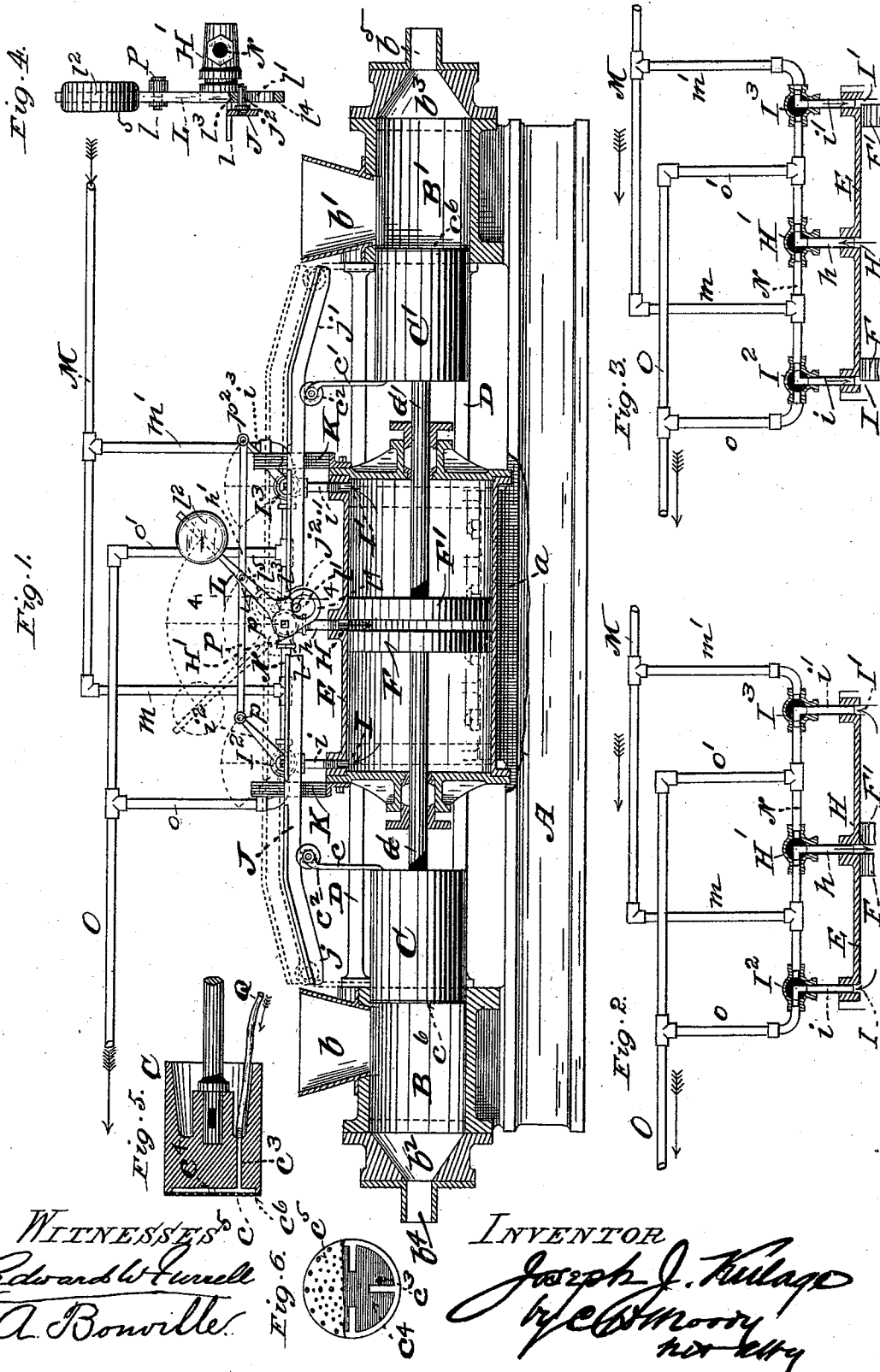


(No Model.)

J. J. KULAGE.
BRICK OR TILE MACHINE.

No. 516,377.

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JOSEPH J. KULAGE, OF ST. LOUIS, MISSOURI.

BRICK OR TILE MACHINE.

SPECIFICATION forming part of Letters Patent No. 516,377, dated March 13, 1894.

Application filed November 30, 1891. Serial No. 413,593. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. KULAGE, of St. Louis, Missouri, have made a new and useful Improvement in Brick or Tile Machines, of which the following is a full, clear, and exact description.

The improvement relates to duplex, reciprocating machines, adapted more especially to wet or damp clay, and it consists mainly in the means for actuating the plungers, substantially as is hereinafter set forth and claimed, aided by the annexed drawings, making part of this specification, in which—

Figure 1 is a vertical, longitudinal section of the improved machine, the plungers, pistons, piston-rods, valve-mechanism, and steam-pipes, being in elevation; Fig. 2 a sectional elevation showing the pipes and valves for directing the flow of the steam, the valves being adjusted for delivering the live steam between the pistons, and discharging the exhaust steam from the ends of the cylinder; and Fig. 3 a view similar to that of Fig. 2, but showing the valves reversed to exhaust the steam from between the pistons and deliver the live steam into the ends of the cylinder; and Figs. 4, 5, and 6 details; Fig. 4 being a cross sectional elevation upon the line 4—4 of Fig. 1; Fig. 5 a longitudinal section of one of the plungers; and Fig. 6 a face view, partly broken away, of one of the plungers. Fig. 4 is upon an enlarged scale.

The same letters of reference denote the same parts.

Saving as it is modified or supplemented by the improvement under consideration, the machine is constructed in any of the customary forms.

A represents a suitable bed-plate for sustaining the working parts of the machine.

B and B', represent, respectively, the chambers arranged, respectively, at or toward the ends of the machine, for receiving the clay to be molded. The clay is introduced into them through the hoppers *b, b'*, and is expelled, by means of the plungers C, C', through the funnel-shape ends *b², b³*, and dies, *b⁴, b⁵*, in the usual manner, saving as the operation is modified as hereinafter described. The chambers are properly supported upon the bed-plate, and they are also tied together, as well as braced apart, by means, say of rods such as

shown at D. A steam-cylinder, E, is arranged, between the ends of the machine, in line with the chambers and plungers. It is conveniently steadied in position by attaching it to the bench *a* of the bed-plate, and, if desired, by means of the rods, D, which can pass through lugs, not shown, upon the cylinder, and be connected therewith in any suitable manner. The cylinder is provided with two pistons, F and F', the piston-rods, G and G', and it has three steam-ports, one, H, midway in its length, and two others, I and I', at the ends, respectively of the cylinder. The piston-rod, G, connects the plunger, C, and the piston F, and the piston-rod, G', the plunger, C', and piston, F'. The pistons are thus adapted to, respectively, operate the plungers, the pistons moving apart from each other within the cylinder to effect the expulsion of the clay from the chambers, and closing toward each other to open the chambers to the admission of the clay. As they thus move apart from each other each piston becomes an abutment for sustaining the live steam pressure upon the other. That is, one of the pistons travels in one end of the cylinder, and the other of the pistons in the other end of the cylinder, and, in expelling the clay from the chambers, the live-steam is admitted, through the port H, to that portion of the interior of the cylinder which is between the pistons, causing the pistons to move apart, and the pistons, in such movement, to mutually sustain the steam-pressure exerted upon the pistons. In moving the pistons in the opposite direction the live-steam is admitted into the cylinder through the ports I and I'. In the first-described movement the steam is exhausted through the ports I and I', and in the last-named movement through the port H. The described admission of steam is also so controlled as to enable the pistons to be suitably cushioned at the ends of their strokes, in manner analogous to that in use in ordinary steam-cylinders.

As the plungers are liable to move at different rates in expelling the clay, one of them reaching the terminus of its stroke in advance of the other, a valve-operating mechanism must be provided which shall operate the valves for admitting and discharging the steam only when both plungers have com-

pleted their strokes. To this end the following means are preferably adopted: J represents a bar extended longitudinally in the machine, and adapted to be raised and lowered substantially as is indicated by its two positions shown respectively in the full and the broken lines in Fig. 1. Suitable guides, K, K, serve to keep the bar laterally in place, and the arms, *c*, *c'*, attached, respectively, to the plungers, C, C', and provided with the friction wheels, *c*², serve, as the plungers move to and fro, to elevate and lower the bar. Said arms and bar are suitably relatively constructed, as by beveling or inclining the bar at its ends, *j*, *j'*, substantially as shown, to enable the described movement of the bar to be properly effected. If one end of the bar is raised in advance of the other end thereof the valves are not changed. But when both pistons and plungers have made their full stroke, and the bar is thereby properly elevated throughout its length, the valves are shifted. The bar is provided with a projection, *j*²: it coacts with a bell-crank lever L, which is pivoted, at *l*, to any suitable support, is slotted at *l'*, and weighted at *l*², causing said lever to be tilted forward and backward on its pivot as the bar, J, rises and falls. As the bar rises the projection, *j*², bears against the upper side, *l*³, of the slot and thereby causes the lever to be turned on its pivot: if the bar is not sufficiently raised at both of its ends the lever is not turned far enough on its pivot: but when the bar is sufficiently raised at both ends the projection *j*² has acted upon the lever to carry it past its balancing-point, whereupon its weight *l*² acts to tilt it sharply still farther, and, by this last described portion of its movement, effect the desired shifting of the valves. The movement is indicated by the broken lines. The projection, *j*², has now been relatively brought into contact with the opposite side, *l*⁴, of the slot *l'*. The valves being shifted, the steam is exhausted from the portion of the cylinder between the pistons, and live steam is admitted into the ends of the cylinder, and the plungers and pistons are now moved toward the center of the cylinder. As the plunger-arms, in their movement, lower the bar J the projection *j*² acts upon the lever, L, and causes it to be tilted toward its balancing-point: if one of the plungers, and its arm and piston, move in advance of the other of the plungers, &c., the bar is lowered, but not sufficiently to cause the lever to tilt past its balancing-point: but when both plungers, &c., have made their inward stroke the bar is sufficiently lowered, and the bar is sufficiently heavy, to cause the lever to be tilted past its balancing-point, whereupon its weight acts to sharply move the lever into its position shown in the full lines, and the valves are again shifted, and the operation is repeated.

65 The motion of the lever L is communicated preferably as follows: H', I², and I³, represent two-way cocks which, respectively, command

the flow of the steam to and from the ports, H, I, and I'. The live-steam is supplied through the pipe M: a branch, *m*, thereof leads to a pipe, N, which in turn contains the three cocks mentioned; and another branch, *m'*, of the pipe, M, connects with the cock I'. O represents the exhaust pipe; it has the branches, *o* and *o'*, which, respectively, connect with the cock I², and with the pipe N at a point therein between the cocks H' and I³. The cocks are respectively connected with the ports by means of the pipes *h*, *i*, *i'*. The lever, L, is jointed at *l*⁵, to a rod, P, which in turn is jointed, at *p*, and *p'*, and *p*², to the handles, *i*², *h'*, and *i*³, of said three cocks respectively. The lower portion of the lever L constitutes the handle *h'*.

The operation is as follows: Starting with the parts in the position shown in Figs. 1 and 2, the live-steam is passing through the pipe M, the branch, *m*, the pipe N, the cock H, and the pipe *h*, into the cylinder between the pistons: at the same time the exhaust steam is escaping from the ends of the cylinder as follows: From the left hand end thereof, as seen, through the pipe *i*, cock I², branch *o*, and pipe O, and, from the right hand end of the cylinder, through the pipe *i'*, cock I³, pipe N, branch *o'*, and pipe O. The steam continues thus to move until the valves are shifted, which position is represented in Fig. 3, and the live-steam is now admitted into the cylinder as follows: through the branch *m*, cock I², and pipe *i*, into the left hand end of the cylinder, and, through the branch *m'*, cock I³, and pipe *i'*, into the right hand end of the cylinder; and at the same time the steam is exhausting from the central portion of the cylinder through the pipe *h*, the cock H', the pipe N, the branch *o'*, and the pipe O. Any suitable stop, not shown, may, if desired, be employed to prevent the pistons, in moving toward each other, from passing the port H.

From the foregoing it will be noted that not only is the clay, in the operation of the machine, expelled from both chambers simultaneously — whereby the capacity of the machine is increased — but that during such expulsion no strain comes upon the cylinder-heads, which parts in a steam cylinder are usually the first to give way. That is, as the plungers move to eject the clay the steam pressure is confined to that portion of the cylinder which is between the pistons, and the resistance offered by the clay in either chamber, B or B', reacts through the two plungers, piston rods, and pistons, and the steam-pressure existing between the two pistons, from end to end of the machine. While the present improvement is well adapted to presses for making bricks or tiles, or for preparing clay to be ultimately formed into bricks or tiles, I desire not to be restricted to such presses, as presses embodying the improvements herein described and claimed can be employed for compressing many other substances or materials.

An additional feature of the improvement—one which is employed more especially in presses for operating upon clay or similar material—is the provision for delivering a fluid, such as steam or hot water, or water that is not heated, into the chambers, B, B', so as to have the clay, which has, by the action of the plunger, been advanced more or less through the chamber, in a favorable condition for forming a weld, as it were, with the next lot of clay which, by the next movement of the plunger, is forced against the first named lot of clay. This is best carried out, and at the same time provision made for preventing or hindering the adhesion of the clay to the face of the plunger as the plunger is withdrawn, in the manner indicated in Figs. 5 and 6; each plunger has a passage, c^3 , extending longitudinally in it and communicating, at its inner end, with any means, such as the tube, Q, for supplying steam, and, at its outer end, with a chamber, c^4 , formed in the outer end of the plunger, and from which perforations, c^5 , lead through to the face, c^6 , of the plunger. The steam passes through the described passages and escapes through said perforations, and not only forces the clay away to separate it from the face of the plunger, but also moistens and loosens the face of the clay which has been opposed to the plunger and leaves it in an advantageous condition for intimately uniting with the clay which at the next stroke of the plunger is pressed against it, and thus the product of the machine is a continuous, homogeneous part free from any marked tendency to separate at any special points.

I claim—

1. The combination of the cylinder having the three ports, as described, the valves, the pistons, piston rods, plungers and the clay chambers, said plungers in their movements actuating a valve operating mechanism, substantially as set forth.

2. A duplex, reciprocating brick machine having the clay chambers B and B', the plungers, the plunger arms and the valve operating bar J, adapted to be raised and lowered, the pistons, the three ported cylinder, and the valves, said plungers adapted in their movements to actuate the bar J, as they move simultaneously in opposite directions to act upon the clay in said chambers, substantially as described.

3. In a duplex, reciprocating brick machine the cylinder E, arranged between the clay chambers of the machine and in line with the same, and the plungers, and having steam ports H, I, I', as described, the longitudinal tilting bar J, connected with the plungers and the guides K, keeping said bar in place and pistons for operating said plungers, a valve operated by said bar, whereby when the pistons move apart from each other, clay is expelled from the chambers, and moving toward each other clay is admitted, and in these movements steam is admitted with and expelled from the cylinder.

Witness my hand this 21st day of November, 1891.

JOSEPH J. KULAGE.

Witnesses:

C. D. MOODY,
A. BONVILLE.