4 Sheets—Sheet 1

E. R. & W. E. GARD.
Brick-Machine.

No. 202,537. Patented April 16, 1878.

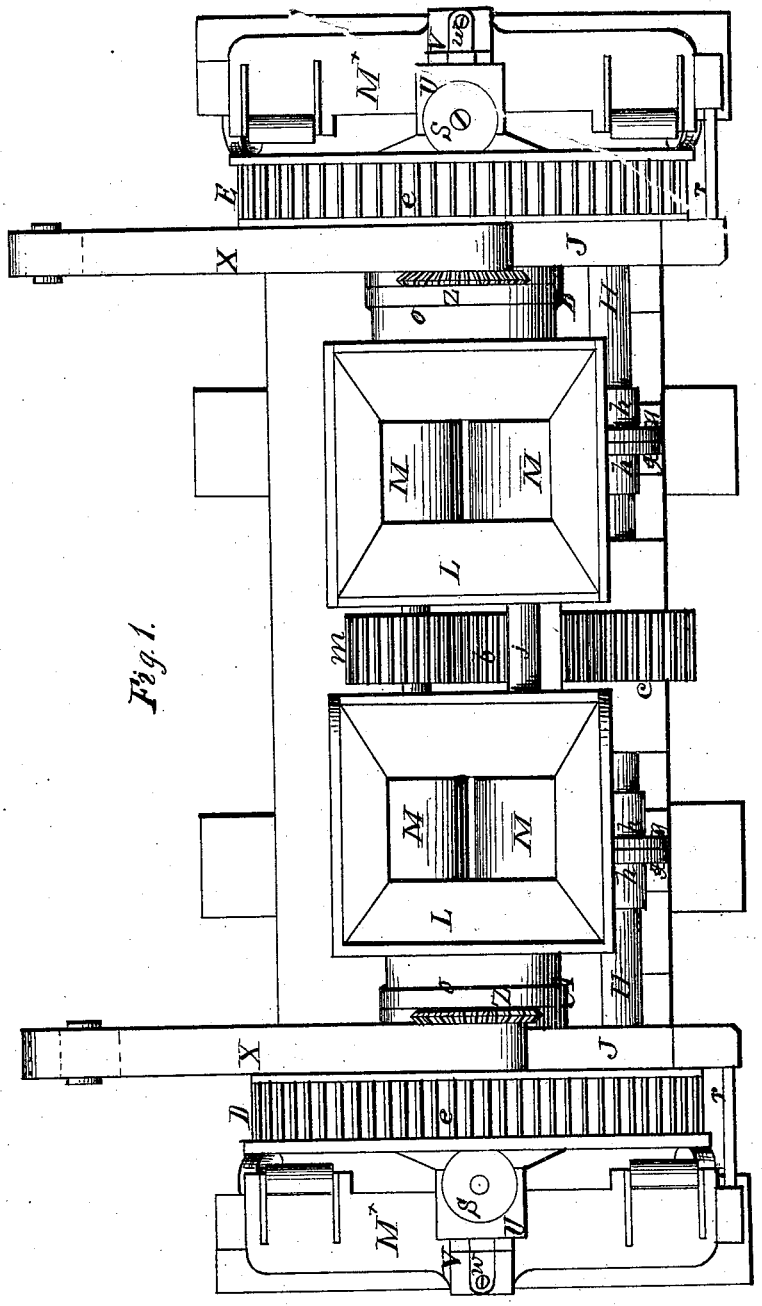

Fig. 1.

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4 Sheets—Sheet 2

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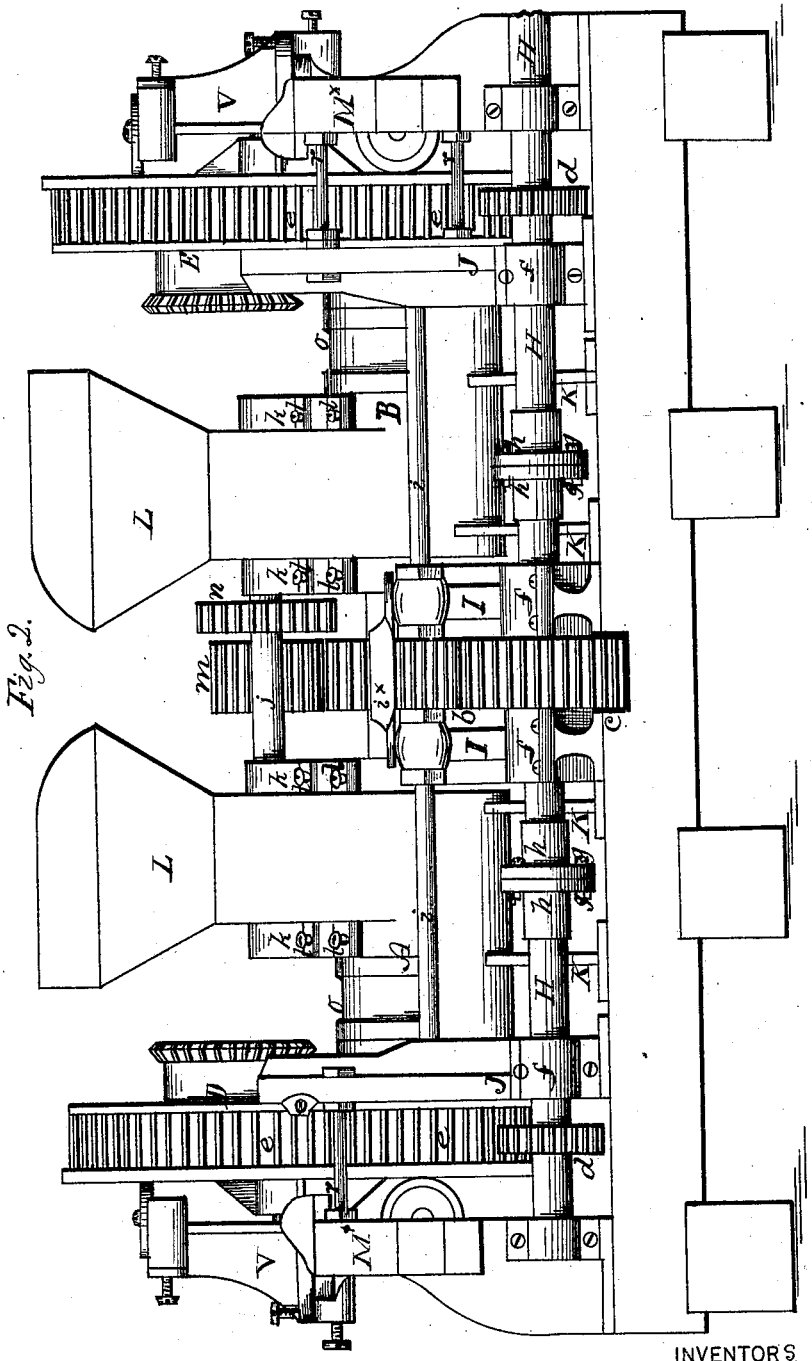

Fig. 2.

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Fig. 4.

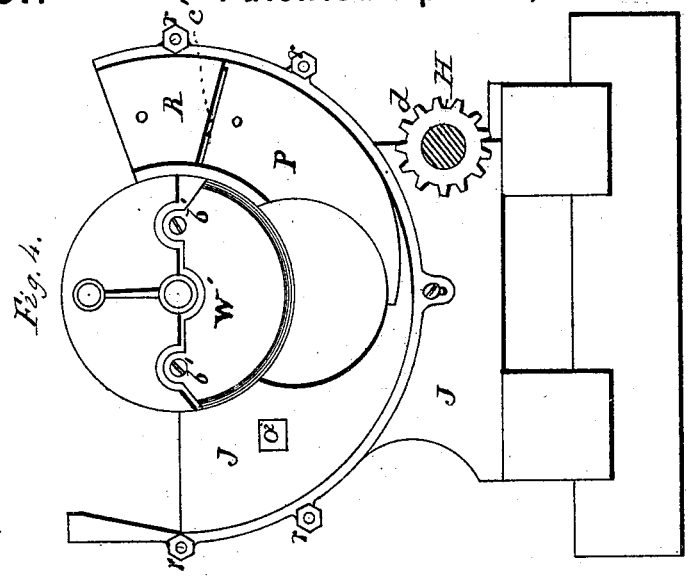
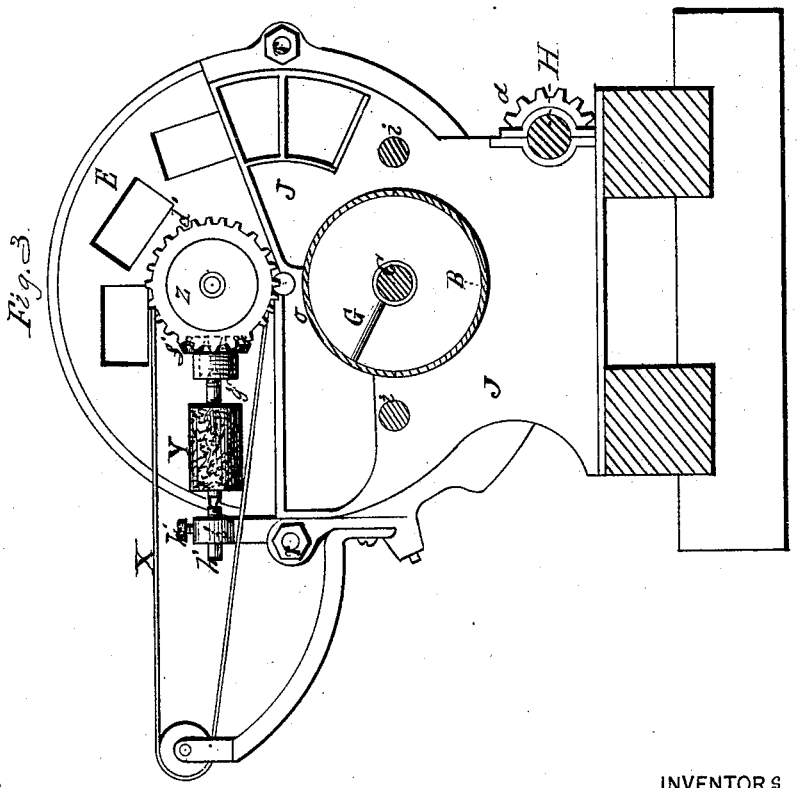


Fig. 3.



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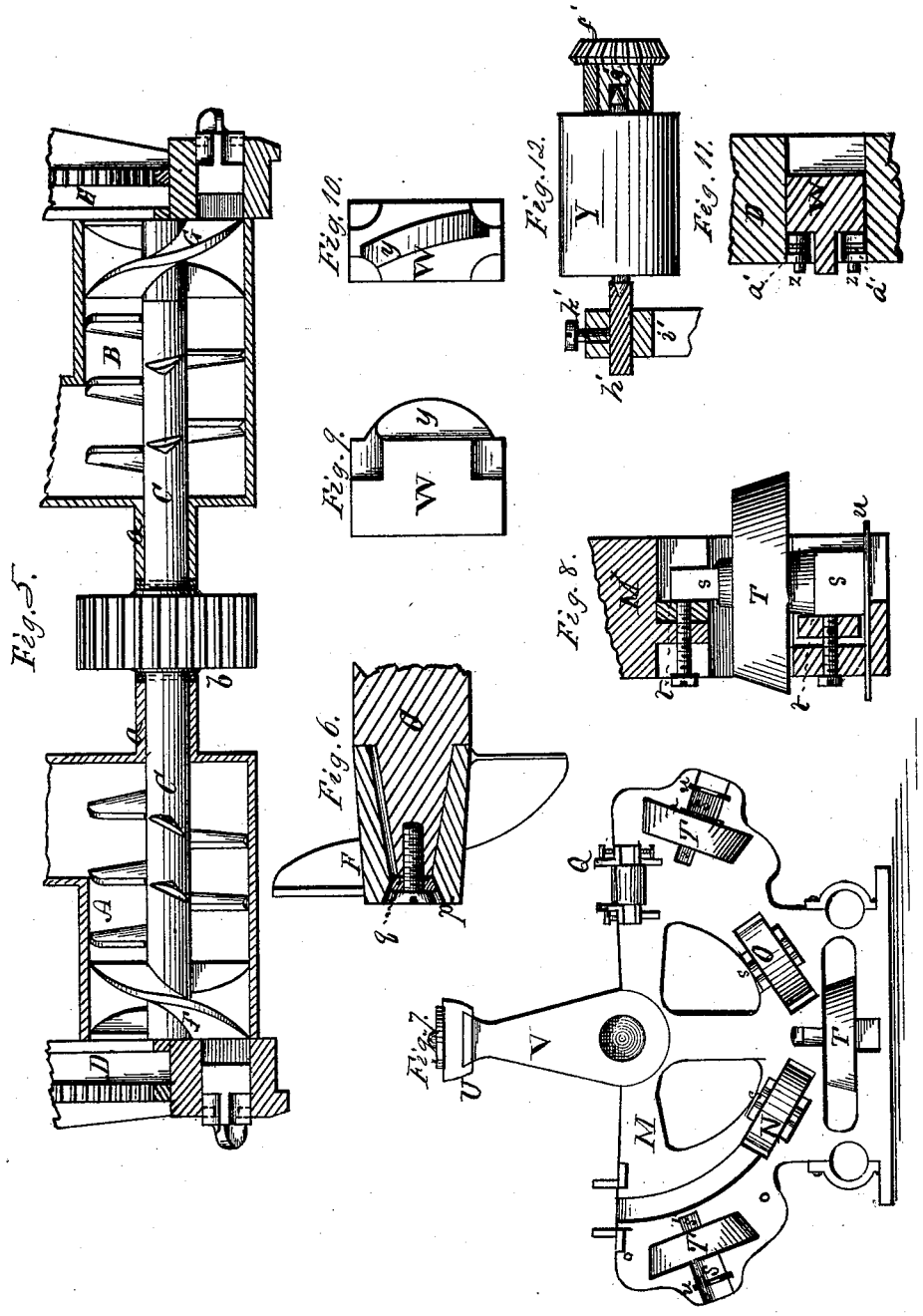

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UNITED STATES PATENT OFFICE.

EMERY R. GARD AND WALTER E. GARD, OF CROTON LANDING, NEW YORK.

IMPROVEMENT IN BRICK-MACHINES.

Specification forming part of Letters Patent No. **202,537**, dated April 16, 1878; application filed July 11, 1877.

To all whom it may concern:

Be it known that we, EMERY R. GARD and WALTER E. GARD, of Croton Landing, in the county of Westchester and State of New York, have invented an Improved Brick-Machine; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a top view of the machine; Fig. 2, a side view thereof; Fig. 3, a transverse vertical section of the same, in a plane indicated by the line *x x*, Fig. 1; Fig. 4, an end view of the same, a portion being removed; Fig. 5, a partial longitudinal section thereof; Figs. 6, 7, 8, 9, 10, 11, 12, views of parts detached.

Like letters designate corresponding parts in all of the figures.

This brick-machine, as we now arrange it, works with mold-wheels upon horizontal shafts. The leading feature of the invention has for its important purpose a complete obviation of the effects of the powerful reacting force of the clay upon the pug-mill shaft, tending to drive it endwise from the mold-wheel; and this part of our invention consists in the arrangement of two pug-mills opposite to each other, to receive a single pug-mill shaft, having, respectively, on its opposite ends two sets of tempering-arms and two clay-forcing screws, so that reacting forces operate against and neutralize each other, thereby preventing all strain and undue wear and friction on the pug-mill shaft and on the parts of the machine connected in action therewith. This construction allows and requires two mold-wheels to receive and mold the clay from the two pug-mills, thus making a brick-machine of double capacity, while the strain, friction, and wear in many of the parts are diminished rather than increased.

In the drawings, A B represent the two pug-mills or tempering apparatus, both receiving their action through a single shaft, C, and D E are the two mold-wheels, respectively fed from the two pug-mills by the two forcing-screws F G. The screws, as well as the mixing arms or knives, are inclined, respectively, to the right and left in the two pug-mills, so that the two mold-wheels move in the same direction. This is the simplest and most convenient construction, though not essential. The two pug-mills are closed at their inner adjacent ends, except apertures through which the shaft C extends, and from which project bearings, and the only bearings required therefor, leaving all the interior of the two pug-mills free from obstruction for the passage of the clay therein. The two bearings *a a*, Fig. 5, are only a sufficient distance apart to allow space for the gearing through which the pug-mill shaft is driven. This gearing is a cog-wheel, *b*, on the said shaft, gearing into another cog-wheel, *c*, on the driving-shaft H, which extends along the side and near the base of the machine, in proper position for other cog-wheels, *d d*, thereon to gear into gear-cogs *e e* on the periphery of the two mold-wheels D E. The supporting-heads I I of the adjacent ends of the pug-mills and of the bearings *a a* also extend down to the base-timbers of the machine, and support the said ends of the pug-mills; also, supporting-heads J J sustain and partially close the outer ends of the pug-mills, and extend down to the base-timbers. These four supports respectively sustain bearings *f f f f* for the driving-shaft H, close to the several cog-wheels thereon. There may be intermediate lighter supports K K under the pug-mills, as shown.

Since it is sometimes desirable to run only one mold-wheel, and sometimes necessary to stop one for repairs or other purposes, without disabling the whole machine, the driving-shaft H is divided in two places, between the middle driving-pinion and the respective pinions which drive the mold-wheels, so that either of the latter driving-pinions may be removed while the other remains in action. The parts of the divided shaft are coupled together by means of flange-caps *g g*, secured on the adjacent ends of the shaft, with bolts *h h* put through the flanges of the caps.

The two supporting-heads I J of each pug-mill are connected by strong rods *i i*, and held by nuts, as represented, and the adjacent heads I I are also connected by bars or rods $i^{\times}$ $i^{\times}$, thus strengthening the parts against the thrusts of the pug-mill shaft, and neutralizing the effect of the back pressure of the clay.

The clay is fed into hoppers L L over the peripheries, near the inner ends of the pug-mills, substantially as represented. In these hoppers we locate, when necessary, sets of crushing-rollers M M, arranged sufficiently close together to crush any stones or other substances above a determined limit of size. Both sets of rollers are driven by a single shaft, *j*, extending through both hoppers on each side, and bearing one roller of each set, there being suitable bearings *k k* for the shafts at the sides of the hoppers. These bearings are adjustable toward and from each other on bearing-seats by set-screws *l l* and slots in the bearings, so that the rollers may be adjusted nearer together or farther apart. One of the roller-shafts *j j* has a pinion, *m*, on it, gearing into the cog-wheel *b* below on the pug-mill shaft, whereby the said shaft *j* receives its revolving motion; and another pinion on the same shaft gears into a pinion, *n*, on the other shaft *j*, so that both shafts are driven simultaneously, as desired. A portion, *o*, of the upper periphery of each pug-mill body, between its hopper and outer end, is made removable, to provide a man-hole for convenience in gaining access to the interior thereof without taking apart any of the machine. It is fastened in place by screws or bolts.

The forcing-screws F G, being attached to the ends of the pug-mill shaft, so that there may be no projections to interfere with the mold-wheels, and to allow the screw to work in close proximity thereto, we have a peculiar device for securing these screws to the shaft, as shown in Fig. 6, which represents a central section of the parts referred to. The tenon or inserted end of the shaft is conical or tapering, and the hub of the screw has a conical hole to fit upon it, there being a feather on the shaft entering a notch or slot in the hub, to keep the screw from turning on the shaft. The shaft-tenon does not reach entirely through the hub of the screw; and there is a counter-sink or conical opening, *p*, beyond the shaft, into which counter-sink a washer-head, *q*, fits, and through this a screw extends into the end of the shaft, as shown. This washer-head and its screw secure the hub on the shaft, and there is no projection beyond the surface of the hub of the forcing-screw.

Each mold-wheel is mounted between the outer supporting-head *j* of its pug-mill on one side and another supporting head or frame, M$^{\times}$, secured upon the bed-timbers of the machine. This supporting-frame is tied to the adjacent supporting-head J by screw rods or bolts *r r* and tightening-nuts, so that one head helps to support the other against the thrust of the pug-mill shaft, and thus the tie-rods of the several supporting-heads unite all the main parts of the frame for mutual strength. In the supporting-frame M$^{\times}$ are mounted the various rollers or friction-wheels by which the pressure is given to the bricks in their molds, and by which they are expelled from the molds, and the introduction of the clay into the molds is regulated. These rollers (all shown in Fig. 7) act on solid or single-piece followers in the molds, thereby obviating the employment of friction-rollers on the followers themselves, and greatly simplifying and cheapening their construction, as well as obviating various causes of disarrangement incident to the more complicated construction of followers made to run upon mere tracks or cams. These rollers are, respectively, a roller, N, to first hold the followers out and gradually allow them to retreat into their molds only as fast as the clay fills the molds after them, to avoid the inflowing of air into the molds while molding the bricks; a pressure-roller, O, opposite to the first pressure-plate P of the machine; a second pressure-roller, Q, opposite to the second pressure-plate R of the machine; and a roller, S, which operates as an anti-friction cam to drive the followers through the mold-wheel and expel the pressed bricks from the molds. Besides these functional rollers, the frame M$^{\times}$ has mounted therein two or more counter-pressure rollers, T T, on opposite sides of the machine, to bear against the outer face of the mold-wheel near its periphery, and sustain it against the powerful pressure of clay from the clay-forcing screw. These counter-pressure rollers turn on fixed pivots *s s*, which have square or flat-sided bearings fitting in ways or pockets in the frame, and are adjustable toward the mold-wheel, to keep the latter always close up to the pug-mill bottom and compensate for the wear of the parts.

Our mode of adjustment, as shown in Fig. 8, is by means of plates or blocks *t t*, situated in the ways behind the pivot-bearings, and themselves adjustable by set-screws, as shown. The inner bearing end of each pivot is small enough to pass through the eye of its roller, for the purpose of insertion and withdrawal. The outer way, in which the larger end or bearing of the pivot lies, has an open end, through which the whole pivot is inserted into or withdrawn from the frame.

To keep the pivot in place, a sliding plate, *u*, is inserted in grooves across the open end of the way, as shown in the said Fig. 8, and to withdraw the pivot this plate must first be drawn out. On the removal of its pivot, the the roller itself is readily withdrawn from its slot in the frame. The pivots of the several cam-rollers N O Q also have square or flat-sided bearing ends, which slide in ways of the frame, and are adjustable toward and from the mold-wheel by thin backing-plates, with or without set-screws, and are held in position by lateral tightening-screws, as represented.

The roller S, which expels the bricks from the molds, is mounted in a bearing-block, U, which slides on ways of its support V, and is adjustable toward and from the mold-wheel on the said ways by a set-screw, *v*. The support V is screwed upon the top of the frame M$^{\times}$ over the shaft of the mold-wheel, and there is a horizontal projection extending outward

therefrom over the outer bearing of the said mold-wheel shaft, with a set-screw, *w*, therein, which rests upon the bearing, thereby strengthening the support, and being capable of use for a limited adjustment, if desired.

The roller N, which controls the receding of the followers into the molds as fast as the clay enters, and no faster, not only causes much less friction than a simple receding cam, but the curved form of the part on which the followers finally ride to recede into the molds gives a rate of receding to the followers better than can be well effected by a simple cam.

Each follower W (seen most clearly in Figs. 9 and 10, which are respectively top and rear views thereof) is in one piece, and has a curved cam-back, *y*, oblique in position, so as to properly traverse past the several pressure-rollers. The curved cam-back is of a form to strike and ride easily over the peripheries of the rollers, and to receive the full action of the rollers on the summit thereof, which is opposite to the center of the followers, so that the action of rollers thereon is central, free, and even.

The depth to which the follower recedes into its mold, and consequently the thickness of the bricks, are regulated by the four rear corners thereof resting against the enlarged inner ends or heads of pins *z z z z*, which are held in holes of lugs at the rear opening of the mold, on which pins are thin washer-plates *a' a'*, as seen in Fig. 11.

By inserting more plates around the pins the bricks are made thinner, and by taking away plates the bricks are made thicker. This is a simple, reliable, and easily-adjusted mode of regulating the depth of the molds, and one that is accurate without the exercise of any special care.

The circuit of the pug-mills is below the shaft of the mold-wheels, and the outer heads of the pug-mills reach down to or below the center of the pug-mills and of the pug-mill shaft, leaving a crescent-shaped aperture below for the passage of clay to the molds, as shown in Fig. 4.

The lower part W' of the head covering the upper part of the pug-mill is removable, and held in place by screws *b' b'*, so that it can be removed and replaced when it becomes worn without removing or disturbing the other parts of the machine. It is also adjustable by means of the screws or otherwise, to take up the wear and prevent leakage. By being thus separate, and not requiring to be drilled or shaped, it may be made of very hard material, and therefore resist undue wear for a very long time, thereby enhancing the durability of the part and of the machine as a whole. The two pressure-plates P R are also separate, removable, and adjustable. There is a surplus-clay outlet, *c'*, between them, as heretofore used by us.

As the followers expel the bricks from the molds the mold-wheels deliver them upon endless traveling belts X X, as also previously employed by us, ready for packing.

The faces of the followers are oiled after the bricks are taken from before them by means of a roller, Y, covered with lamb-skin having the wool side outward, or an equivalent material, and revolving in contact with the slightly-projected followers. The roller is caused to revolve by means of a bevel-cog wheel, Z, on the shaft of the pulley *d'*, which drives the endless traveling belt, itself driven by an internal gear of the mold-wheel, as heretofore used by us, the said cog-wheel gearing into a bevel-pinion, *f'*, on a driving-shaft or mandrel, *g'*, Fig. 12, to which the shaft of the oiling-roller is coupled. Both ends of the roller-shaft are square or angular, to fit a square or angular socket in the mandrel, and both ends of the said shaft also have a conical point to fit a conical counter-sink in the opposite bearing *h'*, in which the shaft turns, all as shown in Fig. 12. The bearing *h'* is stationary, and is held in a support, *i'*, by a fastening-screw, *k'*, so that it can be readily released and pushed back, to allow the roller to be taken out and reversed in position occasionally, in order that the wool of the lamb's skin with which the roller is covered may be ruffled in both directions, and thus prevent permanent lying and wearing of the wool in one direction.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A brick-machine provided with a tempering-shaft, having two sets of tempering-arms and two clay-forcing screws respectively at its two ends, in combination with two clay-tempering receptacles and two mold-wheels, substantially as and for the purpose herein specified.

2. In a double brick-machine, as herein described, a single tempering-shaft, C, mounted solely in two bearings, *a a*, at its middle part, and provided with a cog-wheel, *b*, between the said bearings, substantially as and for the purpose herein specified.

3. A divided driving-shaft, H, having driving cog-wheels *c d d* thereon, for driving the tempering apparatus and the two mold-wheels, its parts being coupled together so as to be readily separated, arranged in combination with the tempering-shaft and two mold-wheels, substantially as and for the purpose herein specified.

4. Rods *i i*, connecting the supporting-heads I J of each pug-mill, in combination with bars or rods connecting the adjacent heads of the two pug-mills, substantially as and for the purpose herein specified.

5. Two sets of crushing-rollers, M M, situated respectively in the two hoppers of the pug-mills, and mounted on the same shafts, driven by the same pinion gearing into the cog-wheel on the tempering-shaft, substantially as and for the purpose herein specified.

6. The device composed of the conical opening *p* in the countersunk hub of each clay-forc-

ing screw, the conical washer-head *q*, and its screw, screwing into the end of the tempering-shaft C, substantially as and for the purpose herein specified.

7. Solid mold-followers W W, provided with curved cam-backs *y y*, in combination with stationary cam-rollers N O Q S, substantially as and for the purpose herein specified.

8. A follower-receding roller, N, operating as described, in combination with the followers W W, substantially as and for the purpose herein specified.

9. Adjusting-pins *z z z z*, mounted in lugs of the mold-wheel, and provided with removable washer-plates *a' a'*, in combination with the followers W W, substantially as and for the purpose herein specified.

10. The separate removable plates W' W', forming part of the outer heads of the pug-mill, substantially as and for the purpose herein specified.

11. The follower-oiling roller Y, covered with lamb-skin or its equivalent, and arranged to be driven by a mandrel, so as to be reversed in position, as required, substantially as and for the purpose herein specified.

The foregoing specification signed by us.

EMERY R. GARD.
WALTER E. GARD.

Witnesses:
A. F. CHASE,
P. MCBRIDE.