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2 Sheets--Sheet 1.

J. W. PENFIELD.

Improvement in Brick Machines.

No. 122,851.

Patented Jan. 16, 1872.

Fig. 1.

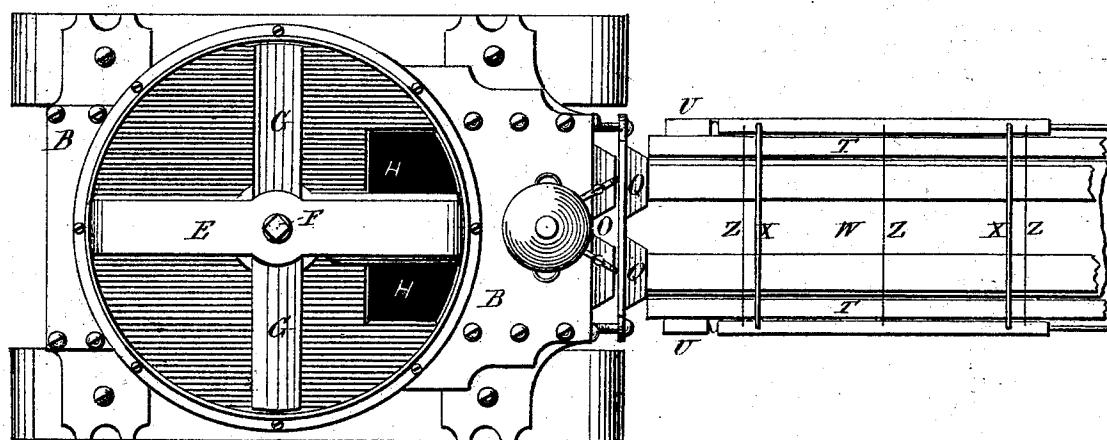


Fig. 2.

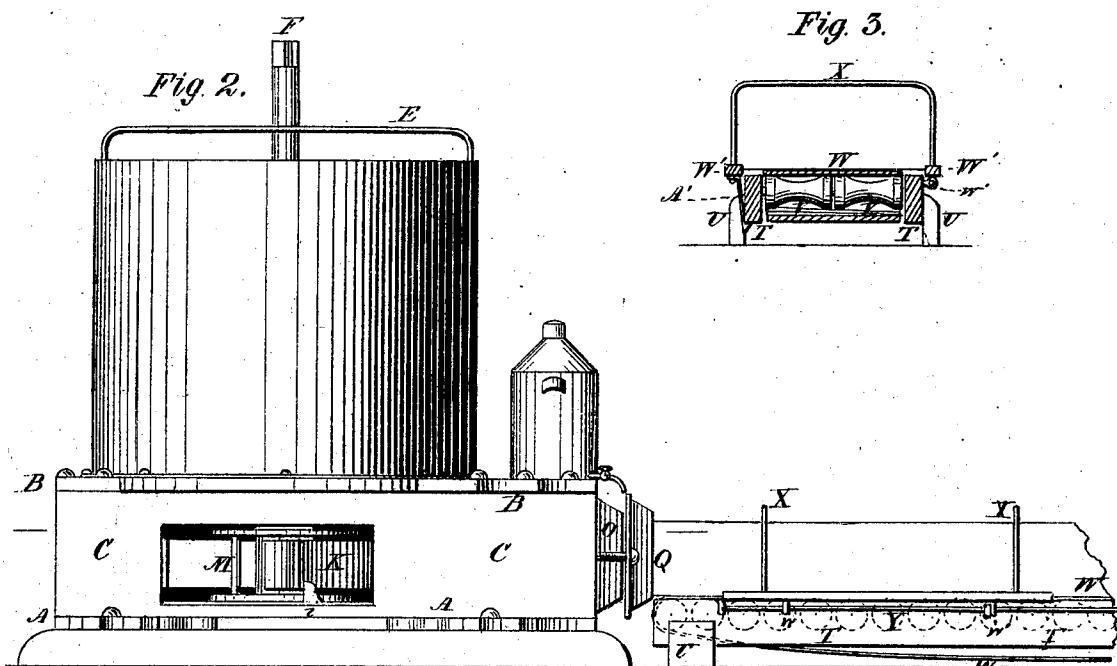
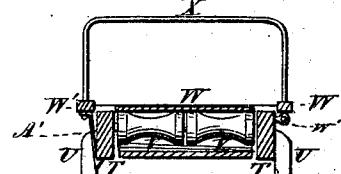


Fig. 3.



Witnesses.

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(20.)

2 Sheets—Sheet 2.

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Fig. 4.

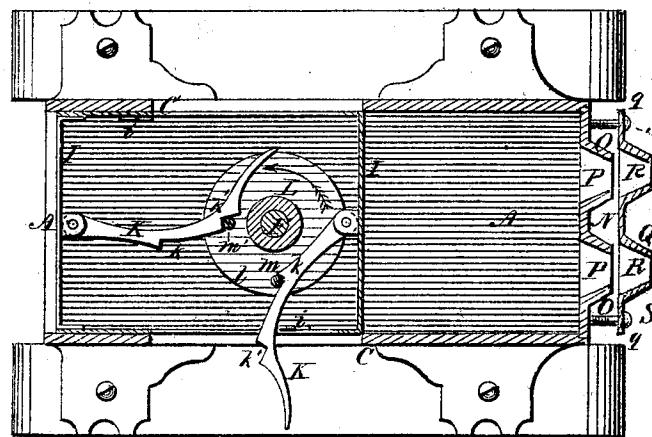


Fig. 6.

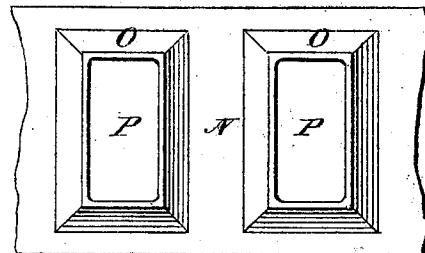


Fig. 5.

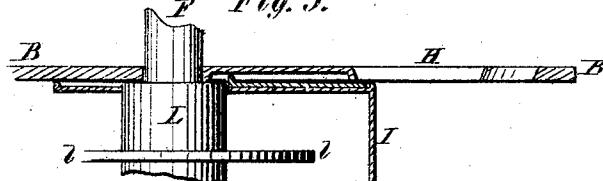


Fig. 9.

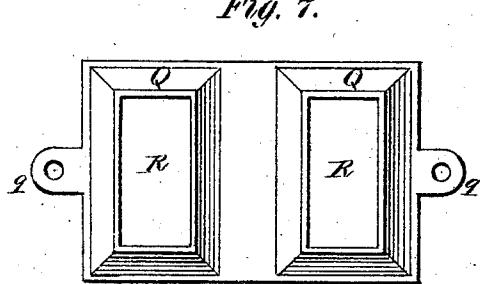
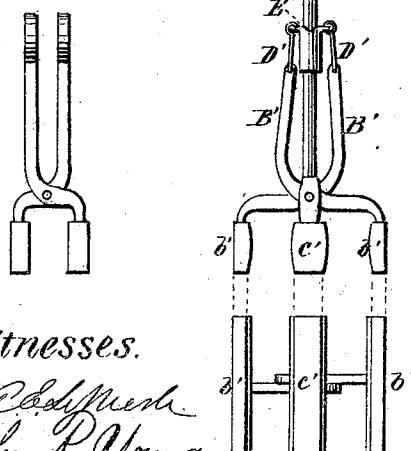


Fig. 8.



Witnesses.

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## UNITED STATES PATENT OFFICE.

JAMES W. PENFIELD, OF WILLOUGHBY, OHIO.

## IMPROVEMENT IN BRICK-MACHINES.

Specification forming part of Letters Patent No. 122,851, dated January 16, 1872.

*To all whom it may concern:*

Be it known that I, JAMES W. PENFIELD, of Willoughby, in the county of Lake and in the State of Ohio, have invented certain new and useful Improvements in Brick-Machines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a plan view of the upper side of my machine with the several parts arranged for operation. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical cross-section of the carriage for receiving the bars of clay, and the apparatus for cutting the same into brick. Fig. 4 is a horizontal section of the machine on the line  $x x$  of Fig. 2. Fig. 5 is a vertical central section of the plunger and casing on the line  $z z$  of Fig. 2. Fig. 6 is a front elevation of the primary set of dies employed in forming the bars of clay. Fig. 7 is a like view of the secondary set of dies used for said purpose. Fig. 8 is a side elevation of a pair of single lifters for removing the completed brick from the carriage; and Fig. 9 is a side elevation and a bottom view of a double pair of lifters intended for a like purpose.

Letters of like name and kind refer to like parts in each of the figures.

My invention is an improvement in a class of brick-machines in which the clay is forced outward through suitable dies in a bar having a transverse size corresponding to that of the finished brick, which latter are completed by being cut in suitable lengths from said bar; and my invention consists, principally, in the combination of a primary die having round corners, and a secondary or finishing-die somewhat smaller than the first, and having square or right-angle corners, substantially as and for the purpose hereinafter specified. It consists, further, in the employment of suitable lubricating devices between and in combination with the forming and finishing dies, substantially as and for the purpose hereinafter set forth. It consists, further, in the means employed for operating the plunger, substantially as and for the purpose hereinafter set forth. It consists, further, in the employment of an endless apron or belt, constructed of rubber, for receiving and supporting the bars of clay while being cut into brick, substantially as

and for the purpose hereinafter shown and described. It consists, further, in the employment of two or more independent sets of spools or rollers for receiving and sustaining the bars of clay upon the carriage, substantially as and for the purpose hereinafter specified. It consists, further, in the construction of the cutting apparatus, and its combination with the carriage, substantially as is hereinafter shown. It consists, finally, in the construction of the lifters employed for removing brick from the carriage, substantially as hereinafter set forth.

In the annexed drawing, A represents the bottom plate; B, the top plate; and C, the sides composing the base, upon which is secured a cylindrical hopper, D, of usual construction. Journalized vertically within the base, and within the brace E, secured to and extending horizontally across from opposite sides of the hopper, is a shaft, F, upon which, within said hopper, are secured the usual radial arms G, for grinding the clay and for pressing the same into the base through an opening, H, provided in and through the top plate B at the front side of the machine, and immediately within said hopper. Fitted closely to or within the rectangular space formed within the base is a plunger, I, formed of or from thin plates of metal, and inclosed at its front end and upper side, near the same, while its lower side is entirely open, and its sides and rear end partially so, said plunger being so adjusted as to slide freely in a longitudinal direction within its housing, the base. Within each end of the plunger I, at its transverse center, is hinged one end of a lever, K, having the irregular curving form shown in Fig. 4, and provided upon its convex face with two notches,  $k$ , which rake forward toward its free end. A spool, L, secured to or upon the shaft F in such position as to permit the lever to swing between its collars  $l$ , is provided with two vertical rods, M, which extend between said collars, and while placed equidistant from the shaft, are relatively arranged, so as to cause the space between them to exactly equal the distance between the notches  $k$  of the lever K. As thus constructed, the levers are arranged upon opposite sides of the spool, and with their notches  $k$  raking in a direction against or opposite to the movement of the shaft, it will be seen that, as the latter is rotated, the forward pin or rod M will engage with the inner or

rearward notch of one of the levers, and move the latter and the plunger in the same direction, until said rod has drawn inward the free end of said lever, and cause the rear rod  $M'$  to engage with the second or outer notch  $k'$ , by which time the rotation of said shaft will carry said rod  $M$  beyond said lever and out of engagement with its notch. The second rod  $M'$  now moves forward the lever and plunger until the rotation of the shaft carries it away from its notch, at which instant the forward pin or rod  $M$  engages with the inner notch  $k$  of the second lever, and moves the same and said plunger in an opposite direction, so that by alternately engaging with the opposite levers the rotary motion of said shaft is converted into a reciprocating motion of said plunger. When a lever is released from engagement with the rods, its inner or curved face rests against and travels over the hub or central portion of the spool, by which means the outer end of said lever is turned outward through the open sides of the plunger and base, as seen in Fig. 4, so as to bring it into the exact position for engagement with the forward rod at the precise instant that the rear rod leaves the opposite lever; but in order that said levers shall not swing so far outward as to prevent such engagement, a stop,  $i$ , is provided upon the plunger  $I$  in such position as to bear against the rear side of said lever and hold it in place. The front end of the base is inclosed by means of a plate,  $n$ , within which is provided two rectangular dies,  $O$ , the sides of which extend forward and inward, and at their forward edges form openings,  $P$ , slightly larger in area than a transverse section of a finished brick, and having their corners rounded. Immediately in front of the dies  $O$  is placed a second set of dies,  $Q$ , which correspond in general shape and relative position with those before named, but are slightly smaller than the same, (or the size, transversely, of the finished brick,) and have the corners of their openings  $R$  made square. The supplementary or finishing dies thus formed are connected with and made adjustable toward or from the fixed dies by means of two bolts,  $S$ , which pass through suitable lugs  $q$  attached to the ends of the former, and have their inner threaded ends fitted within corresponding openings within the latter.

As thus constructed and combined, the operation of said dies is as follows: The clay is forced outward from the base in the usual manner, and, passing through the first dies, forms two bars having a general rectangular shape, but with their corners slightly rounded. As the ends of the bars of clay emerge from the first dies a small stream of some fluid lubricant, preferably light lubricating-oils, is caused to flow downward upon the same, so that when they pass through the finishing-dies, and are reduced to the exact size required, so little friction is developed that the surfaces of said bars are exceedingly smooth, and perfect square corners produced. Upon leaving the dies the

bars of clay are received upon a carriage and divided into bricks, as is described below. The carriage employed consists of two horizontal and parallel bars,  $T$ , connected together and supported upon legs  $U$ , and having secured at equidistant points along their inner faces suitable rods, upon each of which is placed two spools or rollers,  $V$ , having the shape shown in Fig. 5. Around the frames thus formed, and resting upon the rollers, is an endless belt,  $W$ , of thick rubber, the upper surface of which is upon a line with the lower edge of the opening  $R$  of the finishing-dies, so that as the bars of clay are forced outward they rest upon and move forward said belt, which, from its stiffness, protects said bars from said rollers, and prevents the upsetting of their lower edges. The cutting apparatus consists of two bars,  $W'$ , secured together in parallel lines by means of two metal braces,  $X$ , which extend upward and across from near the ends of said bars. One of the bars  $W'$  is provided upon its lower side with two metal eyes,  $w'$ , which fit around and slide upon a metal rod,  $Y$ , that is attached to the side of the corresponding frame-bar  $T$ , and permit said cutting-frame to slide longitudinally upon said rod, and over the carriage, and also to be swung over or removed from the upper side of the latter. A series of cutting-wires,  $Z$ , corresponding in relative position to the length of the brick, stretched across and between the bars  $W'$ , and a spring-catch,  $A'$ , that extends downward from the outer or free side of the cutting-frame, and engages with the lower side of the bar  $T$ , completes this portion of the device, the operation of which is as follows: The cutting-frame is moved backward until its outer wire is in a line with the end of the bars of clay as they emerge from the dies, and then turned over upon said bars, pressed downward, so as to force the cutting-wires through the same and cause the spring-catch to engage with the frame-bar, after which the cut brick are removed from the belt and the cutting-frame, (which has moved forward with the motion of the bars of clay,) is again turned upward, moved toward the dies, and the operation repeated. As the brick thus constructed are quite slippery, and in their removal from the carriage require careful handling, in order that the sharpness of their corners may be preserved, I employ the lifters illustrated in Fig. 9, which consist of two metal arms,  $B'$ , (having the form shown,) pivoted together, and upon or near the lower end of a straight bar or handle,  $C'$ , the lower ends of said arms and bar being provided with suitable jaws  $b'$  and  $c'$ , respectively, for grasping the brick. The upper ends of the pivoted arms  $B'$  are connected, by means of short links  $D'$ , with a sleeve,  $E'$ , which slides freely upon the bar  $C'$ , and, by its action upon said arms, opens or closes the jaws. The lifters thus constructed are placed over four brick, and the sleeve raised upward, so as to close together the jaws, after which the whole may be raised and removed, the weight of said brick having

a tendency to hold said jaws together with sufficient firmness. In Fig. 8 is shown a pair of lifters for use in stacking the brick, or in handling one at a time, the construction of which, being sufficiently illustrated by the drawing, requires no further description.

While more especially intended for use in the manufacture of brick, this device can be readily converted into a tile machine by removing the rubber belt and dies, and substituting in place of the latter dies adapted to the desired product, in which event it will be found that the double set of spools is far better than a single set, as it enables each of the tile pipes to move forward without injury from obstructions or delays of the other pipe. In addition to the above it is found that an advantage arises from the use of two sets of rollers with the belt, as the edges of the latter are usually of unequal length upon opposite sides, transversely, and by giving to each side an independent rolling support, its variable motion will neither accelerate nor retard the rollers upon which the opposite side rests, by which means perfect freedom of motion in a longitudinal direction is insured to said belt. An especial advantage is obtained by the use of rubber for a supporting-belt, as its surface possesses sufficient elasticity to receive the cutting-wires, and enable them to pass entirely below the lower surface of the prism of clay without pressing downward the belt, so as to make a clean cut, while in a leather or canvas belt the surface is unyielding, so that if one cutting-wire should strike upon or immediately over a roller, and another wire between two rollers, or if from any cause said wires should not bear equally upon the belt, the highest wire would not pass entirely through the clay, and the edges of the brick would be left ragged.

Having thus fully set forth the nature and merits of my invention, what I claim as new, is—

1. In a brick-machine, the combination of a primary die having the corners of its openings

slightly rounded, with a second or finishing-die constructed with square corners, and somewhat smaller in size than said primary die, substantially as and for the purpose specified.

2. Also, in combination with the dies O and Q, a suitable lubricating device, substantially as and for the purpose shown.

3. Also, the means employed for imparting a reciprocating movement to the plunger I, consisting of the levers K, hinged to said plunger, and provided with the notches k, the spool L, secured to or upon the shaft F, and provided with the collars l, and the rods M, when said parts are constructed and combined substantially as and for the purpose set forth.

4. Also, in combination with a suitable frame or carriage, provided with transverse pivoted spools, a rubber belt for receiving and sustaining the bars of clay, substantially as and for the purpose shown and described.

5. Also, in combination with a carriage for receiving and sustaining the bars of clay forced from the machine, two or more sets of pivoted spools working independently, substantially as and for the purpose specified.

6. Also, in combination with the carriage shown, the cutting device, consisting of the bars W', connected by the braces X, pivoted to or upon the guide-rod Y, and provided with the cutting-wires Z and spring catch A', substantially as and for the purpose shown.

7. Also, in combination with the carriage above described, the lifters employed for removing the finished brick, consisting of the pivoted arms B', the handle C', the jaws b' and c', the links D', and the sleeve E', substantially as set forth.

In testimony that I claim the foregoing, I have hereunto set my hand this 10th day of October, 1871.

JAMES W. PENFIELD.

Witnesses:

J. W. HAYFORD,  
T. C. STARK.

(20)