(No Model.)

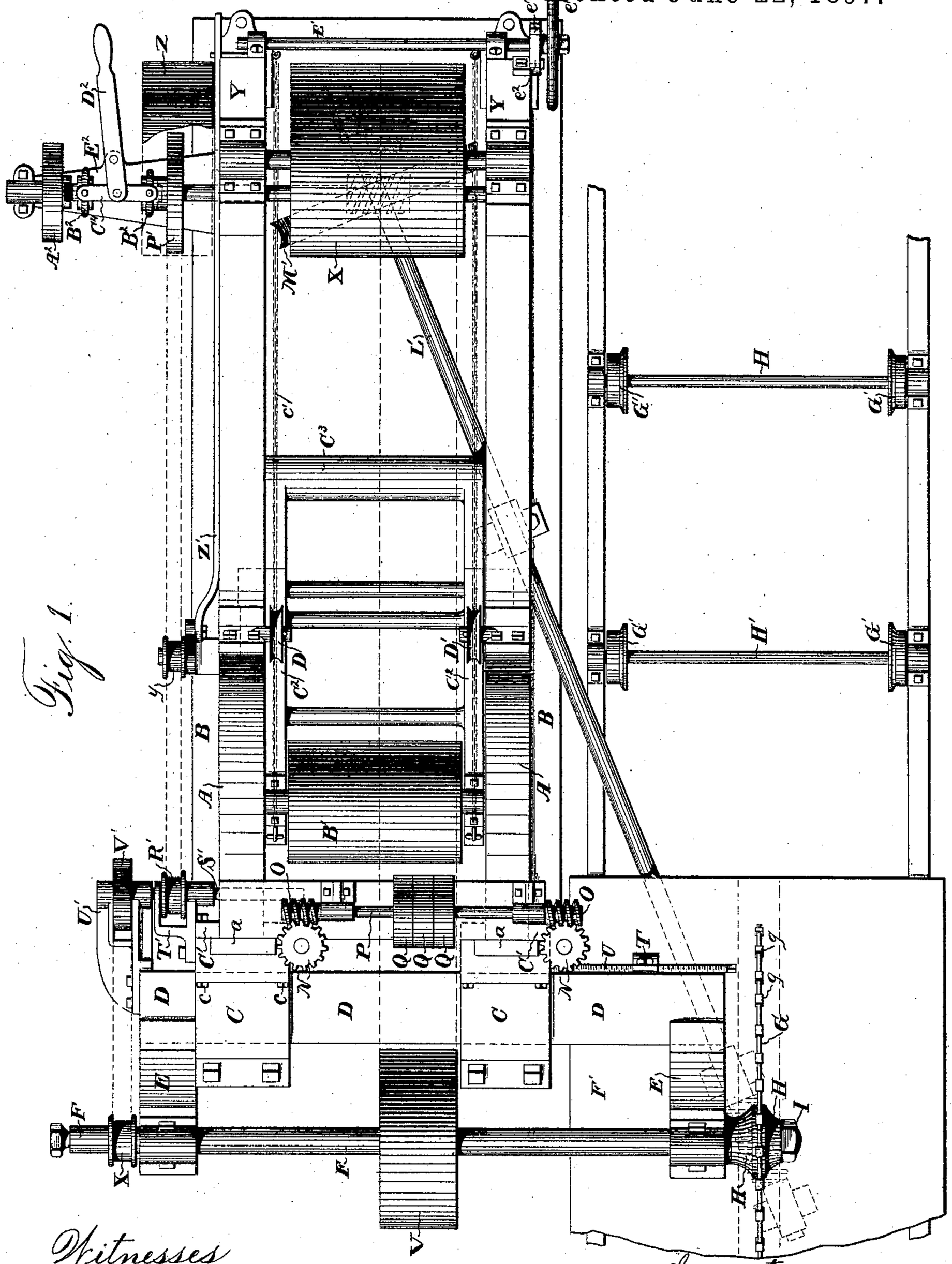
4 Sheets—Sheet 1.

T. A. JACKSON.

STONE CUTTING MACHINE.

No. 585,102. Patented June 22, 1897.

Fig. 1.



(No Model.)

4 Sheets—Sheet 2.

T. A. JACKSON.

STONE CUTTING MACHINE.

No. 585,102.

Patented June 22, 1897.

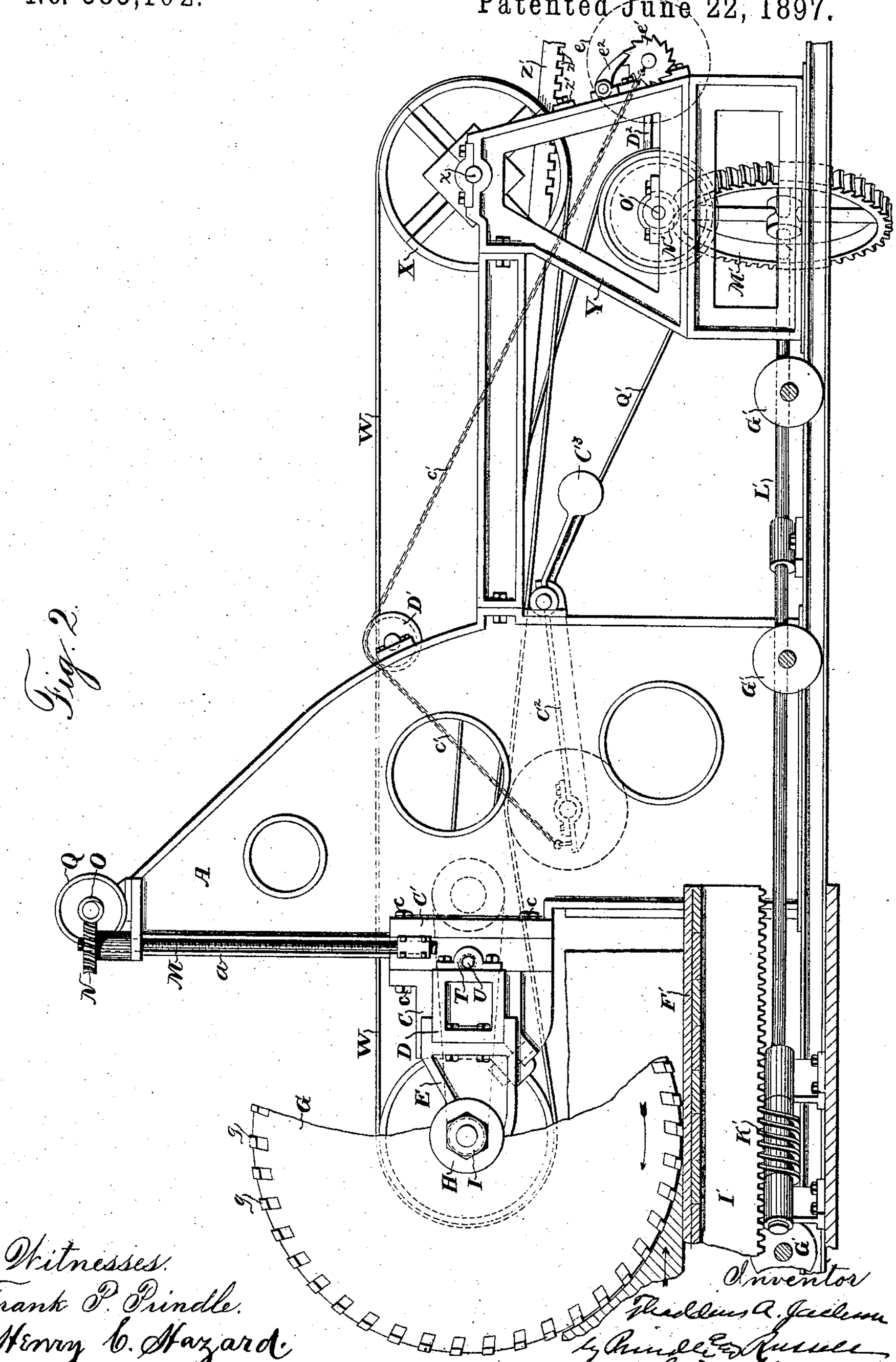


Fig. 2.

Witnesses.
Frank P. Prindle.
Henry C. Hazard.

Inventor
Theodore A. Jackson
by Prindle & Russell
his attorneys

(No Model.)

4 Sheets—Sheet 3.

T. A. JACKSON.

STONE CUTTING MACHINE.

No. 585,102. Patented June 22, 1897.

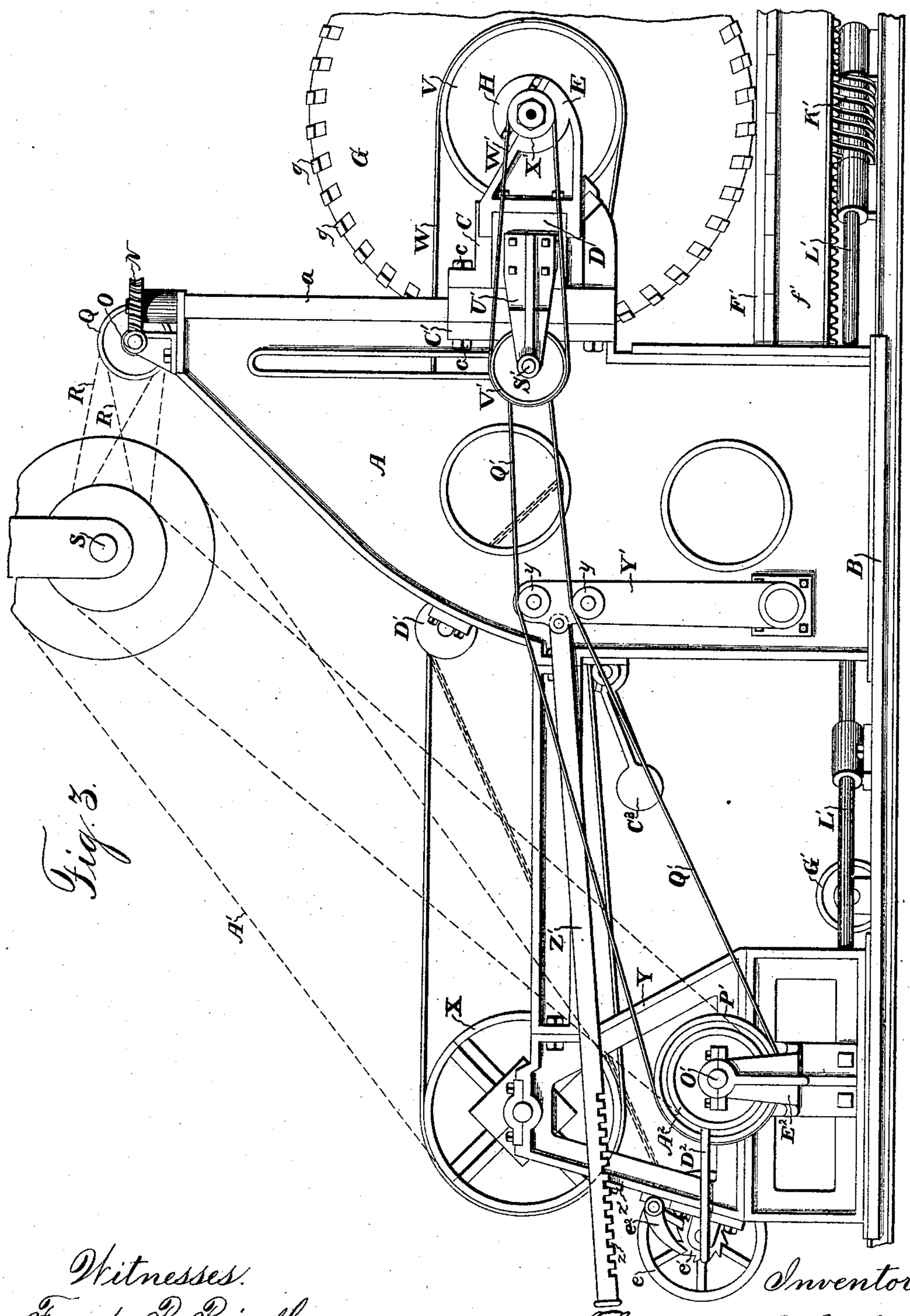


Fig. 3.

Witnesses.
Frank P. Prindle.
Henry C. Hazard.

Inventor.
Thaddeus A. Jackson
by Prindle and Russell
his attorneys

(No Model.) 4 Sheets—Sheet 4.

T. A. JACKSON.

STONE CUTTING MACHINE.

No. 585,102. Patented June 22, 1897.

Fig. 4.

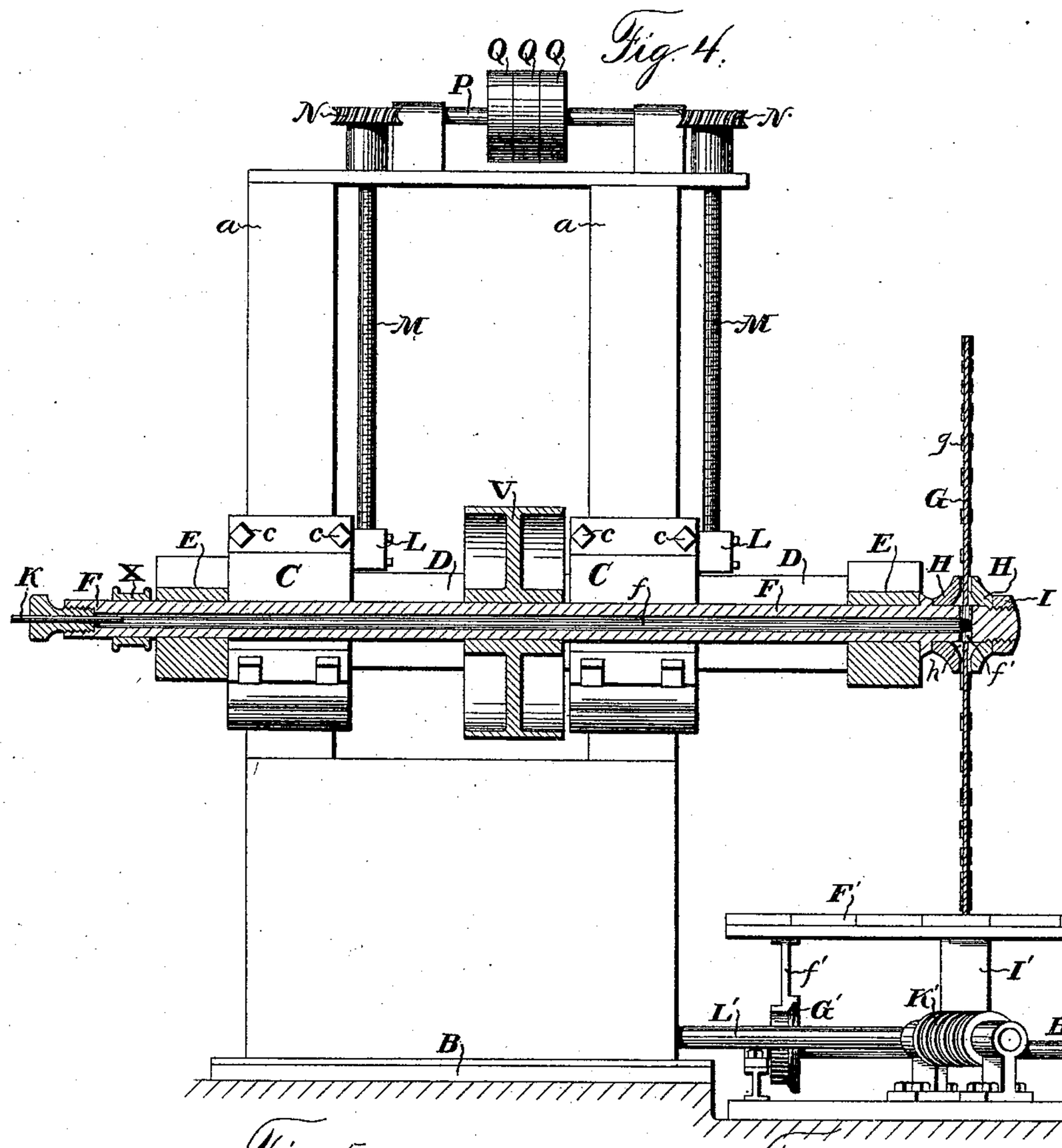


Fig. 5.

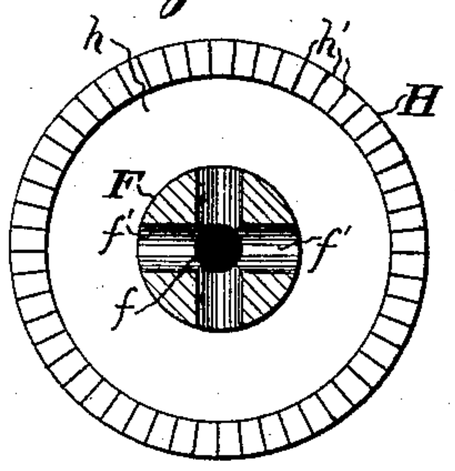


Fig. 6.

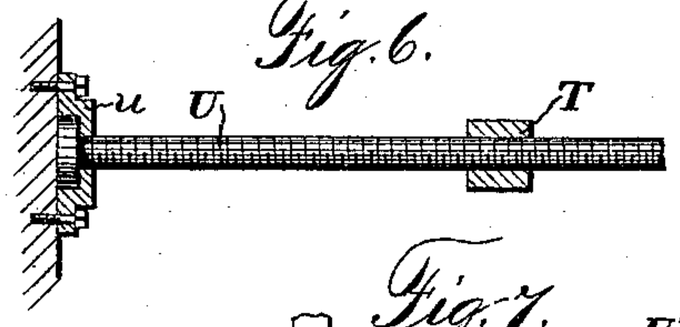
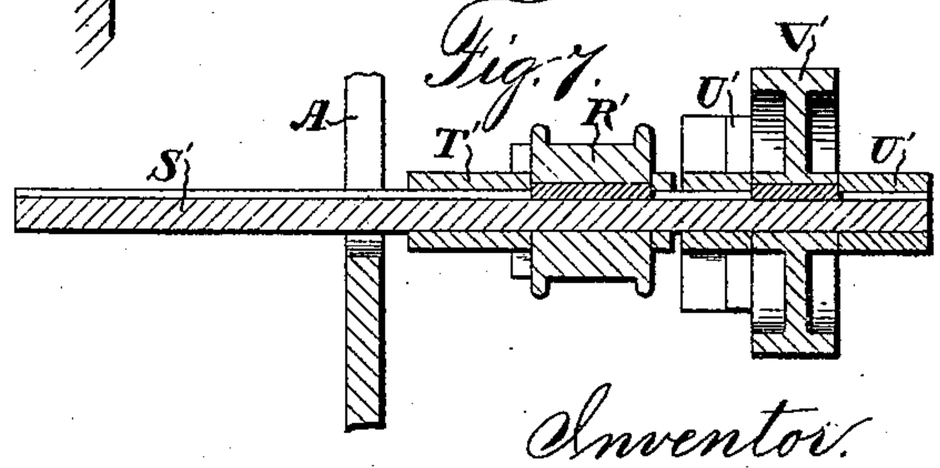


Fig. 7.



Witnesses.
Frank P. Prindle.
Henry C. Hazard.

Inventor.
Thaddeus A. Jackson
by Prindle & Russell
his Attorneys

UNITED STATES PATENT OFFICE.

THADDEUS A. JACKSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HUBBARD C. POTTER, OF NEW YORK, N. Y.

STONE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,102, dated June 22, 1897.

Application filed May 9, 1896. Serial No. 590,867. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS A. JACKSON, of Brooklyn, in the county of Kings, and in the State of New York, have invented certain new and useful Improvements in Stone-Cutting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of my machine. Figs. 2 and 3 are respectively views from opposite sides thereof. Fig. 4 is an end elevation with parts in section. Fig. 5 is a side view of one of the saw clamps or collars, with the saw-mandrel shown in cross-section. Fig. 6 is a detail view of the means for adjusting the saw laterally, and Fig. 7 is a longitudinal section of a shaft and pulleys thereon that form part of the gearing between the saw-mandrel and the stone-carrying table or carriage.

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

The object of my invention is to provide a thoroughly practical machine for satisfactorily and rapidly sawing or cutting stone by means of a circular saw; and to this end said invention consists in the stone-cutting machine having the construction and combination of parts substantially as hereinafter described.

In the drawings, A and A designate two vertical frame parts or standards that are firmly fastened to a suitable bed-plate B. Clamped to vertical flanges or ribs *a* and *a* at the front edge of each of said frame-plates is a bracket or box C, the clamping means being bolts *c* and *c* and plates or bars C′ and C′, that bear against the rear faces of the ribs. Said brackets or boxes are each provided with a square opening to receive a cross-head D, consisting of a hollow bar or beam that is square in cross-section to fit the openings in the brackets. The top and front side of each bracket is formed by a removable cap that is secured by bolts to the body of the bracket, by which the cross-head may be firmly clamped in position.

The cross-head D is of such length as to project through the latter at both ends, and on its ends outside of said brackets it is provided with forwardly-projecting arms E and E, that have bearings for a mandrel or shaft F, upon one end of which is mounted a circular saw G. Said saw consists of a blade or plate that is provided at its periphery with numerous inserted teeth *g* and *g* in the form of oblong blocks or pieces of steel or other suitable metal, whose sides and outer edge are provided with diamonds. The outer edge of each tooth projects beyond the periphery of the saw-plate, and the outer portion of each is thicker than the latter, so as to project upon both sides of the plate. The teeth being thicker than the saw-plate, the sides of the latter do not touch the stone, and hence there is provision for clearance, and a possible cause of much friction is obviated.

It will be observed that the teeth *g* and *g* are not placed in lines radial to the center of the saw-plate, but in lines oblique thereto, the angle at which they stand being forward and outward with reference to the direction of rotation of the saw. By this inclined arrangement of the teeth there is not only less tendency to their dislodgement by contact with the stone, that would be the case if they were arranged on radial lines, but any tendency to be thrown from the saw by centrifugal force is materially checked by the overhanging of the rear side of each tooth by the side of the slot containing it.

In order to prevent the loosening of the teeth *g* and *g* by the opening of the slots containing them, due to slight enlargement of the diameter of the saw-plate from centrifugal force, the plate is made so that when at rest it is dished or buckled to a degree to compensate, by straightening out when it is revolving, for its expansion by centrifugal force. Thus, although the distance from one tooth to an adjacent one is greater when the saw is in motion than when it is at rest, the curvature of the saw-plate between the teeth when it is motionless provides for the tight filling up of the space between such teeth when it becomes greater from the effect of centrifugal force.

The saw is firmly clamped to the mandrel between two collars H and H, that engage the

saw on opposite sides, against the outer one of which bears a nut I, that is screwed on the end of the mandrel. In the face of each collar adjacent to the saw is a cavity *h*, from which to the periphery of the collar extend numerous fine radial cuts or slits *h'*, through which water supplied to the interior of the collar escapes and is carried by centrifugal force to the circumference of the saw, passing freely to the stone being cut through the spaces between the teeth *g* and *g*. It will be seen that in this connection the employment of teeth thicker than the saw-plate is of material advantage as furnishing channels for the free passage of water.

The water is supplied to the interior of the collars H and H by a longitudinal passage or opening *f*, extending through the saw-mandrel from one end to a point in line with the saw-plate, where it communicates with a number of radial openings *f'* and *f'*, that extend to the periphery of the mandrel, and are so much greater in diameter than the thickness of the saw-plate as to extend on opposite sides of the same, so as to communicate with the cavity in each collar H.

The open end of the mandrel is connected by a pipe K with a suitable source of water, from which the water is drawn by the rotation of the saw.

For raising and lowering the saw a nut or block L, having a threaded opening, is bolted to the side of each cross-head bracket C, through which passes a vertical threaded shaft or screw M, that at its upper end is provided with a worm-wheel N in mesh with a worm O upon a horizontal shaft P, that is journaled in bearings upon a horizontal plate that extends from the top of one side frame A to the other.

At or near its longitudinal center the worm-shaft P has three pulleys Q, Q, and Q side by side, the middle one being fixed to the shaft and the other two loose. Two belts R and R, receiving motion from a main driving-shaft S and one of which is crossed, are adapted to be alternately shifted to the fixed pulley from the loose pulleys to drive the worm-shaft in one direction or the other and thus raise or lower the saw.

Horizontal adjustment of the saw is provided for by moving the cross-head D longitudinally through the brackets C and C, and this may be conveniently done by means of a nut T, that is secured to the side of said cross-head, and a screw U, passing through the same, that at one end is adapted to receive a suitable turning tool and at its other end has a swiveled connection *u* with the side of one of the brackets C, as best shown in Fig. 6.

Preliminary to raising or lowering the saw the brackets C and C are loosened from the guide ribs or flanges on the frame-plates A and A, and when the desired elevation is reached they are again tightened, and when the saw is to be shifted horizontally the cross-head brackets C and C are loosened, and the adjustment having been effected are again clamped on the cross-head.

For revolving the saw the mandrel has at or near its longitudinal center a pulley V, that is connected by a belt W with a band-wheel or drum X, which is mounted upon a shaft *x*, journaled in bearings upon a frame Y, secured upon the bed-plate B in rear of the frame-plates A and A.

The wheel or drum X has sufficient length to permit all needed sidewise travel of the belt W when the saw is moved laterally, as hereinbefore described, and said wheel receives its motion by means of a band-pulley Z on the shaft *x*, said pulley Z being connected by a band or belt A' with a wheel on the shaft S.

The tension of the belt W is regulated by means of a roller B', which is adapted to engage the under side of the same and is mounted on a vertically-swinging frame C^2, pivoted to the rear of the frame sides A and A. Said roller B' moves away from the belt by gravity, and to move the same against the belt a chain or chains *c'* and *c'* are respectively connected to opposite sides of the frame C^2, and, being carried up and over wheels D' and D', pivoted to the frame sides A and A, are carried rearward to a shaft E', that is journaled upon the rear side of the frame Y. Said shaft E' is provided with a hand-wheel *e*, by which it may be revolved, and to hold it from turning, so as to prevent the lowering of the roller B', a ratchet-wheel *e'* is placed upon it, which is adapted to be engaged by a pawl e^2, pivoted to the frame Y.

Preferably a counterbalance C^3 is attached to the roller-carrying frame C^2 to assist in the raising of the roller.

The stone to be cut is placed upon a traveling carriage or table F', that upon its under side is provided with parallel rails *f'* and *f'*, that rest upon and travel over a series of flanged wheels G' and G', mounted in pairs upon suitably-journaled shafts H' and H'. At its transverse center on its under side said carriage has a longitudinally-extending rack-bar I', the teeth of which are engaged by the thread of a worm K' upon the forward end of a shaft L', that extends at an incline rearwardly and laterally and at its rear end has a worm-wheel M', which is engaged by a worm N' upon a transverse shaft O', that is journaled in the frame Y. Upon said shaft O' is a pulley P', that is connected by a belt Q' with a pulley R' upon a shaft S', which is journaled in bearings provided upon brackets T' and U', that are bolted, respectively, to a cross-head bracket C and the cross-head D. Also upon said shaft S' is mounted a pulley V', that is connected by a belt W' with a pulley X' upon the saw-mandrel, from which the power is derived through which the moving of the carriage is effected to feed the stone to the saw, as cutting proceeds. This gearing of the carriage and the saw-mandrel together, so that

the feeding movement of the former is effected from the mandrel, is of great importance, as the rate at which the stone is fed is regulated exactly in accordance with the rate at which the saw is cutting, and liability of the feed being faster than the cutting with consequent clogging of the saw is obviated. The pulley V′ on the shaft S′ is moved laterally with the cross-head, so as to keep it in line with the pulley X′, and preferably the shaft S′ moves longitudinally with it. The pulley R′, however, does not move in an axial direction, and accordingly the pulley R′ is splined on the shaft to enable such movement of the shaft. Each bracket T′ and U′ is bifurcated, as shown, to embrace its pulley on opposite sides, in the one case to prevent and in the other to cause its movement in an axial direction.

The direction of travel of the carriage, as indicated by the arrow in Fig. 2, is opposite that in which the portion of the saw travels that is operating on the stone. The tendency of the saw is thus to move the stone from it instead of draw it toward it with possible danger of clogging or jamming, as would be the case were the stone and the working part of the saw traveling in the same direction.

By placing the worm-shaft L′ obliquely the thread of the worm can be so arranged that the portions that engage the teeth of the rack-bar I′ extend in lines at right angles to the travel of the carriage, and hence the power is applied to move the latter directly in line with the direction in which it is desired to move it. Sidewise tendency and resulting undue friction are thus avoided.

The use of the worm-gearing to move the carriage is advantageous as insuring a certain steady movement thereof.

To maintain the requisite tension on the belt Q′ notwithstanding variations in the distance between the shafts O′ and S′ due to the latter being placed at different elevations by the raising and lowering of the saw, I employ a lever Y′, that is pivoted to the side of the adjacent frame-plate A and is provided with two rollers *y* and *y*, that engage the under sides of the two portions of the belt. Connected to said lever Y′ is a rod or bar Z′, that extends rearwardly to a point where it is convenient of access to a man who is in position to operate the hand-wheel *e* of the other belt-tightener device. The under side of the bar Z′ is provided with a series of notches *z* and *z*, that are adapted to coöperate with a small bar *z′*, that projects horizontally from the frame Y, and thereby hold the lever Y′ at the point to which it may be adjusted.

For causing the return or backward movement of the stone-carriage a pulley A^2 is placed on the shaft O′ and is belted to a wheel on the main shaft S. Said pulley A^2 and the pulley P′ are revolved in opposite directions, and both are mounted loosely upon the shaft O′, to which they are adapted to be alternately clutched. Keyed upon said shaft O′ are two clutch-collars B^2 and B^2, one for each pulley, that are connected by a link C^4, to which is pivotally connected a hand-lever D^2, by the movement of which one pulley or the other may be clutched to or unclutched from the shaft, and thus the carriage moved in one direction or the other. Said lever is pivoted to a bracket E^2, that is bolted to the frame Y to provide a bearing for one end of the shaft O′.

The operation of my machine is briefly as follows: The saw having been adjusted to position vertically and laterally and the cross-head brackets C and C and the cross-head rigidly clamped against possible movement, power is applied to the drum or wheel, preferably through the medium of a friction-clutch, (not shown,) to put the saw in motion. A friction-clutch is employed, as the diameter of the saw preferably used is six feet, and its rate of movement is seven hundred and fifty revolutions per minute, and it is consequently necessary that the power be applied gradually. When the saw is revolving at the desired rate of speed, the clutch-lever D^2 is operated to cause the carriage-moving mechanism to be geared with the saw-mandrel to feed the stone to be cut toward the saw. By using belt or friction gearing as a part of the mechanism for feeding the stone to the saw it will be seen that because of the possibility of slip in such gearing any unusual resistance to the travel of the stone would not result in harm, nor could there be serious jamming or clogging of the saw. The desired cut having been made, the lever D^2 is operated to unclutch the pulley P^2 and to clutch the pulley A^2, whereupon the carriage will travel from the saw. It will be seen that at any time without stopping the saw the cutting can be instantly stopped by unclutching the pulley P^2 to stop the feeding of the carriage.

The action of the saw upon the stone is an abrading one, the product being an almost impalpable powder and the cut surfaces being left in such condition as to require but little after dressing. But although the saw thus acts the cutting proceeds very rapidly, a granite block thirty inches thick having been cut by me at the rate of a lineal inch per minute.

My machine is entirely practical, not complex in construction, and capable of being easily handled, and while I prefer the construction herein shown and described I wish it understood that changes can be made therein which will involve no departure in principle, and hence be within the scope of my invention.

Having thus described my invention, what I claim is—

1. In a machine for cutting stone, the combination of a revolving cutter or saw, and a hollow mandrel having an opening or openings communicating with the outer side surface of the cutter or saw, substantially as and for the purpose described.

2. In a machine for cutting stone, the combination of a revolving cutter or saw, a mandrel, and collars to hold the cutter in position on the mandrel, having cavities communicating with a source of supply of water or other fluid, and having openings from said cavities to the outer surface of the collars, substantially as and for the purpose set forth.

3. In a machine for cutting stone, the combination of a revolving cutter or saw having teeth that project beyond the sides of the saw plate or blade, a mandrel having a longitudinal opening, and radial openings intersecting the latter, collars having cavities communicating with the radial openings, that hold the saw on the mandrel, and provided with slits in their faces which engage the saw sides, substantially as and for the purpose shown.

4. In a machine for cutting stone, the combination of a circular cutter, or saw, a bar or beam supporting the same, brackets having openings through which said bar or beam passes, a portion of each bracket being a clamping device, and means for adjusting the bar or beam in the brackets, substantially as and for the purpose set forth.

5. In a machine for cutting stone, the combination of a circular cutter or saw, a bar or beam supporting the same, brackets having openings through which said bar or beam passes, one side of each bracket being removably secured in place and adapted to be clamped upon the bar or beam, and means for adjusting the bar or beam in the brackets, substantially as and for the purpose set forth.

6. In a machine for cutting stone, the combination of a circular cutter or saw, a horizontal bar or beam journaling the cutter-mandrel, brackets supporting said bar or beam and having clamping-caps to engage the same having openings through which the bar or beam passes, means for moving the latter horizontally, vertical guides upon which said brackets are mounted and means for raising and lowering the brackets, substantially as and for the purpose shown.

7. In a stone-cutting machine, the combination of a circular saw, a frame journaling the same, means for adjusting said frame sidewise, a band-wheel connected with the saw, a second wheel journaled by and movable with said frame, a belt or band connecting said wheels, a third wheel mounted upon the same shaft with the second wheel, and held against sidewise movement, a fourth band-wheel to which said third wheel is geared, a stone-carriage, and gearing between the latter and said fourth wheel, substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of May, 1896.

THADDEUS A. JACKSON.

Witnesses:
CHARLES A. WINTER,
JESSE STEARNS.