3 Sheets—Sheet 1.

E. R. & W. E. GARD.

BRICK-MACHINE.

No. 172,111. Patented Jan. 11, 1876.

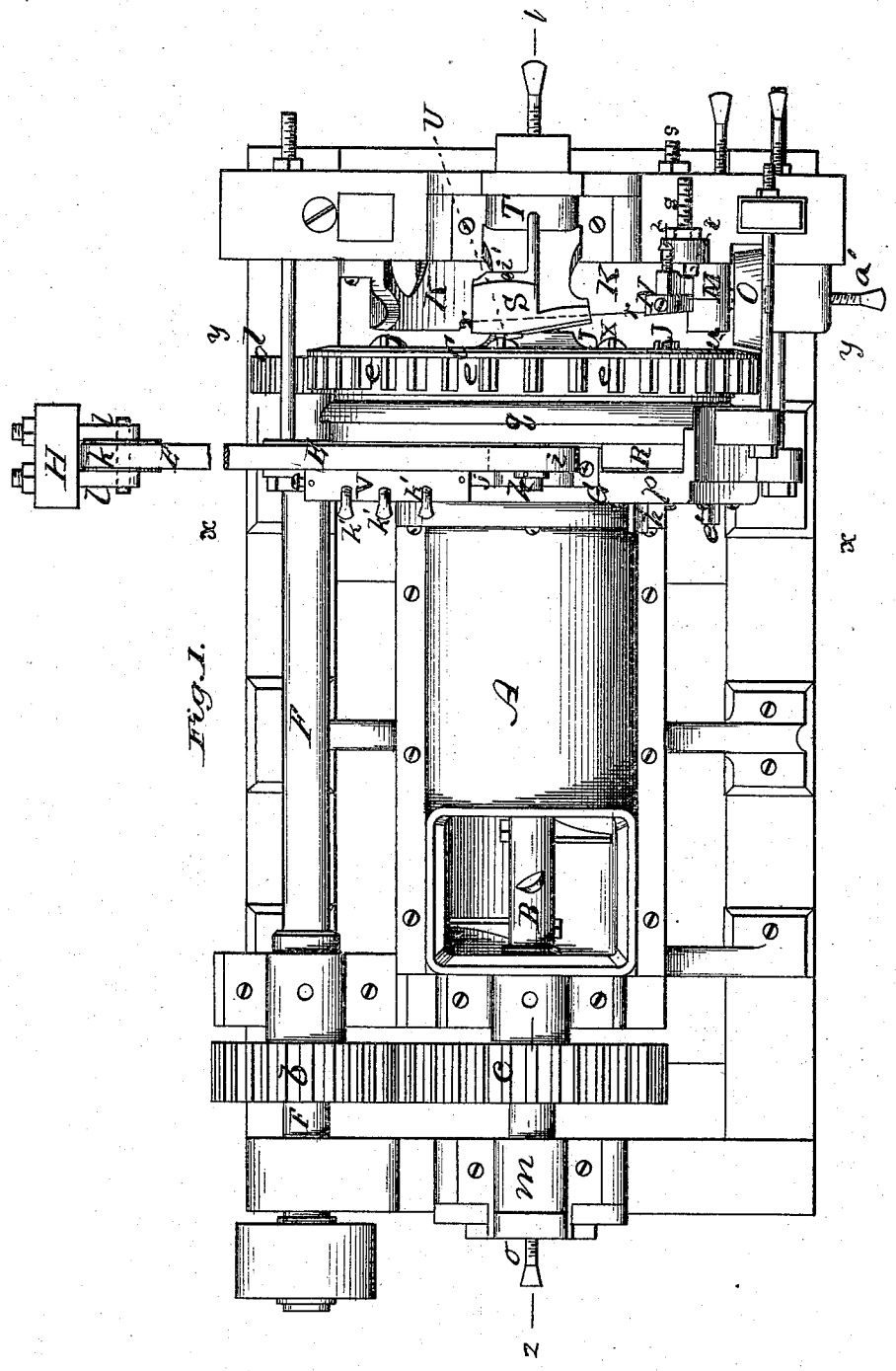

Fig. 1.

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BRICK-MACHINE.

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Fig. 3.

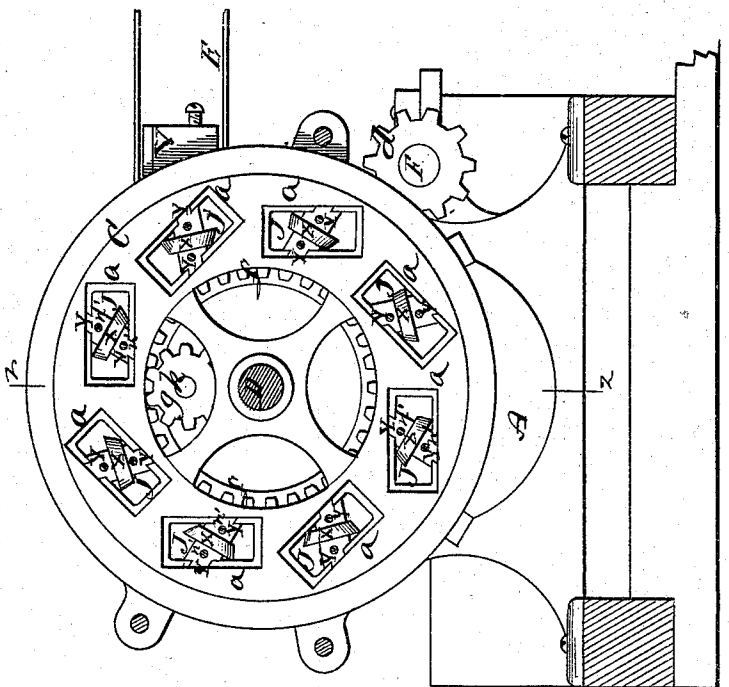
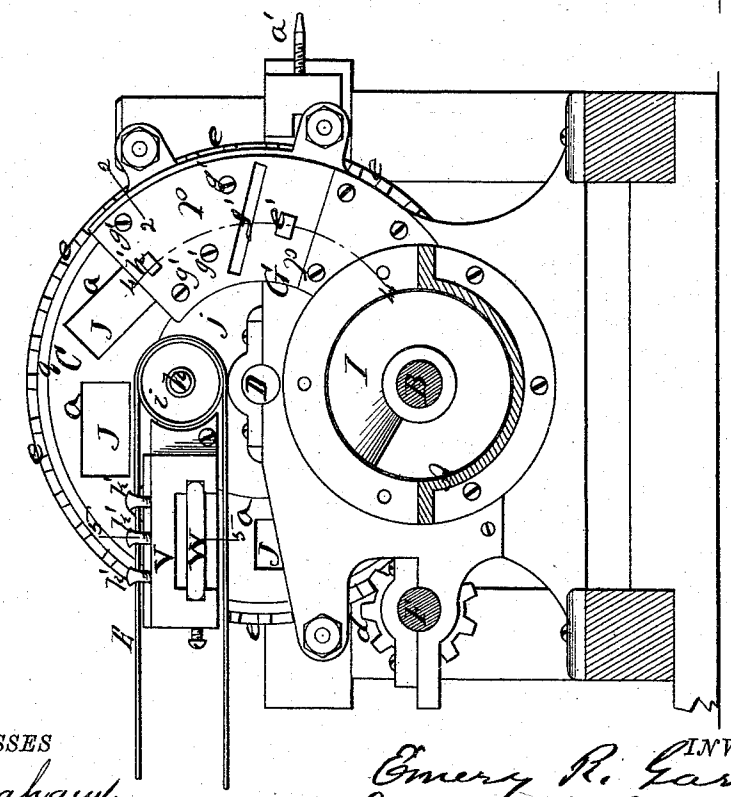


Fig. 2.



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BRICK-MACHINE.

No. 172,111. Patented Jan. 11, 1876.

Fig. 4.

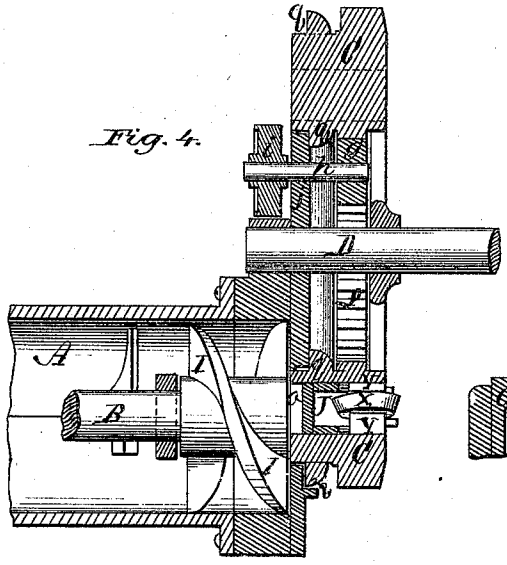


Fig. 8.

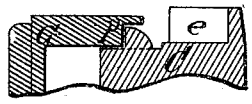


Fig. 12.

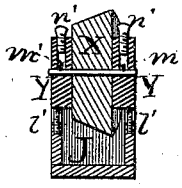


Fig. 5.

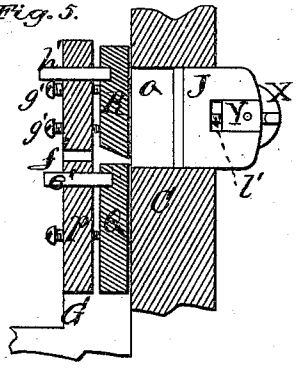


Fig. 7.

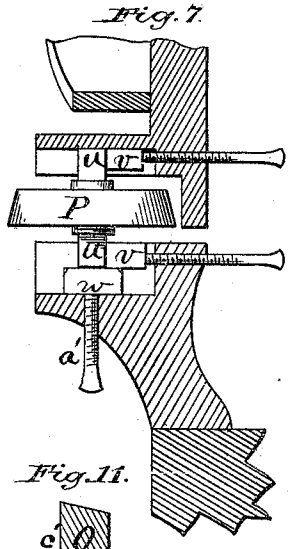


Fig. 6.

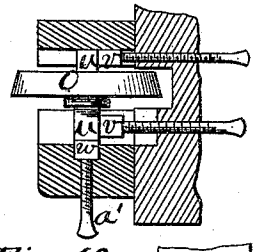


Fig. 10.

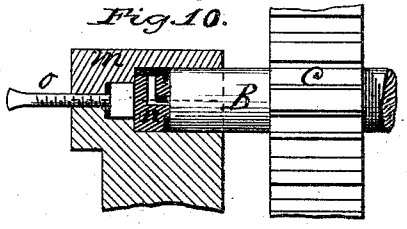


Fig. 9.

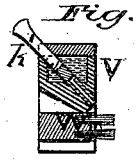
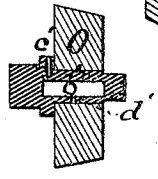


Fig. 11.



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UNITED STATES PATENT OFFICE.

EMERY R. GARD AND WALTER E. GARD, OF NEW YORK, N. Y.; SAID E. R. GARD ASSIGNOR TO SAID W. E. GARD.

IMPROVEMENT IN BRICK-MACHINES.

Specification forming part of Letters Patent No. **172,111**, dated January 11, 1876; application filed October 14, 1875.

To all whom it may concern:

Be it known that we, EMERY R. GARD and WALTER E. GARD, of the city, county, 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 brick-machine; Fig. 2, a transverse vertical section of the same in a plane indicated by the line *x x*, Fig. 1; Fig. 3, a transverse vertical section thereof in a plane indicated by the line *y y*, Fig. 1; Fig. 4, a partial longitudinal vertical section of the same in a plane indicated by the line *z z*, Figs. 1 and 3; Figs. 5, 6, 7, 8, 9, 10, 11, and 12, sections of parts in detail, as indicated by the letters of reference marked thereon.

Like letters designate corresponding parts in all of the figures.

In this our improved brick-machine, the pug-mill A and pug-mill shaft B are situated horizontally, and the mold-wheel C is upon a horizontal shaft, D, situated above the pug-mill shaft, so that the molds *a a*, arranged in a concentric circle in the mold-wheel, pass properly across the bottom or delivery end of the pug-mill in the lower part of their revolving circuit, and the bricks, as fast as they are molded in the said molds, are delivered in the upper part of the mold-circuit upon a horizontally-traveling belt, E, which carries them from the machine for hacking. The power is communicated to the machine by means of a horizontal shaft, F, placed at the side of the pug-mill and parallel with its shaft B, to which it transmits motion through the cog-wheels *b* and *c*, respectively, on the two shafts; and a cog-wheel, *d*, on the driving-shaft F, gears immediately into cog-gearing *e* on the periphery of the mold-wheel C, so that the pug-mill shaft, workers, and screw turn in the same direction as the mold-wheel, and the cog-gearing which transmits the motions to them is relatively proportioned, so as to impart the desired velocity to the said parts. The brick-delivering belt E is driven by means of an internal gear, *f*, on an inner periphery of the mold-wheel, the mold-wheel being formed with a central cavity, as shown in Fig. 4, so that this movement for driving the belt is rendered practicable. The said interior gear *f* matches into the cogs of a pinion, *g*, on the shaft *h*, of the inner carrying-pulley *i* of the delivering-belt. This pulley-shaft is mounted in a bearing, *j*, attached to or formed with the pug-mill bottom G, and projecting upward into the proper position for the purpose. The outer carrying-pulley *k* of the delivery-belt is mounted in bearings *l l*, which have screw-threaded shanks to pass through a post or upright, H, set firmly in the ground at the desired distance from the machine, or attached to an extension of the frame of the machine. Nuts on the ends of the screw-shanks of the bearings serve to tighten the belt by drawing the bearings farther through the post.

The whole device is simple, convenient, and effectual.

Our invention consists in the peculiar features of the general construction of the machine, as above set forth, and in the special features which are hereinafter specified. The clay-forcing screw I, on the pug-mill shaft B, works in immediate vicinity to the inner face of the mold-wheel C, without any intervening plate or partition, as is usual. By this construction, no unnecessary obstruction to the movement of the clay is interposed, nor useless friction, and no imperfection nor inconvenience in the working of the machine are incurred. To secure the necessary strength of all the parts, with this relative arrangement of the pug-mill screw and the mold-wheel, the face of the mold-wheel being made annular, with a central cavity therein, as above described, this annular part is made as narrow as practicable, each side of the outer and inner corners of the molds *a a* are set oblique to the tangents of the mold-wheel, one end of each mold being at right angles to the radii of the wheel at those respective points, while the other ends of the molds are considerably oblique to the radii of the mold-wheel at those points. An annular or arc-shaped opening is formed in the pug-mill bottom G, to receive

the annular part of the mold-wheel, allowing, thereby, the inner surfaces of the mold-wheel and of the pug-mill bottom to be flush with each other. The pug-mill screw I sweeps across this annular part of the mold-wheel, and fills the molds in the most efficient manner.

In order to hold the pug-mill screw I close and firm to the pug-mill bottom, and to the face of the mold-wheel, and to adjust it, if necessary, there is located in the outer bearing *m* of the pug-mill shaft B, a block, *n*, (Fig. 10, which is a section taken at the line 1, Fig. 1,) of chilled iron or other very hard material, to bear against the end of the shaft; and outside of this block is located a nut, in which an adjusting-screw, *o*, turns and bears against the block, for adjusting its position and that of the pug-mill shaft and screw. The block *n* has an oil-cavity, as shown, to be provided with a small outlet-opening leading to the center of the end of the pug-mill shaft. The oil-cavity is to be kept supplied with oil and cotton-waste, or its equivalent, to prevent the too rapid escape of the oil. The block *n* and screw *o*, and its nut, are embedded in cavities in the bearing *m*, and they can be removed at will on taking off the cap of the bearing.

A precisely similar device for holding, adjusting, and oiling the mold-wheel shaft D in the frame, is employed.

The inner end of the mold-wheel shaft has its bearing in an extension of the pug-mill bottom; and the inner bearing of the pug-mill shaft is in the outer end of the pug-mill. There is, or may be, also, a bearing-support for the pug-mill shaft just outside or back of the forcing-screw I, supported by the sides of the pug-mill or tub. The lower half of the pug-mill is suitably supported by, or forms part of, the frame of the machine, and its upper half is hinged to the lower half or made removable therefrom.

The pug-mill bottom G, as far as it extends around the periphery of the mold-wheel, including an extension, *p'*, which contains the pressure-plates or stone blocks, is made to closely embrace or inclose a portion of the outer periphery of the mold-wheel, and, to prevent the leakage of clay between the two, we form one or more angular projections, *q*, shown most clearly in Fig. 8, which represents a partial section of the mold-wheel, and pug-mill bottom at the line 2, Fig. 2, on the periphery of the mold-wheel and corresponding angular shoulders or recesses on or in the inclosing-surface of the pug-mill bottom. A similar construction is applied between the inner periphery of the mold-wheel and the part of the pug-mill bottom which fits therein. The followers J J in the molds are forced backward therein by the pressure of the clay itself, driven inward by the screw I on the pug-mill shaft. The followers are driven forward to produce the compression of the bricks in the molds by means of a track or cam, K, secured in the frame of the machine, concentric with, and opposite to, the pathway of the followers, and extending through so much of the circuit of the followers in the revolution of the mold-wheel as is necessary to fulfill its functions, which include also the regulation of the backward movement of the followers from the pressure of the clay as well as the active function of forcing the followers inward to compress the brick, or hold them under pressure while they are carried along in contact with the pressure plates or blocks.

This regulation of the movement of the followers while filling the molds, and the shape of the cam-track K, to effect it are important and peculiar. When, successively, each follower in its circuit with the mold-wheel, first comes opposite to the interior of the pug-mill its inner surface is flush, or nearly so, with the inner surfaces of the mold-wheel and pug-mill bottom. Then, while it is traversing across the inner space of the pug-mill, and the screw I is acting to press the clay into the mold, the follower is allowed, by the gradual retreat, or backward inclination of the cam-track, as shown at *r*, Fig. 1, to move backward only gradually, so as to cause the mold to be continually filling during the whole, or nearly the whole, traverse across the pug-mill. Therefore, no air enters the mold, but the clay enters and fills it as fast as the follower retreats. Hence, no air ever interferes to spoil the bricks, and the clay is always thoroughly compacted in the molds, and without any sudden exertion of power or strain on the machine.

The horizontal position of the pug-mill and of the mold-wheel shaft enables us to get ready access to the cam-track and all the operative parts connected with the mold-wheel and followers, and to adjust any part necessary with convenience.

The upper part or continuation M of the cam-track, which is situated opposite to the pressure plates or blocks, is made separate from the main track K below; and this part is made adjustable toward and from the followers, to determine the amount of pressure to be given to the bricks. We effect this adjustment by casting screws *s s* in the same, to reach backward through the sustaining parts of the frame, and two nuts, *t t*, are employed for each screw, as shown in Fig. 1, one for adjusting the track-piece, and the other for tightening and retaining it in position.

At the upper end of the adjustable part M of the cam-track is a movable piece, N, adjustable out or in, toward or from the said part, to give the final pressure to the bricks, greater or less, as desired.

The mold-wheel is sustained against the pressure of the clay in the pug-mill, and under the pressure plates or blocks, in addition to the hardened block at the outer end of its shaft, by means of friction-rollers O P, one opposite to the pressure-plates, and the other

opposite to the pug-mill, the former being shown in Figs. 1 and 6, and the latter, in its detail arrangement, in Fig. 7—the section, Fig. 6, taken at a horizontal line even with the center of the roller. Each of these friction-rollers has a somewhat beveled or conical periphery, to fit against a corresponding form of the back surface of the mold-wheel, near its periphery, against which surface the friction-rollers bear. Each friction-roller turns upon a fixed axle or pivot, *u*, which has square or flat-sided ends that slide in slots or ways of its bearings, and against these ends, laterally, are pressed blocks *v v*, (or nuts, when screws pivoted stationary in the frame are employed,) by adjusting-screws, to adjust the rollers to proper angles for fitting the beveled surface of the mold-wheel; also, a block or nut, *w*, bears against the outer end of the pivot of the roller O, and against the lower end of the roller P, and each is adjusted by a set-screw, *a'*, as shown, to adjust the roller toward or from the shaft of the mold-wheel, and bring its periphery in contact with the beveled surface of the mold-wheel. The pivot has a shoulder outside of the roller, to cause the roller to move laterally with the longitudinal adjustment of the pivot.

Each pivot *u* has an oil-cavity, *b'*, in its center, to be supplied through a hole, *c'*, in the upper side thereof, for the roller O, and having another hole, *d'*, (shown in Fig. 11, which is a section through the center of the pivot and roller O,) to furnish oil to the eye of the roller, to which it leads, for lubricating the same. For the vertical pivot of the roller P, the oil-cavity may open directly into its upper end or journal, and be supplied through the upper bearing of the pivot. Each cavity is to contain cotton-waste and oil.

As soon as the molds are filled with clay they pass from the pug-mill at once behind a plate or stone block, Q, Fig. 5, which represents a section taken in the concentric curved line 4 4, Fig. 2, which serves to cut off the clay in the pug-mill from that in the molds, and to produce a counter-pressure against the followers, acting against the bricks by the force of the cam M. This plate or block is adjusted to the face of the mold-wheel by set-screws in the extension *p* of the pug-mill bottom, simply bearing against the back surface of the plate or block. It is sustained in position by a wooden or iron pin, *e'*, passed through the pug-mill bottom. Just above the upper end of this pressure plate or block is an outlet-aperture, *f'*, through the extension *p*, to allow the escape of surplus clay that puffs out from the molds after the bricks therein have passed through the pressure, as above specified.

Immediately above the clay-outlet *f'* we locate another pressure-plate or stone block, R, which cuts off all surplus clay from the bricks in the molds, and gives a final counter-pressure to the bricks, smoothing also their outer surface. It is adjusted to the mold-wheel by screws *g' g'* in the extension *p*, bearing against the back surface of the plate or block, which also is sustained in position by a wooden or metallic pin, *h'*, inserted, through the extension, into the plate or block, as represented.

After the bricks have been submitted to the final pressure and brought up into the proper position, they are gradually pushed out of the molds, so as finally to drop therefrom when they are at or near the highest ascent of the mold-circuit. The followers J J are driven forward in the molds, for expelling the bricks therefrom, by means of a stationary cam, S, Fig. 1. This cam, for convenience and economy of construction, is formed as a part of the bearing-cap T of the mold-wheel shaft. The arrangement of the molds *a a*, as before specified, so that the rear ends thereof, as the mold-wheel revolves, are in line with radii of the mold-wheel, thus causing the front ends of the molds to extend nearer to the outer periphery of the said mold-wheel, enables the bricks to be deposited upon the horizontal carrying-off belt E just when the molds are in a horizontal position, so that both ends of the bricks descend alike upon the belt and through the smallest possible distance after they drop from the molds. Thus they come upon the belt perfect in form and unmarred in surface.

For oiling the faces of the followers without oiling the face of the mold-wheel the followers are caused, at proper times, to be pushed out somewhat beyond the inner surface of the mold-wheel when or immediately after they deliver the bricks upon the carrying-off belt. To accomplish this there is a movable piece, U, in the face of the cam S, adjustable toward and from the mold-wheel by a set-screw, *i'*, in the cam, so that this piece can at any time be adjusted forward to throw the followers beyond the face of the mold-wheel when the oiling is required, and afterward be adjusted back flush with the face of the cam when the followers are desired only to be pushed out even with the face of the mold-wheel. The piece U should be adjusted forward only when the machine is in operation, making full bricks; otherwise, since the pressure of the clay is relied on to push the followers back into the molds, the followers would strike the edge of the pressure plate or block Q, and produce damage. Therefore, the machine is always first started and got to making full bricks before the followers are thrown out for oiling, and the piece U is always set back before stopping the machine, and the clay gets low in the pug-mill, and finally does not fill the molds.

The follower oiling device consists of an oil-box, V, secured to the pulley-bearing *j*, or to an extension of the pug-mill bottom G, a little distance from the face of the mold-wheel, and provided with an oiling-brush, W, or its equivalent, at the bottom, to apply the oil to the followers as they pass by it. The oil-box is

filled with oil, and has a peculiar device for gradually supplying the oil to the brush without waste, as shown in Fig. 9, which represents a cross-section of the oil-box at the line 5 5, Fig. 2. There are three, more or fewer, screws *k' k' k'* inserted through the oil-box, their lower ends reaching down near to the brush.

Each screw has a small hole through its center up from its lower end, to a position near the bottom of the oil-cavity, and from the upper end of the said hole a side passage communicates with the oil-cavity, as shown.

The screws can be screwed upward to open the whole side aperture to the oil, and allow a full flow of oil to descend to the brush; or they can be screwed down till the side apertures are entirely closed in the bottom of the oil-box, thus entirely stopping the flow of oil; or the said side apertures can be partially closed, more or less, to any degree, to allow a greater or less flow of oil. Thus the exact quantity of oil necessary for the purpose can be regulated to a nicety, and no waste of oil be permitted.

The top of the oil-box serves as a support to the carrying-off belt E, which passes along immediately over it, where the bricks are conveyed, so that the belt is thereby relieved of much strain, and no sagging thereof takes place from the weight of the bricks. The bricks are placed upon the belt edge down, so that they are delivered by the belt in the most convenient position to take hold of by the attendants for hacking.

The followers J J are of improved construction in several particulars. Each follower has its friction-roller X set oblique to the follower sufficiently to compensate for the oblique position of the mold, so that its faces shall be properly tangent to the circles in which the follower moves by the revolution of the mold-wheel, and the bearings Y Y of its journals are set in correspondingly-oblique positions in the follower, as shown in Fig. 3, to bring the roller to the position required. These bearings slide in ways in the sides of the follower, toward and from the face thereof, and their distance from the face of the follower is adjusted to vary the thickness of the bricks, and to cause the bricks made in all the molds in the mold-wheel to be uniform in thickness, by means of adjusting-screws *l' l'* screwed into the follower opposite to the inner ends of the bearings for the said bearings to abut against, so that by setting the said screws farther out or in, the position of the face of the follower, in relation to the bearings and their friction-roller, is determined, and since this roller moves in contact with the cam-track, which has a fixed relation to the mold-wheel, thereby the depth to which the follower sinks in the mold, to limit the thickness of the bricks molded therein, is determined.

These set-screws might be screwed into the inner ends of the bearings, the heads thereof projecting toward and bearing against the follower, with the same result as above specified.

The journals of the friction-roller X are lubricated by means of oil-cavities *m' m'*, Fig. 12, which represents a central section through the friction-roller and its journals and bearings, in the bearings Y Y, to hold cotton-waste and oil. A small orifice opens from each oil-cavity to the roller-journal within. The oil-cavities are closed by corks or stoppers *n' n'*, so that no escape of oil takes place except to the journals, and there only as fast as needed.

Each of these oil-cavities may contain oil enough to last a month, and no waste of oil result from the large supply. Thus great convenience and economy are effected from this construction.

The principles and construction of this machine, besides the purpose of making bricks, are also equally applicable to molding peat and coal-dust for fuel, and likewise in proper size and form of molds, to molding linseed-cakes, soap, sugar, and other substances of plastic consistency requiring to be molded into forms for use.

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

1. The combination of the horizontal pug-mill A and pug-mill shaft B, the mold-wheel C, on a horizontal shaft, and the delivery-belt E, all arranged substantially as and for the purpose herein specified.

2. The combination of the driving-shaft F, with the pug-mill shaft B and mold-wheel C, substantially as herein specified.

3. The interior gear *f* on the mold-wheel C, in combination with the pinion *g*, shaft *h*, and driving-pulley *i* of the delivering-belt, substantially as herein specified.

4. The outer carrying-pulley *k* of the delivering-belt, provided with screw-shank bearings *l l*, tightened by adjusting-nuts, in combination with the sustaining-post H, substantially as herein specified.

5. The combination of the clay-forcing screw I, on the pug-mill shaft B, with the mold-wheel C, when the said screw is arranged to turn in immediate vicinity to the face of the mold-wheel, substantially as and for the purpose herein specified.

6. The combination of a block, *n*, provided with an oil-cavity and adjusting-screw, *o*, with the shafts B and D of the pug-mill and mold-wheel, arranged in the bearing, substantially as and for the purpose herein specified.

7. The cam-track K, constructed with a gradually-retreating-surface, *r*, in combination with the followers J J, pug-mill A, and screw I, arranged so as to cause the followers to come flush or nearly so with the surface of the mold-wheel when they are first brought opposite to the pug-mill, and then to gradually recede into the molds only as fast as the clay fills the molds, substantially as and for the purpose herein specified.

8. The movable brick-pressing cam M, hav-

ing adjusting-screws *s s* cast therewith, and provided with double nuts *t t*, supporting and adjusting the cam, substantially as herein specified.

9. The adjustable pressure-piece N, attached to the upper end of the cam M, substantially as and for the purpose herein specified.

10. The friction-rollers O P, provided with non-revolving pivots *u u*, adjustable laterally and endwise, substantially as and for the purpose herein specified.

11. The combination of the pressure-block Q and surplus-clay cut-off and final pressure-block R, arranged with an intermediate surplus-clay outlet, *f'*, substantially as and for the purpose herein specified.

12. The cam S, for expelling the bricks from the molds, constructed to form a part or projection of the bearing-cap T of the mold-wheel shaft, substantially as herein specified.

13. The molds *a a*, arranged obliquely to the radii of the vertical mold-wheel C, substantially as described, in combination with the horizontal delivering-belt E, for the purpose herein specified.

14. The movable piece U, on the cam S, for throwing out the followers J J to be oiled, substantially as herein specified.

15. The oil-box V and oiling-brush W, at the bottom thereof, in combination with the followers J J, for the purpose herein specified.

16. The series of perforated oil-delivering screws *k' k' k'* in the oil-box V, constructed and operating substantially as herein specified.

17. The belt-support V, either acting also as an oil-box or not, in combination with the delivering-belt E, substantially as and for the purpose herein specified.

18. The sliding roller-bearings Y Y, and adjusting-screws *l' l'*, arranged as described, in combination with the follower J, substantially as herein specified.

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Witnesses:
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