(No Model.) 2 Sheets—Sheet 1.

W. JOHNSON.

RECIPROCATING BRICK MACHINE.

No. 499,230. Patented June 13, 1893.

Fig. 3

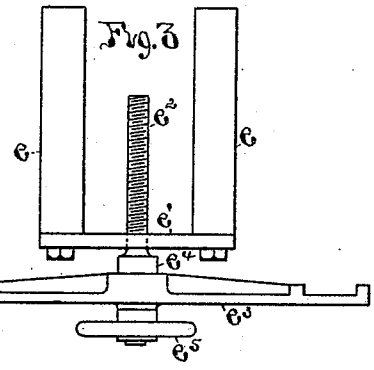
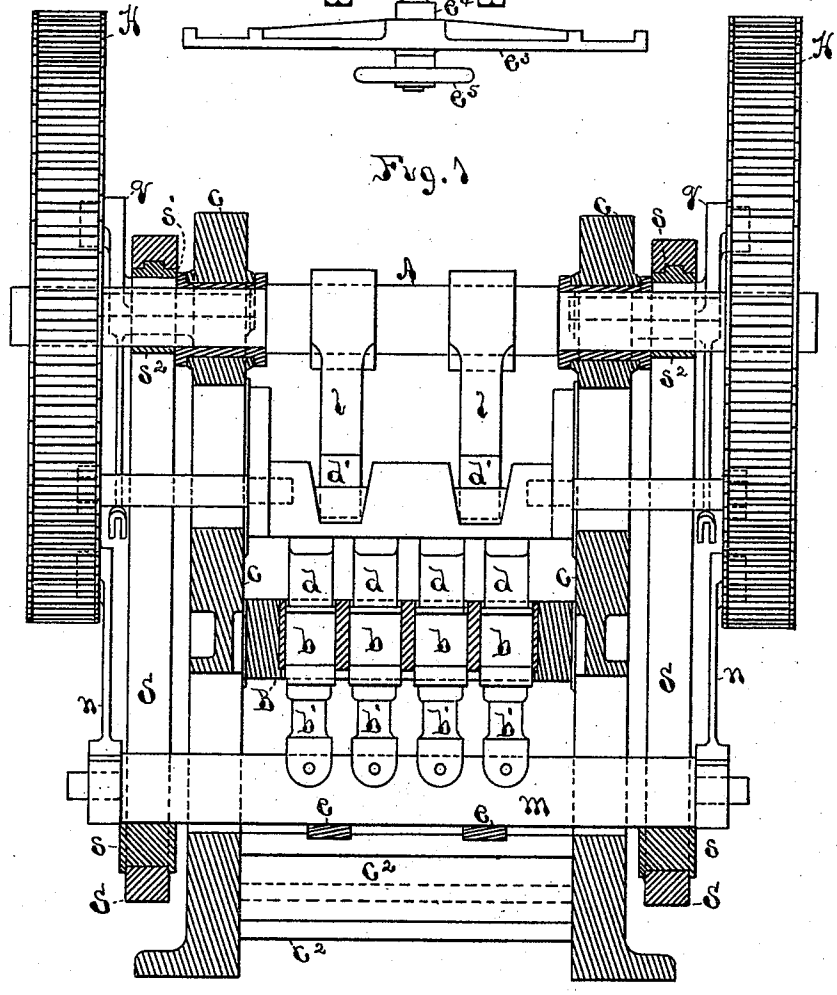


Fig. 1



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(No Model.) 2 Sheets—Sheet 2.

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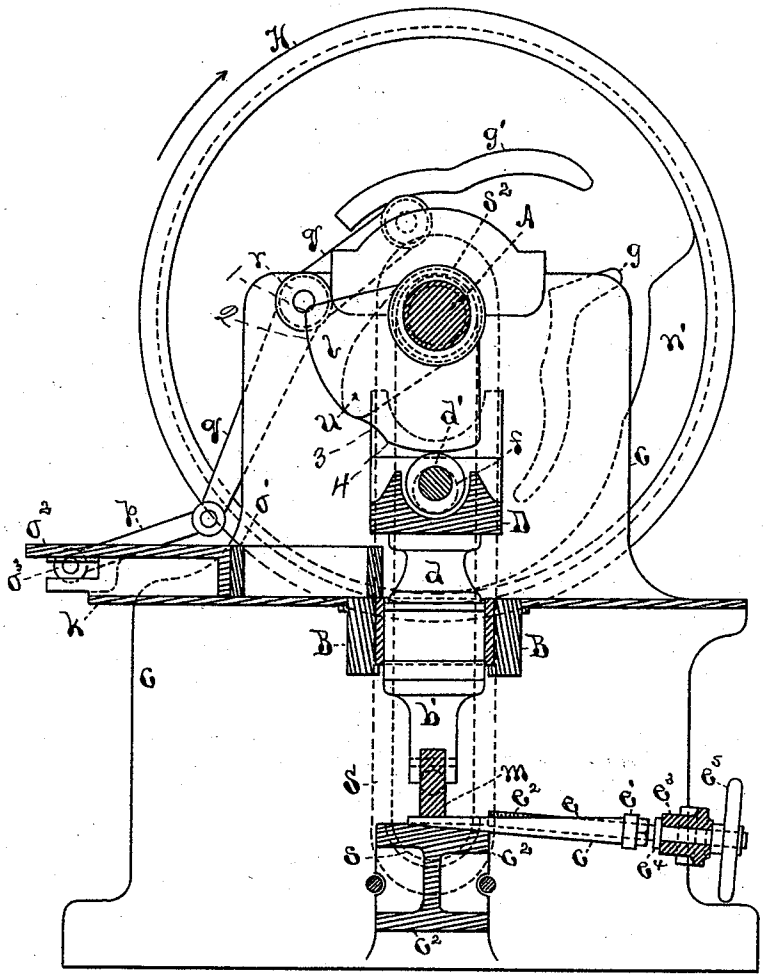
Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM JOHNSON, OF LEEDS, ENGLAND, ASSIGNOR OF ONE-HALF TO THE SOMERSET & JOHNSONBURG MANUFACTURING COMPANY, OF PENNSYLVANIA.

RECIPROCATING BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 499,230, dated June 13, 1893.

Application filed June 15, 1892. Serial No. 436,877. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHNSON, a subject of the Queen of Great Britain and Ireland, residing at Leeds, in the county of York, England, have invented certain Improvements in Brick-Machines, of which the following is a specification.

My invention relates to machines for molding and pressing bricks, tiles, and similar manufactures of clay, preparatory to burning or baking the same, and it consists in certain improved constructions and combinations of the several parts of the machine for accomplishing this result, substantially as hereinafter described and claimed.

In the drawings:—Figure 1 is a transverse vertical section taken through the center of the main working shaft of the machine. Fig. 2 is a longitudinal central vertical section of Fig. 1. Fig. 3 is a plan view of a portion of the machine enlarged.

The invention described in this application is an improvement on the machine shown in the British Letters Patent of William Kennedy, No. 3,578, dated October 17, 1874, and also shown in the Letters Patent of the United States granted to me November 19, 1889, No. 415,343, to which latter specification and drawings reference is had for a more detailed description of the general mechanism, if desired, for a better understanding of the same.

A is the main operating shaft, designed to form four bricks at each revolution. Four molds, *b*, are seated in the strong cross beam, B, which is framed into the two standards, *c*, *c*, and assists in holding them together.

D is a pressing head made heavy and carrying four plungers, *d*, which are made to enter and fit the molds *b* from above. The pressing head D slides up and down in guideways in the uprights *c*. These guideways are in the form of slots passing entirely through the standards, *c*, and on the projecting ends of the head D are fastened anti-friction bowls, *f*, which are constructed to revolve when lifted by the curved cam-rails, *g*, *g'*; these cam-rails are attached to the inner faces of the two cam wheels H, H, which are formed with gears on their outer peripheries by which they are driven. The driving shaft and driving wheels of the gear wheels, H, shown in my said former patent are omitted, as they form no part of the present invention, but the machine is intended to be provided with them as therein shown.

By the rotation of the wheels H, H, both ends of the pressing-head D are lifted simultaneously by the cam-rails, *g*, and then dropped, and it is immediately lifted again by the other set of cam-rails, *g'*, and dropped; these movements being for the purpose of allowing the charger, *o'*, to supply the clay to the molds for pressing it. The charger, *o'*, slides upon the surface of the table, *k*, and the hopper connected with it is also omitted for the sake of clearness of illustration, but is to be arranged as shown in my former patent.

On the shaft A are attached two cams, *l*, *l*, which press upon rollers, *d'*, which are mounted to revolve in sockets in the pressing-head, D, to relieve the friction. These cams come into action after the cam-rails, *g'*, have dropped the pressing-head the second time, and each cam is formed with a cam curve from the point 1 to the point 2 and then on the arc of a circle to a recess in the cam, and then with a second cam curve from the point 3 to the point 4 and thence in the arc of a circle. The effect of this construction is that after the rollers *d'*, *d'*, are pressed downward by the cams the part of the cams curved in the arc of a circle holds them and the platen in their pressed-down position long enough to allow the air to escape from the clay beneath the platen before the latter is released.

The machine is shown in the position where the second cam curve is passing over the rollers, *d'*, and holding the pressing-head D firmly down by its curved part, which is there concentric with the main shaft A.

The charger, *o'*, is provided with a rearward extension, o^2, to which is attached a cross-bar, o^3. This is connected by means of the link, *p*, with the lever, *q*, which turns on the fulcrum stud, *r*, fixed on the standard *c*; the arrangement of parts being similar on each side of the machine. This arrangement causes the lever, *q*, to be moved outward by two tappets attached to the two wheels H, H, and this moves the charger over the molds,

when the pressing-head D falls, driving the clay into the molds. The cam rails, *g*, move the levers, *q*, in the opposite direction and withdraw the charger; these movements being similar to those described in my former patent.

The parts of the machine thus far described are similar to those of my former patent and the present improvements relate to the lower plungers of the molds.

m is a strong bar which passes across the machine and through the side frame parts, *c*. It has two links *n*, *n*, attached to its outer ends, which are provided with anti-friction bowls projecting inward so as to engage with the cams, *n'*, in the cam wheels H. The bar, *m*, has mounted upon it a series of lower pistons, *b'*, which are lifted upward at the proper moment by the action just described, so as to expel the pressed brick from the mold at the proper time.

In order to provide for an under pressure of the brick while being formed in the molds, *b*, *b*, I have connected the main shaft A and the lower cross bar, *m*, by means of two links or straps, S, S, which are made endless so as to pass over the top of the shaft and under the lower part of the bar. The bar rests on two saddle blocks, *s*, *s*, placed in the lower loop of each strap, and by thickening or thinning these saddle blocks vertically the bar and plungers *b'*, *b'*, may be adapted for pressing different thicknesses of bricks. Similar saddle blocks *s'*, of gun-metal are inserted in the upper loops of the straps, S, being retained by tongues and grooves in the straps as shown in Fig. 1. The shaft under these latter saddle blocks is provided with cams, s^2, firmly attached thereto, which are so placed as to operate at the moment when the upper cams, *l*, of the shaft A are holding the upper plungers down, by the circumferential part traversing over the rollers, *d'*, as shown. These cams s^2 are therefore made at this moment to give an upward movement or lift to the lower plungers, *b'*, attached to the cross bar *m*. The brick being pressed is thus subjected to an under pressure by the cams, s^2, after it has received the downward pressure. It will also be noticed that the advancing portion of the cam, *n'*, enters under the bowls of the links *n* before the cam, *l*, has released the upper presser, which gives a second upward pressure upon the lower part of the brick being pressed, before the cam-rails *g* begin to lift the upper pressing head, D, to withdraw the plungers *d* from the molds. The bricks are thus subjected to a double upward pressure and a double lower pressure before being released from the molds. The function of these successive pressures is to expel the air from the clay, so as to produce more perfect bricks when baked.

In order to withstand the strain of the double pressure produced by the cams, *l*, I employ the wedges *e*, *e*, to assist or reinforce the straps, S, and prevent the bar *m* from springing in the middle. These wedges are connected by a cross bar, *e'*, through which is tapped an internal thread, into which the screw e^2 fits. The screw is journaled in the cross-bar, e^3, by means of the collar, e^4 and hand wheel e^5 attached to its outer end. The cross-bar e^3 is bolted at its ends to the uprights, *c*, of the framework. A cross girder, c^2, in the shape of a double T-girder, connects the two frame uprights, *c*, by passing across under the bar, *m*, and has its upper surface beveled to receive the lower surface of the wedges *e*. By moving the wedges inward over the top of the girder, c^2, their upper surfaces can be adjusted under the bar, *m*, so as to just bear upon the lower edge of the bar when it rests on the saddle blocks, *s*, at its ends and, therefore, when the cams *l*, *l*, press downward the bar will be prevented from springing by the wedges under its middle part. The adjustments of the wedges, *e*, are of course effected by the hand-wheel e^5, and this can be done with the greatest accuracy.

The operation of my improved machine, starting with the position shown in Figs. 1 and 2, in pressing bricks will be substantially as follows:—In the position shown a brick is supposed to have undergone the pressure of the upper cams, *l*, and to be undergoing the pressure from below of the cams, s^2, operating upon the straps S. A second pressure is then given to the brick from below by the advancing portions of the cams, *n'*, entering under the links, *n*. When this pressure has reached the proper amount the cam bars, *g*, lift the upper pressing-head, D, and the cams *n'* continue to raise the lower plungers until they have lifted the pressed bricks out of the molds to the level of the top of the table *k*. At this moment the tappets, *u*, in the wheels H (shown in dotted lines in Fig. 2) strike the upper end of the lever, *q*, and advance the charger, *o'*, pushing the pressed bricks from off the tops of the lower plungers, *b'*, and advancing the fresh clay in the charger over them. During this operation the large end of the cam, *n'*, has passed under the links, *n*, allowing the bar *m* to drop down, making room for the fresh charge of clay in the molds. Immediately after this the upper pressing-head, D, is dropped by its ends passing off of the square ends of the cross-rails, *g*. This drives the fresh clay down through the charger into the molds. The cam-rails, *g'*, now enter under the ends of the pressing-head, D, and again lift it, while the advancing ends of the cam-rails, *g*, strike the upper end of the lever, *q*, and withdraw the charger to the position shown in Fig. 2. The cam-rails *g'*, now drop the pressing-head, D, again and the first member of cams, *l*, *l*, comes into action on the tops of the rolls, *d'*, giving the first pressure to the latter. This part of the cams, *l*, will be noticed to be slightly spiral, increasing its pressure as it advances. The pressure is then released and is renewed by the second member of the cams *l*. The con-

centric portion of the latter now holds the pressing-head, D, from above while the cams, s^2, on shaft A, operating upon the straps S and the bar, *m*, move the lower plungers, *b'*, upward and give the clay the first pressure from the bottom. The main shaft progressing releases the clay, when the cams, *n'*, advancing under the links, *n*, give it the second pressure from the bottom as before described, preparatory to forcing the pressed bricks upward out of the molds. This series of operations is repeated for each set of bricks compressed by the machine, and its effect is to remove the air confined in the clay more effectively, not only from the upper part of it but also from the lower part of it, forming the lower surface of the brick in the mold.

What I claim as new and of my invention is—

1. The combination in a machine for pressing clay, of the mold, an upper plunger mounted upon the cross-bar, D, and arranged to compress the clay into the mold from above, a lower plunger mounted upon the cross-bar, *m*, and arranged to compress the clay into the mold from below, the shaft A provided with cams, *l*, *l*, arranged to impart a double downward pressure upon the bar, D, and then hold the same down, and with the cams s^2, s^2, and with the cams, *n'*, to impart a double upward pressure upon the bar, *m*, and the straps S, S, and the links, *n*, *n*, attached to the cross-bar, *m*, and respectively engaging with said last-named cams, substantially as described.

2. The combination in a machine for pressing clay, of the mold, the shaft A provided with the cams *l*, *l*, and s^2, s^2, the cross-head, D, carrying the upper plungers, *d*, *d*, and arranged to receive the compression of the cams *l*, *l*, and to be held down by them afterward, the cross-bar, *m*, carrying the lower plungers *b'*, *b'*, the straps S, S, connecting the same with the cams s^2, s^2, and arranged to impart the upward pressure to it against the hold of cams *l*, *l*, after they have given their pressure, and the auxiliary wedges, *e*, *e*, arranged under the middle part of bar, *m*, to aid the straps S, S, in holding the same against the downward pressure of the last-named cams, substantially as described.

3. The described method of pressing clay into the form of bricks in a mold, which consists in giving a series of compressions to one side of the brick in the mold first, and then holding the clay at the point to which it has been so compressed on that side, while a series of compressions are given to it on the opposite side of the brick, substantially as described.

4. The combination in a machine for compressing clay, of the lower cross-bar, *m*, provided with a series of plungers arranged to enter the molds and form the bottoms of the same, the lower cross-girt, *s*, of the frame, the adjustable wedges, *e*, *e*, arranged to form a support of the bar, *m*, upon the cross-girt immediately under the molds, means applied to the ends of the bar, *m*, arranged to move the bar upward and compress the clay from below, and an upper plunger-head, D, provided with downwardly acting plungers arranged to compress the clay from above, substantially as described.

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