3 Sheets—Sheet 1.

I. MORLEY.

Brick-Machine.

No. 208,416. Patented Sept. 24, 1878.

Fig. 1.

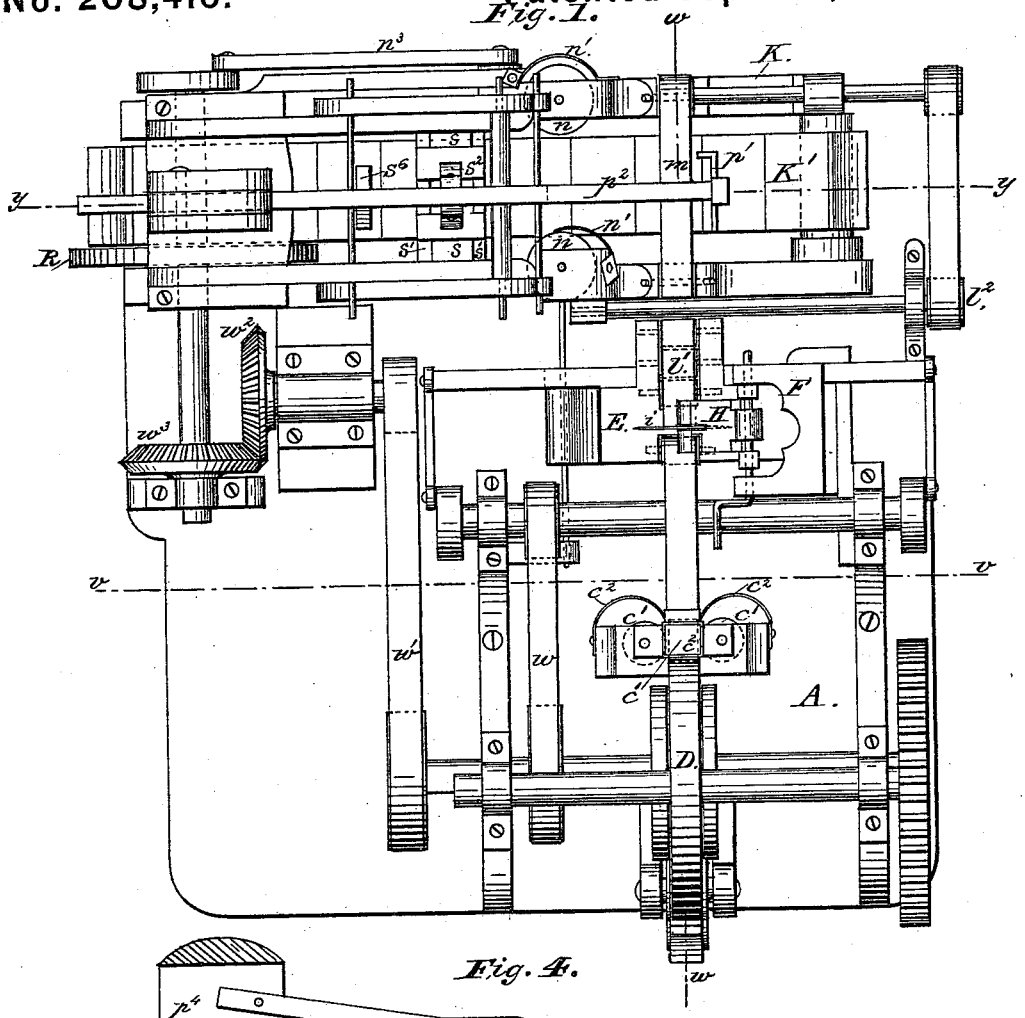
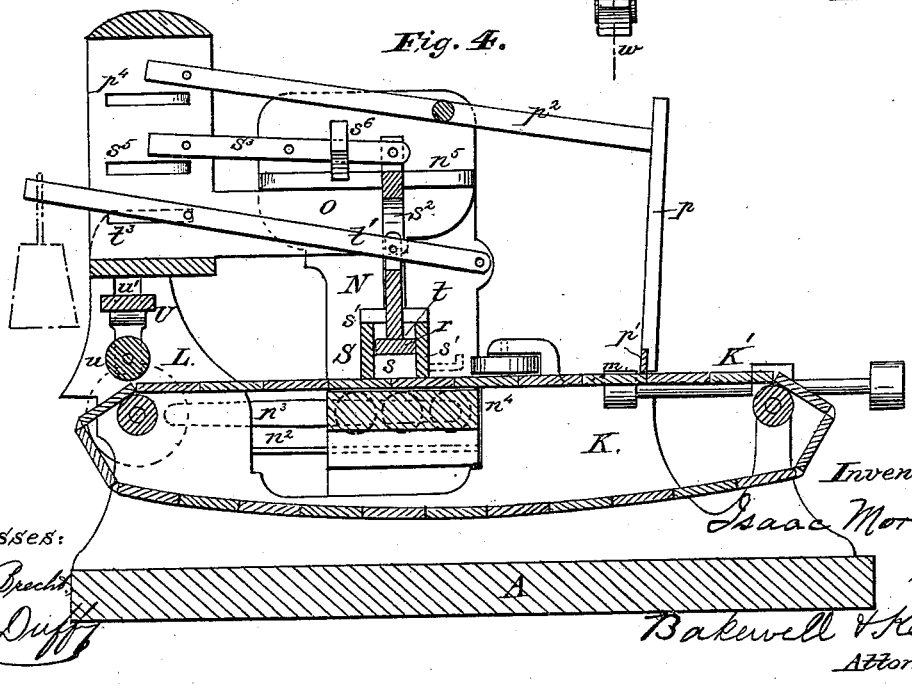


Fig. 4.



Witnesses:
T. C. Brecht.
O. E. Duff

Inventor:
Isaac Morley
By
Bakewell & Kerr
Attorneys.

I. MORLEY.

Brick-Machine.

No. 208,416. **Patented Sept. 24, 1878.**

Fig. 2.

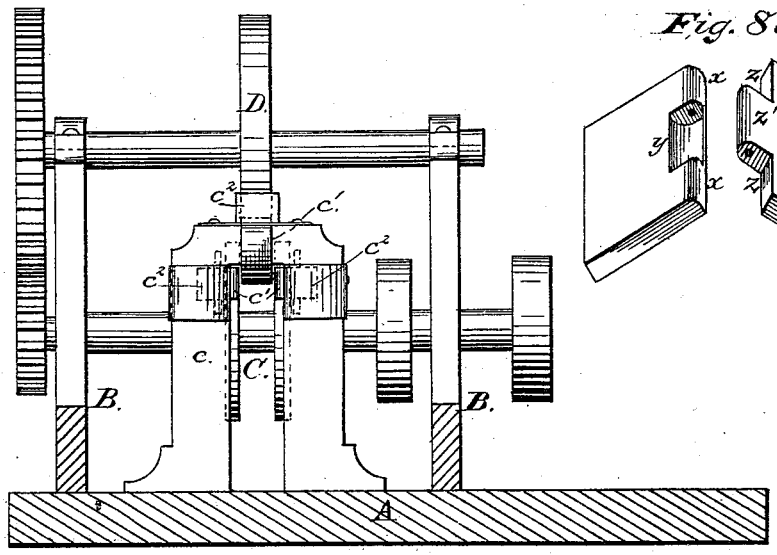


Fig. 8.

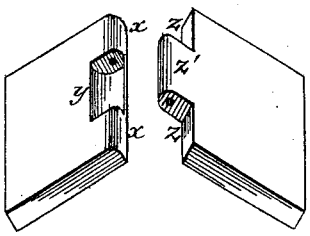
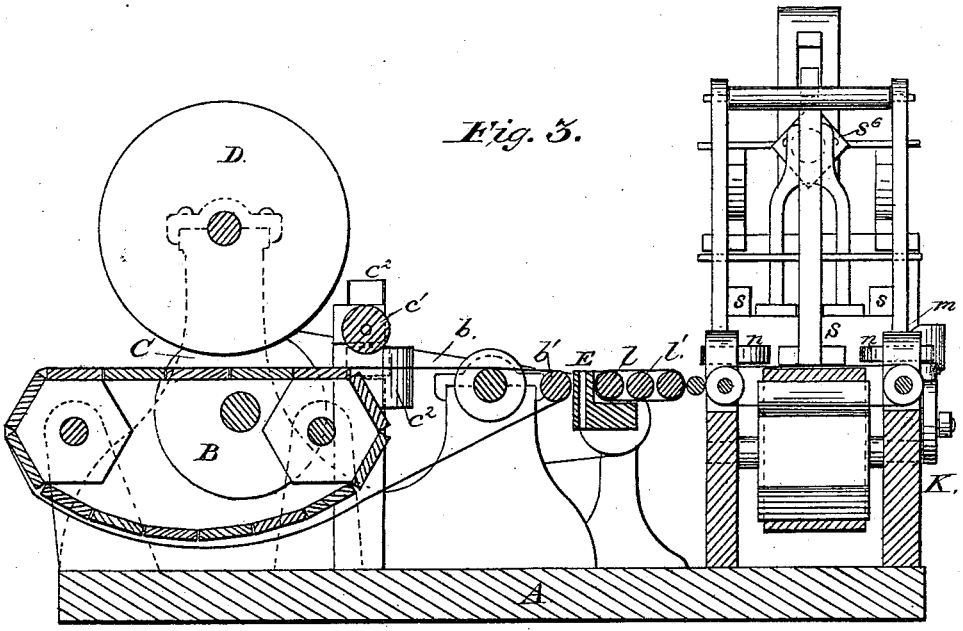


Fig. 3.



Witnesses:
T. C. Brecht.
O. E. Duffy.

Inventor:
Isaac Morley
By Bakewell & Kerr
Attorneys.

3 Sheets—Sheet 3.

I. MORLEY.

Brick-Machine.

No. 208,416. Patented Sept. 24, 1878.

Fig. 5.

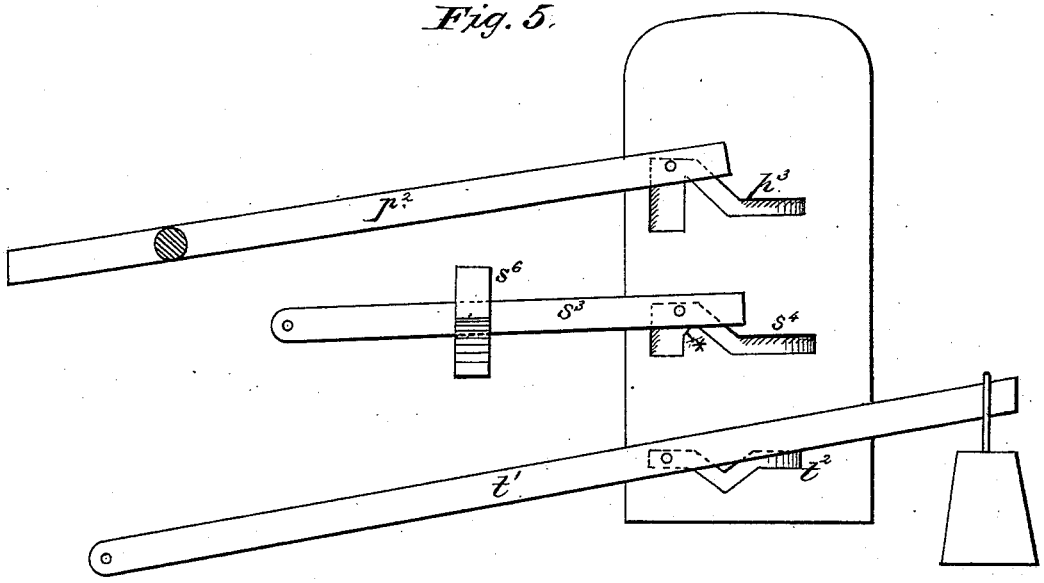


Fig. 6.

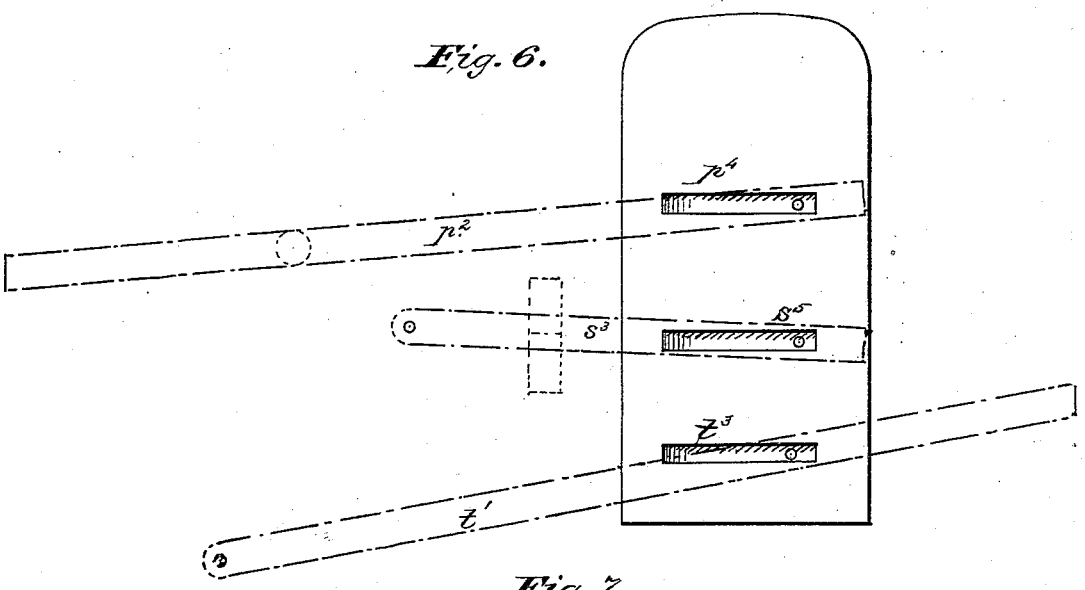
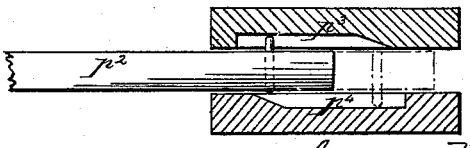


Fig. 7.



Witnesses:
T. C. Brecht.
O. E. Duffy

Inventor:
Isaac Morley
By Bakewell & Kerr
Attorneys.

UNITED STATES PATENT OFFICE

ISAAC MORLEY, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN BRICK-MACHINES.

Specification forming part of Letters Patent No. **208,416,** dated September 24, 1878; application filed September 13, 1878.

To all whom it may concern:

Be it known that I, ISAAC MORLEY, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Brick-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of devices embodying my invention. Fig. 2 is a section on the line *v v*, Fig. 1, looking in the direction of the press-roll. Fig. 3 is a section on the line *w w*, looking in the direction of the supplemental press or molding devices. Fig. 4 is a section on the line *y y*. Figs. 5, 6, and 7 are diagrams illustrating the operation of the devices.

Like letters refer to like parts wherever they occur.

My invention relates to the construction of machines for the manufacture of bricks, tiles, and like articles.

It consists, first, in combining, with the press-rolls of a brick-machine and its endless jointed belt, a continuous belt of leather, rubber fabric, or like flexible material, arranged upon the jointed belt-carrier or connected bottom boards in such manner as to prevent the defacing of or formation of marks on the continuous strip of molded clay by the joints of the main carrier; secondly, in so combining a flexible belt, of leather, rubber fabric, or its equivalent, with the jointed endless carrier or sectional bottom board, and with the reciprocating cutting-carriage of a brick-machine, as to provide a continuous support for the molded strip from the forming to the cutting mechanism, and also to protect said strip from mold-marks; thirdly, in combining, with the forming mechanism for forming the continuous strip of clay, and with the cutting mechanism for severing the strip into blocks, a carrier for receiving the cut sections and sanding-rolls for sanding the cut ends of the sections; fourthly, in combining, with mechanism for forming a continuous strip of molded clay and cutting the same into sections, a supplemental mold and press for giving a final molding or shaping to the article; and, finally, in details of construction hereinafter more specifically set forth.

This invention pertains especially to that class of continuously-acting brick-machines wherein the brick, tile, or like article is severed from a continuously-molded strip. It embraces several features, which may be said to be improvements on Letters Patent No. 203,736, granted to me May 14, 1878, and other features, which can be readily applied by the skillful mechanic to other classes of brick and tile machines now in use.

I will now proceed to describe my invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates a suitable bed or foundation, on which I erect a frame or housing, B, for the pressure or molding devices that form the continuous strip. These devices may consist of the press-roll D and flanged roll C, provided with pinions and geared to move in unison, and an endless belt composed of hinged bottom boards, together with pulleys for carrying the same, as specified in my patent before recited, or may be of other approved form, if preferred. The cutting mechanism for severing the strip into sections may consist of the reciprocating carriage or truck E, which receives its motion from a pitman and pulley, the uprights F for the hanger H, which carries the saw *i*, and cams for operating the hanger and saw, for a more complete description and illustration of which reference is made to the patent before cited, as only so much of the mechanism is here introduced as is requisite to show the improvements since made and enable the present invention to be fully understood.

With such or similar devices I now combine a loose belt, *b*, of leather, rubber fabric, or other material of a flexible nature, arranging the same upon and to inclose the jointed bottom boards, so as to present a uniformly even surface to the under side of the molded strip, whereby a perfectly plain surface is insured on the molded strip of clay; and, in order to form an extensible support between the reciprocating cutting-carriage E and the molding mechanism, I continue the belt over a roll or pulley, *b'*, on the said reciprocating carriage E, leaving sufficient slack in the belt to accommodate the motion of the carriage. The

weight of the belt *b* itself will, in most cases, be sufficient to keep it taut upon the bottom boards, &c.; but, if deemed desirable, a spring tightening-pulley, or a tightening-pulley controlled by a weighted lever, (easily understood and constructed by a skilled mechanic,) may be employed for such purpose.

c indicates a frame, arranged to inclose the endless belt as it leaves the strip-pressing mechanism, and interposed between said mechanism and the cutting mechanism. In this frame *c* are journaled sanding-rollers c^1, so arranged as to bear lightly upon the sides and top of the strip; and in order to supply sand to the rolls c^1, a series of sand-boxes, c^2, are arranged on the frame *c*, so that the rolls c^1 traverse the same.

K represents a second frame, erected on the bed A, preferably at right angles to the frame B, and adjoining the same, wherein is arranged a second endless belt, K′, of jointed sections, carried by suitable pulleys.

Between the reciprocating cutting-carriage E and the endless belt of jointed sections are arranged a series of three or more small transfer-rolls, *l*, usually provided with a belt, l^1, one of said rolls having its shaft extended and provided with a pulley, as at l^2.

Mounted in the frame K are two pulleys adapted to run faster than the transfer-pulleys, which latter pulleys carry a belt, *m*, whose function is to receive the cut section from the transfer-pulleys *l* and separate the sections the desired distance. The shaft of one of the pulleys of this belt or apron *m* is provided with a second pulley, from which a driving-belt passes to the pulley on the extended shaft of the transfer-pulleys.

Journaled on the frame K are two more sanding-rolls, *n*, provided with sand-boxes n^1, and so arranged as to sand the cut ends of the bricks or sections severed from the continuous strip.

N indicates a traveling mold-carriage, which carries the re-pressing or supplemental molding devices, said carriage either provided with a truck or adapted to slide on rods or ways n^2, as preferred, and reciprocated by a pitman, n^3, from the pulley of the belt K′. The bottoms n^4 of carriage N, on which the belt K′ rests and over which it travels, may be solid and move with the carriage, or it may be dispensed with, and rollers independent of the carriage substituted, as indicated by dotted line, Fig. 4.

The sides or frame of the carriage may be provided with cleats n^5, forming guideways for guide-bars *o*, and on the said frame are pivoted the lever of the shifting-arm *p* and the lever of the plunger *r*, while the mold is caused to move with the mold-carriage N by means of vertical cleats *s*, which may also be constructed to constitute the ends of the mold S.

The frame K for the endless belt K′, of jointed boards, is extended, as at L, to afford bearing for a friction-pulley, which rests on belt K′; also, to provide camways for actuating the shifting-arm, supplemental mold, and mold-plunger, which devices are employed for finishing the article, and will be next described.

p indicates the shifting-arm, whose function is to transfer the brick from the cross-belt *m* to the belt K′, for which purpose the shifting-arm is adapted to rise, fall, and traverse, is provided below with a foot-piece, p^1, and is secured above to the end of a lever, p^2, pivoted on the carriage or moving frame N, the opposite end of lever p^2 being provided with a loose or sliding pin, which rests alternately in one of two cam slots or grooves, p^3 p^4, the first slot, p^3, being straight for a distance, at its highest point, in order to keep the foot p^1 of the shifting device near the belt for so much of its travel as is necessary to sweep the brick off belt *m* onto belt K′. Then it is inclined down, so as to lift the foot p^1 and cause it to pass over the brick, and finally is made straight, to retain the shifting mechanism in its elevated position until the end of the travel in that direction, said cam slot or groove shallowing at its extremity, so as to push the sliding cam-pin across into the straight slot p^4, which keeps the parts elevated during the entire return-stroke. The cam-slot p^4 also shallows abruptly at its forward end, to transfer or push over the pin into a vertical extension of the first cam-slot, p^3, whereby the lever p^2 ascends and the foot p^1 is permitted to descend into position for again commencing its travel.

The brick, tile, or like article is thus swept onto the belt K′, which carries it into the mold S. This mold S is composed of the two side pieces, s^1, suspended from a yoke, s^2, and acting in conjunction with two end pieces, *s*, which latter are fixed to the frame, so that while the side pieces of the mold can rise and fall to receive and discharge a brick, tile, or like article, the mold as a unit moves with the carriage N. In order to actuate the mold, the yoke s^2 is attached to one end of a lever, s^3, which is pivoted on the frame or carriage N, the opposite end of said lever s^3 being provided with a sliding or loose cam-pin, which rests alternately in one of two grooves, s^4 and s^5, whose general forms and functions are the same as the cam-grooves p^3 p^4 before described, excepting that the groove s^4 is so shaped at the point indicated by * as to force the mold firmly down on the belt K′ during the action of the plunger. The mold moves through a given space in contact with belt K′, rises, and moves through the rest of its travel in its elevated position, and falls or sinks into its original position, the same as specified for the shifting mechanism, and substantially in unison therewith. The weight of the mold will usually be sufficient to cause it to descend into position at the end of its return travel; but, if found requisite under any circumstances, the drop of the mold may be insured at the proper time by means of a sliding weight, s^6, on the lever s^3.

t indicates the plunger, which works in the mold S, said plunger secured to a lever, t^1, pivoted by one extremity to the carriage or

moving frame N, and provided with a sliding cam-pin, which rests alternately in one of two grooves, t^2 t^3, the former of which, t^2, consists of two straight sections, in the same plane, united by a V-section, so that the plunger is held up for the first part of its travel to insure the seating of the mold, then depressed to compress the clay in the mold, and finally elevated, in which latter position it is retained by the straight groove t^3 during its return movement. The cam-grooves t^2 t^3 are shallowed abruptly at opposite ends, as before specified, for the purpose of shipping the sliding cam-pin. The free end of the plunger-lever t is weighted to the required pressure, as indicated at t^6.

u represents a friction-roll, adapted to rest on the belt K′ in such manner as to cause said belt to take its motion from the driving-pulley when it is not clamped by and moving with the mold and mold-carriage. This roll u is journaled in a frame, U, movable in slots u' in frame L, and the parts will in general be sufficiently heavy to insure their proper action; but, if desired, springs or weights can be added.

R represents a fly-wheel, arranged on the driving-shaft of the pulley of belt K′, said wheel having for its object to equalize the motion of belt K′ and the re-pressing or supplemental molding mechanism.

w represents a belt, by means of which the reciprocating cutting-carriage can be driven from the strip-molding mechanism w^1 w^2 w^3, belt and gearing for imparting motion to the endless belt K′, the mold-carriage N, and the re-pressing mechanism; but other means for imparting motion thereto may be employed if desired.

The sections for the endless belts I prefer to construct as shown in Fig. 8—that is to say, one end rounded, as at x x, with cavity y, and the other slightly concave, as at z, with knuckle or projection z', as by so doing a close and even surface is preserved.

To obtain the best results, the mechanism for molding the continuous strip should be adapted to form the same somewhat scant in width—say one-sixteenth of an inch less than the width desired in the finished article—the cross-belt m, for shipping the article from the cutting mechanism onto belt K′, should run at least twice as fast as the belt of the strip-molding mechanism, so as to effectually separate the cut sections, and the belt K′ should exceed in speed the speed of belt m, so as to separate the cut sections sufficiently far to insure the proper action of the supplemental mold or re-pressing devices.

The position of the cut section on the belt K′ so that it shall register with the mold S can be insured in several ways—first, by the relative position and travel of the shifting devices, and, secondly, by attaching a gage to the front of the mold S, as indicated by dotted lines, Fig. 4.

The dimensions of the parts are not herein given, first, because they will vary with the size and nature of the article molded, whether brick or tile, and may be varied at will by the skillful mechanic, who can readily compute the relative size of pulleys and travel of belts and molding devices required to obtain any given result.

The operation of these devices is as follows: The belt b of the strip-molding mechanism being kept supplied with sand and clay, fed thereto in front of the press-rolls C D, said rolls will mold the clay into a continuous strip rectangular in cross-section and scant in width. As the strip of clay thus molded passes between the sanding-rollers c^1 the latter, which receive moisture and motion from the clay strip, will gather sand from the boxes c^2 and apply it to the strip, so as to sand it thoroughly on the three exposed or unsanded sides. The strip passes thence onto the cutting-carriage, where it is severed into sections by the cutter or cutters i, and said sections are pushed by the advancing strip upon the transfer-rolls l, which deliver the sections to the transverse shipping-belt m. This belt m, running at a higher rate of speed than the belt l, separates the sections, carrying them forward until each in its turn comes in front of the shifting-foot p^1, when the latter sweeps it off from belt m onto belt K′. The movement of belt K′ carries the section (or article) between sanding-rollers n, which, acting in like manner to rollers c^1, sand the cut ends of the sections. At this part of the machine it is desirable that a workman should be stationed to correct the position of the (brick) cut section with relation to the belt and mold S; but such is not absolutely necessary, as the shifting mechanism p p^1, or a gage on the mold, can be so adjusted, as before specified, as to almost invariably effect the same result.

When the leading section or article upon the belt K′ has come into position beneath the mold S, the mold descends, inclosing the section, which is scant. The plunger r is then brought into operation, and for about one-third or one-half the travel of mold-carriage N the section is subjected to a re-pressing or final molding, after which the devices rise simultaneously, releasing the completed article, which is carried on by the belt, and can be removed from the machine while the carriage makes its return movement. The sliding cam-pins of the shifting-lever p^2, mold-lever s^3, and plunger-lever t^1, moving in the straight slots p^4 s^5 t^3, keep the several devices elevated until the close of the return movement of the carriage N, when the sliding cam-pins are pushed across into the cam-slots p^3 s^4 t^2, and the several operations of shifting a section from belt m to belt K′, and pressing and discharging an article, are repeated.

The advantages of my machine are the rapid and perfect manner in which bricks, tiles, and like articles can be formed, the few hands required to operate a machine, and the uniformity of the work produced.

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

1. The combination, with the endless jointed sectional belt or bottom boards of a brick-molding machine, of a supplemental belt of continuous fabric, such as leather, rubber, or its equivalent, substantially as and for the purpose specified.

2. In a machine for forming bricks, tiles, &c., the combination, with mechanism for forming a continuous molded strip of clay, of a series of sanding-rollers provided with suitable supply-boxes, said rollers arranged around and partly within the path of the feed and with relation to the supply-boxes, so that they may be operated by the molded strip, and will take the sand in limited quantity and apply it to the molded strip, substantially as specified.

3. The combination, in a brick-molding machine, of the press-rolls, the endless sectional belt of bottom boards, the continuous belt of leather or equivalent material, and the reciprocating cutting-carriage, substantially as and for the purpose specified.

4. The combination of the cutting-carriage, the transfer rolls and belt, a shipping-belt, such as *m*, and a transverse sectional belt, such as K′, arranged and adapted to operate substantially as and for the purpose specified.

5. The combination of mechanism for molding a continuous strip of clay, mechanism for cutting the strip into sections, a sectional belt for receiving and separating the sections, and a series of sanding-rollers for sanding the cut ends of the sections, substantially as specified.

6. The combination of a shifting device, endless belt or bottom boards, and a mold and plunger adapted to traverse, with mechanism for molding a continuous strip of clay, severing the same into sections, and delivering it to the shifting device, substantially as and for the purpose specified.

7. The combination, with the sectional traveling bottom board, of the mold-carriage and mold-plunger and the shifting device, the whole constructed substantially as described, and the plunger-mold and shifting device adapted to be operated simultaneously by cam mechanism, substantially as and for the purpose specified.

In testimony whereof I, the said ISAAC MORLEY, have hereunto set my hand.

ISAAC MORLEY.

Witnesses:
R. H. WHITTLESEY,
F. W. RITTER, Jr.