No. 678,259. Patented July 9, 1901.

H. K. KING & C. CHAMBERS, JR.

BRICK MACHINE.

(No Model.) (Application filed June 15, 1899.)

9 Sheets—Sheet 1.

Fig. 2.

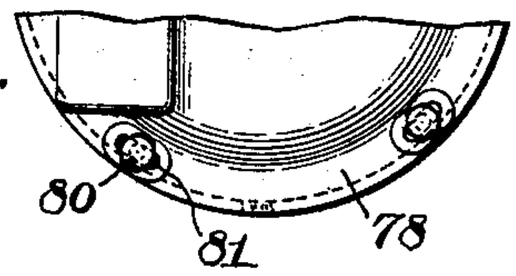

Fig. 3.

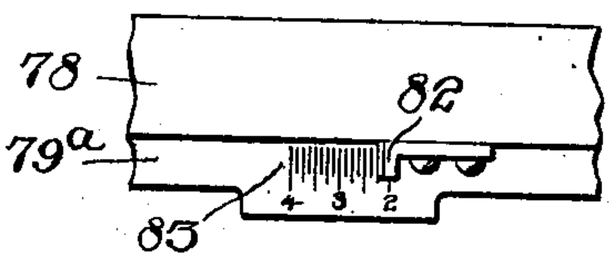

Fig. 1.

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Fig. 4.

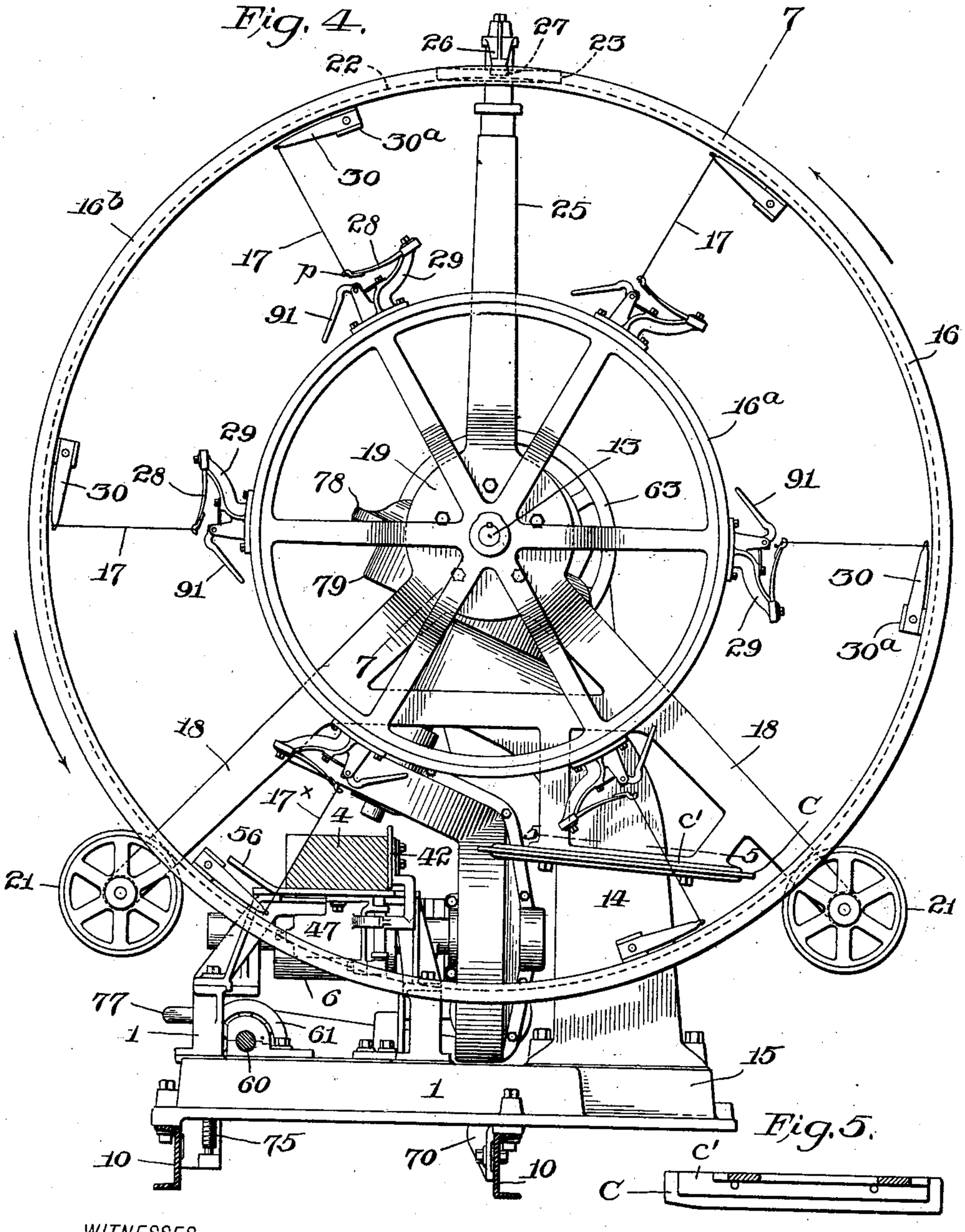

Fig. 5.

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Fig. 6.

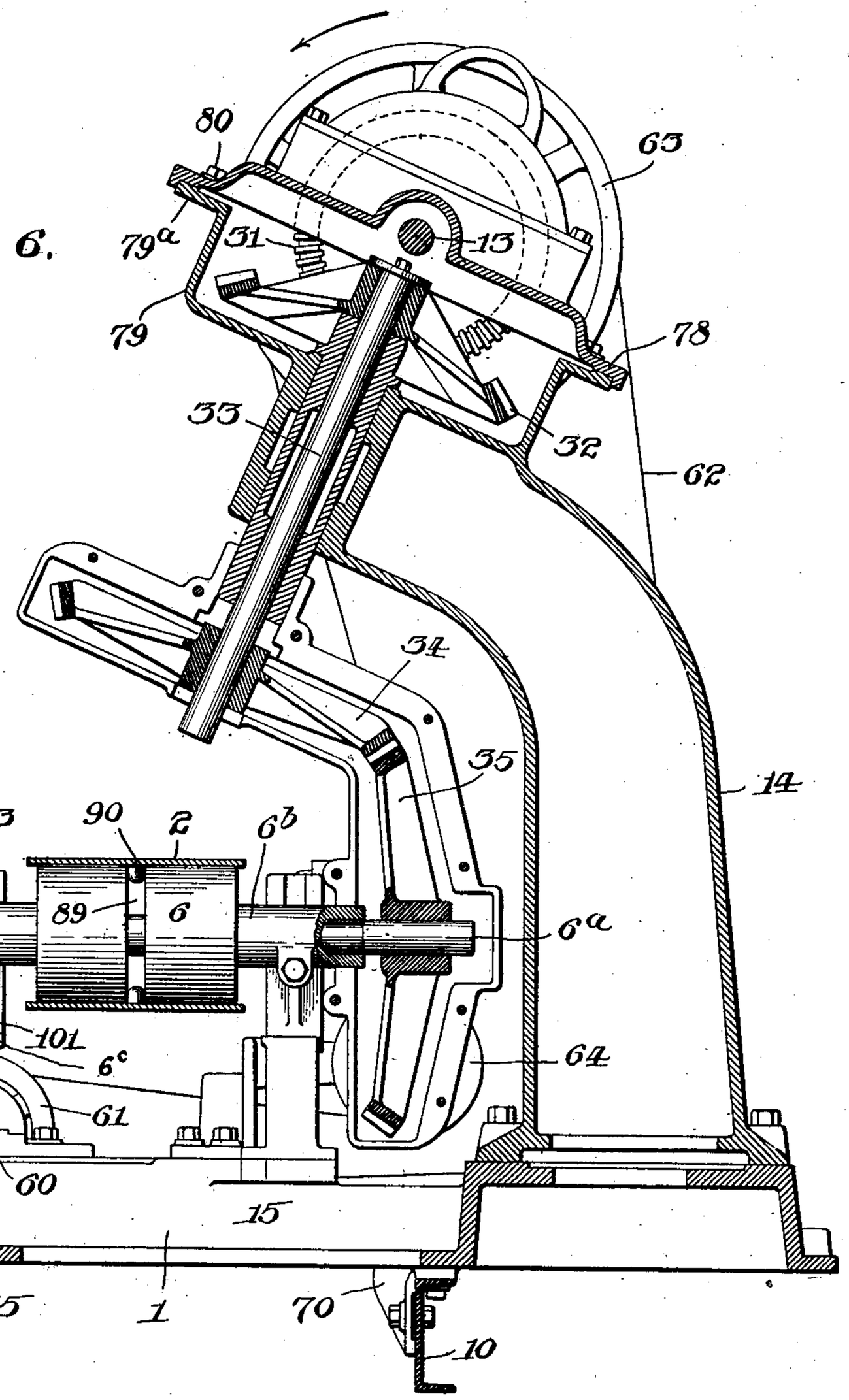

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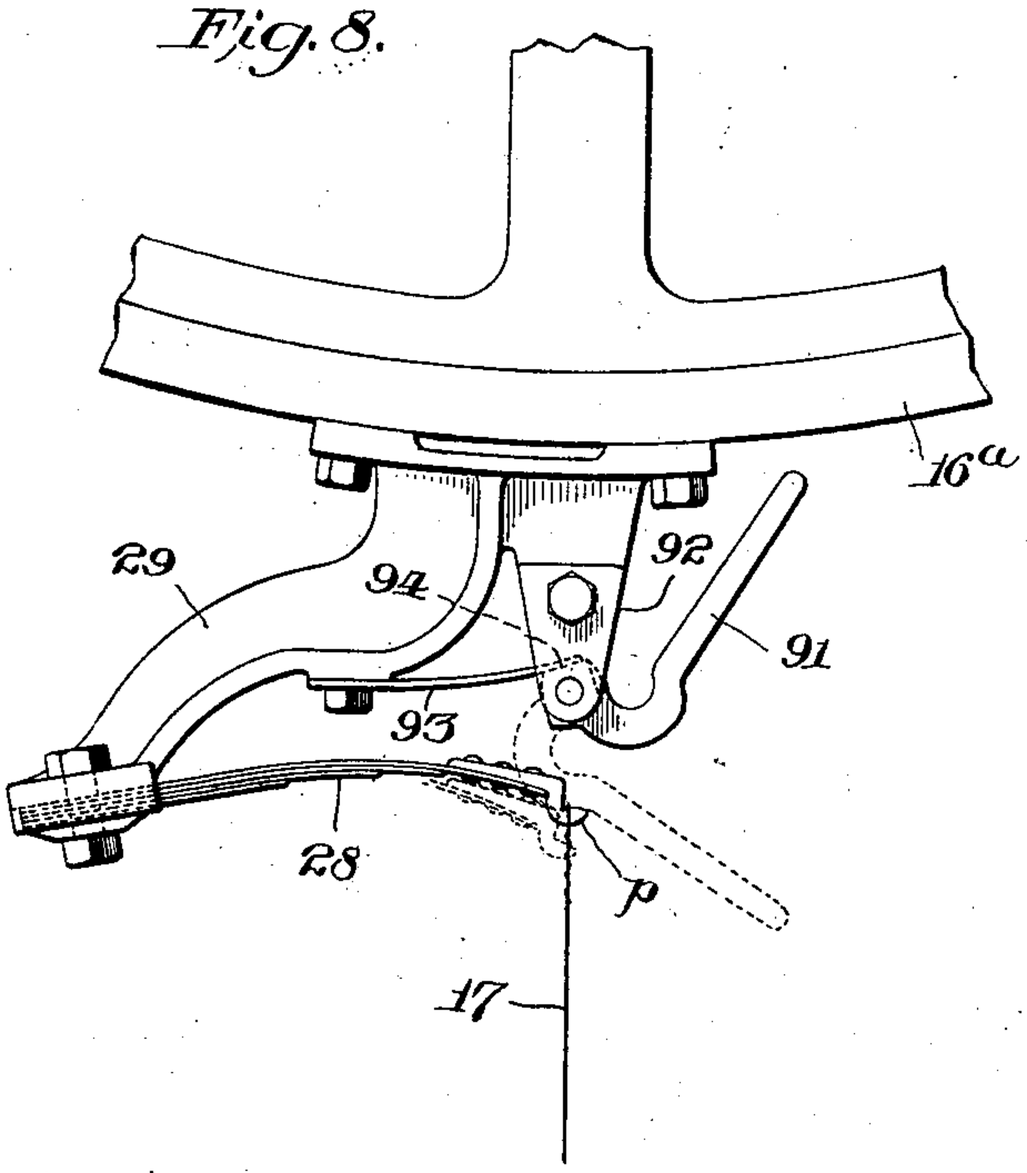
Fig. 8.



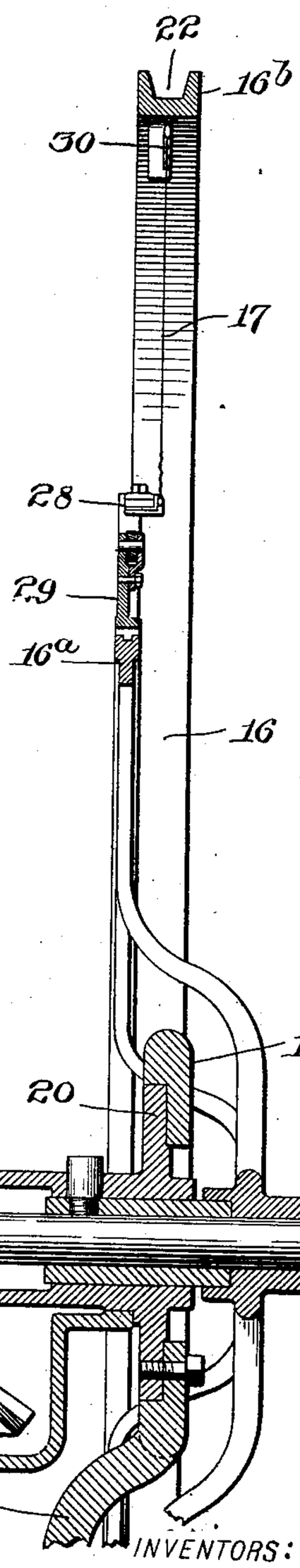
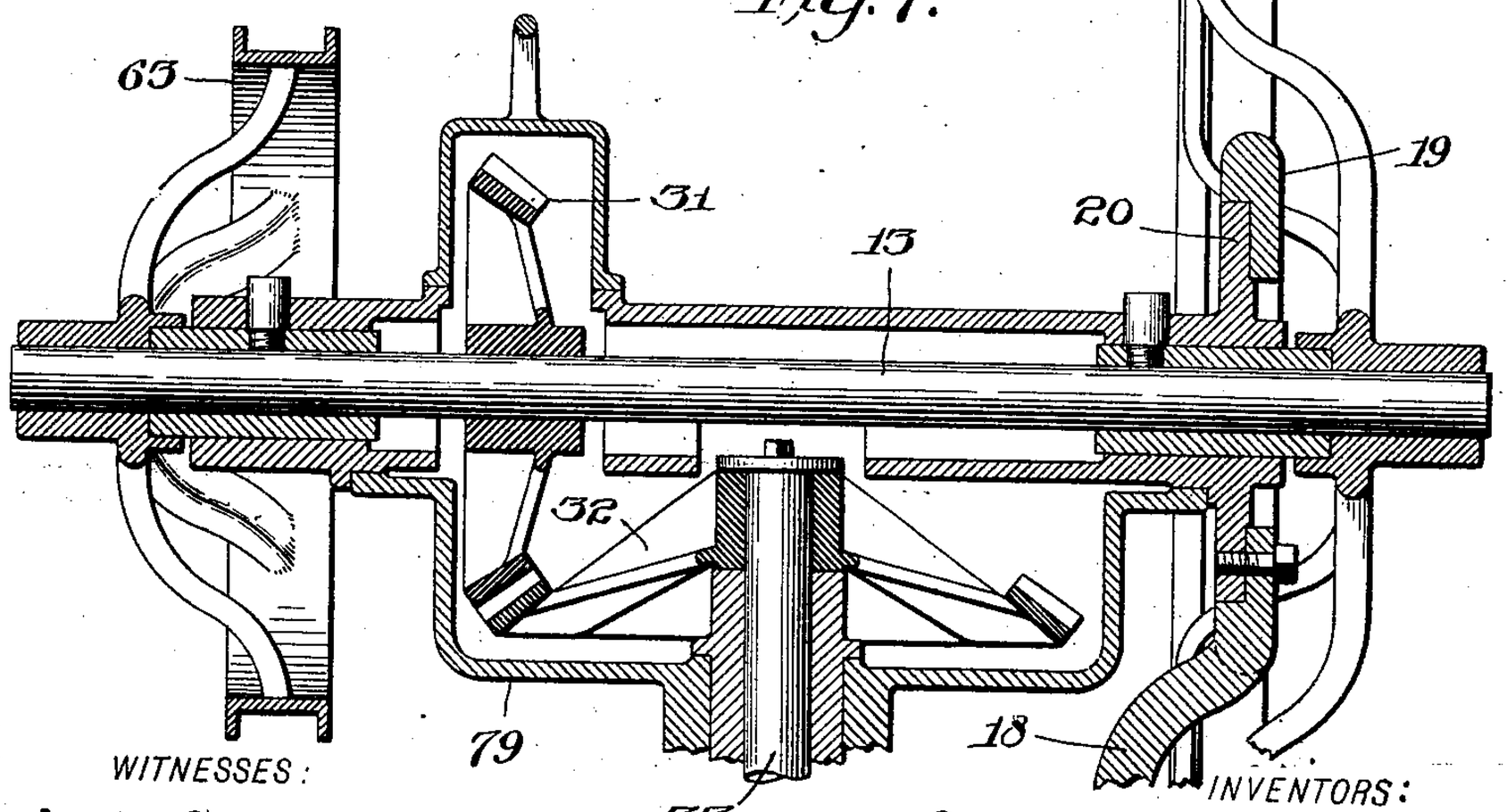


Fig. 7.



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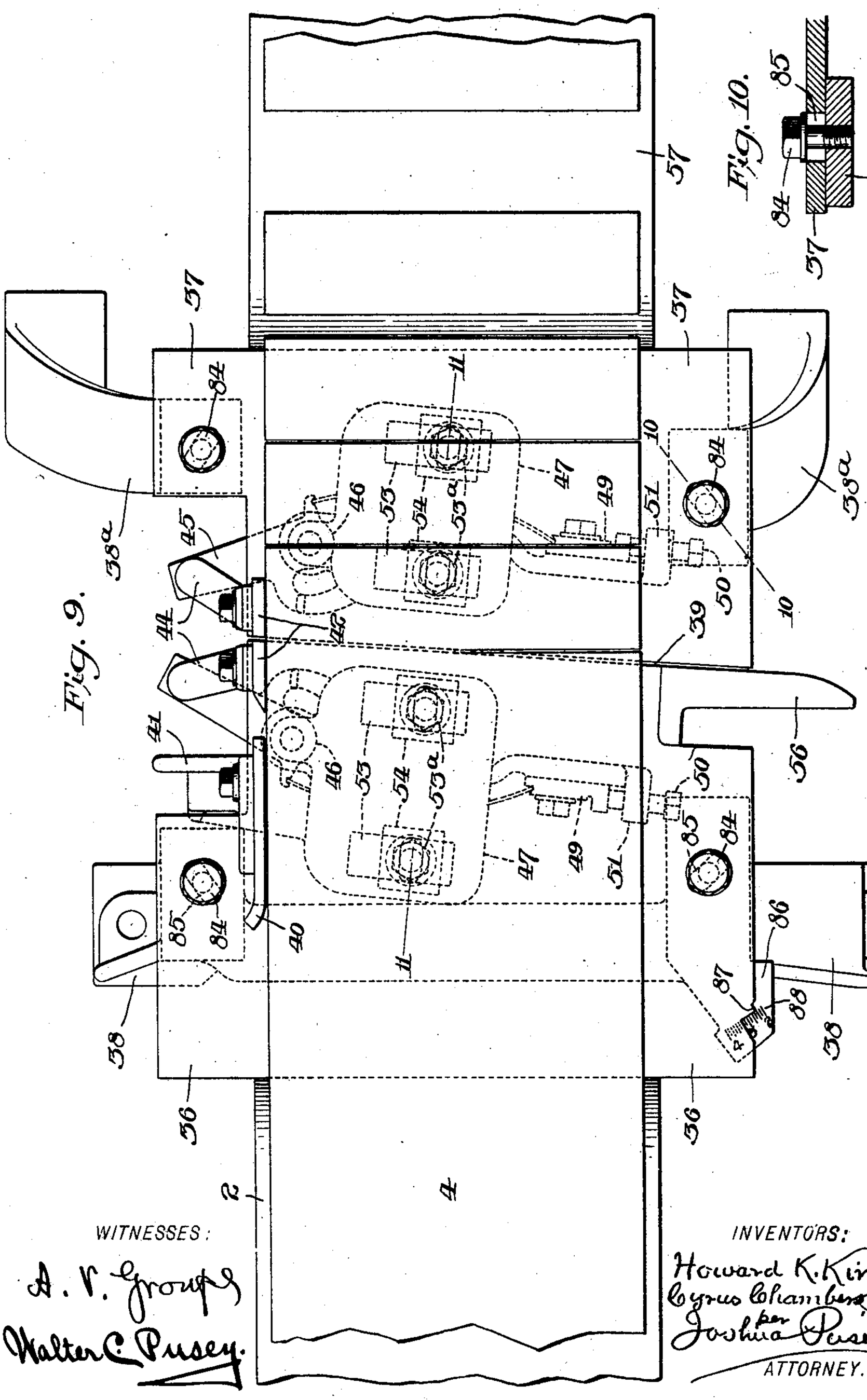

Fig. 9.

Fig. 10.

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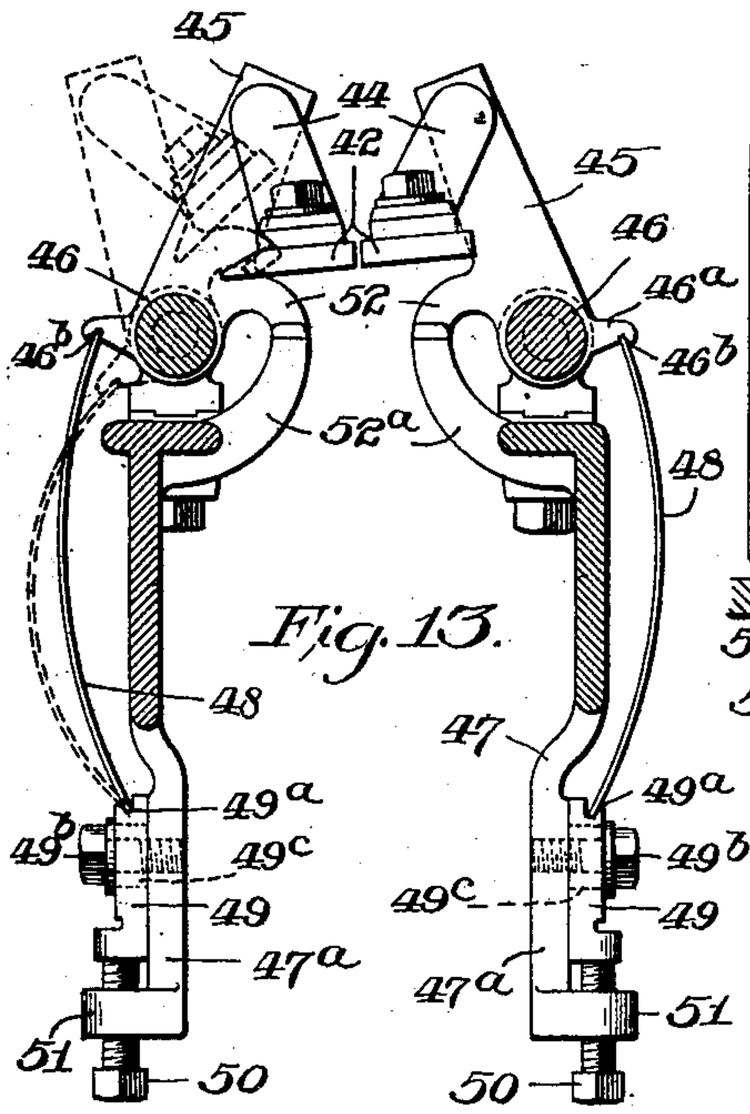

Fig. 13.

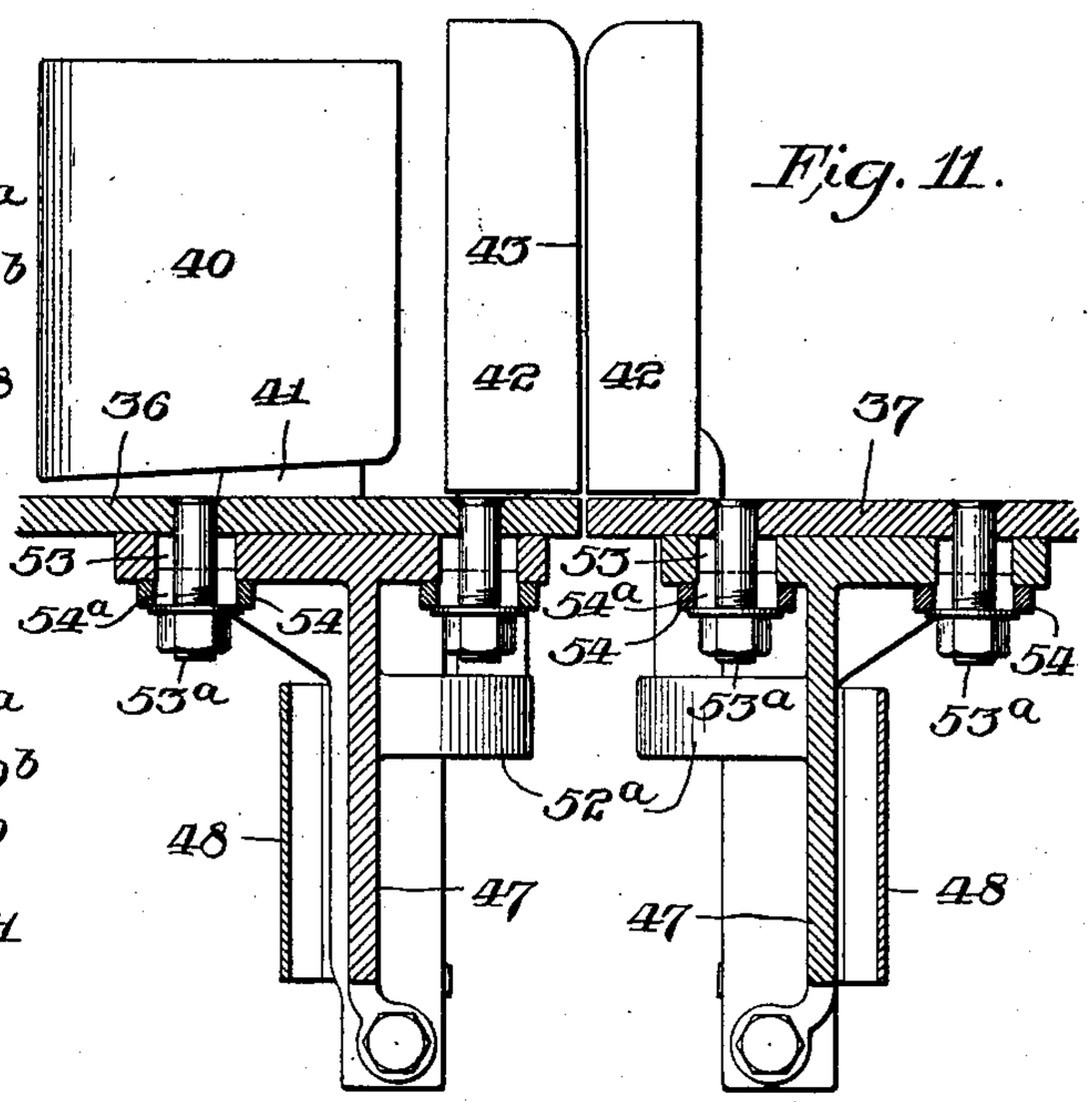

Fig. 11.

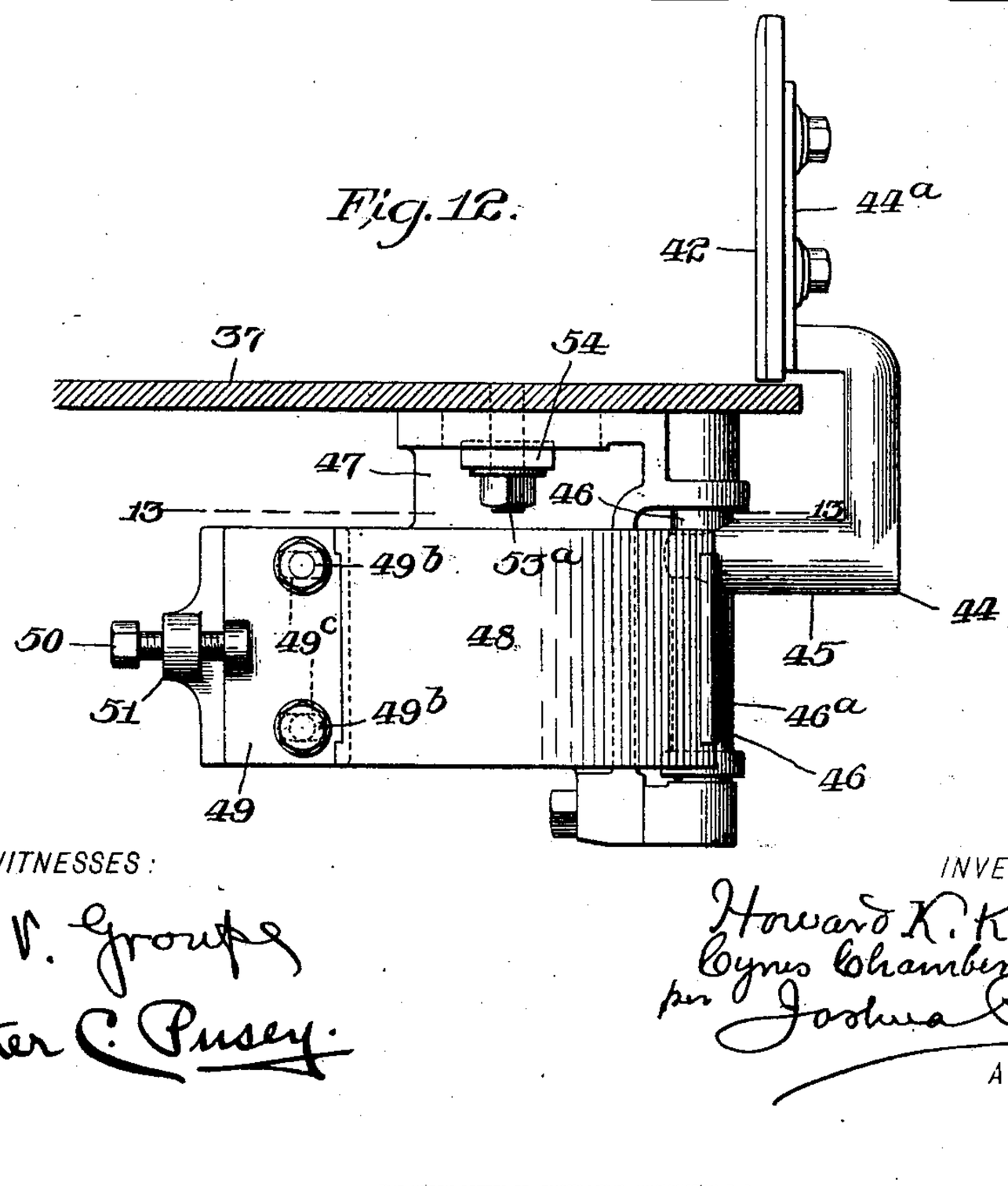

Fig. 12.

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(No Model.) (Application filed June 15, 1899.)

9 Sheets—Sheet 7.

Fig. 14.

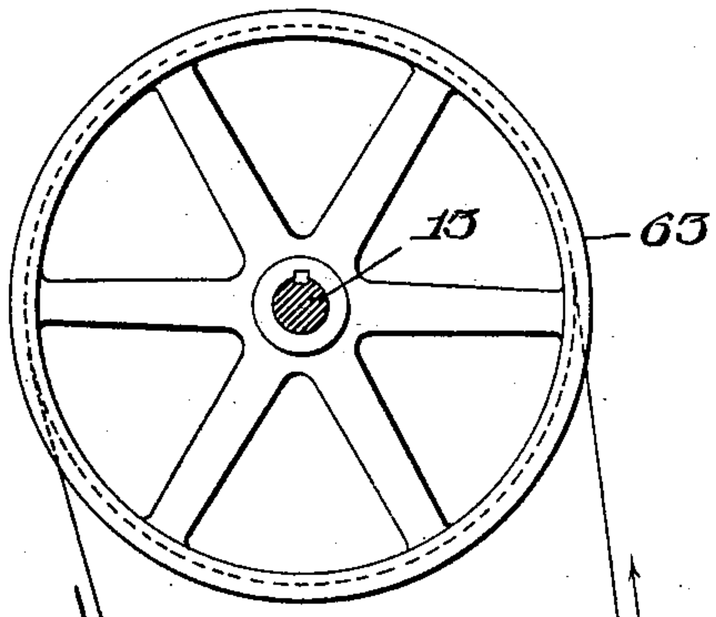
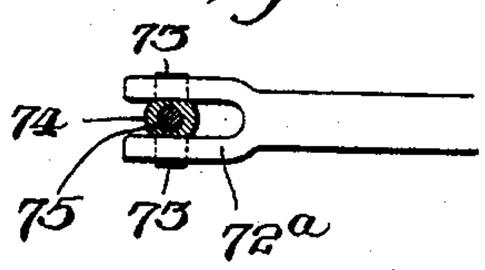


Fig. 16.



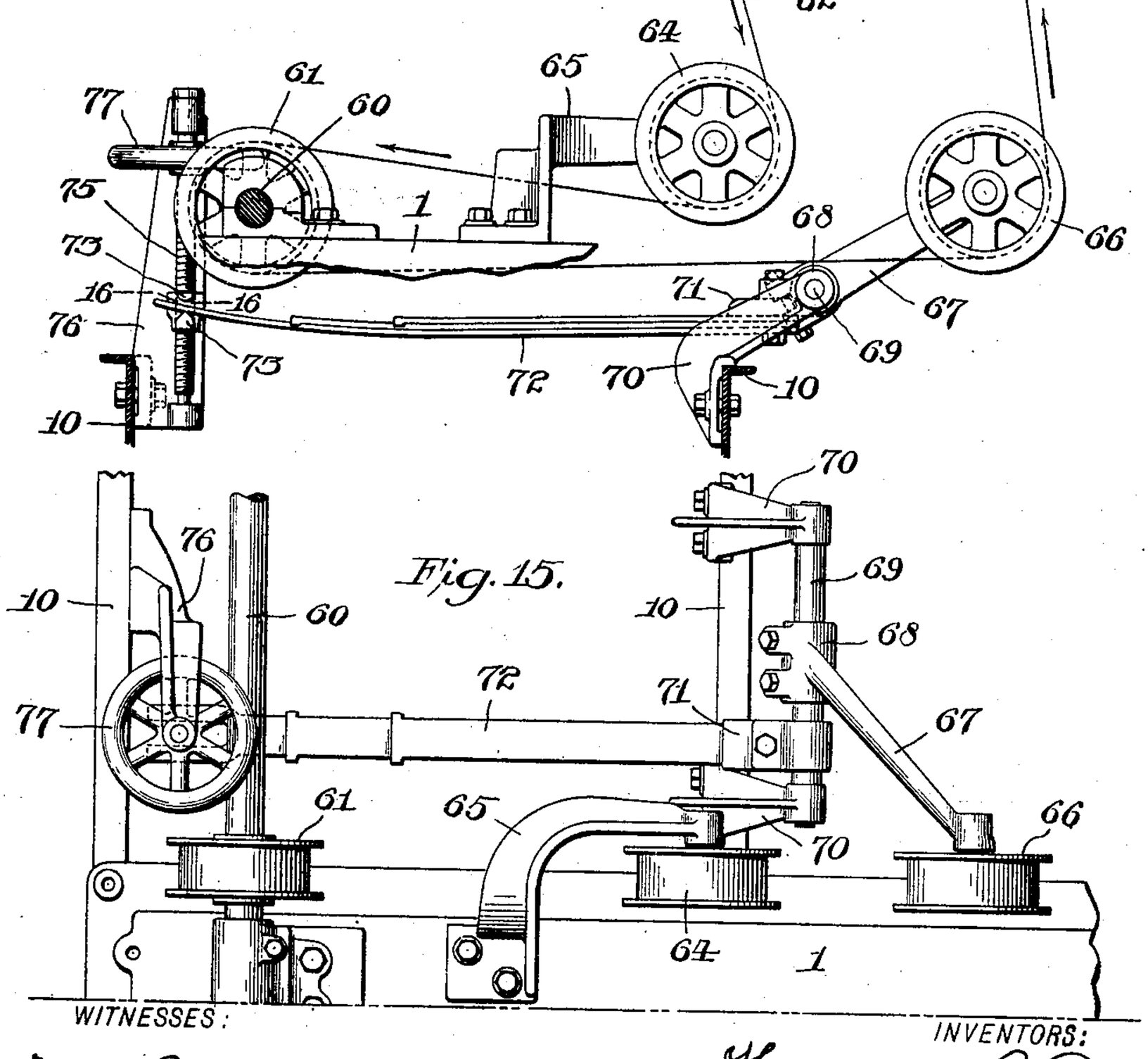


Fig. 15.

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BRICK MACHINE.

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Fig. 17.

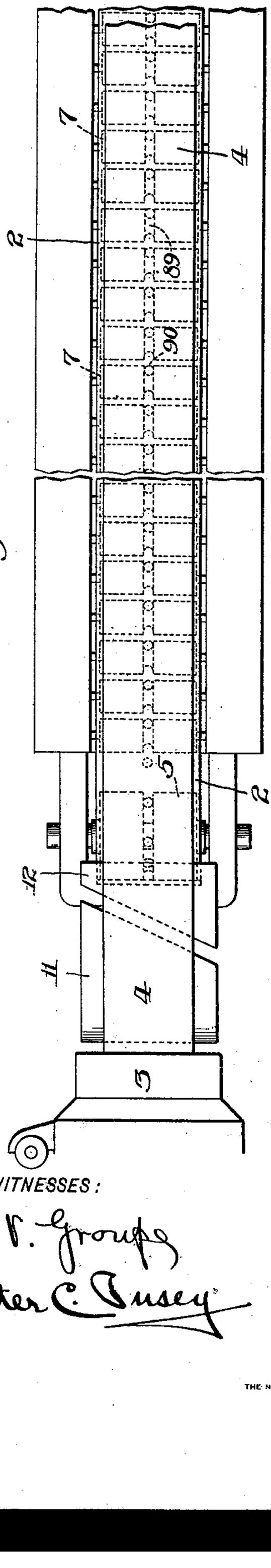
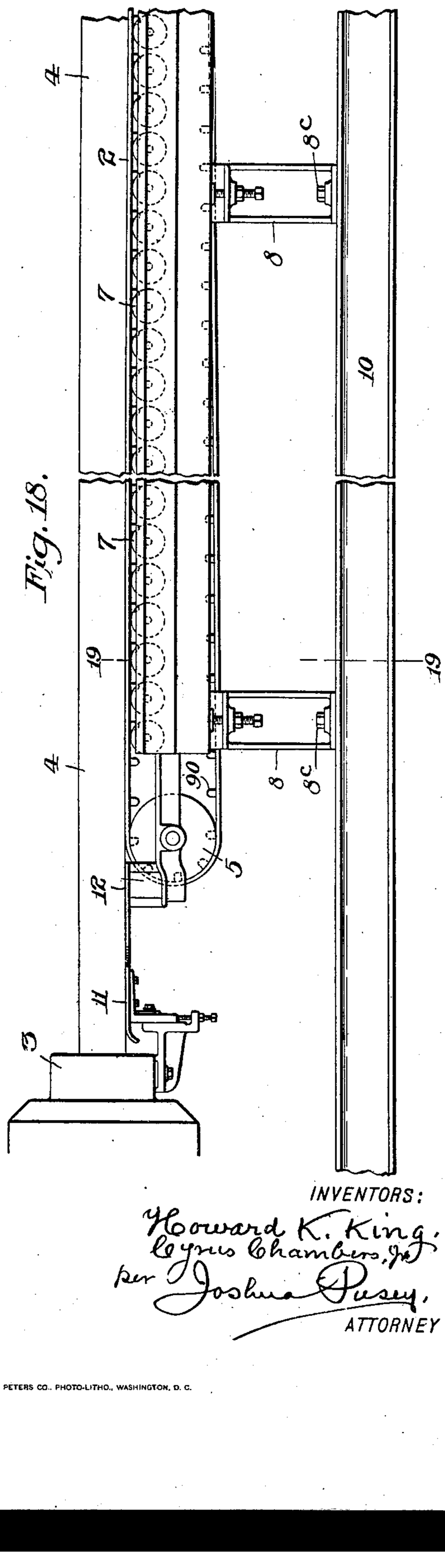


Fig. 18.



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BRICK MACHINE.

(No Model.) (Application filed June 15, 1899.) 9 Sheets—Sheet 9.

Fig. 19.

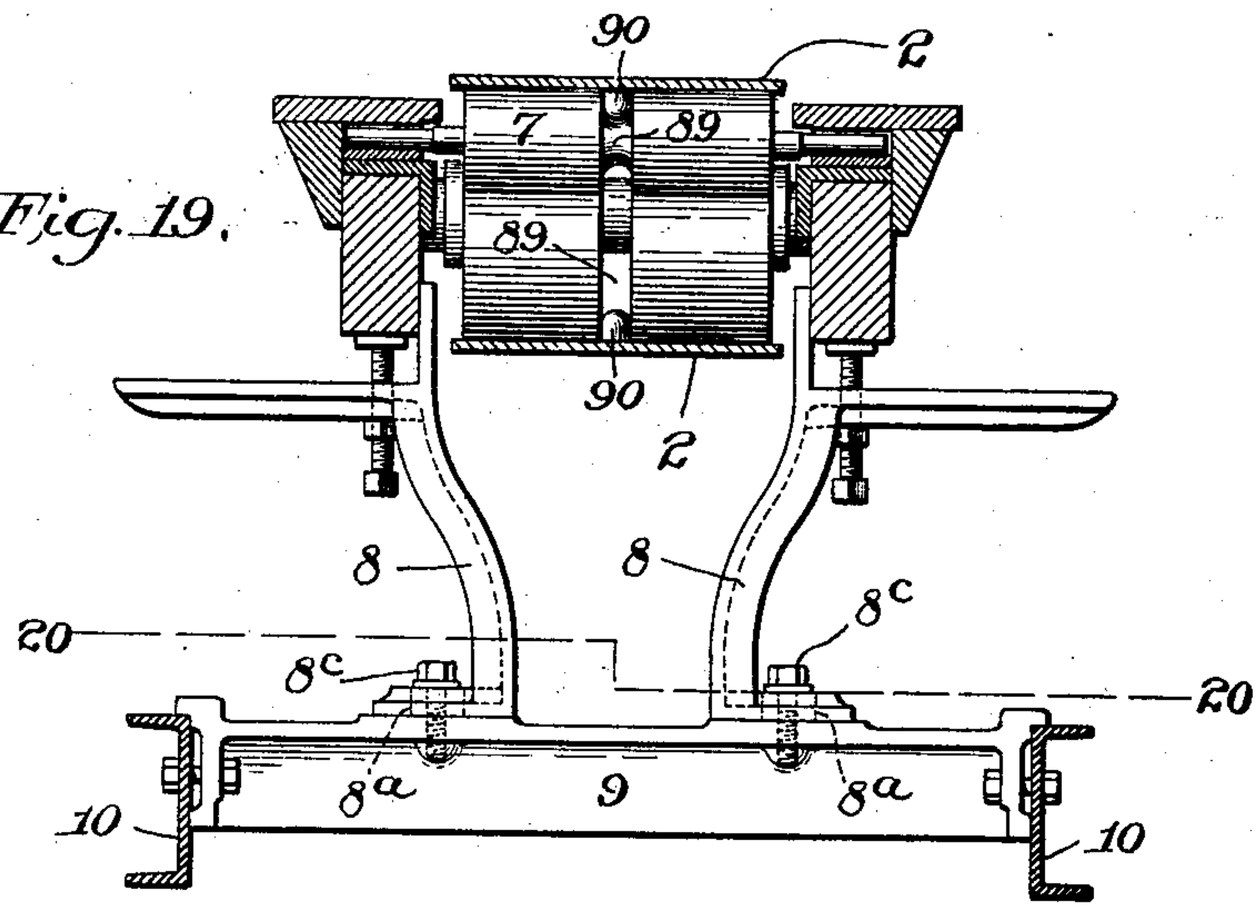


Fig. 20.

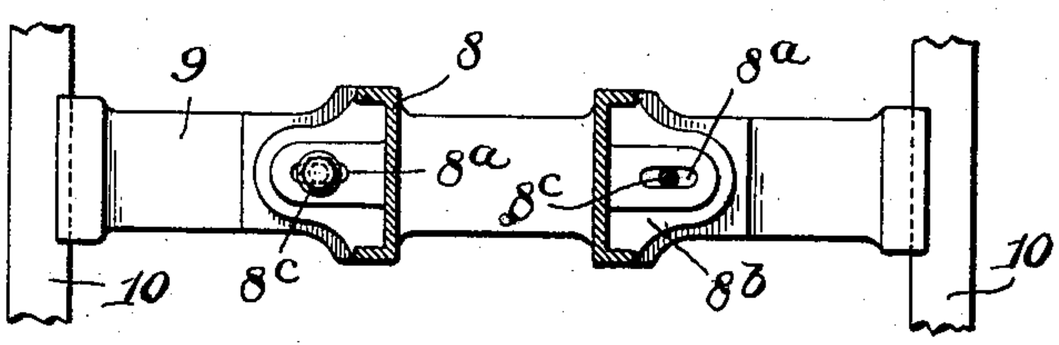


Fig. 21.

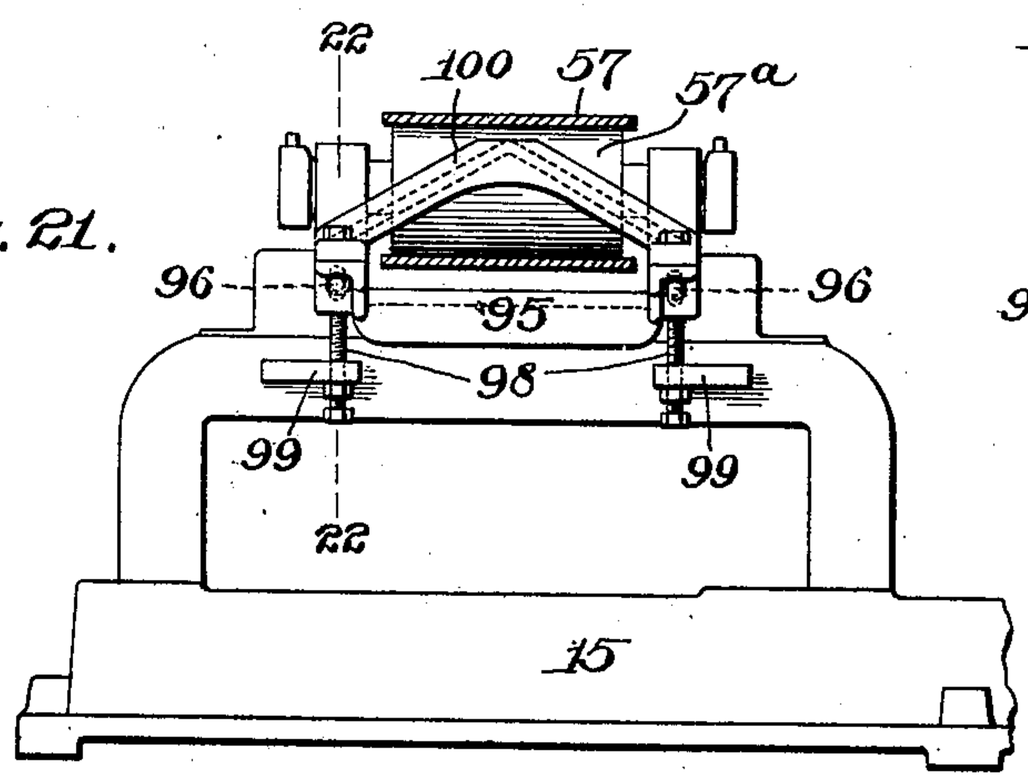
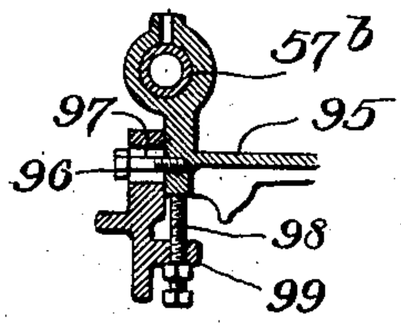


Fig. 22.



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BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 678,259, dated July 9, 1901.

Application filed June 15, 1899. Serial No. 720,692. (No model.)

To all whom it may concern:

Be it known that we, HOWARD K. KING, residing in the city and county of Philadelphia, and CYRUS CHAMBERS, Jr., residing at Overbrook, in the county of Montgomery, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Brick-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 side elevation of the forward end of the propulsion-belt frame and the cut-off mechanism. Fig. 2 is a plan view of the turret, broken off, upon which the cut-off wheel is journaled. Fig. 3 is a side elevation of Fig. 2, enlarged, showing the gage indicating the rotative adjustments of the turret. Fig. 4, Sheet 2, is a front elevation of the cut-off wheel, &c. Fig. 5 is a plan view of the wire-cleaner, being a section as on the line 5 5, Fig. 4. Fig. 6, Sheet 3, is a section on the line 6 6, Fig. 1. Fig. 7, Sheet 4, is a partial section, enlarged, on line 7 7, Fig. 4. Fig. 8 is a side elevation, enlarged, of the rim of the cut-off-wheel spider broken off and showing the means of attaching the end of the cut-off wires thereto. Fig. 9, Sheet 5, is a plan view, enlarged, of the end portion of the propulsion-belt and the off-bearing belt and the plates and adjuncts which support the end of the bar of clay while being cut off. Fig. 10 is a section as on line 10 10, Fig. 9. Fig. 11, Sheet 6, is a section as on line 11 11, Fig. 9. Fig. 12 is an end elevation of Fig. 11. Fig. 13 is a full section as on line 13 13, Fig. 12. Fig. 14, Sheet 7, is a side elevation, enlarged, of the friction-belt device for imparting auxiliary power to the cut-off wheel. Fig. 15 is a plan view of Fig. 14, the pulley on the cut-off-wheel shaft and the friction-belt being omitted. Fig. 16 is a section as on line 16 16, Fig. 14. Fig. 17, Sheet 8, is a plan view of the die of a brick-machine and clay-bar-receiving end of the propulsion-belt frame and parts carried thereby and the bar of clay issuing from the die and resting upon the propulsion-belt. Fig. 18 is a side elevation of Fig. 17. Fig. 19, Sheet 9, is a section, enlarged, as on line 19 19, Fig. 18. Fig. 20 is a section as on line 20 20, Fig. 19. Fig. 21 is a front end elevation of the off-bearing-belt pulley, its supporting-frame, and the means for adjusting the pulley. Fig. 22 is a section as on line 22 22, Fig. 21.

The object of our invention is to improve the construction, operation, and result of that kind of brick-making machines in which the clay forced out through a suitable die in the form of a continuous bar is severed into bricks by means of a series of wires attached to a wheel that is caused to rotate in a plane at a suitable angle to the horizontally-moving bar of clay.

Our invention relates to various features of improvements in machines of this general kind.

A leading feature is a certain construction and arrangement of the wheel carrying the cut-off wires with relation to the bar of clay, whereby the wires are caused to pass through the bar diagonally—that is to say, from an upper corner on one side to the lower corner on the opposite side of the bar—whereby certain advantageous results are obtained, as hereinafter pointed out.

Another feature relates to the construction of the cut-off wheel and the means for connecting the wires thereto and another to means for adjusting the angle of the said wheel to the bar of clay to suit different thicknesses or lengths of bricks to be made.

These and various other features of improvement designed to perfect the construction and operation of the machine will be hereinafter fully described, and duly pointed out by suitable claims.

Referring to the accompanying drawings, forming a part of this specification, and which illustrate a machine that we have caused to be put into successful and practical use, 1 is the usual frame of a machine of the general class to which our improvements pertain that supports the endless belt 2 of suitable length, (hereinafter termed the "propulsion-belt,") upon which passes the body of clay that is expressed from the usual die 3, Figs. 17 and 18, of the machine in the form of a continuous bar 4, whose cross-section is that of the bricks to be made. This belt runs over pulleys 5 and 6, journaled in bearings at the

ends, respectively, of the said frame, the upper part of the belt being supported by a series of transverse rollers 7, journaled in the frame.

We term the last-mentioned pulley 6 and will hereinafter refer to it as the "measuring-pulley," the reason for which will hereinafter appear.

The frame 1 is supported by uprights 8, Figs. 18, 19, and 20, which are in the present instance secured to cross-bars 9, that are bolted to longitudinal channel-bars 10. For convenience we usually interpose two plates 11 and 12 between the die and the propulsion-belt, upon which plates the bar of clay slides and thence continues on to the said belt. One of the said plates 11 is attached to the die of the machine and the other, 12, to the said belt-frame; but as their use is well known in machines of this general class it is not deemed necessary to describe their particular construction and arrangement.

Passing now to the mechanism for severing the free end of the bar of clay into bricks, 13 is a shaft journaled in suitable bearings that are supported by a rigid standard 14, which rises from a base 15, that rests upon and is bolted to the aforementioned channel-bars 10. This base also serves to support the forward end of the propulsion-belt frame 1. As will be observed, looking at Figs. 4 and 6, the said standard is to the side of and opposite to the forward end of the frame, and thus the shaft 13 is some distance above the horizontal plane of the propulsion-belt and also to one side of the latter. Mounted on the forward end of this shaft is a large wheel-like structure 16, which we will hereinafter term the "cut-off" wheel. This wheel has a rimmed spider-like hub 16^a, that is secured to the shaft, and a rim or annulus 16^b of much greater diameter than the spider and entirely independent of the latter, except as connected therewith by the radial cut-off wires 17, as hereinafter described. This annulus is supported by two arms 18, extending at an angle of ninety degrees or thereabout to each other from a hub 19, that is secured to a flange 20 of the forward bearing of the cut-off-wheel shaft 13. Each of these arms has a wheel 21 journaled at its free end, projecting beyond the annulus 16^b, which latter has a peripheral groove 22, in which the wheels are entered, as shown. The upper part of the annulus is supported by the following means: 23 is a horizontally-disposed wheel or roller that is journaled on a vertical stud 24 upon the upper end of an arm 25, that rises vertically from the aforesaid hub 19, from which the arms 18 depend. The periphery of said wheel is adapted to bear against the rear side of the annulus, and so prevent the latter from canting over in that direction. It is prevented from canting forwardly by means of an arm 26, that is secured to the top of the stud upon which the wheel 23 is mounted, upon the free end of which arm is a downturned finger 27, that is entered into the groove 22 of the annulus adjacent to the rear side wall of said groove, all as seen in Fig. 1 and indicated by dotted lines in Fig. 4.

The cut-off wires 17 are equidistant and six in number in the present instance. They are stretched radially between the rim of the spider 16^a and the inside periphery of the annulus, as plainly seen in Figs. 4 and 7. The inner end of a wire is attached to the free end of a flat—preferably a leaf—spring 28, whose other end is secured to a lug or arm 29, that projects from the rim of the spider 16^a, which latter is in the same plane substantially with the annulus. The outer end of the wire is attached to the free end of a flat spring 30, that is fastened to a lug 30^a upon the inner side of the annulus. These two springs are adapted to act in planes at right angles to each other, the former, 28, in the direction of the length of the wire and the latter, 30, transversely. The function of the spring 28 is to tend to keep the wire taut, yet permitting it to yield when required. The special function of the other spring 30 will hereinafter appear.

It will be observed that the cut-off wheel is located some distance in advance of the forward pulley—the measuring-pulley—of the propulsion-belt 2; also as the said cut-off wheel rotates, as hereinafter described, the cut-off wires extend successively from a point above to a point below the plane of the propulsion-belt.

The cut-off-wheel shaft 13 carries a bevel-gear 31, that engages a similar gear 32 on the upper end of an oblique shaft 33, (shown more clearly in Figs. 6 and 7,) which is journaled in suitable bearings of the standard 14. On the lower end of the latter shaft is a bevel-gear 34, that engages a like gear 35 on the projecting end of the shaft 6^a of the measuring-pulley 6 of the propulsion-belt. It will thus be seen that motion imparted to the propulsion-belt will be transmitted to the shaft 13, and consequently to the cut-off wheel, in the direction of the arrows in Figs. 1, 4, and 6.

Just forward of the point where the propulsion-belt starts to turn around the measuring-pulley are two fixed plates 36 and 37, whose upper surfaces are practically in the same horizontal plane as that of the top of said belt. These plates are secured, respectively, to supports 38 38^a, rising from the base 15, to which supports they are adjustably secured, as hereinafter described. The inner or adjacent ends of said plates are oblique and are separated to form a narrow slit 39, as indicated by dotted lines in the plan view Fig. 1, Sheet 5, for the passage of the cut-off wires, as hereinafter explained. This slit is made only of sufficient width to easily permit the passage of the wires therethrough, so that the bottom of the clay bar shall be supported close to the slit on each side thereof.

It will be obvious to those familiar with brick-machines of the particular class to

which our present invention belongs that in order to effect a square cut the rotatable cut-off wheel must be at a suitable angle to the path of movement of the clay bar, or, more directly, the cut-off wires must move at a certain angle across the path corresponding with the relative speed of movement of the clay bar.

It will be obvious that the portion of a cut-off wire that is passing through the bottom part of the bar of clay must travel at greater speed in going through the bar than the portion of the wire which severs the upper part of the bar, although of course all parts of the latter are moving forward at the same speed. Consequently the wire would not make a true vertical cut unless some provision be had to compensate for or, so to say, "counteract" this difference. In order to insure such vertical cut, we, by giving to the slit 39 the proper angle or obliquity, so deflect and guide the wire from the path it would normally take according to the angle to which the cut-off wheel is set with relation to the bar of clay as to cause it (the wire) to take such a course in moving across the path of the bar of clay that will compensate for the difference above mentioned. The spring 30 on the annulus permits the necessary lateral deflection of the wire, which, so to say, "swings" from its point of attachment to the inner spring 28 on the spider. In fixing the angle of the slit 39 we first set the cut-off wheel at such an angle to the path of the bar of clay that its said point of attachment would, as the wheel is rotated, pass squarely through the upper part of an imaginary bar on the propulsion-belt of sufficient height for its top to be swept by said moving point. We then make the inclination of the slit such that the lower part of the wire will be so guided therethrough as to pass squarely through the bar. Thus as the upper end of the wire and also the lower part thereof will now move in the required path the intermediate part of the wire will do the same.

It is essential in order to effect a clean cut-off by a wire as it passes out the side of the clay bar that that part of the bar shall be suitably supported close to the line of exit of the wire, just as the bottom of the bar is supported close to the slit 39, as previously stated. To this end we provide two similar vertical plates 42, extending above the plane of the top of the propulsion-belt and at right angles thereto, whose inner edges are adjacent, so as to form a slit 43 between them coincident with that end of the slit 39 for the passage of the wire. The said slit 43 is, however, necessarily slightly out of the vertical, so as to accommodate the cut-off wire, which does not quite occupy a true vertical plane as it passes out of the bar of clay. It is also important that there be provision for permitting the escape of stones or other obstructions with which the wire may come into contact in the clay and force against the plates 42. To this end we hinge said plates in such manner that they will be forced open by the stone or the like against the stress of springs which return the plates to the normal position after the obstruction has escaped. We may here observe, however, that it is not, broadly, new in a machine of the special class to which ours belongs to employ spring-controlled plates for permitting the egress of stones, &c., from the clay bar. These have been, so far as we are aware, defective in construction and in operation—defects that do not exist in our construction—which latter we shall now proceed to describe in detail, reference being had especially to Figs. 9 to 13, both inclusive. The description relative to one of said plates is equally applicable to the other.

The plate 42 is bolted to the vertical limb 44^a of a bent arm 44, that extends obliquely from the outer end of a horizontal arm 45. The inner end of the latter beneath the plate 36 (or 37) has a vertical shaft 46, that is suitably journaled in bearings of a bracket 47, which is bolted to the under side of plate 36, (or 37,) as seen in Figs. 11 and 12 and indicated by dotted lines in Fig. 9. Shaft 46 has an outwardly-projecting lug 46^a with a notch 46^b to receive the end of a bow-spring 48, whose other end engages a similar notch 49^a in the end of a piece 49, that is secured to the side of a limb 47^a of the aforesaid bracket 47 by means of set-screws 49^b, passing through longitudinal slots 49^c in the piece 49. By first loosening these screws the said piece may be adjusted longitudinally, thus adjusting the tension of the spring 48 by means of a screw 50, that passes through a lug 51 on the bracket 47 and bears against the outer end of the piece 49. The force exerted by the spring 48 tends to turn the shaft 46, and consequently the arm 44, to which the plate 42 is connected. In order to limit the inward throw of the plate 42, we provide a projection 52 on the arm 45, which is adapted to impinge against a stop-arm 52^a, extending from the bracket 47, as seen in Fig. 13, Sheet 6. Normally the side of the plate next to the moving bar of clay will be maintained, through the stress of spring 48, in connection with the described stop device, parallel with the side of the bar of clay, which latter bears against the plates 42. It will be observed that the pivot on which the arm 44 is adapted to turn is located some distance inwardly from the line of the said plates—that is, beneath the bar of clay inwardly beyond the side or edge of the latter. It will also be noticed that the plate 42 is much nearer to the slit 39, through which the cut-off wire passes, than the pivot of the arm 44. By reason of this arrangement pressure outwardly against the two plates will tend to cause them to swing out easily and quickly and so separate them to allow the passage of a stone or the like. As the arm 44 and plate 42 swing out, proportionately less force is required to still further open the plates, for it will be evident that—similar to a

knuckle-joint—as the point of contact of one end of the spring with the lug 46ª approaches the line connecting the pivot of the arm 44 with the point of contact of the spring with the piece 49 leverage of the said arm 44 increases. The dotted lines in Fig. 13 indicate the position of one of the plates when it is opened out.

The bracket 47 is adjustable in a horizontal plane in two directions by means of slots 53 and bolts 53ª, passing through the same, which secure the bracket to the plate 42, said bolts also passing through a slot 54ª at right angles to the slots 53 in blocks 54, interposed between the nut 55 on the bolt and the bracket, as seen in Fig. 11 and indicated by dotted lines in Fig. 9.

Having described the construction of our invention, omitting the description hereinafter given of some non-essential details and also of the friction helping-belt device which we generally use, we will proceed to describe the mode of operation. Before doing this, however, it is necessary to explain that the circumference of the forward pulley 6—the measuring-pulley—of the propulsion-belt, taking into account the thickness of the latter, must be such as to measure off at each revolution of the cut-off wheel a length of clay bar equal to the aggregate thickness (or length) of the bricks to be cut off during such revolution. For example, if six bricks of, say, two and one-fourth inches each be cut off at each revolution of the cut-off wheel, there being six cut-off wires, the length of clay bar measured off must be thirteen and one-half inches.

To proceed with the description of the mode of operation of our invention, as the cut-off wheel rotates the leading wire, as 17×, Fig. 4, enters the slit 39. To insure the entrance of the wire into the slit, we provide an upturned guide projection 56, Figs. 4 and 9, at the side of the rear plate 36, the outer end of the projection being rounded back, as shown. As the cut-off wire advances through the said slit, the side of the bar of clay sliding against the plates 42, the bar will be severed squarely—that is, at right angles both transversely and vertically. The brick now being pushed on by the moving end of the bar and continuing to slide forward on the plate 37 passes on to the usual off-bearing belt 57, Figs. 1, 9, and 21, which for the purpose of separating the bricks for convenience of handling in removing the same is driven at a higher speed than the propulsion-belt from the source of power that drives the mechanism for expressing the clay from the die. Although not absolutely essential, we usually place a vertical plate 40, Figs. 9 and 11, to the rear of the plates 42 to serve as a guard to prevent liability of the bar of clay jamming against the end of the adjacent one of the plates 42. The said plate is secured to a lug 41, that projects from the bracket 47, and its inner surface is not in line with that of the plates 42, but a small fraction of an inch outwardly from the latter. The rear end of the said plate 40 is curved outwardly, as seen in Fig. 9. The plate 40 performs its office when from any cause the bar of clay becomes misplaced—as, for example, in case it should become too soft and buckle up or take a more or less serpentine shape, when it will be prevented from coming against the plates 42 until it returns to the normal straight form and position.

It will be observed that by reason of the hereinbefore-specified position of the cut-off wheel with relation to the propulsion-belt and the bar of clay thereon the cut-off wires first enter the bar at the upper corner thereof and finally emerge from the lower corner diagonal to the said upper corner. In other words, the wire in passing through the clay bar will always be oblique to the horizontal. This is one of the important features of our invention, for the reason that obviously the wire makes a draw cut and also that in passing through the two unsupported faces—the top and one side—it presses the particles of clay inwardly from the said surfaces, and thereby produces a smooth instead of a furred or ragged edge along the line of the said surfaces.

Should a cut-off wire come into contact with a stone or other obstruction in the clay, it may, owing to the elasticity of the spring 28, slide or spring around such obstruction. If not, the latter will be carried along by the wire against the plates 42, whereupon they will be forced open against the stress of the bow-springs 48 and the obstruction will escape, the plates being then returned to their normal position by said springs.

We are aware of the fact that spring-controlled plates or the like intended to permit the escape of obstructions in the bar of clay have been described in connection with wire cut-off mechanism of the particular class to which our invention pertains. Therefore we shall not broadly claim such devices.

The cut-off wires are kept clean by means of a cleaner consisting of a strip C, Figs. 4 and 5, of india-rubber or the like, that is secured to a plate c', which is connected with the arms 18. This strip is placed edgewise and is so disposed, as shown, that as the cut-off wheel rotates the wire impinges against the edge of the strip, which sweeps the wire from the inner to the outer end, and thus wipes off any dirt or fibers that may have adhered to the wire in going through the clay.

In the foregoing description of the operation of the machine we have assumed a condition that rarely occurs in practice, and that is a uniform consistency of the clay, in which case the friction of the moving bar of clay upon the propulsion-belt drives the latter, and consequently the cut-off wheel. When, however, the clay is liable to vary in character and consistency, the moving clay bar alone cannot be relied upon to drive the

wheel. For example, at one time the clay may be so soft that the bar will not have strength enough to propel the belt and cut-off wheel, but will buckle up. At another time the clay may be temporarily so hard and smooth that the bar will slip upon the belt for lack of sufficient friction.

In order to insure the proper driving of the cut-off wheel, so as to cut off bricks of uniform length under all the varying conditions of the clay, we adapt to the machine the slipping or helping belt shown in several figures of the drawings and hereinafter described, which is similar to and operates generally in like manner to a device of the same kind that has been successfully employed in what are well known as the "Chambers wire cut-off machines," and shown and described in United States Letters Patent No. 297,917, dated April 29, 1884, and No. 362,204, dated May 3, 1887, to Cyrus Chambers, Jr. The purpose of such friction slipping belt is to impart an auxiliary power as it may be needed to the cut-off device, the pulley imparting power to said belt being positively driven and tending to drive the cut-off device at a greater speed than the moving bar of clay could at any time impart to it. We shall now describe the manner in which we have combined and arranged the said helping-belt with the mechanism of our machine, particular reference being had to Fig. 1 and the figures on Sheet 7 of the drawings.

60, Fig. 1, is a horizontal shaft that is driven from the main source of power, upon which shaft is a pulley 61. The helping-belt 62 passes around the latter and over a pulley 63, of considerably larger diameter than the first pulley, mounted upon the rear projecting end of the shaft 13 of the cut-off wheel. One part of the belt passes around the under side of a pulley 64 on the free end of a bracket 65, that is secured to the base 15. The other part of the said belt passes under and around an idler-pulley 66 on the free end of an arm 67, that extends obliquely from a sleeve 68 on a shaft 69, which is journaled at the ends of arms 70, that extend up from and are fastened to one of the channel-bars 10. On the shaft 69 is a short arm 71, to which is secured one end of a spring, preferably a leaf-spring, 72, as shown, whose other end is bifurcated, as seen in Figs. 15 and 16. The bifurcations 72^a extend between lugs 73 of a nut 74 upon a vertical screw 75, that is journaled in bearings of a support 76, which is fastened to the channel-bar 10 on that side. By turning a hand-wheel 77 on the upper end of the said screw the nut 74 will obviously be caused to travel up or down the screw, as the case may be, thus increasing or diminishing the tension of the spring 72 and so the pressure of the idler 66 against the belt 62, thereby adjusting the degree of friction of the latter upon the positively-driven pulley 61. To prevent the slipping of the belt from the several pulleys, they are, as is common, flanged, as shown.

In order to readily adjust the angle of the cut-off wheel to suit varying thickness of bricks if "side cut" or lengths if "end cut," we journal the shaft 13 of the wheel in bearings of a turret 78, which we mount upon the upper end of the standard 14 in a manner to permit rotative adjustment of the turret in a plane at right angles to the oblique shaft 33, which, it will be remembered, is geared with the shaft 6^a of the measuring-pulley. The peripheral portion of the turret is seated upon the peripheral flange 79^a of the cup-like top or head 79 of the standard 14 and is secured by cap-screws 80 to the latter, which screws pass through slots 81, Fig. 2, in the turret. By first loosening the said screws the turret, and consequently the wheel, may be adjusted to such angle to the bar of clay as may be required, the cut-off-wheel shaft and the shaft 33 always remaining at right angles to each other and their major axes bisected by the same oblique plane. The friction-belt 62 swings around with the cut-off-wheel shaft, it not being necessary to throw off the belt in changing the adjustments of the wheel. For convenience of readily bringing the wheel into the adjustment required for a particular thickness of brick we make use of a gage. (Shown in Fig. 1 and more clearly in the enlarged view, Fig. 3.) This consists of a finger 82, extending down from the under side of the turret, that projects beyond the flange of the head 79 and a scale 83 of lines and figures on the edge of said flange, indicating in inches thickness of bricks. For example, if the turret be swung around to bring the vertical front face of the finger to coincide with the line indicating "$2\frac{1}{4}$," the cut-off wheel is at the proper angle to cut off bricks two and a quarter inches thick. Obviously when the angle of the cut-off wheel is changed it is necessary to change the angle of the slit 39 between the two plates 36 and 37 accordingly. To this end we pass the four bolts 84, (two for each plate,) that fasten the said plates to their respective supports 38, through slots 85 in the plates, said slots being substantially in the arc of a circle struck from a point in the slit about where a radial line drawn from the center of the cut-off wheel through the center of the bar will bisect said slit.

We make use of a gage, Fig. 9, for readily adjusting the plates 36 and 37—that is, the angle of the slit—to correspond with the adjustments of the angle of the cut-off wheel. This gage consists of a plate 86, that is fixed to the support on that side of plate 36 and underlies the latter, in connection with an edge portion 87 of the plate, that extends across a line-scale 88, marked on the plate, said scale having figures indicating in inches the thickness of bricks. Thus the cut-off wheel being set for bricks two and one-fourth

inches thick the plate 36 would be turned to bring the edge 87 to the "2¼" line on the scale-plate 86, the angle of plate 37 being afterward correspondingly adjusted.

It is essential that the bar issuing from die 3 shall be so "landed" upon the propulsion-belt as to maintain a proper relation to the plates 42—that is, so that the side of the bar will properly bear against said plates. To insure this, we employ means, first, for preventing the lateral shifting of the propulsion-belt upon its pulleys and supporting-rollers 7, and, secondly, means for effecting lateral adjustment of the propulsion-belt frame and adjuncts. The former means consists in the present instance in providing the pulleys 5 and 6 and also the rollers 7 each with a peripheral groove 89 and a series of suitable projections or buttons 90 on the inner side of the belt, which projections are adapted to travel in said grooves, the grooves and buttons being in the same vertical plane. This device is, however, not our invention and is not new *per se*.

The capability of lateral adjustments of the belt-frame, &c., is had by providing transverse slots 8^a, Fig. 20, in the feet 8^b of the uprights 8, Figs. 18, 19, and 20, through which pass the bolts 8^c, which secure the uprights to the cross-bars 9, that rest upon the channel-bars 10. By first loosening the said bolts and suitably shifting the rear end of the propulsion-belt frame, it not being necessary to directly shift the forward end thereof, the belt may be brought into proper position or alinement with relation to the die 3 to insure the said required relation of the bar to the plates 42. It is desirable that the cut-off wires shall be readily attachable to the springs 28 and 30. To secure this desideratum, we make an eye at each end of the wire, as is customary in wire cut-off brick-machines, adapted to loop over pins or hooks *p* at the free ends of the aforesaid springs, and as the spring 28 tends to maintain the wire taut and such spring is of considerable stress it is of course necessary to press it outwardly in order to loop the wire over it. To this end we employ a device (shown in Fig. 4, Sheet 2, and enlarged in Fig. 8, Sheet 4) that is permanently attached to the cut-off wheel. This consists of a lever 91, that is pivoted to a lug 92, that projects from the rim of the spider 16^a of the cut-off wheel. This lever is bent adjacent to its pivoted end and in line with spring 28. When not in use, it is maintained fixedly by means of a flat spring 93, that is fastened to the arm 29, to which said spring is secured and whose free end bears against a flat portion 94 of the pivoted end of the lever. When a cut-off wire is to be attached to the springs 28 and 30, the said lever is rotated to the position indicated by the dotted lines in Fig. 8, thereby pressing the spring 28 outwardly toward the annulus 16^b, whereupon the wire is looped over the two springs and the lever then returned to the original position.

In order to provide for adjustment of the pulley 57^a of the off-bearing belt, so that the latter may be readily brought into suitable relation in a horizontal plane to the plate 37 for the successive bricks to be properly received by the off-bearing belt, we journal the shaft 57^b of the said pulley in a yoke-frame 95, that is secured to the upper part of the support of the plate 37 by means of screws 96, that pass through vertical slots 97 in said support, as seen in Figs. 21 and 22, Sheet 9. The upper ends of vertical adjusting-screws 98, one at each side of the frame, which are passed through and extend up from lugs 99 of the said support, bear against the under side of the frame 95. By first loosening the retaining-screw 96 the height of said frame, and consequently that of the pulley and so the off-bearing belt, may be adjusted as required by turning the screws 98 or either of them, as may be necessary. The usual bow-shaped scraper 100 for freeing the pulley of any dirt or clay that may happen to lodge thereon is fastened to the frame 95, and, of course, its position with regard to the pulley is unaffected by the adjustments of the said frame.

We may remark that if the center of swing of the cut-off-wheel shaft were coincident with the center of the wheel itself paths of a cut-off wire at different angles of the wheel would bisect each other at a certain point, which would be in the middle line of the bar of clay; but as it is of course impracticable that the wheel can swing on such a center we bring the center of swing of said shaft as nearly as practicable to the wheel, so that the difference between that center and the ideal or theoretically perfect center is such as to be of no practical moment.

While it will be obvious that in order to maintain the proper relation between the size of the measuring-pulley and the speed of rotation of the cut-off wheel, so as to insure the cutting off of bricks of any given uniform thickness, (or length,) the said pulley may remain unchanged and the speed of the cut-off wheel be (within certain limits) suitably increased or diminished, as the case may be, by changing the diameter of some one or more of the gears, as the gear 31, for example, we prefer by reason of greater convenience and capability of obtaining more accurate results under all circumstances to change the diameter of the measuring-pulley to suit the thickness of bricks to be made. To this end we make the pulley, with its shaft and boxes, in which the latter run detachable from their supports at the end of the propulsion-belt frame, so that a pulley of another diameter, with its shaft and boxes, may be readily substituted for that removed in a manner that the top of the pulley of any diameter will always be at the same height, so that the top of the propulsion-belt shall be in the plane of the top of the plates 36 and 37. A convenient means which we employ for effecting this

interchangeability is shown in Figs. 1, 4, and 6. It consists in providing the boxes 6^b of the pulley-shaft with legs 6^c, whose feet are adapted to rest upon bottom flanges 101^a of supports 101, rising from the base 15. The length of the said legs for each set of boxes, shaft, and pulley varies according to the diameter of the pulley, so that when the said feet rest upon the supports the pulley will stand at the required height, as before mentioned. The boxes 6^b are secured to the front side of the said supports 101 by means of screws or bolts 102, and in order to prevent lateral shifting of the boxes, &c., we usually provide a groove 103, Fig. 6, in each support, into which is entered a tongue 104, (indicated by dotted lines in Fig. 1,) that projects from the leg 6^c. When, however, a pulley of one diameter is substituted for one of another diameter, the height of the shaft 6^a is also correspondingly changed. Consequently there must be provision for suitably changing the gears 34 and 35. This may of course be done by substituting gears of proper diameter for the others; but we avoid the necessity of doing this by using the same gears and having them adjustable longitudinally on their respective shafts to which they are keyed, so that they (the gears) may be brought into proper position to suit the height of the shaft of the measuring-pulley.

We finally remark that while we have shown and described a certain wire cut-off device—to wit, a rotatable wheel with radial wires arranged relatively to the parts that receive and support the bar of clay expressed from the die of the machine in a manner to effect the diagonal cut hereinbefore described—we believe that we are the first to effect such diagonal cut by means of any mechanism. We do not, therefore, limit ourselves to the particular mechanism described by which such cut is effected, as other means or devices may be employed for carrying the cut-off wires and causing the same to pass through the bar of clay diagonally—that is, to enter the latter at one unsupported corner and to pass out at a supported corner diagonal to the first.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a brick-machine, the combination of clay-expressing mechanism, a suitable support for the bar of clay expressed from the die of the machine, the cut-off wires and a suitable carrier to which said wires are secured, and means for imparting motion to said carrier to cause said wires to enter a corner of one side of said bar and to pass out from a different side of the bar through the corner thereof diagonal to the first-mentioned corner, substantially as and for the purpose set forth.

2. In a brick-machine, the combination of the horizontal plates having the narrow slit between their adjacent ends, the latter vertical plates having the slit between their adjacent ends, the cut-off wires, and a suitable carrier to which the same are secured, together with means for imparting suitable motion to said carrier, whereby said wires are caused to enter the upper corner of the bar of clay supported by said plates, and to pass out through the lower corner of said bar diagonally to said upper corner, substantially as set forth.

3. In a machine of the kind recited, the combination of clay-expressing mechanism, a suitable support for the bar of clay expressed from the die of the machine; the wheel having the cut-off wires; means for imparting a rotary motion to said wheel; the horizontal plates, having the passage-way for the wires between them; and the vertical plates adapted to support the said bar laterally; the said plates being relatively arranged as shown, whereby the cut-off wires are adapted to enter the upper corner of the bar of clay and to pass out through the lower corner of said bar diagonal to said upper corner, substantially as and for the purpose set forth.

4. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt adapted to receive the bar of clay expressed from the die of the machine, the wheel having the radial cut-off wires, mechanism whereby a rotary motion is imparted to said wheel through the motion of the said belt, the axis of rotation of said wheel being in a plane above and beyond that of said belt, whereby the bar of clay carried forward upon said belt will be severed diagonally with relation to opposite upper and lower corners of said bar, for the purpose set forth.

5. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt adapted to receive the bar of clay expressed from the die of the machine, the wheel having the cut-off wires and its axis of rotation being in a plane above, and in a vertical plane beyond said propulsion-belt, the rotatable shaft upon which said wheel is mounted, the gear upon said shaft, the gear upon the forward pulley of the propulsion-belt, and the intermediate gears whereby the motion imparted to said belt effects a rotary motion of the cut-off wheel, substantially as and for the purpose set forth.

6. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt adapted to receive the bar of clay expressed from the die of the machine, the wheel having the radial cut-off wires and its axis of rotation being in a plane above, and in a vertical plane beyond said propulsion-belt, the rotatable shaft upon which said wheel is mounted, means for adjusting the angle of said shaft and wheel with relation to said belt, the mechanism whereby the motion imparted to said belt effects a rotary motion of the cut-off wheel, the pulley on said shaft,

the positively-driven pulley and the friction helping-belt passing over said pulleys, substantially as and for the purpose set forth.

7. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt adapted to receive the bar of clay expressed from the die of the machine, the wheel having the radial cut-off wires and its axis of rotation being in a plane above, and in a vertical plane beyond said propulsion-belt, the rotatable shaft upon which said wheel is mounted and the mechanism whereby motion imparted to said belt effects a rotary motion of the said wheel, the pulley on said shaft, the positively-driven pulley, the idler-pulley, and the friction helping-belt passing over said pulleys; and means for adjusting the position of said idler whereby the tension of the friction-belt may be varied, substantially as and for the purpose set forth.

8. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt, a suitable support for the bar of clay, the wheel having the radial cut-off wires, the rotatable shaft upon which said wheel is mounted, connections between said belt and shaft for driving the latter, the turret on which the said shaft is journaled, the support for said turret, and means for effecting rotative adjustments of said turret on its said support whereby the angle of the said wheel with relation to the bar of clay may be adjusted, substantially as and for the purpose set forth.

9. In a machine of the class recited, the combination of the propulsion-belt, the wheel having the radial cut-off wires, the shaft upon which said wheel is mounted, the gear on the shaft of the forward pulley of the propulsion-belt, the oblique shaft, the gear thereon engaging the gear on said shaft of the propulsion-belt pulley, the gear on the cut-off-wheel shaft, with which the last-mentioned gear is engaged, and the turret to which the cut-off-wheel shaft is journaled, said turret being adapted to be rotated on its support in a plane at right angles to said oblique shaft, and means for securing said turret in the position to which it may be rotatably adjusted, substantially as and for the purpose set forth.

10. In a machine of the kind recited, the combination of the rotatable shaft, the wheel fixed to said shaft and composed of the central hub portion, the annulus having the circumferential groove and the radial cut-off wires connected thereto, means for supporting the annulus, consisting of the fixed arms, and the wheels journaled thereto and engaging said groove in the annulus, together with means for maintaining the latter in the upright position upon its said supports, substantially as described.

11. In a machine of the kind recited, the combination with the wheel composed of the central hub portion, the annulus and the radial cut-off wires connected thereto, of means for sustaining the annulus and maintaining the same in the upright position, said means consisting of the fixed arms, the wheels journaled thereto and engaging a circumferential groove of the annulus, and the vertical arm carrying the roller, adapted to support the annulus on one side, and the finger adapted to support said annulus on the opposite side, substantially as described.

12. In a cut-off wheel of a machine of the class recited, the combination with the central hub portion, and the annulus, of the wire-holding springs attached to the said hub portion and annulus respectively, the former of which springs tends to maintain the wire taut and the other spring is adapted to yield laterally, substantially as and for the purpose set forth.

13. In a cut-off wheel of a machine of the class recited, the combination of the spring tending to maintain the wire taut, and the compressing-lever pivotally connected to said wheel, substantially as shown and for the purpose specified.

14. In a machine of the kind recited, the combination of clay-expressing mechanism, the propulsion-belt, or the like, for receiving and guiding the bar of clay, the rotary wheel having the spring-controlled radial cut-off wires, means for adjusting said wheel to occupy a plane oblique to the sides and oblique to the top and bottom of said bar, the horizontal plates upon which the said bar is adapted to slide having the slit between their adjacent ends, substantially as and for the purpose set forth.

15. In a machine of the kind recited, the combination of the wheel having the radial cut-off wires, the horizontal plates having the slit between their adjacent ends, the lateral vertical plates with the slit between their adjacent ends, the swinging arms to which said vertical plates are attached, the pivots of said arms being in a vertical plane inwardly beyond the plane of the latter plates as shown, the spring tending to maintain said plates in the closed position, and a stop for determining and limiting the inward position of the plates, substantially as and for the purpose set forth.

16. In a machine of the kind recited, the combination of the wheel having the radial cut-off wires, the horizontal plates, between adjacent ends of which the cut-off wires are adapted to pass, the vertical lateral plates having the slot between them for the passage of said wires, the respective swinging arms to which said vertical plates are attached, the stop for limiting the inward position of said plates, the projections on said arms respectively, and the piece, 49, together with the bow-spring, one end of which bears against said projection and the other end against said piece, substantially as and for the purpose set forth.

17. In a machine of the kind recited, the combination of the vertical lateral plates, having the passage-way for the cut-off wires be-

tween their adjacent ends, the respective swinging arms to which said plates are attached, a stop for limiting the inward position of said plates, the projections on said arms respectively, the pieces, 49, the bow-springs engaging said projections and pieces, respectively, and means for adjusting said pieces with relation to said projections whereby the tension of said springs may be varied.

18. In a machine of the kind recited, the combination of the plates, 36, and 37, plates, 42, and plate, 40, substantially as and for the purpose set forth.

19. In a machine of the kind recited, the combination of the plates 36 and 37, the plates, 42, the swinging arms to which the latter plates are attached, the brackets to which said arms are pivoted, the stop for determining and limiting the inward position of said plates, 42, the springs tending to maintain the latter in the closed position and means for adjusting said brackets and adjuncts, whereby the position of the plates, 42, may be adjusted, substantially as and for the purpose set forth.

20. In a machine of the kind recited, the combination of the horizontal plates, 36 and 37, the vertical plates, 42, the propulsion-belt, its pulleys, the propulsion-belt frame, means for maintaining said belt in a definite position upon said pulleys and means for lateral adjustment of said frame, whereby the proper position of the bar of clay with relation to said several plates is insured, substantially as and for the purpose set forth.

21. In a machine of the kind recited, the combination of the horizontal plates, 36 and 37, the vertical plates, 42, the propulsion-belt having the buttons thereon, its pulleys having peripheral grooves in which said buttons are adapted to travel, the propulsion-belt frame, and means for sidewise adjustment of said frame, substantially as and for the purpose set forth.

22. In a machine of the kind recited, the combination of the plates, 36 and 37, the off-bearing-belt pulley, its shaft, the yoke or frame in which said shaft is journaled, and means for effecting adjustments of said frame, whereby the said pulley may be brought into proper position vertically with relation to said plates, substantially as specified.

In testimony whereof we have hereunto affixed our signatures this 6th day of June, A. D. 1899.

HOWARD K. KING.
CYRUS CHAMBERS, JR.

Witnesses:
WALTER C. PUSEY,
JOSHUA PUSEY.

Correction in Letters Patent No. 678,259.

It is hereby certified that in Letters Patent No. 678,259, granted July 9, 1901, upon the application of Howard K. King, of Philadelphia, and Cyrus Chambers, jr., of Overbrook, Pennsylvania, for an improvement in "Brick-Machines," an error appears in the printed specification requiring correction, as follows: In line 68, page 7, the word "latter" should read *lateral;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 23d day of July, A. D., 1901.

[SEAL.]

F. L. CAMPBELL,
Assistant Secretary of the Interior.

Countersigned:

E. B. MOORE,
Acting Commissioner of Patents.