(No Model.)

6 Sheets—Sheet 1.

P. L. SIMPSON.

BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

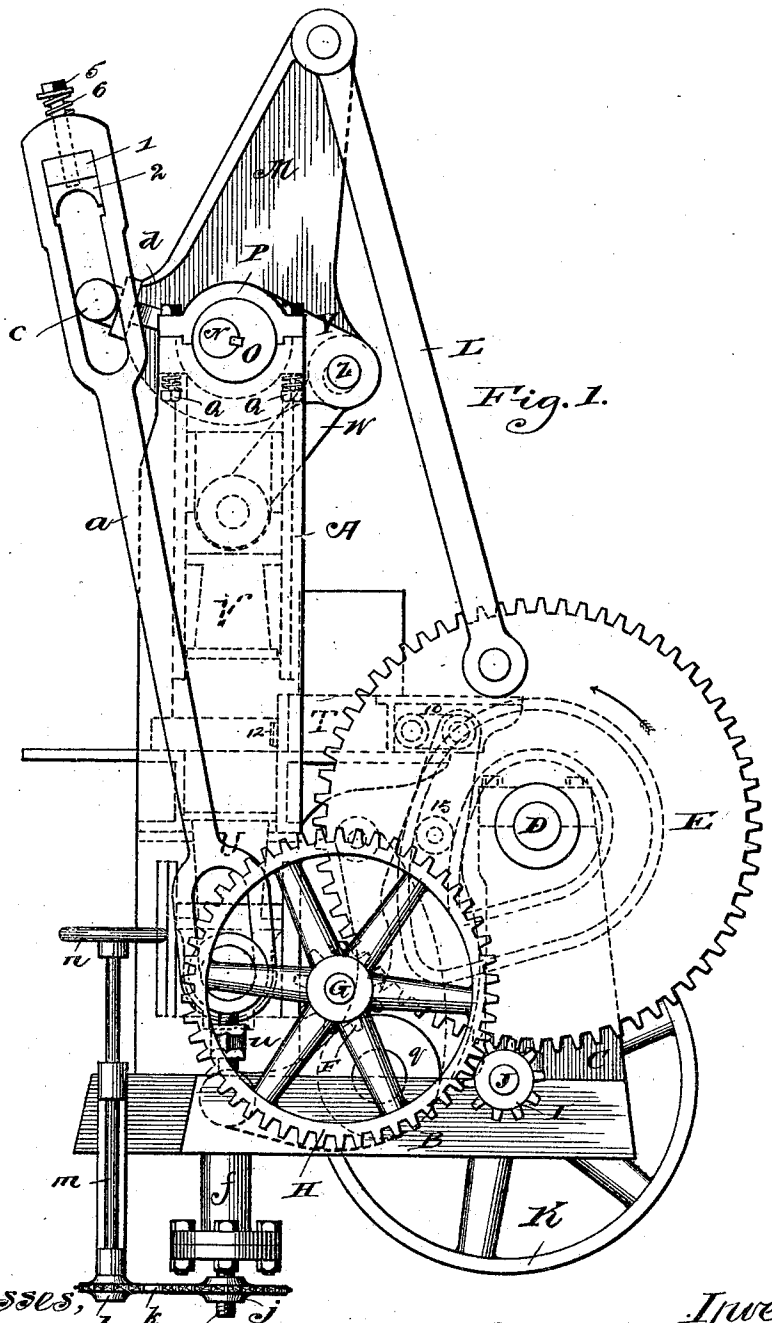

Fig. 1.

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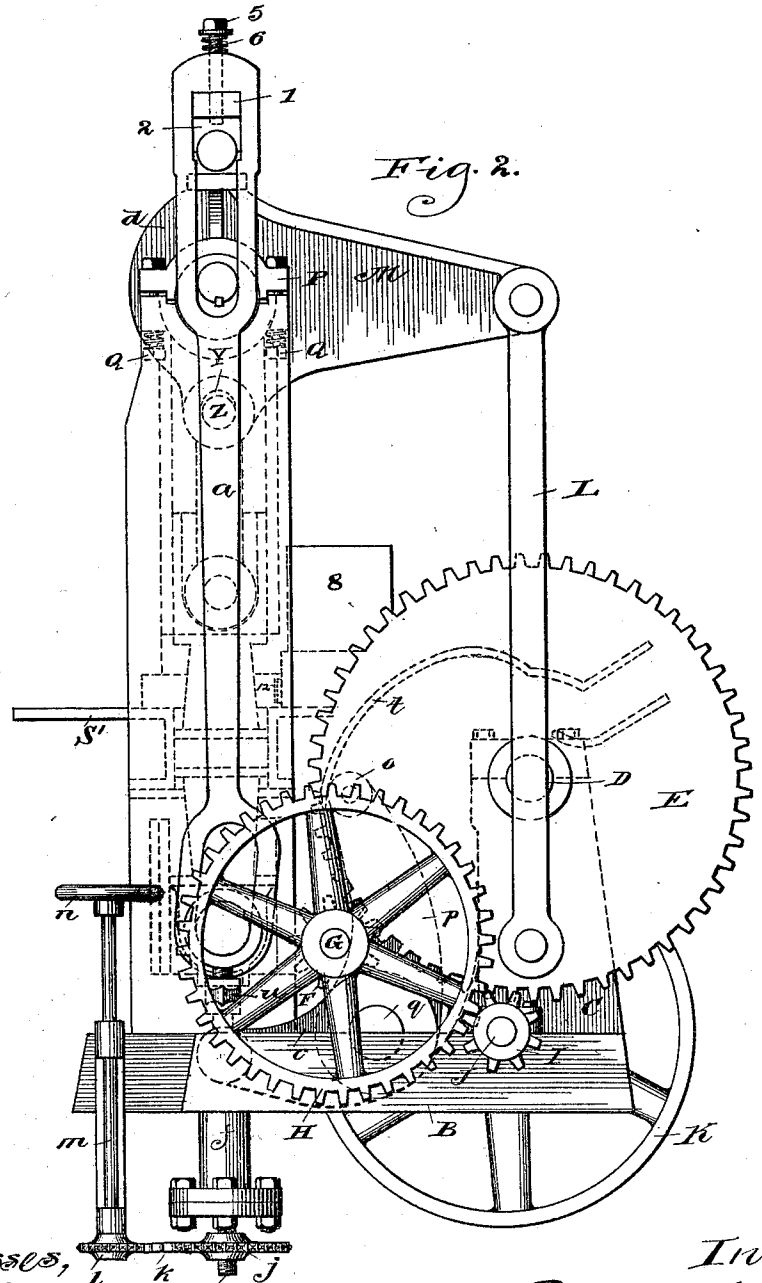
P. L. SIMPSON.

BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

Fig. 2.



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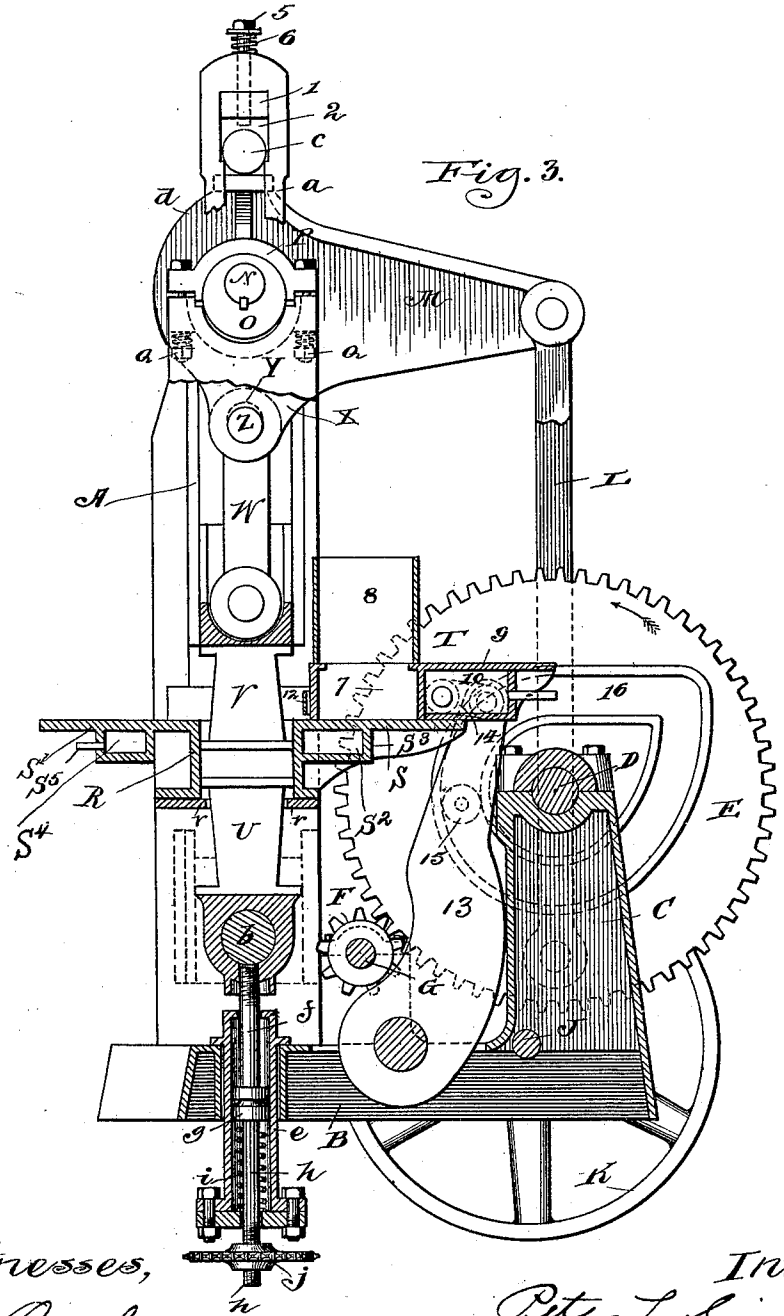
BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

Fig. 3.



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BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

Fig. 6.

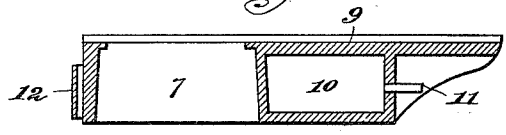


Fig. 4.

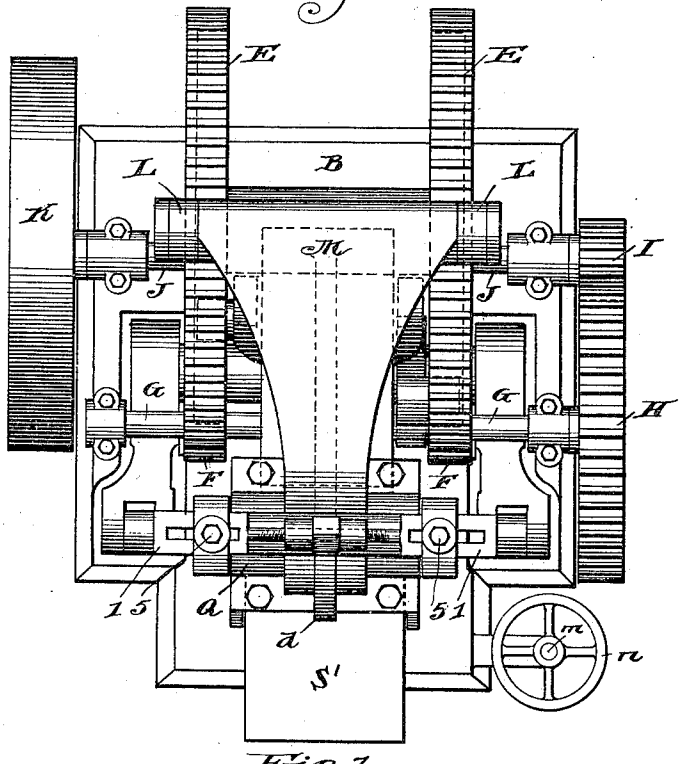
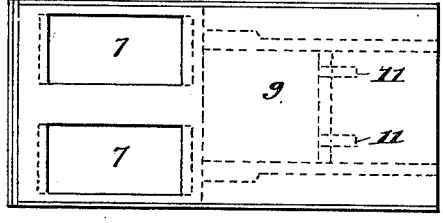


Fig. 7.



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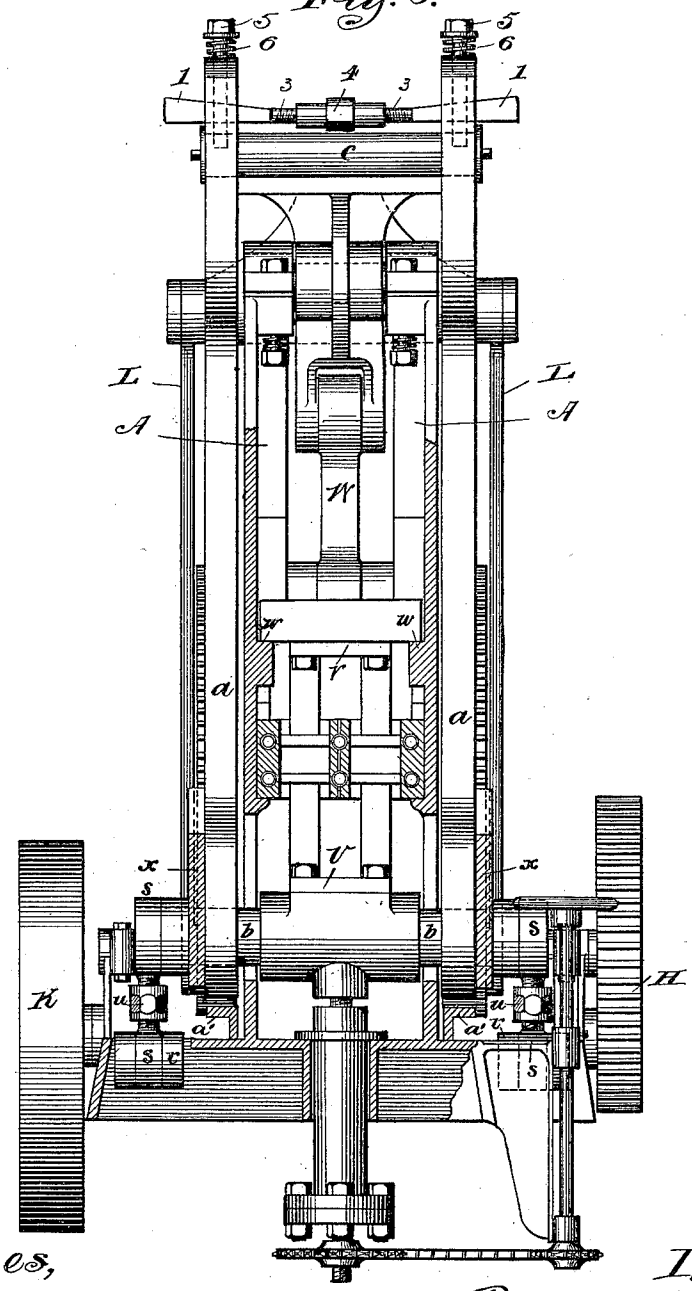
(No Model.) 6 Sheets—Sheet 5.

P. L. SIMPSON.

BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

Fig. 5.



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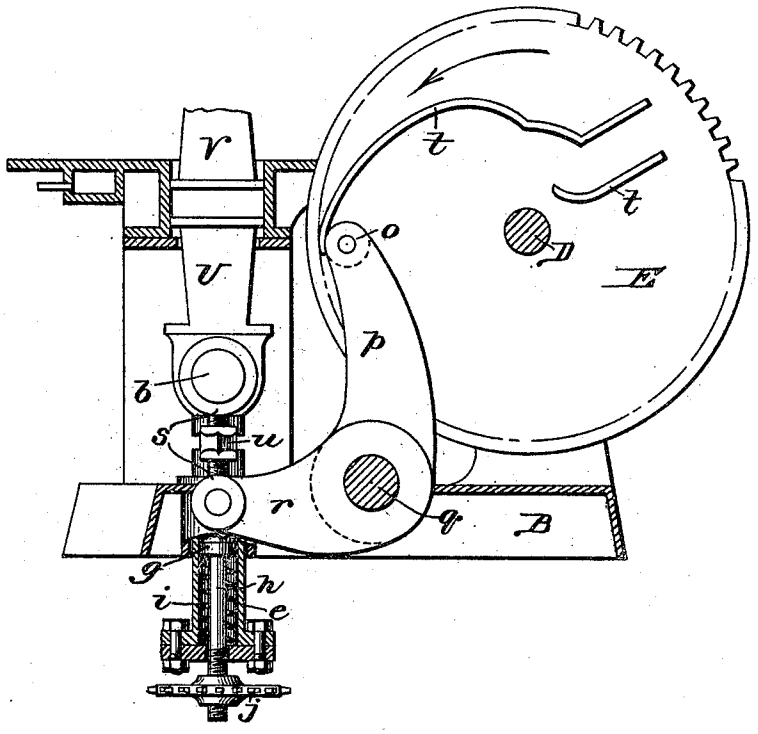
BRICK MACHINE.

No. 513,444. Patented Jan. 23, 1894.

Fig. 8.



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UNITED STATES PATENT OFFICE.

PETER L. SIMPSON, OF CHICAGO, ILLINOIS.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 513,444, dated January 23, 1894.

Application filed April 2, 1891. Serial No. 387,331. (No model.)

To all whom it may concern:

Be it known that I, PETER L. SIMPSON, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Brick-Presses, of which the following is a specification.

This invention relates to improvements in brick presses, which, among other things, has for its object to press the bricks from dry, or semi-dry clay, and eject them from the mold without injury thereto; to utilize one of the plungers as an adjustable bottom for the mold, in order to change the capacity of the molds, and thereby regulate the density; and to avoid the formation of a granular seam around the middle faces of the bricks, by moving the clay in the molds while under pressure, thereby polishing or glossing the surface of the brick.

The prime object of this invention is to accomplish these objects in an effectual manner, whereby the cost of construction and operation of the machine will be both simplified and cheapened.

Another object is to have the pressure applied by the plungers alternately, but with the plungers so operated as to offer a yielding and variable resistance to one another during their respective pressing operations.

Another object is to operate the plungers and apply the pressure by a double toggle working upon a variable or moving pivot, whereby the clay will be moved in the mold while under pressure.

A further object is to enable a quick and ready changing of the thickness of the brick produced by the machine, without the employment of any extra plates or "shims" by simply changing the relative centers of the upper and lower plungers without otherwise altering the operation of the machine.

A further object is to discharge the formed brick from the mold simultaneously with the recharging of the latter and in such manner as to prevent the adhering of loose particles of clay to the bricks.

Further objects, are to prevent the adhesion of the clay to the feed box, and the front and rear plates by maintaining them in a heated condition at all times during the operation of the machine; and finally, to provide certain details in the carrying out of my invention, all as illustrated in the accompanying drawings, in which—

Figure 1, represents a side elevation of a brick press embodying my invention, showing the parts in position to receive the charge of clay preparatory to forming and pressing the bricks; Fig. 2, a similar view, showing the parts in the position they assume when the bricks are fully pressed; Fig. 3, a sectional elevation of the same; Fig. 4, a top plan view thereof; Fig. 5, a sectional end elevation of the machine; Figs. 6 and 7 detail longitudinal section and plan view respectively, of the feed box, and Fig. 8, a diagrammatic elevation more clearly illustrating the mechanism for actuating the lower plunger to eject the bricks from the mold.

Similar letters and numerals of reference indicate the same parts in the several figures of the drawings.

The frame for supporting the working parts of the machine may be of any suitable dimensions and contour, but preferably comprises a pair of uprights or standards A, a base B, and a pair of upright posts C, which latter constitute the bearings of a cross shaft D, upon which is mounted near each end, a master gear wheel E, for transmitting power to all the operating parts of the machine. These gear wheels are driven by spur gears F, mounted upon the counter shaft G, upon one end of which shaft is also mounted a cog wheel H, meshing with and driven by, a spur gear I, mounted upon one end of a power shaft J, upon the opposite end of which is keyed a belt pulley K, for imparting power thereto; but I may here state that power may be imparted to the master gear in any other suitable manner. These master gears are respectively connected by rods L, with the one arm M, of a double bell crank lever, which latter is pivoted upon a cross pin or shaft N, keyed at each end in eccentrics, which bear in suitable boxings on the upper ends of the standards A, the caps P, of said boxings, being capable of a slight vertical movement, or separation from the standards, which is resisted

by the spring bolts Q, which secure the caps to the standards, for a purpose which will be described farther on.

Between the standards and about the center of height thereof, is located the mold R, to the front and rear of which, and flush with the upper end thereof, extend the tables S, S′, upon the former of which, works the feed box T, and upon the latter of which, the pressed and completed bricks are delivered when ejected from the mold.

Working vertically between the standards in suitable guides therefor, are the plungers U and V, arranged to press one, two or more bricks at a time, the lower plunger U, also constituting a movable bottom for the mold beside subserving the purpose of assisting in pressing the bricks and of ejecting the bricks from the mold. The upper plunger, after assisting in pressing the bricks, moves upward so as to clear the mold and thus permit the ejectment of the bricks and recharging of the mold. The upper plunger is operated by means of a link W, pivotally connected at the ends respectively, with said plunger and the arm X, of the double bell crank lever, the perforation Y, in the ends of said link, in which the pivot pin Z, of said arm works, being elongated for the purpose of permitting a certain degree of lost motion of the pin, the object of which is to permit the full weight of the top plungers to rest upon the bricks during their ejectment from the mold, thereby preventing the splitting of the bricks by the force of suction. This lost motion is necessary to avoid danger of breaking down the machine or coming to a standstill, which would be the result if the cam operating the lower plunger to eject the bricks from the mold were of such form as to cause the bricks to be ejected faster than the retreating upper plunger would allow. The lower plunger U, is operated by means of the bars *a*, having a slotted connection at their lower ends with a cross shaft *b*, to which the plunger is rigidly secured, and at their upper ends, a like connection with a pivot pin *c*, is carried by the third arm *d*, of the rocking double bell crank lever thus forming a loose-jointed connection between the plunger and the bell crank lever. The slots in the upper and lower ends of the side arms *a*, *a*, are for the purpose of allowing the free play of the pins that move in the same while the pressing is not going on, for instance, the ejectment of the bricks requires that the shaft carrying the bottom plunger, should be free to move upward without opposition from the side arms, as will be explained farther on while the side arms come to a rest upon the stops or supports *a′*, Fig. 5, before the double bell crank lever has completed its stroke, and hence the pin connecting it with the side arms should be free to have lost motion in the slots in the arms.

It will be observed that the action of the double bell crank lever, the side arms and the link W, by which the two plungers are operated, is nothing more nor less than that of a double toggle operating from the eccentric pivot N, one of which is formed by the link and the arm X, while the other toggle is formed by the arm *d*, of the double bell crank lever and the side arms *a*, and I may here state that while the operation of this double toggle is preferably accomplished by uniting the two actuating arms *d*, and X, thereof, with the arm M, so as to form a double bell crank lever, at the same time the same result would be attained by applying the upper directly to the pivot connection between the link W, and the arm X, as is usual in the operation of toggles; and it will therefore, be understood, that while I have herein shown and hereinafter specifically described a double rocking bell crank lever, my invention broadly contemplates a double toggle for simultaneously operating the plungers, without regard to the detail construction by means of which the power is applied thereto, which is a question more of convenience and preference than necessity.

Depending from the lower plunger and working in a cylinder *e*, is a stem *f*, having an end bearing against a piston *g*, also working in the cylinder, the rod *h*, of which, has sleeved thereon a coil spring *i*, confined between the piston and the lower end of the cylinder, the end of the rod working through the end of the cylinder, and being screw threaded for reception of a sprocket wheel *j*, the hub of which is correspondingly screw threaded, so that the position of the wheel upon the rod may be readily and quickly changed through the medium of a sprocket chain *k*, working around said wheel and around another wheel *l*, keyed to the lower end of an upright shaft *m*, carrying at its upper end a hand wheel *n*, for convenience of manipulation. The piston *g*, is for the purpose of determining the position of the plungers in the mold at the time the mold is being filled with clay, thus determining the quantity of clay to be pressed, and therefore, the solidity of the bricks. The spring *i*, is always under tension, so that when it is desired to decrease the quantity of clay in the mold, the piston *g*, is allowed to move upward by acting upon the end arm, as above described; and on the other hand, when more clay is required the tension is increased by the drawing down of the piston, which permits the lower plunger to take a lower position in the mold. Other functions of the spring will be noticed when the pressing of the bricks is described.

As before described, the slots in the lower ends of the side bars *a*, are for the purpose of enabling a still further upward lifting of the lower plunger, after it has been lifted as high as possible by these arms in completing the pressing operation, for ejecting the bricks from the mold, which is accomplished by means of an upright rocker arm *p* Fig. 8, (shown partly in full lines and partly in dot-

ted lines in Fig. 2) keyed to a shaft *q*, having bearings in the bed plate B, of the machine, near each end of which shaft are mounted thereon, horizontal rocker arms, *r*, one at each side of the machine, the extremities of which are connected by links *s*, with the shaft *b*, to which the lower plunger is secured.

An anti-friction roller *o*, carried by the rocker arm *p*, engages, and is actuated by a cam *t*, cast upon or otherwise rigidly secured to one of the master gear-wheels E, as shown by dotted lines in Fig. 2, which cam is so located and timed, that it will come into action just after the bars *a*, have lifted the lower plunger to the limit of their stroke in completing the pressing of the bricks, thus operating to take up the movement of the lower plunger and continue this movement until the upper surface thereof lies flush with the surface of the table onto which the ejected bricks are discharged. The links *s*, are adjustable as to length, each being composed of two parts connected by a turn buckle *u*, of any suitable construction, so as take up the wear of the working parts of the ejecting mechanism, and thus dispense with the employment of thin strips of iron, or "shims," between the bottom plunger and the face plates thereof, which is the usual practice to cure this defect. Hence should the bottom plunger, through the wearing of the parts or from other cause, not rise flush with the top of the mold and the receiving table, this defect can be immediately cured by adjusting the turn buckles.

In operation, assuming the parts to be in the position shown in Fig. 1, with the mold filled, and the lower plunger at some point above the bottom of the mold ready for the commencement of the pressing operation, the side bars resting on the stops or supports *a'*, and the master gears moving in the direction indicated by the arrows, the first result of the swinging of the double bell crank lever on its pivot, is to move the upper plunger rapidly down into the mold, while in the mean time the lower plunger remains at a standstill unaffected by the upward movement of the bars *a*, operating the same on account of the slot connection between said bars and the plunger and lever. As soon as the upper plunger descends sufficiently to enter the mold, the pressure upon the clay therein, begins and increases until the tension of the spring *i*, is overcome, when the bottom plunger and partially pressed clay will be forced downwardly, until shoulders on the lower plunger come in contact with the stops *v*, permanently located on the standards (which stops, however, may if desired, be dispensed with). It will thus be seen that by moving the partially pressed clay and bottom plunger downward below the original position of the latter, when the mold is charged, the bricks are formed low down in the mold, and consequently receive a smoothing or polishing of the sides, which they would not have, but for this mode of operation. The pressing of the clay by the top plunger alone then continues until the side bars *a*, pick up the lower plunger, when the pressure from below begins, the lower plunger ascending in the mold and applying pressure to the bricks from below the bottom, against the resistance offered by the upper plunger to the top of the bricks, which is of course equal to the pressure from below, until the centers of the double toggles reach a dead center, at which time the pressing of the brick will be complete and the parts will be in the position shown in Fig. 3, with the fully pressed brick still well down in the mold. It will be noted, however, that during this action, the pivot N, of the double toggle, or rather, of the double bell crank lever, is moved upward under the influence of the eccentrics by which it is supported to the dead center, the result of which action is to move both plungers and the clay upward in the mold, during the final pressing operation, thereby causing the end and side faces of the brick to be smoothed and polished by friction against the walls of the mold, thus effectually doing away with the seam usually formed around the middle of the brick when pressed in the usual manner. The movement of the clay in the mold produced by the eccentric pivot of the double toggle, will in most cases, be sufficient to thoroughly eradicate the disfiguring seam usually formed in the brick by other methods of pressing, but for the more effectual accomplishment of this end, the eccentric pivot may be supplemented by stops or projections *w*, cast on, or otherwise rigidly secured to the standards A, (see Fig. 5,) with which the extremities of the upper plunger come in contact just before completing its natural stroke which arrests the descent of the plunger, so that the continued movement of the double toggle to a dead center or straight line, has the effect of lifting the eccentric pivot of the toggles, or rather of the double bell crank lever bodily upward in addition to the upward movement imparted to the pivot by the eccentrics, as illustrated in Figs. 2 and 3, the result of which is to lift the box caps P, which are normally held in place by the spring bolt Q. In this way the pressure is finished on the bottom side against the resistance of the upper plunger, which, while not allowed to descend farther into the mold, as above explained, yet, is equal to the pressure applied from below. I may therefore here state that either the eccentric pivot alone, or the stops for the upper plunger acting in conjunction with the spring capped boxes of the toggle pivot (not eccentric), will be sufficient, with the molds operated in the manner hereinbefore described, to move the clay in the mold while under pressure, and thus eradicate the seam therefrom; but the use of both these devices is preferred, because I have found by practical use of my machine, that their conjoint use produces the best results, for the effect there-

of is to alternate the pressure upon the clay, pulling it first to the top side, and then afterward to the bottom, while at the same time the bricks receive the same alternate pressure, which consequently makes both edges of the brick good and sharp. When the spring caps for the bearing boxes of the toggle pivot (whether eccentric or otherwise) are employed, the initial pressure on the clay exerted by the upper plunger, depends upon the strength of the spring maintaining the box caps in position, for the resistance of the clay and the tension of the spring *i*, supporting the lower plunger against the initial pressure of the upper plunger, must be overcome by the strength of the springs Q, as otherwise, provided the pivot be not eccentric, the plungers would simply move in toward each other and would not move the clay in the mold.

Another important feature of my invention is the facility with which the thickness of the bricks may be changed without having recourse to the use of thin plates or "shims" beneath the bottom, or above the top of the plunger faces. This is accomplished by means of the horizontally arranged wedges 1, intervening between the sliding bearing boxes 2 of the pivot pin *c*, carried by the arm *d*, of the rocking double bell crank lever, and the upper ends of the slots in the bars *a*, in which such boxes work. These wedges terminate at their inner ends in the stems, 3, which are provided respectively with a right and left screw thread, and work in a female threaded turn buckle, or nut 4, by means of which, the wedges may be caused to simultaneously approach or recede from each other, thereby resulting in depressing or elevating the bearing boxes of the pin *c*. It will be observed that these boxes are supported by bolts 5 working loosely through the ends of the bars *a*, and between the heads of which, the ends of the said bars, are confined coil springs 6, exerting an upward tendency upon the bearing boxes, acting to maintain them in close relation with the wedges. Hence whenever it is desired to change the thickness of the bricks, it is only necessary to apply a wrench to the double nut or turn buckle 4, turning the same either to the right or the left, thereby causing the wedges to simultaneously move inwardly or outwardly and produce a corresponding upward and downward movement, of the bearing boxes. This movement results in changing the distance between the working centers of the side bars *a*, or in effect, shortens and lengthens such bars, so that the movement imparted thereby to the lower plunger in the pressing operation, will be greater or less, and hence the thickness of the bricks pressed thereby, will vary in exact accordance with the adjustment of these parts. It will also be observed that while the changes in the thickness of the bricks is accomplished by the right and left screws operating the wedges, yet practically no strain is put upon these screws, nor is there any dependence upon the screws for strength, as would be the case if the bearing boxes were directly actuated by screws working through the side bars, but on the contrary, the wedges interpose a solid body between the boxes and the ends of the bar, to withstand the pressure exerted thereon by the bars, which, to all intents and purposes, in every adjustment becomes a part and parcel of either the box or the bars, but at the same time possesses the advantages of adjustability.

The feed box for charging the molds, as more clearly illustrated in Figs. 6 and 7, is bottomless, and has one or more compartments 7, of dimensions suitable to receive a charge of loose, dry, or semi-dry clay, from a hopper 8, from which it is recharged after each operation, and when the brick is ejected and the top plunger has moved up far enough to permit it, the feed box moves forward to fill the mold, and at the same time pushes the pressed brick off of the lower mold onto the table S'. Just before completing its forward movement, the lower plunger is permitted or caused to fall the desired distance in the mold by the action of its actuating mechanism, and the charge of clay falls into the mold cavity; and afterward completing its forward movement, the feed box returns to its normal position, with the bottomless compartment 7, therein, beneath the hopper 8, in position for recharging, striking off the surplus clay in moving backward, thus putting an even quantity of clay in the mold. The feed box T, is also provided with a plate 9, which moves under and serves as a bottom for, the hopper, as the bottomless compartments of the box move out from under the hopper to fill the mold, while the rear part S, of the table, serves as a bottom for the feed box while receiving the charge of clay from the hopper, and conducting it to the mold.

To prevent the clay from sticking to the feed box or the plate 9, and hardening thereon, so as to cause obstruction to the free action of the feed box running underneath the hopper, I have provided the feed box with a compartment 10, underlying the said plate, through which a circulation of steam or hot air is maintained, by the pipes 11, leading to and from any suitable source of supply, by means of which the plate 9, in particular, and in fact the entire feed box, is heated sufficiently to prevent the clay adhering thereto.

Across the front end of the feed box with its lower edge a little above the bottom of the box, is arranged a small plate 12, the purpose of which is to push the bricks in advance of the feed box proper, so as to prevent surplus particles of clay, which may fall onto the table S, in front of the box, and thus damage the same, to which end the plate is arranged to stand out from or beyond the end of the feed box, leaving a space therebetween, so that the falling particles of clay may fall through this space close to the feed box instead of over the plate, and beyond the feed

box. Of course in returning to its normal position under the hopper, and in the act of leveling and removing the surplus clay in the mold, some particles are liable to be left on the table S, in front of the feed box, but this objection is removed by the employment of this plate, which engages and pushes the bricks sufficiently in advance of the feed box to prevent these loose particles from being pushed up against and adhering to the ends of the bricks, as would otherwise be the case.

The mechanism for operating the feed box, is a rocker arm 13, more clearly shown in Fig. 3, having a link connection 14 at its upper end, and carrying an anti-friction roller or pin 15, which runs in a camway 16, formed in or other wise secured to, one of the master gear wheels E, to the other one of which, is secured the cam *t*, for operating the lower plunger to eject the bricks. This cam 16, imparts to the feed box, the desired reciprocating action and is properly proportioned and timed to produce the desired result.

In practice, it is proposed to provide the table S, upon its under side with a steam box S′, to which steam may be admitted through the pipe S^3, and by this means, heat the table S, so as to provide against any possibility of the clay adhering thereto and retarding the movement of the feed box, and likewise, to provide the table S^2, with a steam box S^4, to which steam is admitted through the nipple S^5, so that no clay may adhere to this table to an extent subjecting the edges of the brick to injury, as the bricks are being pushed upon said table.

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

1. A brick press of the character described, consisting of molds and plungers, double toggle levers for operating said plungers, and an eccentric pivot for said double toggles, substantially as set forth.

2. In a brick press, the combination with the mold and the upper and lower plungers, of a double toggle for operating said plungers having a loose-jointed connection with said lower plunger, and yielding and resisting pivots for said double toggle, substantially as set forth.

3. In a brick press, the combination with the mold and plungers, of a double rocking bell crank lever connected with and actuating said plungers and said lever having a spring bearing so as to permit of its pivots being moved in a vertical direction, substantially as set forth.

4. In a brick press, the combination with the mold and plunger; of a double rocking bell crank lever having a yielding fulcrum connected with and simultaneously actuating said plungers, a stop for limiting the movement of one of said plungers and the connections between the other of said plungers and said lever being loose, so as to alternately press the clay in the mold, substantially as set forth.

5. In a brick press, the combination with the mold and the upper and lower plungers; of a double rocking bell crank lever having its arms respectively connected with and actuating said plungers, and yielding bearings for the pivot of said lever, substantially as set forth.

6. In a brick press, the combination with the mold and the plungers; of a double rocking bell crank lever connected with and actuating said plungers, an eccentric pivot for said lever, and yielding bearings for said pivot, substantially as set forth.

7. In a brick press, the combination with the mold and the plungers; of a lever, a link, pivotally connected at one end with one of the plungers and having a slot and pin connection at its opposite end with one arm of said lever, and a pair of bars having a slotted connection between their ends respectively, and another arm of said lever, and the other plunger, substantially as set forth.

8. In a brick press, the mold, and the plungers; the double rocking bell crank lever; eccentric pivot bearing therefor, a link pivotally connected with one of said plungers, and having a pin and slot connection with one arm of said lever, and side bars having a pin and slot connection at their ends respectively, with another arm of said lever, and the other plunger, substantially as set forth.

9. In a brick press, the combination with the mold and the plungers; of a double rocking bell crank lever, yielding bearings for the pivot of said lever, a link pivotally connected with one of said plungers and having a pin and slot connection with one arm of said lever, a stop for said plunger, and a pair of bars having a slot connection at their ends respectively, with one arm of said lever and the other plunger, substantially as set forth.

10. In a brick press, the combination with the mold and plungers; of a double rocking bell crank lever, an eccentric pivot therefor, yielding bearings for said pivot, a link pivotally connected with one of said plungers and having a pin and slot connection with one arm of said lever, a stop for said plunger and a pair of bars having a slot connection at their ends respectively, with another arm of said lever and with the other plunger substantially as set forth.

11. In a brick press, the combination with the mold and the upper and lower plungers and a stop for limiting the downward movement of the upper plunger; of a rocking double bell crank lever, an eccentric pivot therefor, yielding bearings for said pivot, a link pivotally connected at one end of the upper plunger, and having a pin and slot connection at its opposite end with one arm of said lever, and a pair of bars having a slot connection at their ends respectively, with the lower plunger and another arm of said lever, substantially as described.

12. In a brick press, the combination with the lower plunger, the rocking double bell

crank lever, and a pair of side bars connecting one arm of said lever with the plunger; of adjustable bearing boxes for the pivot connecting said bars and lever working in slots in said bars, and adjustable wedges interposed between said boxes and the ends of said slots, substantially as set forth.

13. In a brick press, the combination with the lower plunger, the rocking double bell crank lever, and a pair of side bars connecting one arm of said lever with the plunger; of adjustable bearing boxes for the pivot connecting said bars and the lever, working in slots in said bars, a pair of oppositely inclined wedges interposed between said boxes and the ends of the slots, screw threaded rods projecting inwardly from said wedges, provided with right and left threads respectively, and a turn buckle or nut receiving and simultaneously actuating said rods and wedges, substantially as set forth.

14. In a brick press, the combination with the upper and lower plungers and the standards; of a stop for limiting the downward movement of the upper plunger, a double bell crank lever, having eccentric pivots journaled in said standards and being connected to both plungers by loose joints or connections, substantially as set forth.

15. In a brick press, the combination with the mold and the upper and lower plungers, a pair of bars having a slot connection with the lower plunger for operating the same to compress the bricks in the mold, and rocker arms also connected with the lower plunger for operating the same to eject the bricks from the mold, of a yielding support for the lower plunger, a detachable connection between the said support and plunger, and means for adjusting said support so as to change the initial position of the plunger in the mold, substantially as described.

16. In a brick press, the combination with the mold, of links connected to the lower plunger and having turn-buckles therein for adjusting the length thereof, and means for operating said link to elevate the plunger and thereby eject the bricks from the mold, substantially as set forth.

17. In a brick press, the combination with the mold and the lower plunger, of links connected to said plunger and having turn buckles therein for adjusting the length thereof, rocker arms for operating said links to elevate the plunger, and means for actuating said rocker arms, substantially as described.

18. In a brick press, the combination with the mold and the lower plunger, of a yielding stop and support for said lower plunger, a detachable connection between said stop and plunger, rocker arms, adjustable links connecting said lower plunger and one end of the rocker arms, and cams engaging the other ends of said arms for actuating the same, substantially as described.

19. In a brick press, the combination with the mold and the lower plunger, of the shaft *b*, stem *f*, spring actuated rod *h*, rocker arms *p*, *r*, links *s*, turn-buckles *u*, and cams *t*, substantially as set forth.

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Witnesses:
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