No. 711,896. Patented Oct. 21, 1902.

H. L. HIX.

BRICK CUTTING MACHINE.

(Application filed Sept. 11, 1901.)

(No Model.) 4 Sheets—Sheet 1.

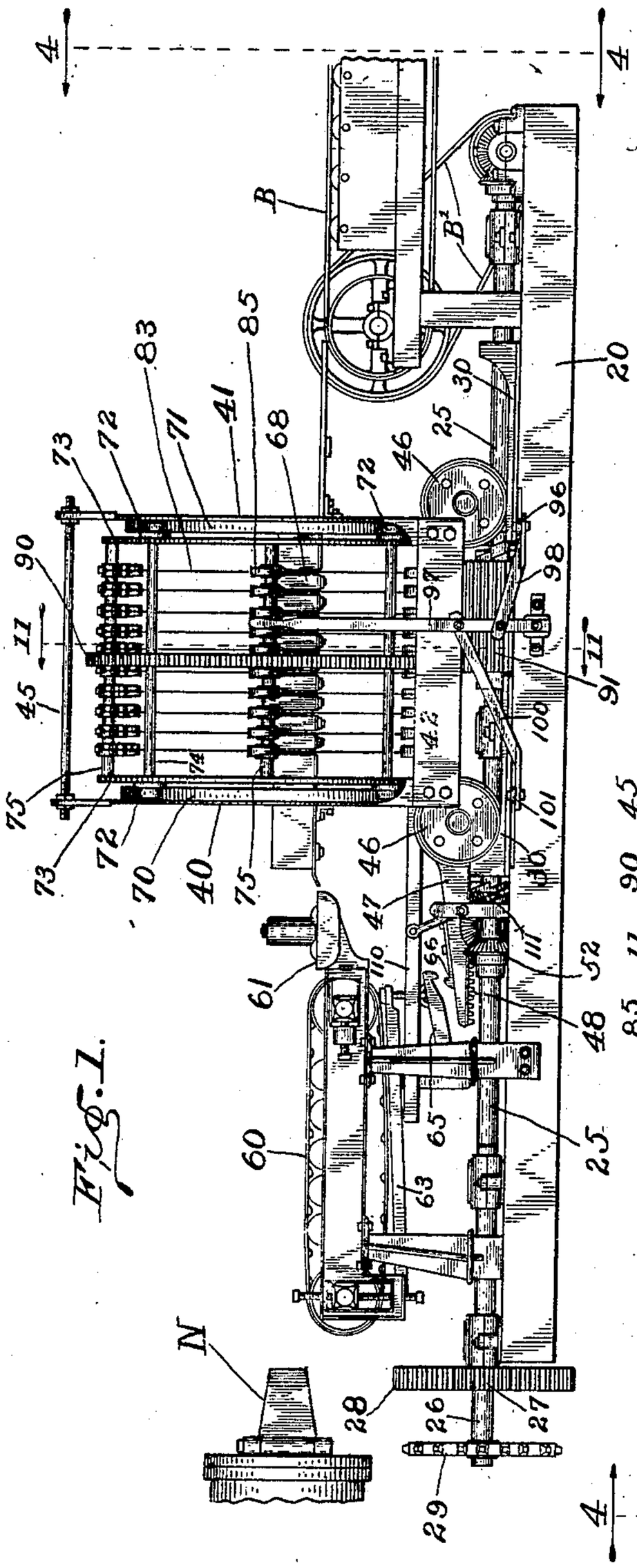

Fig. 1.

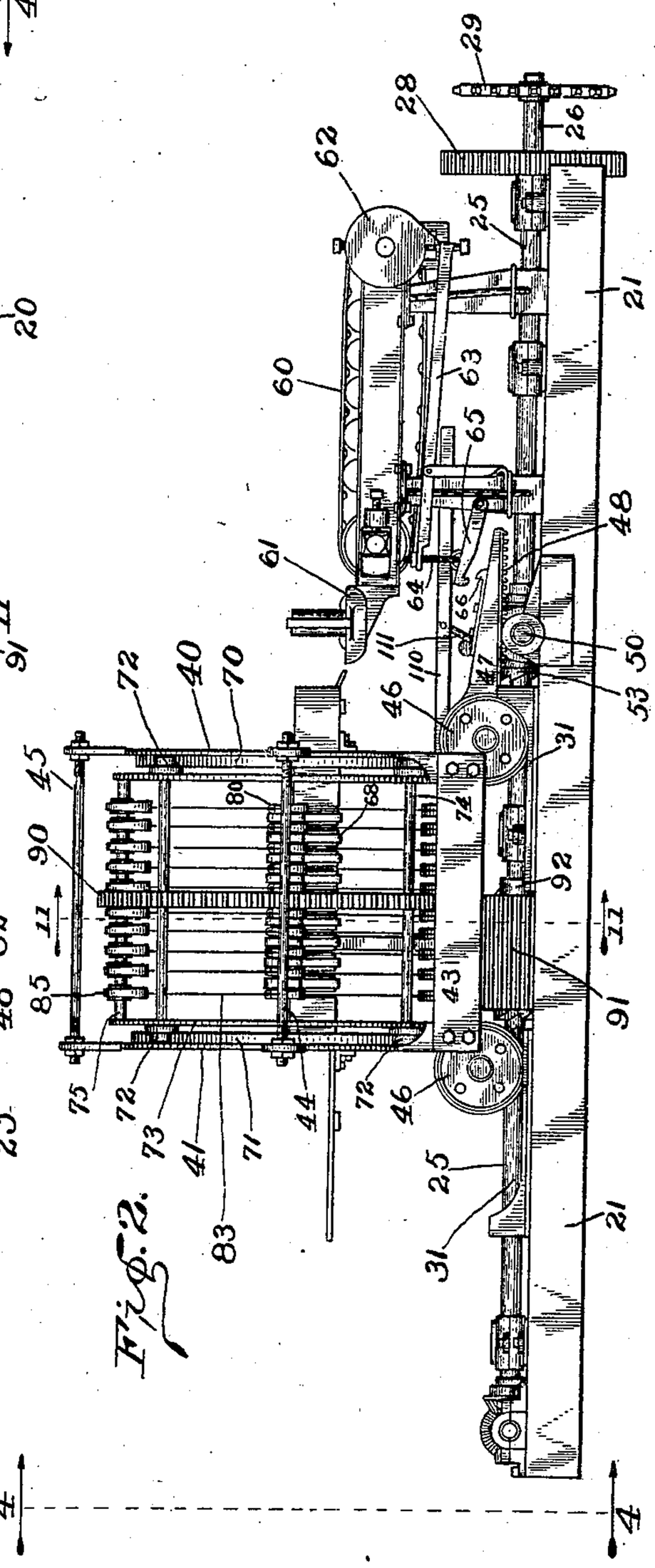

Fig. 2.

WITNESSES:
C. S. Prye.
F. H. Colvin.

INVENTOR
Howard L. Hix.,
BY
Chester Bradford.
ATTORNEY

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H. L. HIX.

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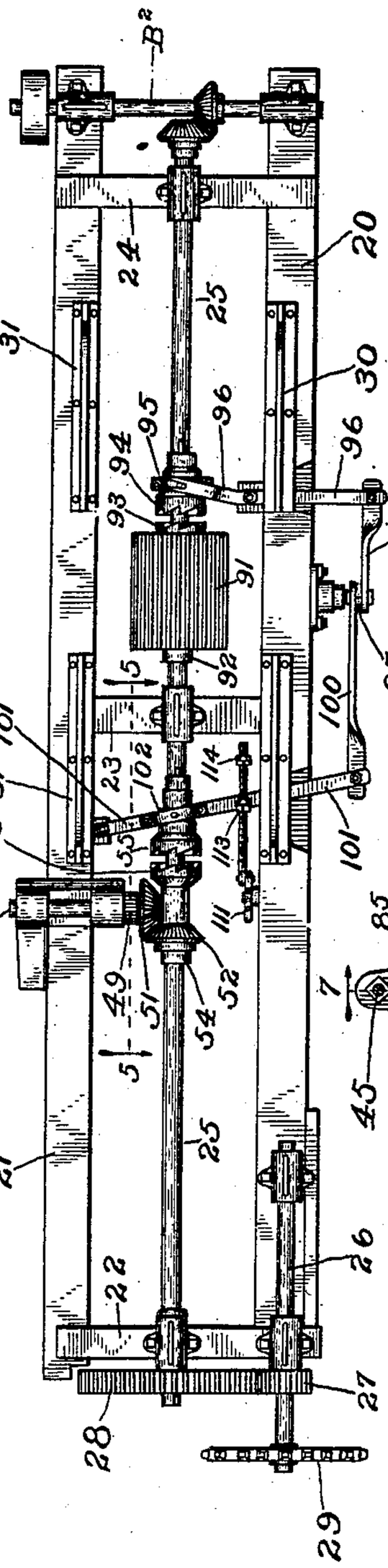

Fig. 3.

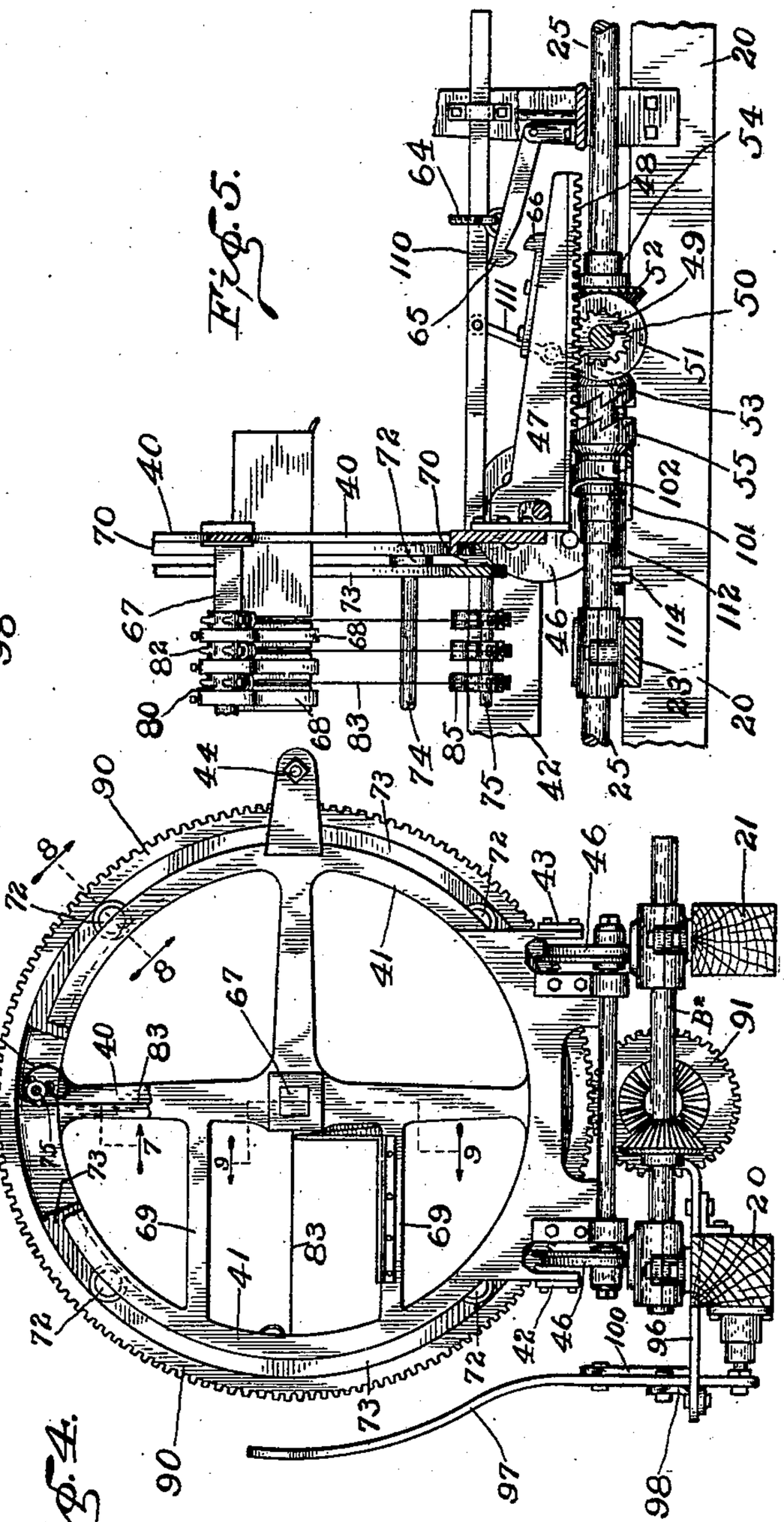

Fig. 4.

Fig. 5.

WITNESSES:
C. S. Frye.
F. N. Colvin.

INVENTOR
Howard L. Hix,
BY
Chester S. Bradford,
ATTORNEY

No. 711,896. Patented Oct. 21, 1902.

H. L. HIX.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 6.

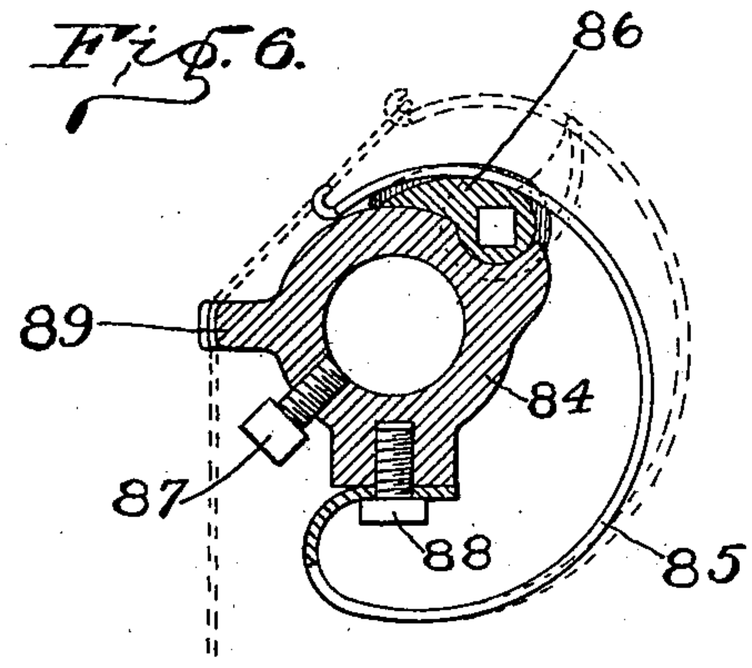


Fig. 7.

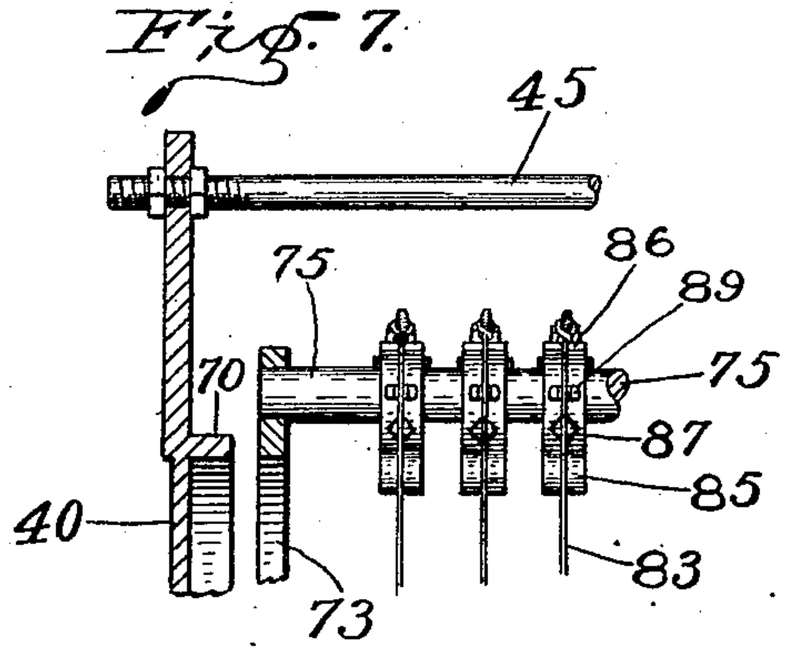


Fig. 8.

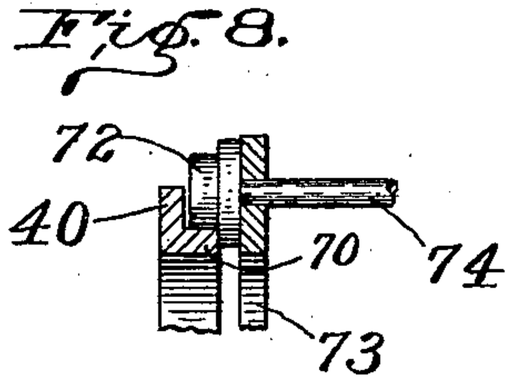


Fig. 9.

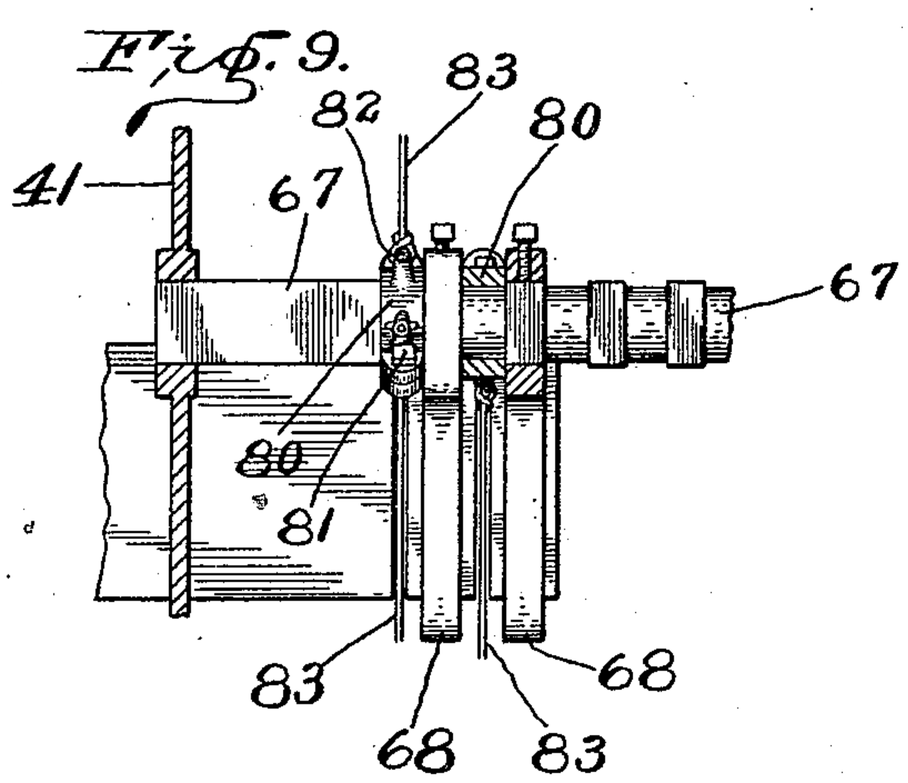
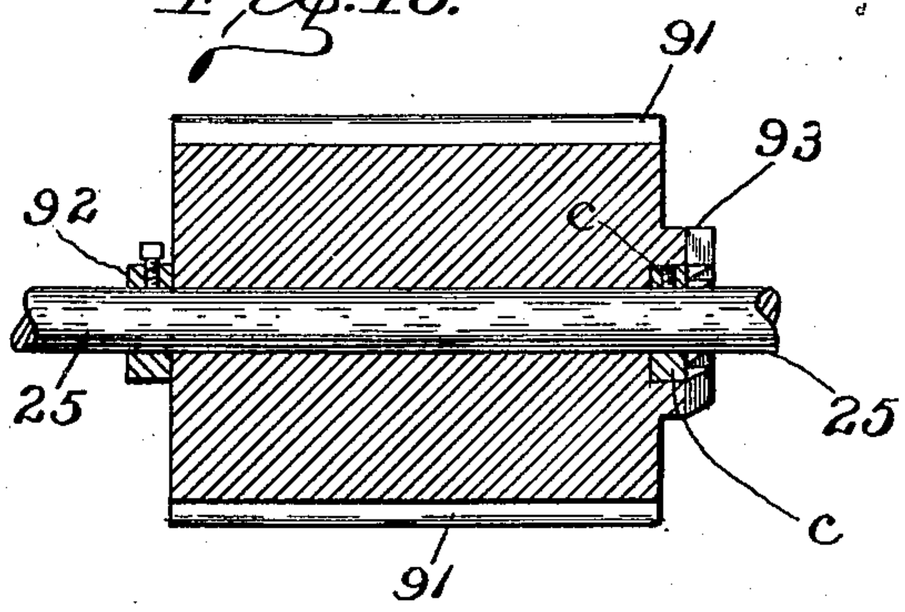


Fig. 10.



WITNESSES:
C. S. Fryc
T. H. Colvin.

INVENTOR
Howard L. Hix,
BY
Chester I. Bradford
ATTORNEY

No. 711,896. Patented Oct. 21, 1902.

H. L. HIX.

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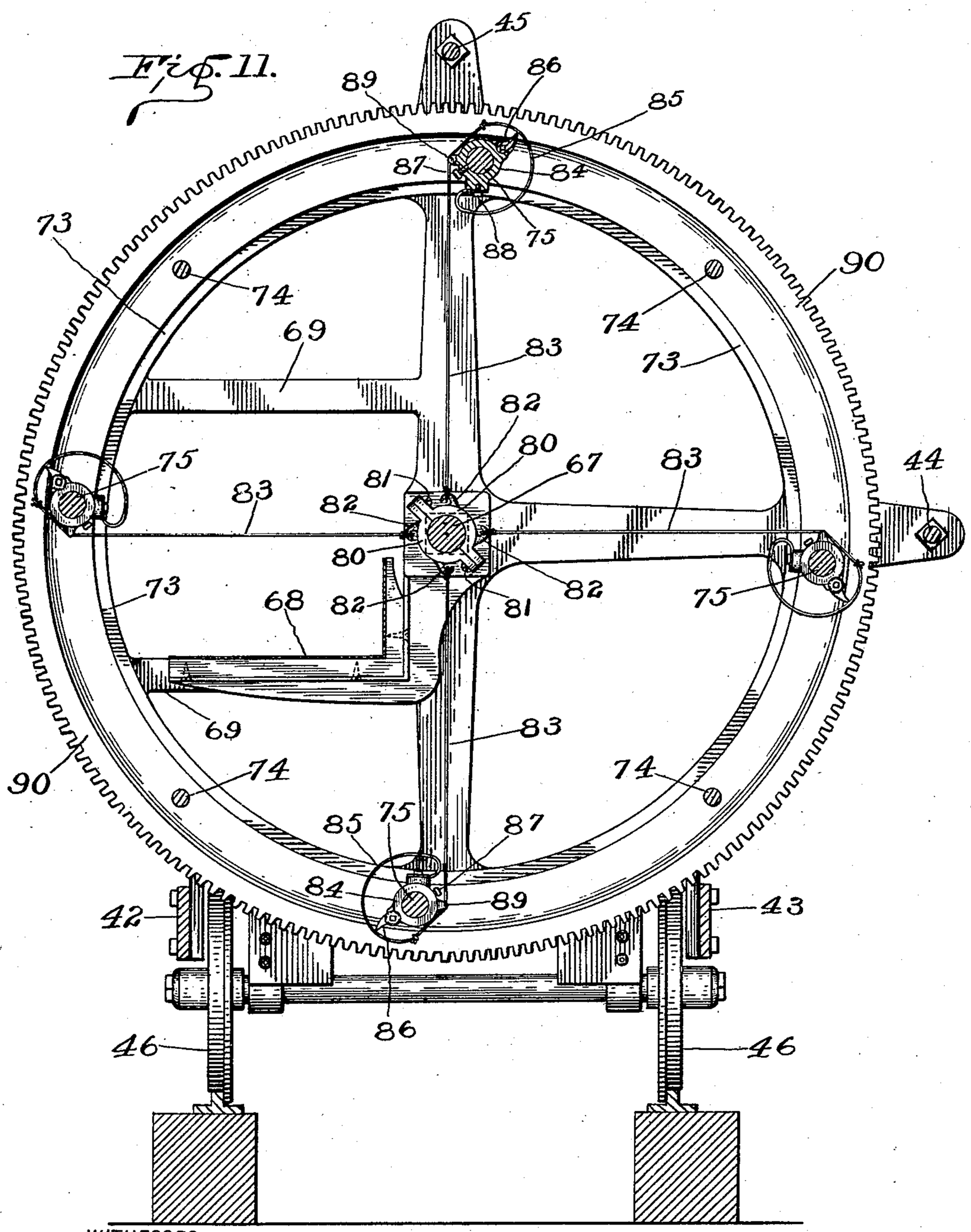
Fig. 11.



WITNESSES:

C. S. Frye.

T. N. Calvin.

INVENTOR

Howard L. Hix,

BY

Chester I. Bradford.

ATTORNEY

UNITED STATES PATENT OFFICE.

HOWARD L. HIX, OF FRANKFORT, INDIANA, ASSIGNOR TO THE WALLACE MANUFACTURING COMPANY, OF FRANKFORT, INDIANA, A CORPORATION OF INDIANA.

BRICK-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 711,896, dated October 21, 1902.

Application filed September 11, 1901. Serial No. 75,054. (No model.)

To all whom it may concern:

Be it known that I, HOWARD L. HIX, a citizen of the United States, residing at Frankfort, in the county of Clinton and State of Indiana, have invented certain new and useful Improvements in Brick-Cutting Machines, of which the following is a specification.

The principal object of my said invention is to produce a machine by which bricks can be cut by power machinery from a column of clay while the same is issuing from the clay-preparing machine, thereby securing the making of a considerable number of bricks at one operation and without the employment of the large amount of manual labor commonly required for the purpose. Its leading characteristic is that the structure carrying or embodying the pallets by which the brick or column of clay is supported also carries the cutting appliances, and the whole apparatus moves concurrently and uniformly with the column of clay while the cutting operation is going on, while the cutting appliances are driven by power without interrupting the movement.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts, Figure 1 is a front elevation of a machine embodying my said invention; Fig. 2, a rear elevation thereof; Fig. 3, a plan view of the operating-shaft and gearing, the cutting mechanism, the receiving and carrying-off tables, and other upper works being removed; Fig. 4, an end elevation of the machine with the receiving-table removed as seen from the dotted line 4 4 alongside Figs. 1 and 2; Fig. 5, a sectional view looking from the rear toward the front of the machine, the point of view being indicated by the dotted line 5 5 in Fig. 3; Fig. 6, a detail sectional view of one of the cutter-wire tension devices on an enlarged scale, the tension cam and spring being shown in the loosened position in full lines and in the tightened position (similar to that shown in the other figures) in dotted lines; Fig. 7, a detail sectional view, on an enlarged scale, looking in the direction indicated by the arrows from the dotted line 7 7 in Fig. 4; Fig. 8, a detail sectional view as seen from the dotted line 8 8 in Fig. 4; Fig. 9, a detail sectional view along a portion of the central shaft, showing a portion of the shaft itself in elevation on the dotted line 9 9 in Fig. 4; Fig. 10, a detail sectional view of the cutter-carrier-driving pinion, showing how it is held on its shaft; and Fig. 11, a detail sectional view, also an enlarged scale, as seen from the dotted line 11 11 in Figs. 1 and 2, illustrating the relation of the cutters to the pallets more plainly.

This machine as a whole is mounted on a frame preferably consisting of bed-timbers 20 and 21 and cross-bars 22, 23, and 24. Centrally on the latter is the main shaft 25, which is mounted in suitable boxes or bearings and is shown as driven from a counter-shaft 26 through a pinion 27 and a spur gear-wheel 28, said shaft 26 being driven from any suitable source of power, (not shown,) a sprocket-wheel 29 being shown as the immediate means to which the driver may by connected, as by a chain belt.

Upon the timbers 20 and 21 are the tracks 30 and 31, which carry a reciprocally-moving structure, and upon this in turn is mounted a cutter-carrying structure. Said reciprocally-moving structure is composed of end frames 40 and 41 and connecting bars and rods 42, 43, 44, and 45, and this frame is mounted on four trucks or wheels 46, which run on the tracks 30 and 31. Extending out from the frame of said reciprocally-moving structure is an arm 47, upon the under side of which is a rack-bar 48, which engages with a pinion 49 (see Figs. 3 and 5) on a counter-shaft 50, which is disposed at right angles with the main shaft 25 and has a bevel-pinion 51 on its inner end, which engages with a similar pinion 52. Said pinion forms part of a spool-shaped structure whose other end has a clutch part 53, and said structure is mounted to revolve freely on the main shaft 25, but is held from longitudinal movement on said shaft by a collar 54. A second clutch part 55 is mounted to move longitudinally but not revolubly on the shaft 25 and is adapted to engage with and drive the loosely-mounted spool-shaped structure at proper times, as will be hereinafter described, and

through the bevel-pinions 52 and 51, the shaft 50, the spur-pinion 49, the rack-bar 48, and the arm 47 to draw the reciprocally-moving structure along its tracks a certain distance, thus returning said structure periodically to position to receive a fresh portion of the column of clay to be converted into bricks, as will hereinafter be more fully explained.

In operation the column of clay which is to be cut up into bricks emerges from the nozzle N (see Fig. 1) of the clay-preparing machine and is thence delivered onto a traveling belt 60, which is arranged to receive it and over which it passes to the cutting portion of my machine. Between said belt and said cutting portion of the machine is the lubricator 61 for the clay column, as is common. On the shaft of one of the rolls, which carries the belt 60, is a cam 62, (see especially Fig. 2,) which operates a vibrating lever 63, which in turn by means of a link 64 is connected to a latch 65, which is adapted when in its lowermost position to engage with a catch 66 on the arm 47, (when the latter has reached the limit of its movement,) and these parts serve as a detent whereby the reciprocally-moving structure is held to said position until the high part of the cam 62 comes around again and through the lever 63 raises the latch 65 out of engagement, whereupon the reciprocally-moving structure will be impelled (by the advancing column of clay) along its tracks, the frictional contact being sufficient so that they will move in unison. The proportion and arrangement of parts is such that the cam 62 will operate to disengage the detent composed of the latch 65 and catch 66 just at the instant the column of clay has advanced to the point where the cutters should or may be operated to cut a series of bricks. The number of bricks to be cut at any single operation is to be determined when the machine is built. I have illustrated a machine capable of cutting ten bricks at each operation, there being ten cutting-wires shown in place. The bricks after being cut are received and carried away by the off-bearing belt B, (see Fig. 1,) which preferably moves at a somewhat-greater speed than the advancing column of clay, and thus tends to separate the bricks somewhat as they come from the machine, as will be readily understood. This belt is shown as being driven by a belt B′ from a counter-shaft B^2, which is driven from the shaft 25.

The ends 40 and 41 of the reciprocally-moving structure are formed with circular tracks, and these are arranged inside of said ends, facing each other. Said ends also have spoke-like arms which extend to the center, where they carry the non-revoluble shaft 67. This shaft is shown as being square in form for the greater part of its length; but any other shape which would hold the parts mounted thereon securely and rigidly might be adopted. As best shown in Fig. 11, a series of narrow pallets 68 are carried by this shaft 67, each of said pallets being of a width about equal to the thickness of a brick. In order to stiffen the structure on the side where the clay-receiving tables and pallets are carried, brace-arms 69 are provided as a part of the structure, as shown in Figs. 4 and 11, these leaving substantially a rectangular opening through which the column of clay travels. The square shaft 67 has a series of round places turned thereon to receive the inner cutter-wire supports, as will be presently described.

The circular tracks 70 and 71 on the end frames 40 and 41 receive the trucks or wheels 72 of the revolving frame or cage, upon which in the construction shown the cutter-wires are mounted. Said frame or cage consists of annular rims 73, connected by two series of rods 74 and 75. Upon the ends of the rods 74 the trucks 72 are mounted. These run on the circular tracks 70 and 71 of the main frame of the structure, said rods thus serving as axles for said trucks. The rods 75 carry the outer cutter-wire holding and straining devices, while the shaft 67 carries the inner cutter-wire-holding devices. These inner cutter-wire holders are composed of two halves 80, fitting together to form a ring, the two parts being united by bolts or screws 81. They are mounted in circular grooves turned in the shaft 67 and are adapted when in operation to revolve around said shaft. They are provided with hook-like projections 82, equal in number (four are shown) to the number of cutter-wires, to which the inner ends of said cutter-wires 83 are connected. The outer cutter-wire holding and straining devices are each composed of a body-block 84, a spring 85, a cam 86, and preferably a set-screw 87. The rods 75 are rigidly secured in the annular rims 73, and the body-blocks 84 are rigidly secured on said rods by means of the set-screws 87. This admits of some adjustment of said blocks in case of necessity. The springs 85 are secured to said blocks by means of cap-screws 88 and sweep out around free from the remainder of the structure until they rest upon the cams 86. The points of said springs are hook-shaped to receive the outer ends of the cutter-wires. Said cutter-wires after being hooked onto the hooks 82 are brought out to the outer portion of the frame or cage and drawn over suitable bearing-points 89 on the body-blocks 84 and then hooked onto the ends of the springs 85. The cams 86 are then turned from the position shown in Fig. 6 to the position most clearly shown in Fig. 11, which (the length of the wires and the position of the parts having previously been properly determined and adjusted) gives these wires just the proper tension to cause them to work in the desired manner. The springs 85, while strong enough to hold the wires to considerable tension, will yield somewhat when the cams 86 are adjusted and also yield slightly in case the wires come in contact with obstructions in doing

their work. The yielding, however, is in no case sufficient to cause the work to be badly done, except where the character of the obstruction is such as to necessarily break the wire or deflect it from its course.

The cutter-carrying frame or cage carrying the cutter-wires is, as heretofore indicated, to be operated and the bricks thus cut from the column of clay during the travel along its tracks of the structure carrying said frame. I have shown as the means of thus operating said cutter-carrying frame a large circular rack-bar 90, surrounding and secured thereto, and a long pinion 91, adapted to engage with said rack-bar and mounted on the main shaft 25. The rack-bar 90 I prefer to secure to the rods 74 and 75 at a point about midway between the two rims 73, this being a convenient location therefor. The pinion 91 is revolubly mounted on the shaft 25, but is held from longitudinal movement on said shaft by an ordinary collar 92 at one end and a small collar *c* within the clutch at the other. Said pinion is shown as having one member 93 of the clutch formed on its hub. The other member 94 of said clutch is arranged adjacent to the member 93 and is longitudinally but not revolubly mounted on said shaft 25. It is adapted to be thrown into and out of engagement with the clutch member 93 by means of a trunnion-ring 95 and a lever 96, engaging with said ring, these parts being of a well-known construction. The lever 96 is connected to a hand-lever 97 by means of a link 98, and the clutch is thus adapted to be thrown into and out of engagement at will. In operation after the latch 65 has been thrown out of engagement with the catch 66 and the reciprocally-moving structure thus permitted (under the impulse of the moving column of clay) to begin its travel, which, as before stated, owing to the frictional contact between said column of clay and the pallets and other clay-supporting parts carried by said structure is uniform therewith, the operator by means of the hand-lever 97 throws the clutch driving the pinion 91 into engagement, and this (through the circular rack 90) propels the cutter-carrying frame until one series of the cutter-wires have passed through the portion of the column of clay at the time in their path and severed the same into bricks. The operator then gives the lever a reverse movement, throwing the clutch out of engagement and stopping the movement of the frame. The last-mentioned movement of the hand-lever also (through the link 100, the lever 101, and the trunnion-ring 102) throws the clutch part 55 into engagement with the clutch part 53, which, as previously described, (through the pinion 49, arm 47, and its rack-bar,) drives the reciprocally-moving structure in the opposite direction until it reaches the limit of its movement. This limit is determined by means of a push-rod 110, which is placed in the path of said structure and is connected to the lever 101 by means of a lever 111 and the link 112, said parts being so adjusted and arranged as to throw the clutch out of engagement automatically when the structure reaches the limit of its movement should the operator (by accident or negligence) fail to move the hand-lever 97 at the proper time. The time that this operation takes place automatically by the means stated can be adjusted with the greatest nicety by means of the adjusting-nuts 113 and 114 on the link 112, said link being screw-threaded and provided with these nuts for that purpose. The machine being thus provided with an automatic throw-out device for the clutch no damage can occur because of a too-protracted engagement thereof, either on account of carelessness of the operator or by reason of any accidental happening. As will be noticed by an examination of the drawings and as appears from the foregoing description, the two clutches are so connected as to be both operated by the single hand-lever 97. This is not only a matter of convenience in operation, but insures that both clutches shall never be in engagement at the same time, so that danger of damage from this source is wholly eliminated. When the clutch 55 53 is thrown out of engagement by the push-rod 110, however, it does not operate to throw the clutch 93 94 into engagement, the adjustment being such that the movement stops short of such a result, so that a further movement is required before the last-named clutch becomes operative.

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

1. The combination, in a brick-cutting machine, of a supporting structure, a reciprocally-moving structure mounted on trucks on said supporting structure and provided with pallets for the reception of a column of clay and adapted to be propelled in one direction by said column of clay as it issues from the clay-preparing machine, a power-driven shaft journaled on the main frame, a projecting arm attached to the reciprocally-moving structure and carrying a rack-bar, gearing for connecting said driving-shaft and said rack-bar, mechanism for throwing said gearing into and out of engagement at the limit of the movement, and a rotary cutter-carrying structure mounted on circular tracks on said reciprocally-moving structure and gearing connecting the same with the main driving-shaft, substantially as set forth.

2. In a brick-cutting machine, the combination, of the main frame, a reciprocally-moving frame mounted on trucks thereon, circular tracks on said reciprocally-moving frame, a rotary cutter mounted on said circular tracks, a circular rack-bar on the cutter structure, a main driving-shaft journaled on the main frame, gearing connecting the

truck-frame with said main driving-shaft, gearing for connecting the circular rack-bar of the cutter structure with said main driving-shaft, means for throwing each of said sets of gearing into or out of engagement, and suitable links and levers connecting the gear-operating devices whereby the operation of one cannot take place without the operation of the other, substantially as set forth.

3. In a brick-cutting machine, the combination, of the main frame, a reciprocally-moving frame mounted on trucks on said main frame, a rotary cutter structure carried by said reciprocally-moving frame, a circular rack-bar thereon, a longitudinally-extending rack-bar extending out therefrom, a main driving-shaft journaled on the main frame provided with loosely-mounted gears engaging said circular rack-bar and said longitudinally-extending rack-bar, clutch mechanisms for connecting said gears with said driving-shaft, links and levers connecting said clutch mechanisms whereby they are operated in unison, a part extending from the clutch-lever into the path of the reciprocally-moving frame, whereby when said reciprocally-moving frame reaches the limit of its movement in one direction it will automatically throw said clutch out of engagement and release itself for its return movement, substantially as set forth.

4. In a brick-cutting machine, the combination, of the main frame, the reciprocally-moving frame thereon, circular tracks on said reciprocally-moving frame, a cutter-carrying structure mounted on said circular tracks, a central shaft rigidly mounted in said cutter-carrying structure, pallets for receiving the clay rigidly mounted upon said shaft, inner cutter-holding devices mounted to revolve on suitable seats on said shaft formed to receive the inner ends of the cutters, outer cutter-holding devices carried by the cutter-carrying structure formed with expanding parts for regulating the tension of the cutters, and said cutters mounted on said inner cutter-holding devices on the shaft and the outer cutter-holding devices on the cutter-carrying structure and passing over said expanding devices, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 7th day of September, A. D. 1901.

HOWARD L. HIX. [L. S.]

Witnesses:
CHESTER BRADFORD,
L. H. COLVIN.