(No Model.) 2 Sheets—Sheet 1.

C. CHAMBERS, Jr.

BRICK MACHINE.

No. 297,671. Patented Apr. 29, 1884.

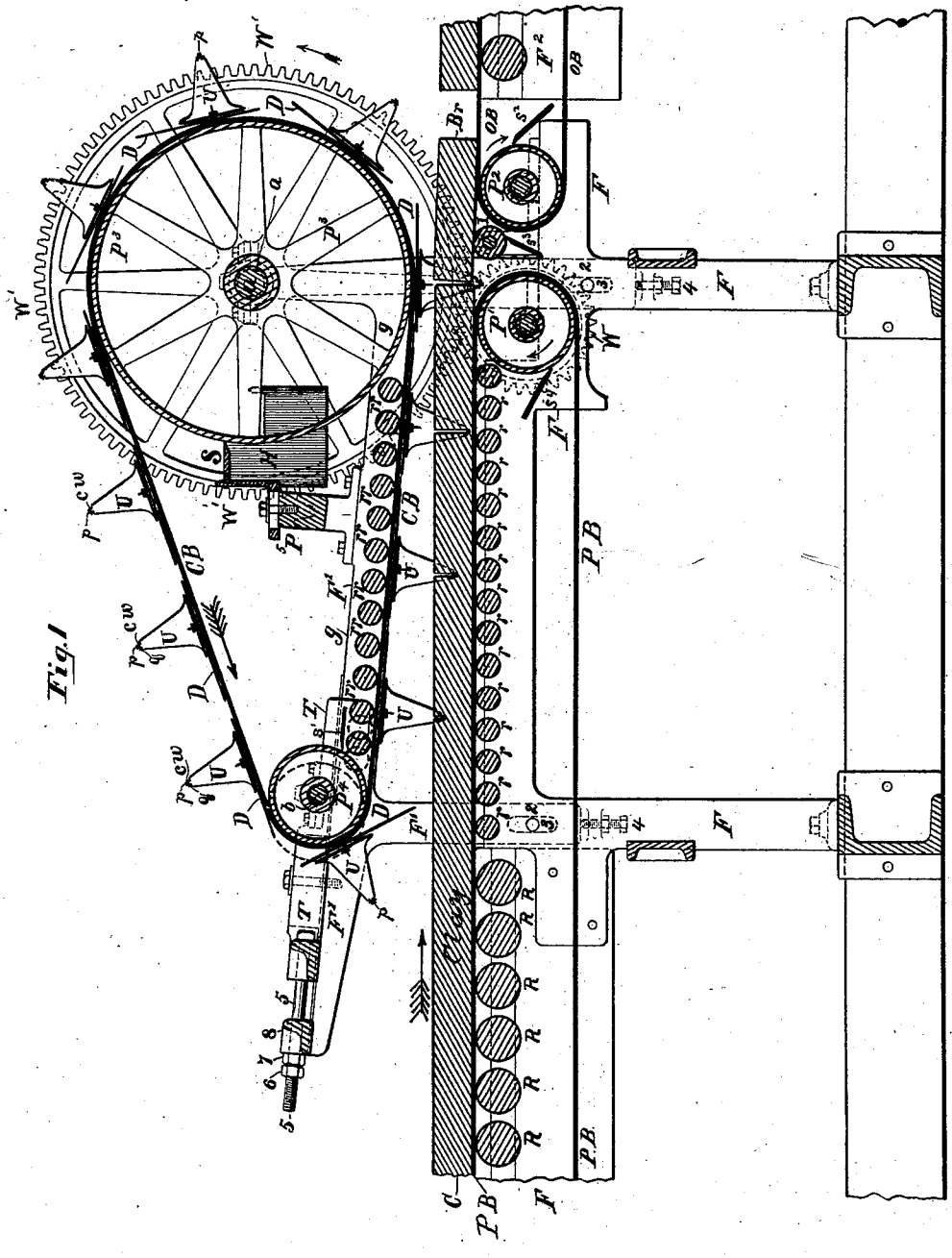


Fig. 1

WITNESSES:

John Burkhardt.

W. V. Burkley

INVENTOR

Cyrus Chambers, Jr.

per Joshua Pusey, atty

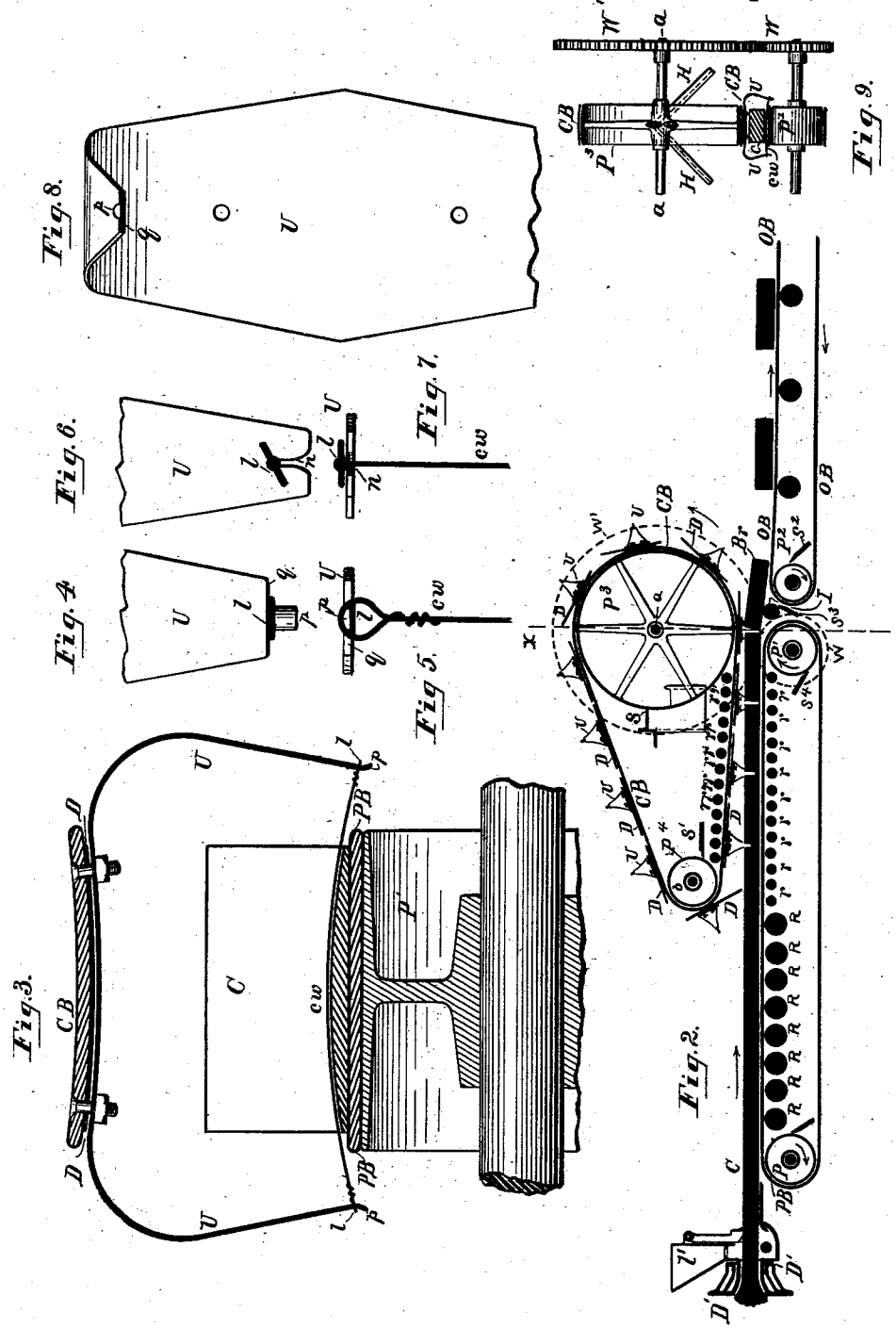
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UNITED STATES PATENT OFFICE.

CYRUS CHAMBERS, JR., OF PHILADELPHIA, PENNSYLVANIA.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 297,671, dated April 29, 1884.

Application filed February 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, CYRUS CHAMBERS, Jr., a citizen of the United States, residing at the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Brick-Making Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

Figure 1, Sheet 1, is a longitudinal section; Fig. 2, Sheet 2, a side elevation *en silhouette;* Fig. 3, Sheet 2, a vertical cross-section, enlarged, through the cut-off carrier-belt, U-shaped bow, bar of clay nearly severed, propulsion-belt, and its pulley, hereinafter described; Figs. 4 and 5, Sheet 2, side and end views, respectively, of part of one of the U-shaped bows, showing a means of securing the cut-off wires to the bows. Figs. 6 and 7, Sheet 2, are similar views, illustrating a modification of the device shown by Figs. 4 and 5. Fig. 8, Sheet 2, is a plan of U-shaped bow or cut-off-wire holder; and Fig. 9, Sheet 2, is an end view of pulleys, gears, and scraper-wings.

This invention relates to that class of brick-making machines in which the clay, forced out through a die in a bar of suitable width and thickness, is cut off into bricks while in motion. Machines operating upon this general principle are well known as the "Chambers brick-machines," and are described in Letters Patent of the United States No. 39,884, of September 15, 1863, and in No. 207,343, of August 27, 1878, and in other patents.

The present improvement has relation only to a method and mechanism for severing into bricks the continuous bar of clay, which is expressed through a die, as shown and described in the patents above referred to, or by any other suitable devices, its object being to provide a cheaper and simpler, yet not less certain and efficient cut-off than those described in said patents, or than any other organization known to me for a like purpose.

Although other means for driving my improved cut-off mechanism may be employed with more or less approach to perfection of result, those which I shall now proceed to describe rely entirely upon the force of the moving bar of clay to automatically operate the cut-off devices.

Referring to the accompanying drawings, C, Figs. 1, 2, 3, and 9, indicates the bar of clay issuing from the die D', Fig. 2, of the tempering-case of the machine, thence from the sand-box C', and resting upon an endless belt, PB, (which I shall term the "propulsion-belt,") which travels over and upon a series of transverse rollers, R and *r*, and pulleys P P', journaled in and at the ends, respectively, of a supporting-frame, F. These rollers are placed quite closely together in line, so that the belt cannot sag, but will be kept in close contact with the bar of clay, in order to preserve as much frictional contact as possible between the belt and the bar, and thus avoid any slipping of the latter upon the former. Rollers *r*, which, it will appear, are located directly beneath the cut-off belt, and which support that part of the bar of clay being severed into bricks, are relatively of small diameter, so that the distance between the points of contact of their peripheries with the propulsion-belt shall be as little as practicable.

OB is an endless belt, (called the "off-bearing belt,") which receives the bricks in succession as they are cut off from the clay bar C. This belt is driven positively faster than—say double—the speed of the propulsion-belt PB, and passes around a pulley, P^2, journaled at the end of frame F. It is placed on a line a little below the top of the opposite pulley, P', the main purpose whereof will appear when I shall arrive at the description of the complete operation of the cut-off devices.

I have stated that the cut-off mechanism is actuated by the force of the moving bar of clay. This is the sequence of actuation. The friction of said bar upon the propulsion-belt PB moves the latter, which turns the pulley P' in the direction of the arrow marked thereon, Figs. 1 and 2, which rotates a pinion, W, fixed upon the shaft of P', the teeth of which pinion meshing into those of a large spur-wheel, W', turns the latter in the direction of the adjacent arrow, which imparts motion to the cut-off mechanism proper. This I shall now proceed to describe in detail. It consists of a pulley, P^3, fixed to the side of the gear W', or, as shown, keyed to the shaft *a* of the latter, and is in line with the path of the bar of clay. A smaller pulley, P^4, some distance from and in line with the other, and an endless belt, CB, (which I shall term the "cut-off

belt,") passing over both of said pulleys, upon which belt are mounted a series of cut-off wires, as presently to be described. The length of this belt should, in order to make bricks of equal length, as will be quite obvious, be a multiple of the length of the bricks to be cut off from the bar of clay.

The shaft *a*, which carries the larger pulley, P^3, and also gear W', and the shaft *b* of pulley P^4, are mounted in bearings in a common frame, F', whose standards are secured to the lower frame, F, by means of bolts 2, passing through slots 3, whereby, with the aid of set-screws 4, Fig. 1, the frame F' may be adjusted vertically at either or both ends thereof. Such adjustments are sometimes required, as will be explained farther on.

It will be observed that the small pulley, P^4, is placed with relation to its fellow P^3, so that the lower or operative side of the cut-off belt CB is inclined toward the front of the clay bar—that is to say, in the direction of its movement. Pulley P^4 is journaled in a tightener-frame, T, bolted to frame F', whereby the interval between it (P^4) and pulley P^3 may be increased or diminished at pleasure. This is effected by means of the bolt 5, passing through a lug at the end of the movable frame T and lug 8 on an extension of the fixed frame F', together with the nuts 6 and 7, working against lug 8 upon the threaded portion of the bolt, all as shown in Fig. 1.

The cut-off wires *cw* are secured to elastic U-shaped steel bows U, the distance between the sides of which is greater than the width of the bar of clay and of pulley P'. (See Fig. 3.) Said bows are bolted onto long and broad plates D, which are in turn secured to the cut-off belt in a position to bring the wires parallel, equidistant, and at right angles to the bar of clay, the distance between the wires being exactly equal to the length of the bricks to be made. These cut-off wires are preferably of steel, and are twisted into a loop, *l*, at each end, as seen in Figs. 3, 4, and 5, so that they may be readily placed upon and be held taut by the spring-bows U. Each limb of the latter terminates in a pin or small projection, *p*, Fig. 4, &c., extending from a shoulder, *q*, which serves as a stop to the loops, and thereby prevents the wire from being forcibly displaced by the back-pressure against it when penetrating the bar of clay. Other means for securing the wires to the bows, whereby they may with facility be attached to and detached from the bows while the endless carrier is in motion, if desired, may be employed—for example, that illustrated by Figs. 6 and 7, which consists in making use of a deep notch, *n*, at the end of the bow, and a knot, head, or loop, *l*, on the end of the wire.

For a purpose hereinafter appearing, the plates D, to which the bows U are attached, are made nearly as long as the length of the bricks to be made, so that there will be but a small interval between their adjacent ends. They are also curved, as shown in Fig. 3, to conform to the swell or convexity of the pulleys P^3 and P^4. This insures the holding of the bows, or in effect the cut-off wires *cw*, in proper alignment, the curvature of the plates preventing any lateral shifting or twisting when passing over the said pulleys and under the series of "resistance-rollers" *rr*, whose faces have also a corresponding curvature. These plates D are secured to the cut-off belt at a single point, or, rather, on a single transverse line, so that they will ride easily over the pulleys P^3 P^4. It will also be seen by reference to Figs. 1 and 2 that the point of attachment of the bows U to these long plates and of the latter to the cut-off belt is considerably to the rear of the transverse axis of the plates. The object of this is twofold: first, to provide for the forward ends of the plates being supported by the first of the line of small rollers *rr*, next the pulley P^4, immediately after they (the plates) have rounded the latter, for it will be seen the space between the under side of that pulley and said roller is necessarily much greater than that between the series of rollers *rr;* secondly, in order that the rear ends of the plates, by reason of such comparatively short distance from the point of attachment of the plates to the belt, may not strike the top of the bar of clay as the plates turn to ride up over pulley P^3, for it is obvious that the farther the rear ends of the plates project from said point of attachment the farther will be their sweep.

Rollers *rr* are journaled in an inclined crosspiece, *g*, Fig. 1, connecting the standards of frame F', and are arranged as shown, so that the under part of their peripheries are on a straight line drawn from the under side of the faces of P^3 and P^4, and inclined correspondingly with the lower portion of the cut-off belt toward the front end of the bar of clay. The function of this line of rollers is to firmly guide and support the cut-off belt and take the upward push or resistance of the clay while being traversed by the wires. One or more—in the present instance two—of the series nearest the pulley P^4 are carried in a forward extension of the tightener-frame T, so that their distance from said pulley will remain unaltered however the pulley may be shifted to and fro.

From the preceding description of the several parts and devices it will be readily understood that as the cut-off belt is put in motion by the bar of clay actuating the gears W W' and pulley P^3 in the manner mentioned, the equidistant cut-off wires thus mounted upon the flexible belt suitably inclined to the clay bar are compelled, successively, to gradually enter and pass through the latter, finally severing it into bricks. In order that the particular wire which has rounded the small pulley, P^4, shall in all cases begin to enter the bar of clay as soon as (and not sooner) the plate D has fully rounded said pulley and has found a firm bearing against it and the nearest of the small rollers *rr*, that end of the frame F' is made adjustable, as stated, (in connection

also with the described longitudinal adjustment of said pulley in the tightener-frame T,) and the vertical adjustability of the other end of the frame F′ is desirable, so that the cut-off wires may be brought to a proper position with relation to the bar of clay and other parts.

The teeth of the gears W W′ are made of unusual length, so that they will remain properly engaged at any required adjustment of the gear W′. These gears must also be so proportioned to each other as to cause the cut-off belt to be driven at a proper speed with relation to that of the bar of clay, so that the wires will cut squarely through the latter. As the cut-off belt is inclined to the clay-bar, the relative distance that a point on the belt has to move is greater than that of an opposite point on the bar. Therefore, the proportion of the diameters of these gears W W′, one to the other, must be such as to give just the increased speed to the latter (the cut-off belt) sufficient to compensate for the slower speed of the bar of clay. This travels, as it were, on the base of a right-angled triangle, while the path of the wires from the time they touch the bar of clay until they emerge after having gone through it is that of the hypotenuse of the triangle. The severance of each brick is effected—as nearly as the sag or upward curve of the cut-off wire caused by the resistance of the clay will permit—when the wire *cw* approaches nearest to the pulley P′, as illustrated in the enlarged section, Fig. 3; but the complete severance is secured by locating this pulley (P′) somewhat to the rear of the vertical from the center of pulley P^3, as shown in Figs. 1 and 2, whereby the wire is caused to pass through, and, in fact, a short distance below, the bar of clay before it is carried past the vertical. Here the necessity of making the distance between the limbs of the U-shaped bows greater than the bar of clay and pulley P′ is apparent. Should the cut-off wires strike a stone or other hard obstacle embedded in the clay, the elasticity of the U-shaped bows comes into play and allows the wires to yield to the extra strain, and thus permits them to slide over or around the obstruction and brings them back to their normal position after the stone, &c., has passed on. As the bar of clay C perforce advances, its free end, nearly severed, is received by and upon an independent transverse roller, I, which performs an important function, soon to appear. It will be seen, by looking at Figs. 1 and 2, that this roller is journaled at the end of the propulsion-belt frame F, Fig. 1; that it is placed nearer to the pulley P^2 at the end of the off-bearing-belt frame F^2 than to pulley P′, and that it is elevated a little above the line of the off-bearing belt—that is to say, in the same horizontal plane with the propulsion-belt. Until the end of the clay bar is entirely cut off to form a brick, it advances on to roller I, its free end extending over and above the off-bearing belt; but, by reason of the stated relative position of that roller at the moment or shortly after the severance of the bar is completed, the center of gravity of the brick B′ passes beyond the supporting-line of the roller, and the brick tilts over upon the rapidly-moving off-bearing belt, the said roller then freely adapting itself to the increased speed acquired by the brick.

In order to prevent the wire, which has just done its work, and is moving on its way to repeat it in its turn, from striking the under side of the brick as the belt carries it (the wire) on and upward over the pulley P^3, I make the latter of relatively large diameter, so that the brick will have ample time to get out of the way before the wire can interfere with it. As the belt quickly turns the wire over the pulley P^3, it will readily be understood that the wire cannot be struck by the end of the clay bar behind.

As shown in Figs. 1, 2, and 9, an adjustable scraper, S, is secured to a pedestal, P^5, on the cross-piece of frame F′, and is kept in contact with the face of pulley P^3. Its office is to clean the latter of any clay that may chance to fall from the wires onto the lower portion of the cut-off belt and be carried around the pulley. The clay thus scraped off falls upon inclined wings H, by which it is directed off to the ground. The small pulley P^4 is also provided with a similar scraper, s', Figs. 1 and 2. Pulleys P′ and P^2 and roller I also have scrapers s^4, s^2, and s^3, respectively, for a similar purpose.

I have hereinbefore stated, in effect, that the cut-off wires on the belt CB should be placed the same distance apart. It is preferred to have the number of such wires an even number—for instance, twelve, as shown in Figs. 1 and 2. The reason for this preference arises from the fact that the usual length of bricks is practically one-half the length of ordinary drain-tiles, and by taking off every other wire and substituting a suitable hollow or tile die for the solid or brick die the machine is very readily changeable from a brick-making to a tile-making machine, and vice versa.

I do not claim, broadly, a brick-machine having devices for expressing the clay from a die in a bar, combined with mechanism for cutting off the bar into bricks, consisting of a series of wires actuated by the force of the ejected bar or otherwise, as I am informed that such machines have been known wherein the clay was forced out from a die intermittingly, and the bar severed into bricks by means of wires mounted on a drum or wheel to which motion was imparted by suitable mechanism. Nor do I claim the U-shaped bows for holding the cut-off wires, except when elastic, as and for the purpose described. Although I prefer to use these bows or frames with elastic sides, and shall specifically claim the same herein, yet I shall not confine myself thereto, as it is obvious that if the sides or limbs of the frames be made rigid, and the cut-off wires be strained between them by means of a spring or springs to which the cords of the wires are connected,

the important function will be performed of permitting the wires to yield and to slide over and around stones, &c., without injury, and to return to their normal position, as hereinbefore described. Other equivalent means of accomplishing this feature of my invention may be devised by any skilled mechanic.

Having thus described my invention, so that any one skilled in the art to which it appertains may know how to construct and operate the same, what I claim as new and original, and wish to secure by patent, is—

1. The improvement in the art of making bricks of clay or other plastic substance, which consists in forcing the same through a die in a bar and cutting the latter into bricks by means of a wire or wires mounted on an endless belt propelled automatically by the pushing force of the said bar, through suitable intermediate mechanism, to move in the same direction as the bar and diagonally across its path, the movement given to the wire or wires with relation to that of the bar being as described, whereby the latter is intersected transversely at right angles, and is cut off into brick-lengths, substantially as set forth.

2. The improvement in the art of making bricks of clay or other plastic material, consisting in forcing such material through a suitable die in a continuously-moving bar or column, and simultaneously dividing the same into bricks by means of a wire or series of wires caused to move with the continuous bar, and at the same time across its path, substantially as set forth.

3. In a machine for making bricks of clay or other plastic material, the following elements, combined and operating substantially as hereinbefore described, viz: mechanism for expressing a body of such material through a die in a bar or column, means for sustaining the latter, and mechanism for severing it into bricks, consisting of one or a series of wires mounted on an endless belt, substantially in the manner described, caused to move with and to carry said wire or wires across the path of the said bar of clay, whereby the latter is divided into bricks.

4. The combination, in a brick-making machine, with mechanism for forcing the clay through a die in a continuously-moving bar, of means for sustaining and preserving the same in line with the die, and a device for severing the bar into bricks, consisting of a wire or a series of wires suitably mounted on an endless flexible belt arranged and caused to move with and simultaneously across the path of the continuous bar, whereby the same is cut off into bricks, all constructed, combined, and operating substantially as described.

5. In a brick-making machine, the combination, with means for forcing a continuous bar of clay through a die, of an endless belt running over pulleys and supported in a suitable frame, which belt is located and adapted to receive said bar of clay thereon and be by the latter propelled, and mechanism for cutting off the advancing end of the bar into bricks, consisting of one or a series of wires suitably mounted over and near the end of the bar on a flexible endless belt inclined toward the bar of clay and propelled, through intermediate connections, by the push or force of the bar impinging upon the first-mentioned belt, all combined, constructed, and adapted to operate substantially in the manner and for the purposes shown and described.

6. The combination, with the propulsion-belt PB, adapted to receive and sustain the ejected continuous bar of clay, of the pulley P′, gears W W′, pulleys P^3 and P^4, and the endless carrier running upon the last-mentioned pulleys, and having mounted thereon the cut-off wires, whereby the wires are successively carried athwart the moving bar of clay, and whereby the latter is severed into bricks, substantially as shown and set forth.

7. In that class of brick-machines wherein the clay is expressed through a die in the form of a bar, the combination of a movable carrier, a series of cut-off wires secured thereto and held taut by spring-controlled devices, whereby said wires are adapted to yield to hard bodies in the clay and then resume their normal position, together with suitable mechanism for propelling said carrier and causing the cut-off wires to advance through and sever the bar of clay into bricks, substantially as and for the purpose set forth.

8. In combination with the endless belt C B, the U-shaped bows secured thereto, and adapted to hold the cut-off wires, substantially as shown and described.

9. The combination, with the endless belt or carrier CB, of the elastic U-shaped bows secured thereto, the said bows being adapted to hold and by their elasticity keep taut the cut-off wires, yet allow them to yield temporarily to obstructions, substantially as specified.

10. In combination with the belt CB, the U-shaped bows having means, substantially as shown, for the ready attachment thereto of the cut-off wires, and for determining and limiting the position of the latter, substantially as and for the purposes set forth.

11. In combination with the endless cut-off belt and the described wire-holding bows, the rigid plates D, substantially as shown, and for the purposes specified.

12. In combination with the bows U, the cut-off belt and its pulleys, the plates D, when secured to said belt at a single point or transverse line, whereby the belt is at all times permitted to hug closely the said pulleys, substantially as specified.

13. The combination, with the cut-off belt and its convex-faced pulleys P^3 P^4, and the U-shaped bows, and the series of convex-faced rollers *rr*, of the plates D, having concaved bases to conform to the shape of said pulleys, substantially as and for the purpose specified.

14. In combination with the flexible endless carrier CB, wire-holders U, and pulleys

P^3 P^4, of the plates D, when secured to said belt at a single point or transverse line to the rear of the minor axis of the plates, substantially as and for the purposes specified.

15. The combination, with the endless cut-off carrier-belt and its pulleys, and the cut-off wires mounted on said belt in bows or frames, having elongated bases, of the series of resistance-rollers *rr*, the arrangement, construction, and operation being substantially as and for the purposes set forth.

16. The combination, with the belt CB, pulley P^4, driving-pulley P^3, the series of wires mounted on said belt in a suitable frame, and the line of resistance-rollers *rr*, of the opposed series of rollers *r* beneath the propulsion-belt, all constructed, arranged, and adapted to operate substantially in the manner and for the purposes described.

17. The combination, with the cut-off belt carrying the transverse wires, the pulley P^3, and mechanism for driving the same, of the pulley P^4, journaled in the tightener-frame T, whereby said pulley P^4 may be adjusted longitudinally, substantially as and for the purposes stated.

18. In combination with the propulsion-belt, its pulley P′, and the endless belt bearing the cut-off wires, the pulleys P^3 and P^4, journaled in the vertically-adjustable frame F′, substantially as and for the purposes specified.

19. The combination, with the cut-off belt having the cut-off wires suitably mounted thereon, as described, of the pulley P^3, and the tightener-frame T, having pulley P^4, journaled in said frame, together with one or more resistance-rollers, *rr*, whereby the relative positions of the pulley P^4 and said rollers will remain unaltered, substantially as and for the purpose specified.

20. The combination, with the wire cut-off belt and its pulleys, arranged as shown with relation to the propulsion-belt PB and to the continuous clay bar C, of the gears W W′, proportioned as described, whereby the said cut-off belt is caused to advance at a speed having a relation to that of the propulsion-belt—that is, in effect the bar of clay—as set forth, whereby the cut-off wires are caused to be carried squarely through the moving clay bar.

21. The combination, with the cut-off belt and mechanism for driving the same, and rollers *r*, and pulley P′, of the U-shaped wire-holders having the distance between their opposite limbs greater than the width of said rollers and pulley, so as to admit of the cut-off wires being carried below the bar of clay, as specified.

22. In a brick-machine of the class recited, the following elements in combination, viz: an endless belt or its equivalent for receiving and sustaining the moving bar of clay issuing from the die of the machine, an endless carrier having cut-off wires suitably mounted thereon and propelled by mechanism, substantially as described, and an off-bearing belt caused to travel at a greater surface speed than that of the carrier and the bar of clay expressed from the die of the machine, whereby the severed bricks are successively carried away by said off-bearing belt in time to escape the wire that has just severed the brick from said moving clay bar, the combination and arrangement being substantially as and for the purpose described.

23. The combination, with the propulsion-belt, and the wires mounted upon the endless cut-off belt running over pulleys above the path of the bar of clay and propelled by suitable mechanism, substantially as shown, of the off-bearing belt caused to run faster than said propulsion-belt, whereby the severed brick is carried away in time to escape the wire which has just cut it from the said bar, substantially as shown and described.

24. In combination with the propulsion-belt and the off-bearing belt running over pulleys, respectively, in suitable frames, the independent transfer-roller I, located with relation to said belts, substantially as and for the purpose described.

25. The improvement in scrapers for freeing belt-pulleys of clay or other substances, consisting in the combination, with said scrapers, of deflecting-wings for directing the material scraped from the peripheries of the pulleys, so that the same will fall beyond the belts, substantially as described.

26. In combination with the cut-off belt and its pulleys, the scrapers having the deflecting-wings H, as and for the purpose stated.

27. In the class of brick-machines in which the bar of clay expressed through a die is severed into bricks by means of a series of wires on an endless moving carrier, the method of adapting the cut-off mechanism for making either bricks or tiles, (in connection with suitable dies,) consisting in mounting upon said carrier an even number of said cut-off wires whose distance apart is substantially equal to the length of ordinary bricks, and removing alternate wires for adapting the cut-off to make tiles, and reinserting such alternate wires for making bricks, substantially as set forth.

In testimony whereof I have hereunto affixed my signature this 1st day of February, A. D. 1883.

CYRUS CHAMBERS, JR.

Witnesses:
JAMES R. MAGUIRE,
I. H. CHAMBERS.