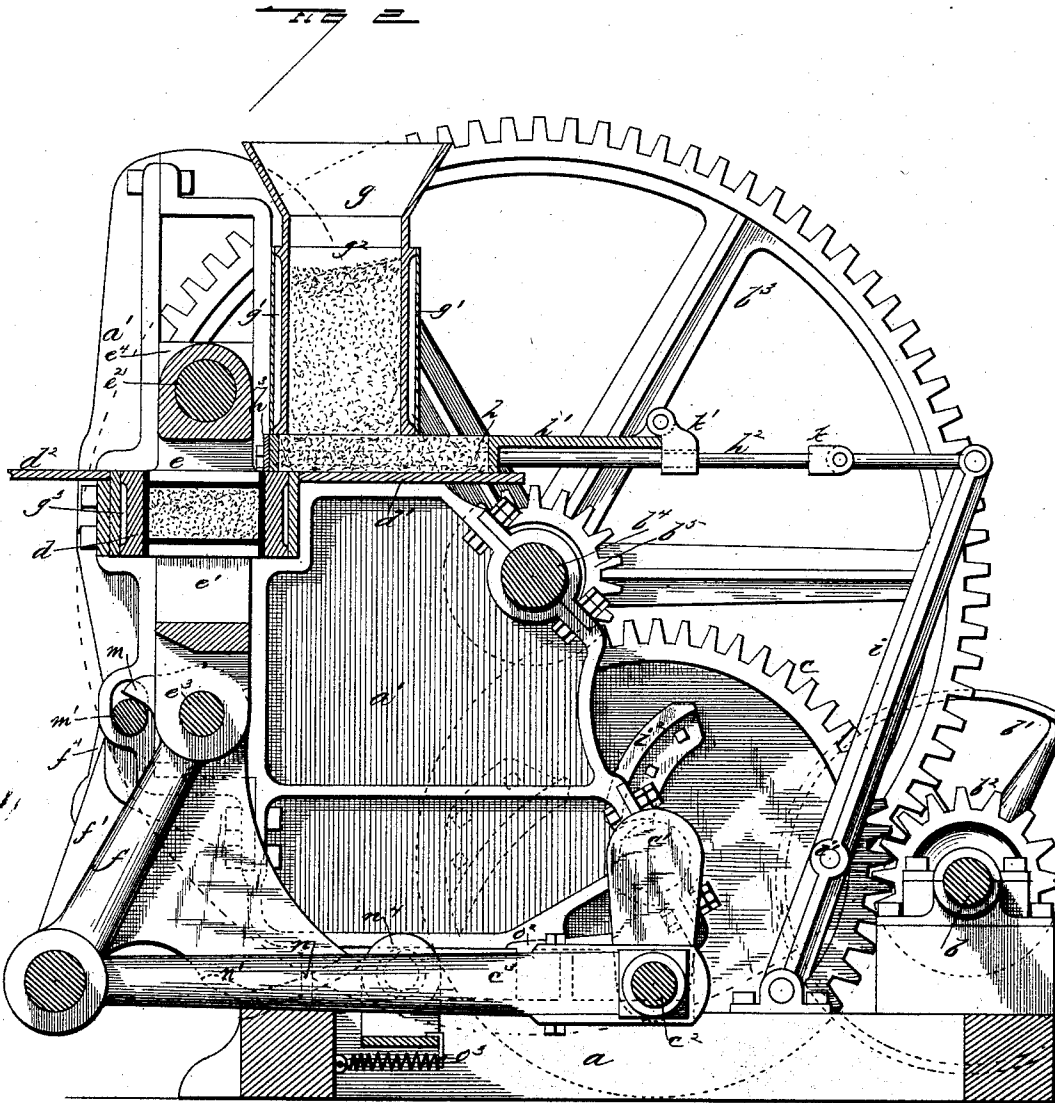
5 Sheets—Sheet 2.

C. L. CARMAN.

BRICK MACHINE.

No. 374,938.

Patented Dec. 20, 1887.



Witnesses:

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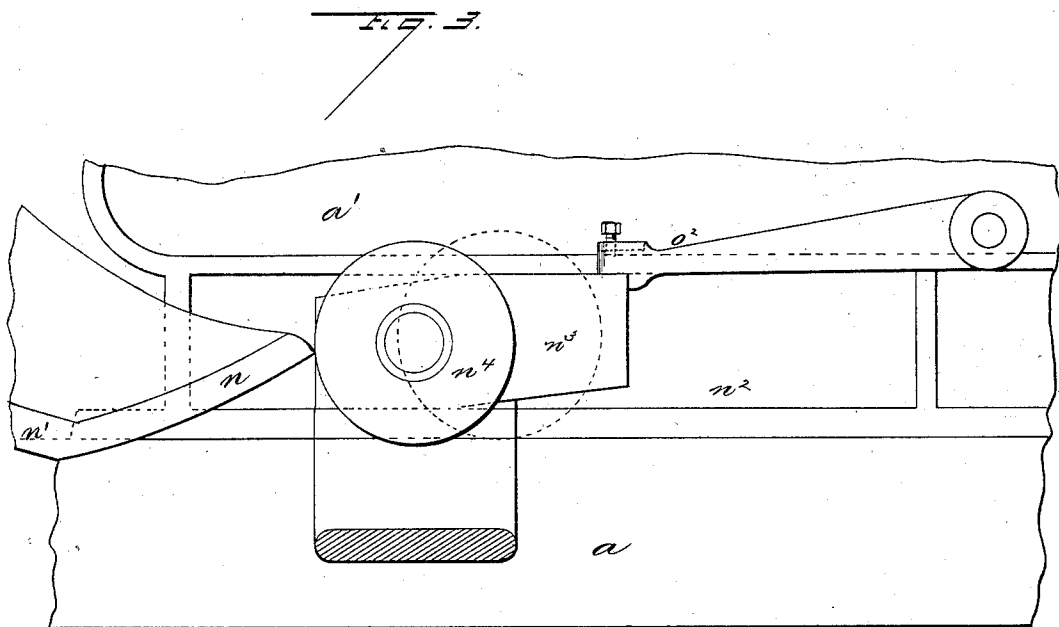
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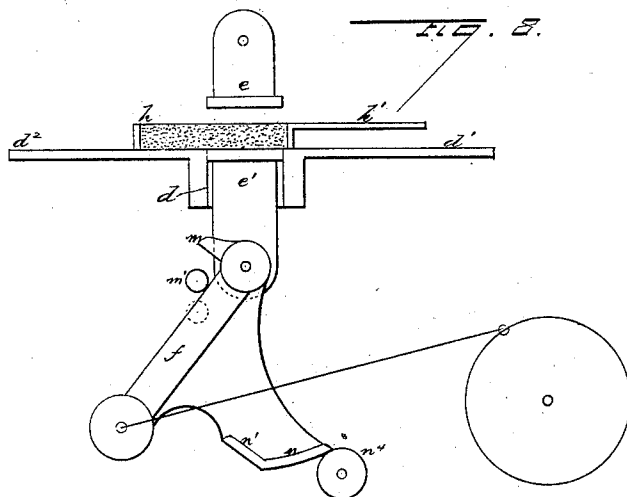
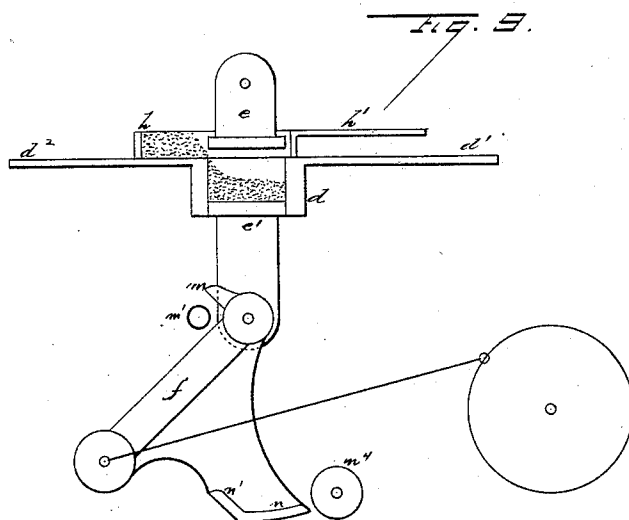
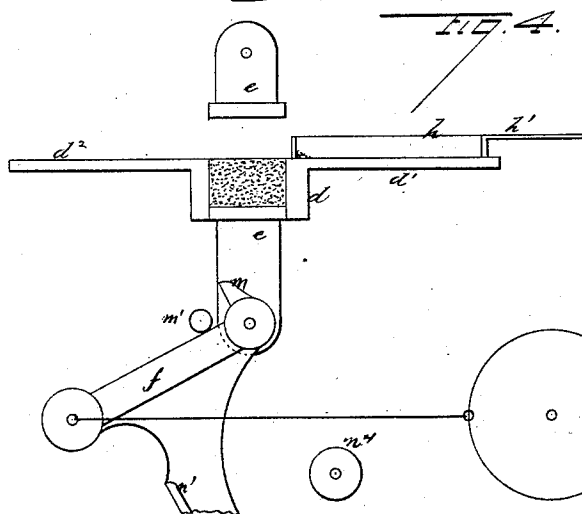
(No Model.)

5 Sheets—Sheet 4.

C. L. CARMAN.
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No. 374,938.

Patented Dec. 20, 1887.



Witnesses:
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(No Model.)

5 Sheets—Sheet 5.

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FIG. 5.

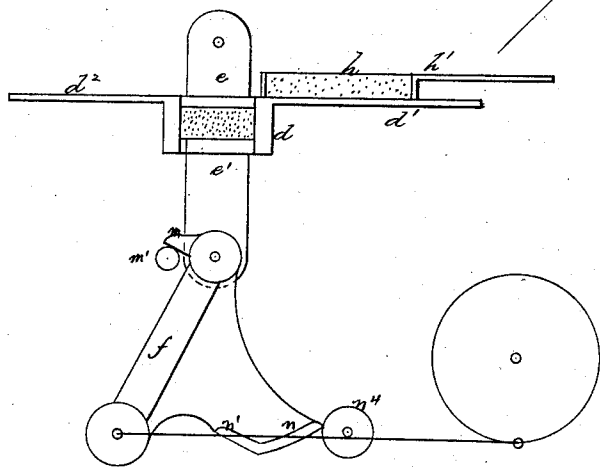


FIG. 6.

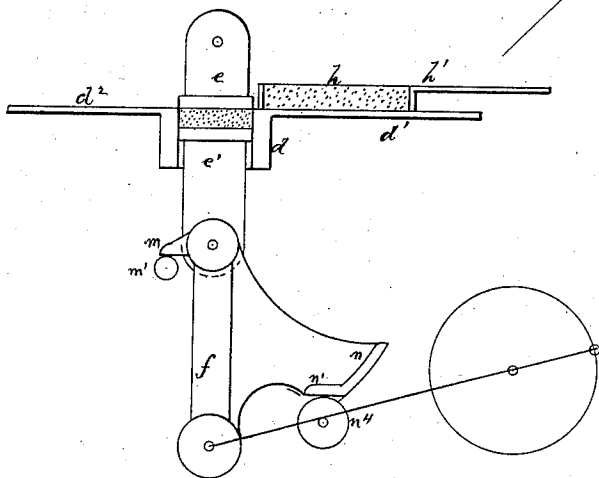
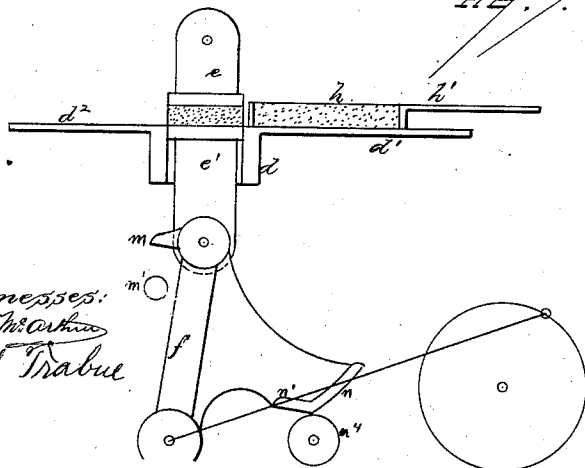


FIG. 7.



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UNITED STATES PATENT OFFICE.

CHARLES L. CARMAN, OF CHICAGO, ILLINOIS.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 374,938, dated December 20, 1887.

Application filed April 5, 1886. Serial No. 197,880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. CARMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Brick-Machines, of which the following is a specification, to wit:

This invention relates to brick-machines; and it consists in certain novel peculiarities of the construction and arrangement of the same, substantially as will be hereinafter more fully set forth and claimed.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe its construction and operation, referring to the accompanying drawings, in which—

Figure 1 is a perspective view of my machine. Fig. 2 is a central longitudinal section of the same. Fig. 3 is an enlarged detail view of the ejecting-roller; and Figs. 4, 5, 6, 7, 8, and 9 are diagram views illustrating the positions assumed by the pressing mechanism during a single revolution of the machine.

a represents the base of my machine, on which is secured the main frame *a'*, of suitable size and form for the purpose in view. In the rear end of this frame is journaled the driving-shaft *b*, on which is a suitable belt-pulley, *b'*, for communicating motion to the machine. This shaft is also provided with a pinion, *b''*, which meshes with and drives a large gear, *b'''*, on a shaft, *b''''*, which extends across the machine, and is provided on each end with a pinion, *b'''''*, which pinions engage and drive a pair of gears, *c*, upon the main shaft *c'*. In the present case, the machine being of small size, this shaft is cranked in its center, as at *c''*, for connection to the pitman; but in machines of greater capacity I would prefer to provide two pitmen, one connected to a wrist-pin upon each of the gears, *c*, which in large machines would insure an even motion of the pressure-links and prevent their being twisted under strain.

At a suitable point in the forward part of the main frame are secured the mold-boxes *d*, of any desired number; but two are herein represented. A plate or table, *d'*, is secured upon the frame in rear of and flush with the upper edges of these molds, and a delivery-table, *d''*, for receiving the completed bricks, is secured

in a similar position in front of the molds, as will be seen in Figs. 1 and 2. The upper plungers or dies, *e*, and the lower ones, *e'*, of a number corresponding to the mold-boxes, are respectively secured to and carried by the shafts *e'' e'''*, which are secured in suitable boxes, *e''''*, sliding in vertical slots or guides in the main frame, which guides retain the shafts and dies in their proper working position with reference to the molds.

To the lower die-shaft, *e''*, is hinged a toggle casting or arm, *f*, and at each side of the main frame the lower end of this toggle-arm is connected by links *f''* with a suitable stud, *f'''*, on the side of the main frame, as clearly seen in Fig. 1. The upper ends of these links are slotted, as at *f''''*, to permit the ejection of the pressed brick, as will be presently explained. The upper die-shaft, *e'''*, is also at each end connected by links *f''''* with the links *f''*, forming an exceedingly strong connection between the upper and lower plungers or dies to draw them together in applying the pressure. The pitman *c''* connects the cranked shaft *c'* with the lower end of the arms *f*, as in Fig. 2, and serves to transmit the motion of the gearing to the pressing mechanism.

The supply-hoppers *g* are placed upon the machine in rear of the mold-boxes over the plate *d'*, and are preferably so divided as to present a bottom opening corresponding with each mold-box. These hoppers are incased in a jacket or casing, *g'*, which is connected with suitable steam-supply pipes, and I thus heat the clay or other material to be used before it is pressed into the molds. To more fully heat this material through its center I pass steam-connections *g''* through the hoppers, as seen in Figs. 1 and 2. The molds in which the bricks are pressed are also provided with steam-jackets, as at *g'''*, in order that the material may be kept hot while under operation, which adds greatly to the value and appearance of the brick.

Beneath the lower ends of the hoppers, upon the plate *d'*, are arranged the feeders, which consist of suitably-sized frames *h*, provided with a cut-off plate, *h'*, and sliding back and forth beneath the hoppers and over the molds.

Between the feeders passes a rod, *h''*, on the forward end of which is a transverse bar, *h'''*,

serving as an ejector for the finished brick. This arm is at its rear end connected to an oscillating arm, i , pivoted on the main frame and provided with small studs or rollers, i' , which are engaged and operated by cams i'' on the gears c , as in Fig. 2. This serves to give the proper reciprocating movement at intervals to the ejector, and the rod h^2 is near its rear end provided with a shoulder, k , and the cut-off plate h' is provided with a hinged fork or casting, k' , which, when turned down, embraces this rod, and when the shoulder k contacts with it on the forward motion the feeders are carried forward to charge the mold.

On the reverse motion the ejector strikes and withdraws the feeders with it. By throwing up the hinged fork k' the feeders are not operated, which is often convenient when the last brick has been pressed and it is desired to eject it without again filling the molds. It will be noted that the feeders are not operated the full stroke of the ejector, but have a dwell at each end of the stroke, thus permitting the finished brick to be pushed off and the lower plunger in position to drop before the filler or feeder starts. It will also be observed that I have constructed the feeders twice as long and only one-half as deep as the molds. This enables me to pass the feeder and its contents forward and back over the mold a sufficient distance to insure the proper filling of all parts with an equal quantity of clay, and avoid the piling of the material in one end of the mold-box, as is often done, thereby producing a brick of unequal density.

The upper end of the lower plunger-arm, f , is formed on its forward side with one or more projecting ears or lugs, m , which bear upon the top of a cross-bar, m' , in the main frame, to serve in prying the brick upward during its pressure, and to aid in lifting it out of the mold, as hereinafter more particularly explained.

On the back of the arm f is also formed or secured a web, having on its lower edge a lifting cam, one part of which is curved concentric with the upper pivot of said arm, as at n , and the other part is at a tangent thereto, as at n' . In the base of the machine is formed on each side a horizontal slot, n^2 , (see Figs. 1 and 3,) in which move a pair of blocks or heads, n^3 , connected across the machine and carrying one or more small rollers, n^4 , according to and corresponding with the lifting-cams n n' . These sliding blocks are beveled off on their upper forward sides, as at o , and their lower rear sides, as at o' , and on the main frame are pivoted stop arms o^2 , which drop behind and lock the sliding blocks in their forward position. When the cams n n' press against the rollers, this pressure rocks the sliding heads, dropping their rear ends below the stop-arms and allowing them to slide back under them. The cam having passed up, the blocks are drawn back to their position by springs o^3 , and the stops drop again behind them, as in the drawings.

In operation, the clay suitably pulverized and of the proper consistency is placed in the hoppers, from which it passes into the feeders and subsequently into the molds. In passing through the hoppers its motion is slow enough to enable the steam-jacket thereon to effectually and thoroughly heat it throughout, so that the moisture that may be contained therein is vaporized or turned to steam, and drives out all air by its expansion. Under subsequent pressure in the heated mold this steam is condensed by pressure, leaving just sufficient moisture to enable the particles to firmly adhere together; but as no air has been left in the material no trouble is had with its expulsion or with air-holes in the finished brick. The feeder having moved forward and filled the mold, and been again drawn back, the main parts of the machine are in the position shown in the diagram view of Fig. 4, with the pitman at the extreme forward end of its stroke, the upper dies lifted above the mold, and the lower dies or plungers just within the lower part of it and forming its bottom, on which the charge of clay rests. As the machine is started, the backward stroke of the pitman draws back the lower ends of the swinging links, and the upper dies fall upon the material and are drawn down within the mold to form the upper pressure, and they arrive at their lowest point, which is the lower ends of the slots in which they move, as the parts assume the position of Fig. 5, and the crank has made a quarter-revolution. As the whole pressing mechanism hangs now from the stud or pin f^2 and the upper guide-slots of the main frame, it can fall no farther, and the continued rearward motion of the crank and pitman lifts the lower dies or plungers toward the upper ones and completes the lower pressure till the links are vertical and the parts are in the position of Fig. 6. During this upward pressure of the lower dies the projecting ears on the forward side of the hinged arm f have contacted with their cross-bar m' , and the whole connected pressure mechanism is pried or lifted upward till the upper edge of the brick is flush with the upper edge of the mold, as represented. The cam-web on the rear of the arm f has at the same time pushed back and risen upon its rollers, the latter springing forward under the tangent part of the cam, as shown. The pitman and the swinging links now begin their forward motion, and the tangent part of the cam-web, acting on the fulcrum-rollers, pries or lifts the brick with the pressure retained upon it till it is lifted entirely out of the mold, as in Fig. 7. The crank and pitman continues steadily to move forward, and the arm f , swinging upon its upper pivot, is sustained at its upper position by the concentric portion of its cam-web, as in Fig. 8. At the same time the outward swing of the pressure-links lifts the upper dies free of the brick to the upper end of its guide-slot, and the ejector now moves forward, pushing the finished brick off upon the receiving-table,

and the feeder is also carried forward to its extreme limit, as in Fig. 8, with its rear half over the mold. At this point the cam-web is moved off its supporting-roller, and the whole pressing mechanism is allowed to fall, as in Fig. 9, with the lower plungers or dies at the bottom of their guide slots, and just within the mold, while the upper plungers fall within the feeders, the contents of which at their rear end have fallen into the mold as the plungers descended. The crank now completes its stroke, again lifting the upper plungers free of the feeders, and the latter are drawn back, leaving the mold entirely and evenly filled, and the parts are again in the position of Fig. 4, and the operation is repeated indefinitely till it is desired to stop the machine, when the feeders are detached, allowing the ejector to move forward and complete its work without again filling the molds.

It will be particularly observed that the pressure is alternately from first one side of the material in the mold and then the other, and also that the brick is first moved in the mold for ejection while under the final and increasing pressure, and that this pressure is retained upon it in full force till the finished brick is lifted completely clear of the mold and is ready for delivery, thus not only retaining the pressure for a time sufficient to cause the particles to set and become firm, but preventing any spring or expansion of the article after the pressure is released, and more fully protecting it from injury by the lifting motion. When pressure is applied to the clay in a mold, the loose particles are shifted in position as they are compressed; but this shifting and pressure becomes smaller in proportion as it recedes from the face of the pressing-plunger, and in most bricks a very distinct line is shown (usually at the center) where this movement of the particles has taken least effect, and where there is in consequence the least density and strength. By applying the pressure first at one side and then at the other and moving the brick within the mold while the final and greatest pressure is being effected I succeed in so moving all the particles from their original position as to form a brick of equal density throughout, besides imparting to the finished brick a smooth and fine finish on its faces that cannot otherwise be had.

The clay always contains just sufficient moisture for proper working, and of course more or less air. The heating of the clay before using turns the moisture to steam and expels the air, as previously described, while the working condition of the material is not injured, indeed being considerably enhanced. When under subsequent pressure this steam is condensed, the moisture of the material remains the same, and there is no air to escape from the mold, and consequently no danger of injury to the brick by its compression.

It will be understood that the descent or fall of the dies when released by the rollers or stops is not in any sense so sudden as to cause

any shock or strain on the parts, but is gradual and of even speed, and the same is true of the descent of the upper die upon the material at the commencement of the pressure.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a brick-machine, a main frame formed with guides in which the upper and lower plungers or dies move, and provided with suitable mold-boxes, in combination with the lower dies supported upon link-arms connected directly to and swinging upon the main frame, and the upper dies connected with the first links directly by a separate pair of links, substantially as and for the purpose set forth.

2. In a brick-machine, the method herein described for expelling air from the clay by heating the moist clay while it is contained loosely in the hopper, and causing the vapor thus formed to expand and expel the air before entering the mold, substantially as described.

3. In a brick-machine, the combination, with the mold and the hopper, of a feeder sliding under the latter and over the former, said feeder being double the length and only one-half the depth of the mold, substantially as and for the purpose set forth.

4. In a brick-machine, the combination, with the mold-box, of a delivery-slide, and a feeder actuated thereby, and having a shorter movement than the slide, whereby it has a rest at the forward end of its stroke, substantially as and for the purpose set forth.

5. In a brick-machine, the combination, with a reciprocating delivery-slide, of a reciprocating feeder actuated by but detachable from said slide, substantially as and for the purpose set forth.

6. In a brick-machine, the combination, with a delivery-slide provided with a shouldered operating-rod, of a feeder provided with a hinged fork for embracing said rod, and moved with the delivery in one direction by the shouldered rod and in the reverse direction by the slide, substantially as and for the purpose set forth.

7. In a brick-machine, the combination, with the mold and the dies or plungers connected by swinging arms with the actuating-pitman, of a cam projection, n , on one set of these arms, and a stop, as n' , on the main frame, with which it contacts to lift the dies and brick free of the mold, substantially as and for the purpose set forth.

8. In a brick-machine, the combination, with the mold and the dies or plungers connected by swinging arms with the actuating-pitman, of a stop, as n' , on the main frame, and a projection or segment, as n , on one set of these arms formed with a tangent or cam portion, n' , to lift the brick out of the mold, and a concentrically-curved section for holding it free of the mold while being delivered, substantially as and for the purpose set forth.

9. In a brick-machine, the combination,

with the mold and the dies or plungers sliding in guides on the main frame and connected by swinging arms with the pitman, of a projecting ear on one set of arms, contacting with a stop on the main frame to lift the brick within the mold while being pressed, and a second cam projection contacting with a second stop to eject the brick from the mold, substantially as and for the purpose set forth.

10 10. In a brick-machine, the combination, with the lower pressure-arms provided with a cam projection, of a stop sliding in guides of the main frame as this projection rises, and provided with a spring to return it beneath
15 the cam, substantially as and for the purpose shown and described.

11. In a brick-machine, the combination, with the stop rollers, of the sliding heads on which they are carried, beveled alternately on
20 their upper forward and lower rear corners, and a locking-stop for the same hinged on the main frame to drop behind the heads, substantially as and for the purpose set forth.

12. In a brick-machine, the combination,

with a continuously-rotating crank and a pitman connected thereto, of the lower plungers, *e'*, connected by arms or links *f* with the pitman, slotted links *f'*, connecting the latter with the main frame, and the side arms, *f'*, connecting the slotted links with the upper
30 plungers, substantially as and for the purpose set forth.

13. In a brick-machine, the combination, with the delivery-slide and shouldered rod *h*², and a feeder, *h*, provided with a hinged fork, *h'*, for engaging and disengaging the feeder and delivery rod at will, of a rocking arm, *i*, connected to said slide and provided with pins or rollers, and actuating-cams *i'* on the driving-gears for contacting with the same, sub-
40 stantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES L. CARMAN.

Witnesses:

W. C. MCARTHUR,
W. S. MCARTHUR.