# DAVID J. HUNTER.

## Improvement in Brick-Machines.

No. 114,011. Patented April 25, 1871.

*Fig. 1.*

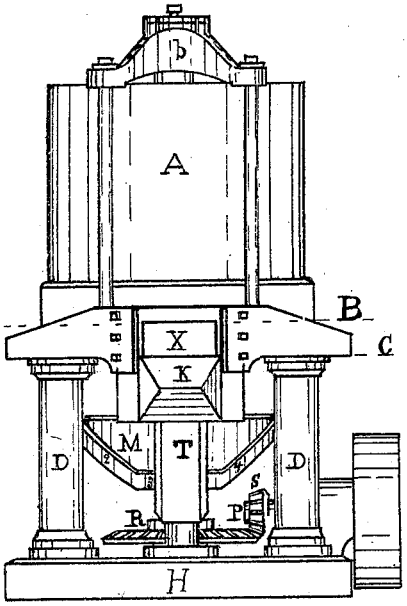



*Fig. 2.*

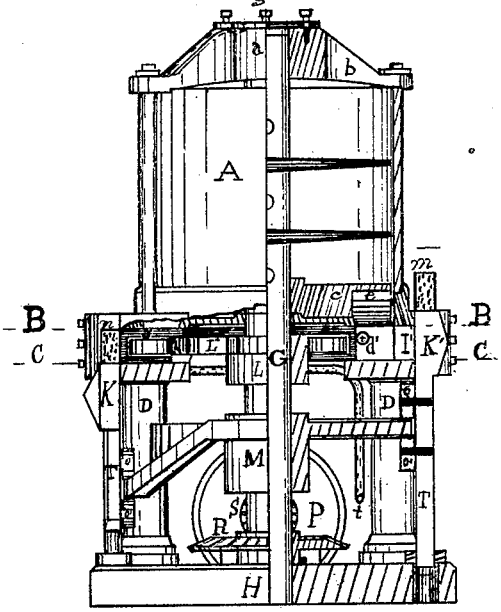



*Fig. 3.*

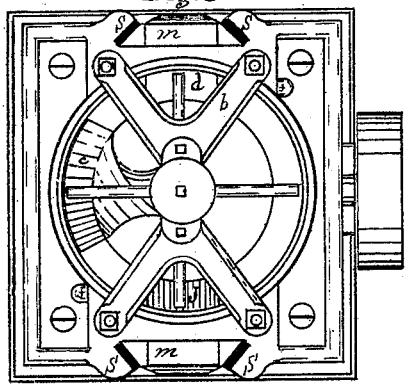



*Fig. 4.*

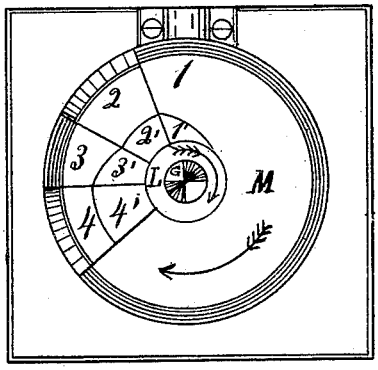
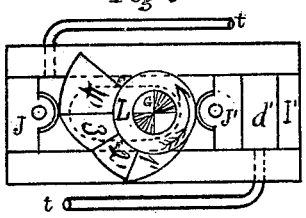



*Fig 5.*




Witnesses

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DAVID JAMES HUNTER, OF SOMERVILLE, MASSACHUSETTS.

Letters Patent No. 114,011, dated April 25, 1871.

## IMPROVEMENT IN BRICK-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all to whom these presents shall come:*

Be it known that I, DAVID JAMES HUNTER, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain Improvements on the Brick-Machine heretofore invented by me, and for which I have received Letters Patent of the United States No. 96,920, and of which the following is a specification; and I do declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, in which—

Figure 1 is a front elevation;

Figure 2, a sectional side elevation;

Figure 3, a plan;

Figure 4, a plan view of the cam L and the cam-table M, both being mounted on the upright shaft G, the cam L above the cam-table M, they being thus combined in the drawing to show their relative position and action when in motion; and

Figure 5, a plan view of the cam L, the horizontal plunger J J′, which is moved by it, the bar F, which connects its heads, the inner part *d′* of one of the brick-molds, I′, and the steam-pipes *t t*, by which said molds are lubricated.

The original machine is for molding and pressing bricks from clay, and the object sought in the present improvements is to obtain the same result and in the same general way, but to dispense with many of the parts employed in the original machine, and by the substitution of others, fewer in number, to reduce the necessary working parts to the lowest possible number, and thus to gain greater ease in working, less liability to derangement, a very large reduction in the cost of construction, and all the advantages which flow from simplicity of mechanism.

The machine as improved consists in the employment of an upright cylindrical tub, A, mounted upon an elevated platform, supported by a strong frame of proper construction, the interior of the tub being provided with an upright shaft, armed with knives for agitating and mixing the clay therein, and which shaft carries upon it, near to the bottom of the tub, a gate for alternately opening and shutting two orifices made through the bottom of the tub at opposite points in its area, such gate serving to direct the clay into molds disposed below the bottom of the tub and communicating with these orifices; a horizontal plunger, operated by a suitable mechanism, being combined with each mold to compress the clay within it, and a reciprocating gate, situated at the outer end of each mold, and serving, at different times, as one side of the mold, as a platform to receive, when molded and pressed, the brick as it is expelled from its mold, and as a carriage to lift the finished brick to a point convenient for its removal by an attendant; also a device for lubricating or sweating the molds after the delivery of each brick therefrom.

It is here especially to be borne in mind, as applicable to the detailed description that is to follow, that this machine, as now described, is a double-acting one, so that the entire process relating to the brick is completed on each half of the machine, and exactly repeated on the opposite half and by each half revolution of the upright shaft, and that all the parts described as necessary to effect the result on one side or half of the machine are exactly duplicated in form and situation diametrically opposite on the other half or side; and that for this reason no special exhibition or exact and detailed description of these duplicated parts or their action on the side where they are so duplicated is necessary.

In the drawing to which allusion has been made as accompanying this specification, and which illustrates my present invention and improvements, the tub is represented at A as an upright hollow cylinder placed upon an elevated platform, C, upheld by upright posts D at the corners thereof, or other suitable frame or structure for supporting the operating parts of the machine.

Within the tub A I dispose an upright shaft, G, armed with knives to agitate and mix the clay, which shaft extends through the bottom of the tub A and is stepped within a suitable block, H, erected upon or within the substructure of the machine.

This shaft is secured at the top by a journal, *a*, working in a four-arm yoke, *b*, placed above the top of the tub A, and properly secured in its place by iron rods extending from the end of each arm to the platform C beneath, or otherwise.

This shaft G, close to the bottom of the tub A, carries a segmental flange or wing, *c*, which extends to the wall of the tub and revolves directly over the bottom of the tub, the office of this flange being to direct portions of the clay alternately into two orifices, *d′*, and its duplicate made through the bottom of the tub at diametrically opposite points, the width and depth of these orifices being the length and width respectively desired for the brick to be made, and of a length sufficient with the dimensions before given to afford space for clay enough to form the brick.

The advance portion *e* of the flange *c* is inclined upward, in order to insure the passage of clay under it.

One of the molds for producing the perfectly-formed brick, shown at I′, and its duplicate on the opposite side, are situated immediately below the bottom of the tub, and are in alignment with and form contin-

uations of the orifices *d'* and its duplicate before mentioned, and have their only other openings upon the front and back side of the machine, the front opening being seen in fig. 1, and is marked X.

J J' is a doubled-headed plunger, playing horizontally within the mold I' and its duplicate, its opposite heads being rigidly connected by the bar F, which straddles the upright shaft G, the necessary movements of the plunger being effected by a cam, L, mounted upon said shaft, and disposed between and abutting against rollers fitted to each of the inner ends of said plunger.

A revolution of the shaft, by the action of the cam L, produces alternate motions of the plunger into and out of the molds, in the manner shown hereafter.

As the mold I' and its duplicate have respectively openings upon the front and back side of the machine which must be closed to form tight chambers in which the brick may be pressed by the outward advance of the plunger, and which must also be again opened in order to allow of the expulsion of the brick from the mold after it has been properly compressed therein, I dispose upon the front and back side of the machine, and over each open mouth of the molds, vertical sliding gates K' and its duplicate, supported by and playing in suitable guides S S, with gibs and set-screws, and furnished with such stems T and its duplicate as afford not only opportunity to affix such attachments as are necessary to connect the gates with the cam-table M, by which they are operated, but also, by being extended through and playing in suitable orifices in the bed-plate of the machine, shall keep the gates in their proper position, and enable them to move freely and accurately in said guides, and which gates, if found necessary or useful in practice, may be counterbalanced.

The proper intermittent movement of these gates, over and away from the mold openings, are effected through the agency of the circular cam-table M, fixed upon the upright shaft G, and revolving with the shaft, a plan view of which is shown in fig. 4, as well a plan view of the cam L, which gives alternate forward and backward motion to the double-headed plunger, as before mentioned, this super-position of the cam L giving also an accurate representation of the synchronous movement of the cam L and cam-table M, when the machine is in operation.

A front view of the cam-table is shown in fig. 1.

Th s cam-table M is divided into four parts, numbered from 1 to 4 respectively. Part 1, and much the largest division, consists of a horizontal disk, with that part of its circumference forming parts 2, 3, and and 4 depressed for that purpose; part 2, in the order of rotation, a descending plane; part 3, a horizontal plane; and part 4, an ascending plane, meeting the horizontal plane of part 1

For the sake of clearness I will here explain its action.

To connect the cam-table with the gate-stems, rollers *o o'*, one above another, and at right angles to the gate-stems T T, as seen in fig. 2, are attached to the inner side of each of the gate-stems at such distance apart as to allow the cam-table to play between them, and at such points on the stems that said cam-table shall close both gates when part 1 rests between their rollers on both stems.

The cam-table is made of sufficient circumference and thickness to extend to and work between the rollers of the gate-stems upon the opposite sides of the machine at the same time.

The cam-table being put in motion while part 1 is passing between the rollers, it presents a horizontal plane of uniform thickness to the horizontal rollers *o o'*, and therefore while it is passing between them there is no action upon the vertical gate.

The passage of this part simply holds the gate firmly in its place at whatever point it may be; but upon the advance of part 2 the under side of the descending plane during its passage acts continuously upon the lower roller *o'*, and draws down the vertical gate till part 3 advances with its horizontal plane, and, like part 1, produces no action on the gate, but simply holds the gate at the point to which it was drawn down by part 2 till part 4 advances, and, with its ascending plane acting upon the upper roller *o*, lifts the gate back to its place.

In completing the revolution of the shaft the same parts are presented to the parts duplicated on the opposite side of the machine, and precisely the same action is repeated.

The form of the cam L is exhibited plainly in fig. 5 of the accompanying drawing, and is divided into five parts, numbered from 1' to 5' respectively. Part 1' of this cam departs at a tangent from the axis of the cam to such an extent as, when in motion, to force forward continuously the horizontal plunger J J' into the mold I' until it has completely pressed the brick, the initial point of said part 1' abutting against the inner end of said plunger J' when it first commences its action.

Part 2' has for its curve the arc of a circle concentric with the axis of the cam, and whose diameter is slightly less than the greatest diameter of part 1', that the vertical gate may be relieved of all pressure and be the more easily drawn down by the cam-table to allow of the expulsion of the brick.

The curve of part 3' departs from the axis of the cam at such a tangent as to again force forward the plunger and expel the brick from the mold through its now open mouth.

The curve of part 4' is a continuation of the greatest diameter of the preceding part, and is concentric with the axis of the cam, in order to hold the horizontal plunger in its place till the brick has been carried by the returning gate to its place.

The curve of part 5' is a semicircle, extending from the initial point of part 1' to part 4', and having the same diameter as said initial point. The remainder of its boundary is the radial line drawn from the final point, in the order of rotation, of part 4', toward the axial center of the cam, till it meets the semicircle aforesaid.

This form allows the free retraction of the part of the plunger that, after the passage of part 4', has completed its office, and allows the cam to repeat its action as the shaft G completes its revolution upon the part of the plunger duplicated on the opposite side of the machine.

To lubricate the molds in which the brick is formed, that it may more easily be expelled therefrom, I connect a steam-pipe, *t*, fitted with a steam-cock, operated by the cam-table M or other machinery, with the interior of each of said molds, so that upon each retraction of the plunger from the mold a jet of steam shall be admitted into the mold sufficient to accomplish this purpose.

Rotary motion is imparted to the shaft G by a beveled gear, R, fixed to the lower part thereof, this gear meshing into and receiving motion from a second beveled gear, S, mounted upon the driving-shaft P.

The above comprises the mechanical construction and arrangement of my improved machine.

Its method of operation is as follows:

I take as a starting point the position of the machine as shown in fig. 2 in the sectional side elevation, with the plunger J' drawn back to its furthest point, and the orifice *d'* in the bottom of the tub completely open, and the vertical gate K' at its highest point and closing the open mouth of the mold I', and confine the description, for the reason already given, (that the machine is double-acting,) to the half or right side of said fig. 2.

Clay in its crude or raw state, or otherwise, is placed

in the tub A in proper quantities, and the machine put in motion.

The clay, by the advance of the revolving wing *c*, is crowded through the orifice *d'* in the bottom of the tub A into the first portion *d'* of the mold marked I', and by the time the horizontal or rear portion of the the wing *c* is over and forms a cover to said orifice *d'*, the cam L, also in motion, forces, by its part 1', the horizontal plunger *j'* forward, and drives the clay now at *d'* into the forward part of the mold I', and, by its increasing curve, continues forcing the plunger forward until the brick is pressed.

The cam-table M, which moves simultaneously with the cam L during the passing of part 1' of the cam L, has presented to the rollers *o o'*, affixed to the vertical gate-stem T, its part 1; its upper horizontal plane and the vertical gate K' remain stationary.

While part 2' of the cam L is passing the plunger J', such is the adjustment of its curve, as before explained, that the plunger is simply held in its place relieved of all pressure.

Part 2 of the cam-table, which acts simultaneously with part 2' of the cam L, has, during the passage of part 2' of the cam L, by its action on the rollers *o o'* attached to the gate-stem, drawn down the vertical gate K' so that its upper edge is on a line with the bottom of the mold I', which upper edge is so constructed as to afford a sufficient platform to receive the now finished brick.

Part 3' of the cam L, following part 2', by its increased curve again throws forward the plunger, which carries before it and entirely out of the mold and forward upon the upper edge of the gate the finished brick *m*.

Simultaneously with this action of part 3' of the cam L the cam-table M has passed its part 3 between the rollers *o o'* of the gate-stem, and, by its horizontal plane, held in its place the vertical gate K' while the finished brick was being forced forward upon its upper edge.

The brick now being ready to be lifted to where it can easily be removed, the cam-table M, by its part 4, its ascending plane acting on the upper roller *o*, lifts the vertical gate back to the point from which it started with the brick *m* upon it, and, in so doing, also closes the open mouth of the mold I' and prepares it to discharge, at the next revolution of the shaft, an office precisely similar to the one just described.

During this movement of part 4 of the cam-table M, it being necessary that a smooth surface should be presented to the ascending brick as a guide, and to prevent its abrasion, the curve of part 4' of the cam L, which has moved simultaneously with part 4 of the cam-table M, has simply held in place, without forward or backward motion, the plunger J', until the vertical gate K' has regained the position from which it started.

The shaft G has now completed a half revolution, and the action of the machine upon one side is complete.

As already explained, the other half of the machine is an exact duplicate of the half whose construction and method of operation have just been described. It is only necessary, therefore, to say that another half revolution of the shaft G will also duplicate, upon the side of the machine not described in detail, precisely the same result as that just explained.

It is further to be observed that, if found desirable in practice, the same constructions may be applied to the other sides of the machine, and four bricks be produced at one revolution instead of two. In such case the driving-power shaft, with its gear and pulley, may be applied at one corner of the machine, or otherwise.

From the foregoing description and comparison with the original machine it will be seen that my improvements consist in employing the horizontal plunger to perform all the offices which in the original machine were performed by the horizontal and vertical plungers combined, by which I am enabled to dispense with nearly all the machinery necessary to their action, this being effected by substituting the peculiar-shaped cam L to give to the horizontal plunger all its motions in place of an eccentric, and in employing the cam-table M to lower and raise the vertical gates which open and shut the molds, in place of the machinery which performed similar offices in the original machine.

A further improvement is the method I employ to lubricate the molds at each expulsion of the brick therefrom.

It is further to be observed that, by the present arrangement of the cam and cam-table mounted upon the same upright shaft, they may be disconnected from the shaft and the machine then be used, if necessary, as a mill to pulverize and mix the clay *ad libitum*, the other mechanism being at rest.

The molds opening upon the sides, and being straight slots, great facility is afforded for cleaning them.

I would remark that I am aware that it is not new to mix or temper clay with steam to render the former plastic prior to being introduced into molds; nor is it new to warm or heat molds by steam introduced into chambers contiguous to the molds; but the introduction of a jet of steam into each mold after the retraction of its plunger, and for the sole purpose of lubricating the mold, I believe to be novel.

Having thus explained the nature, operation, and advantages of my improvements,

What I believe to be novel and original with myself, and desire to secure by Letters Patent of the United States, is as follows:

1. The molds, formed as described, the peculiar-shaped cam L, the horizontal plunger, and the vertical gates, when all the said parts are constructed, combined, and arranged together in manner as shown and described.

2. The double-faced cam-table M, formed as described, in combination with the vertical gates and their stems, provided with two sets of guide-rollers, *r r'*, as set forth, the whole being arranged and operating together in manner as shown and described.

3. The arrangement and combination of the peculiar-shaped cam L, the horizontal plunger, the cam-table M, and the vertical gates, substantially as shown and described.

4. The combination and arrangement of the molds, the peculiar-shaped cam L, the horizontal plunger, the cam-table M, and the vertical gates, substantially as shown and described.

5. A steam-induction pipe, in combination with each mold, when so arranged as to introduce a jet of steam directly into the latter after each retraction of its plunger, as and for the purpose set forth.

6. The hereinbefore-described machine for molding and pressing bricks, the same consisting of the hopper A, its orifices *d d'*, and shaft G armed with knives, and segmental wing *c*, molds I I' provided with a horizontal plunger and vertical gates or covers *k k'*, the said gates being operated by a cam-table, M, and the plunger by a cam, L, the whole being arranged within a suitable frame and operating together as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DAVID JAMES HUNTER.

Witnesses:

ISAAC AMES,

E. B. LORING.