(No Model.)

5 Sheets—Sheet 1.

H. H. ARNOLD.

SOLE CHANNELING AND TRIMMING MACHINE.

No. 575,867. Patented Jan. 26, 1897.

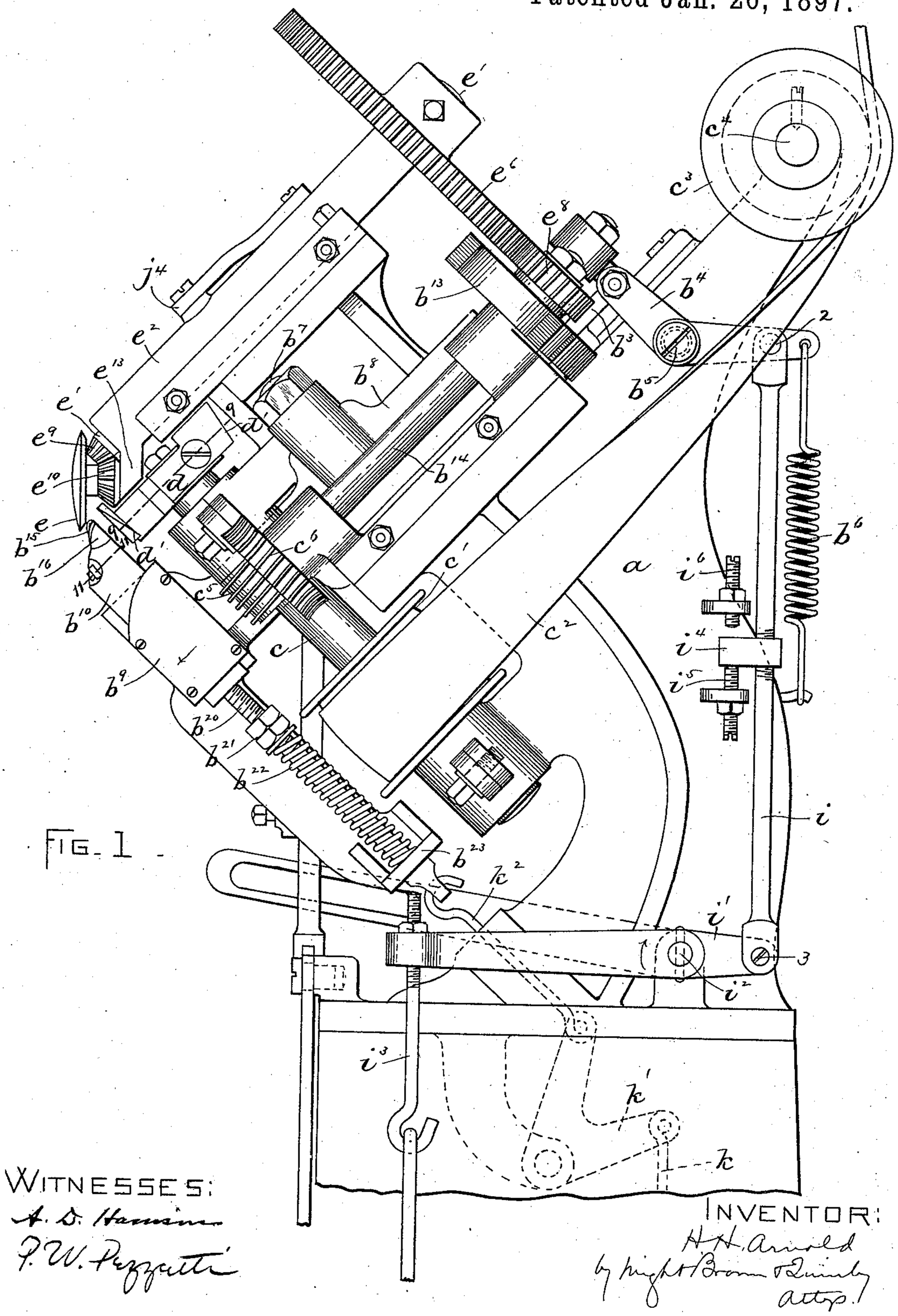

FIG. 1.

WITNESSES:

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P. W. Pezzetti

INVENTOR:

H. H. Arnold

by Wright Brown & Quinby

attys.

(No Model.)

5 Sheets—Sheet 2.

H. H. ARNOLD.

SOLE CHANNELING AND TRIMMING MACHINE.

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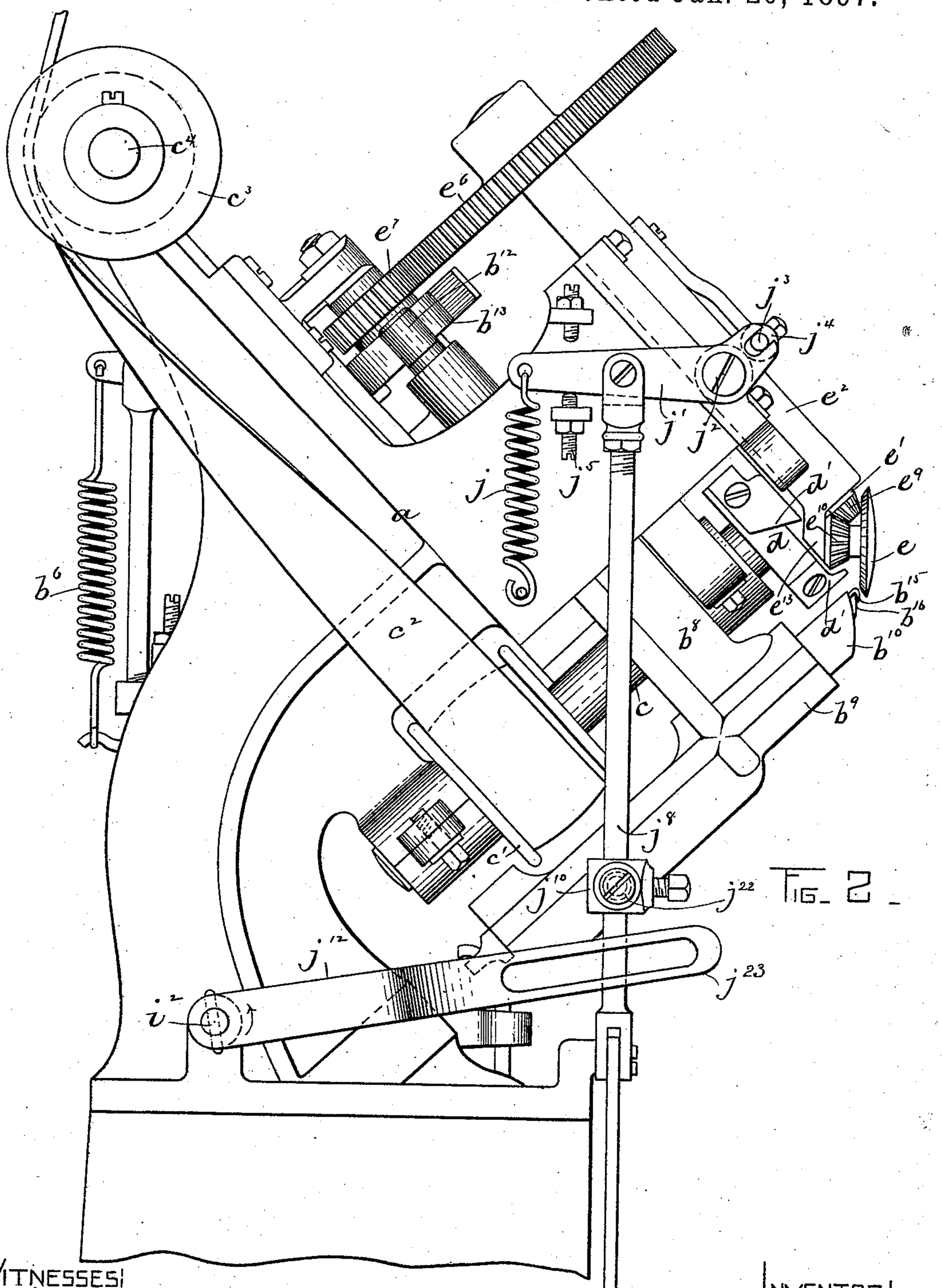

FIG. 2.

WITNESSES:
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(No Model.)

5 Sheets—Sheet 3.

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SOLE CHANNELING AND TRIMMING MACHINE.

No. 575,867. Patented Jan. 26, 1897.

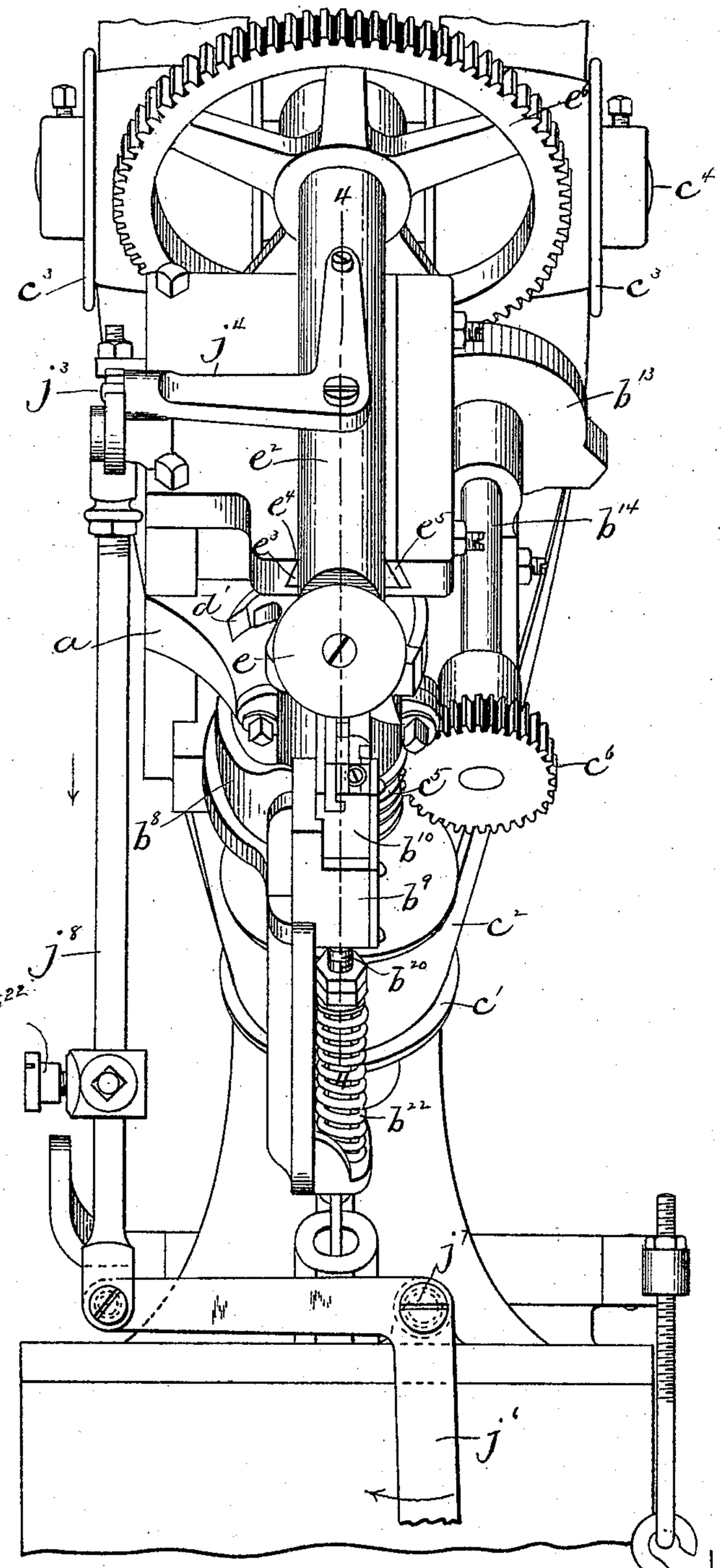

FIG. 3.

WITNESSES:
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(No Model.) 5 Sheets—Sheet 4.

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SOLE CHANNELING AND TRIMMING MACHINE.

No. 575,867. Patented Jan. 26, 1897.

FIG. 5.

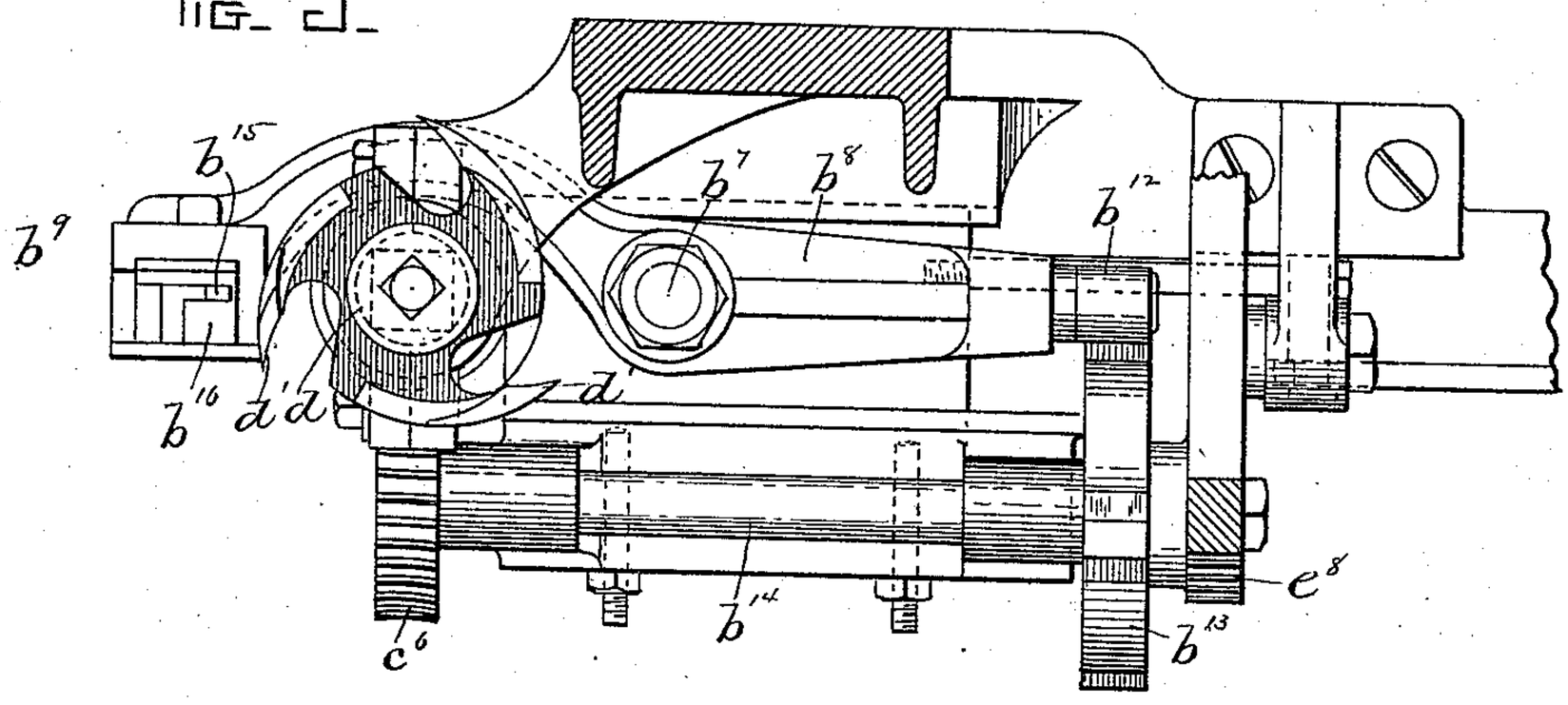
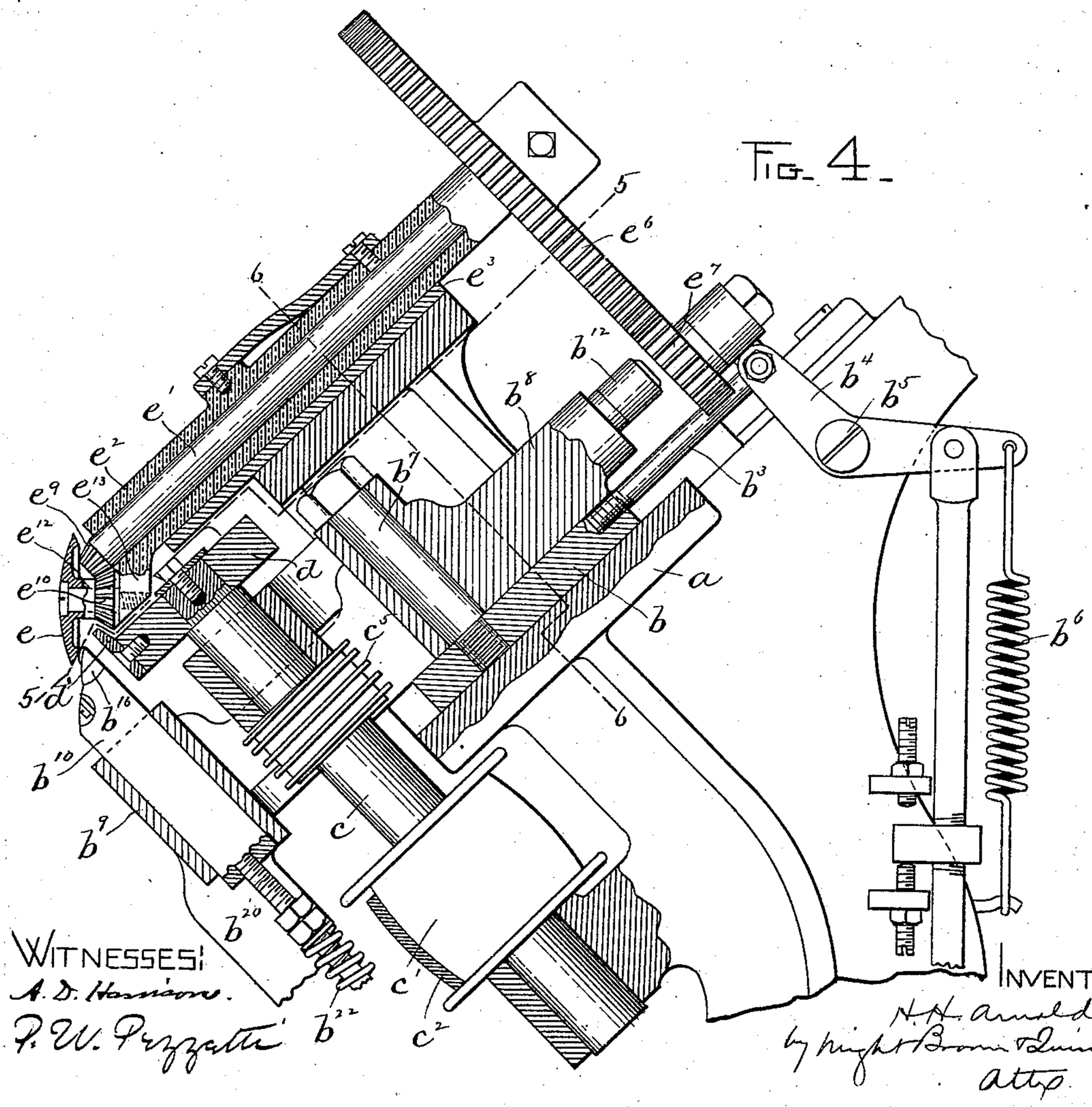


FIG. 4.



WITNESSES:
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(No Model.) 5 Sheets—Sheet 5.

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SOLE CHANNELING AND TRIMMING MACHINE.

No. 575,867. Patented Jan. 26, 1897.

FIG. 6.

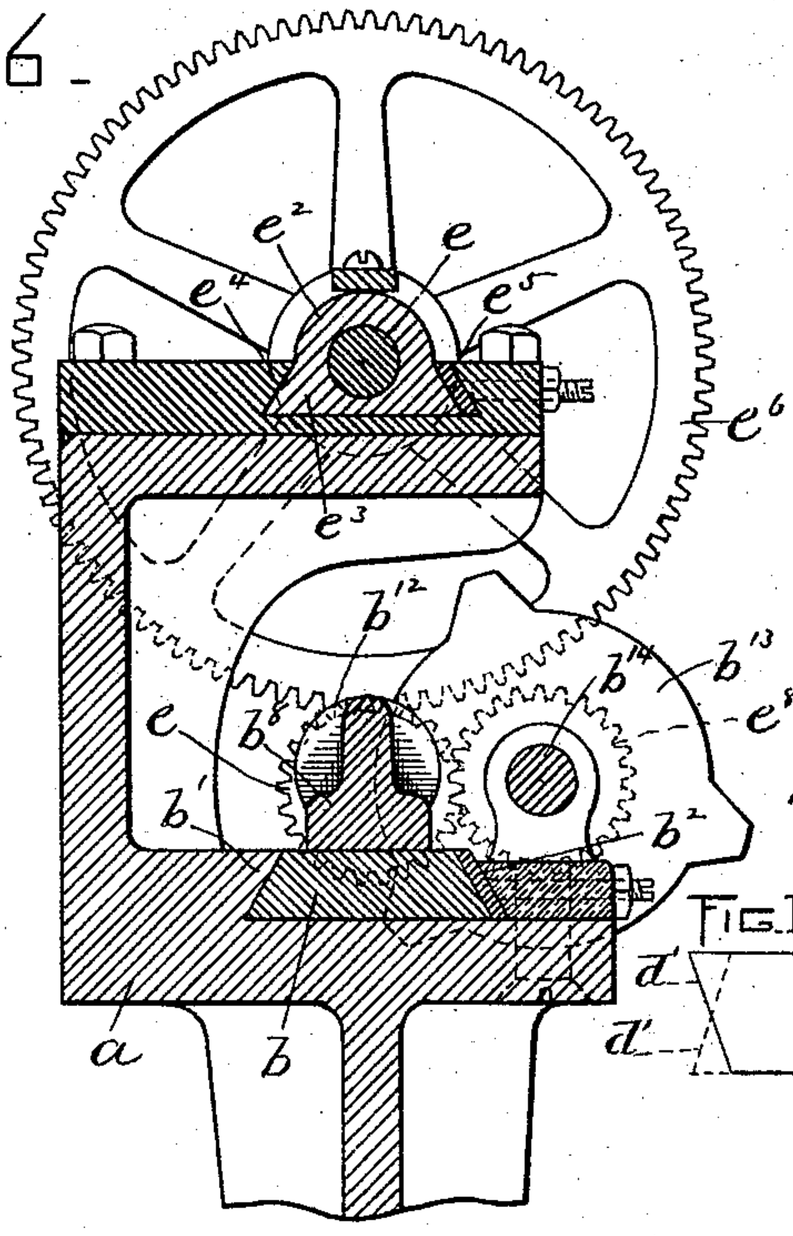


FIG. 10.

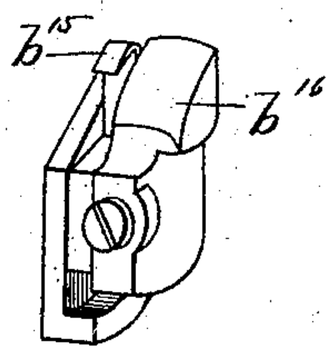


FIG. 9.

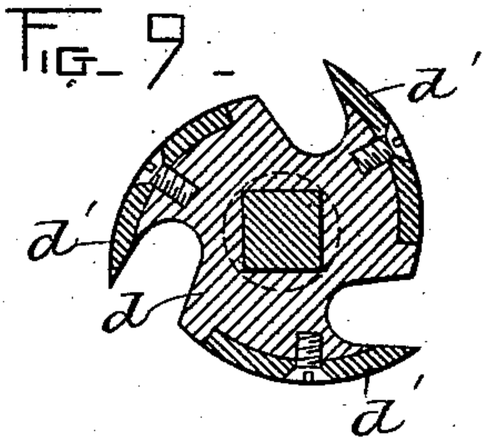


FIG. 11.

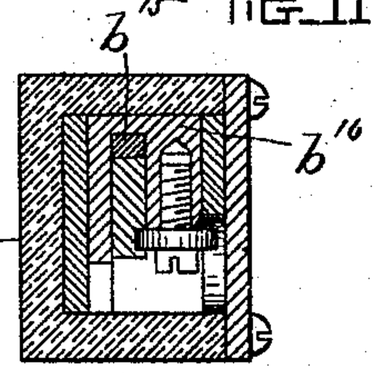


FIG. 12.

FIG. 13.

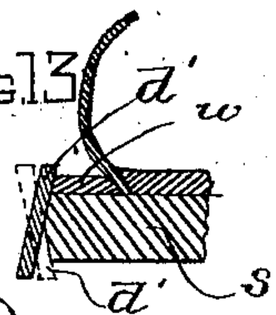


FIG. 7.

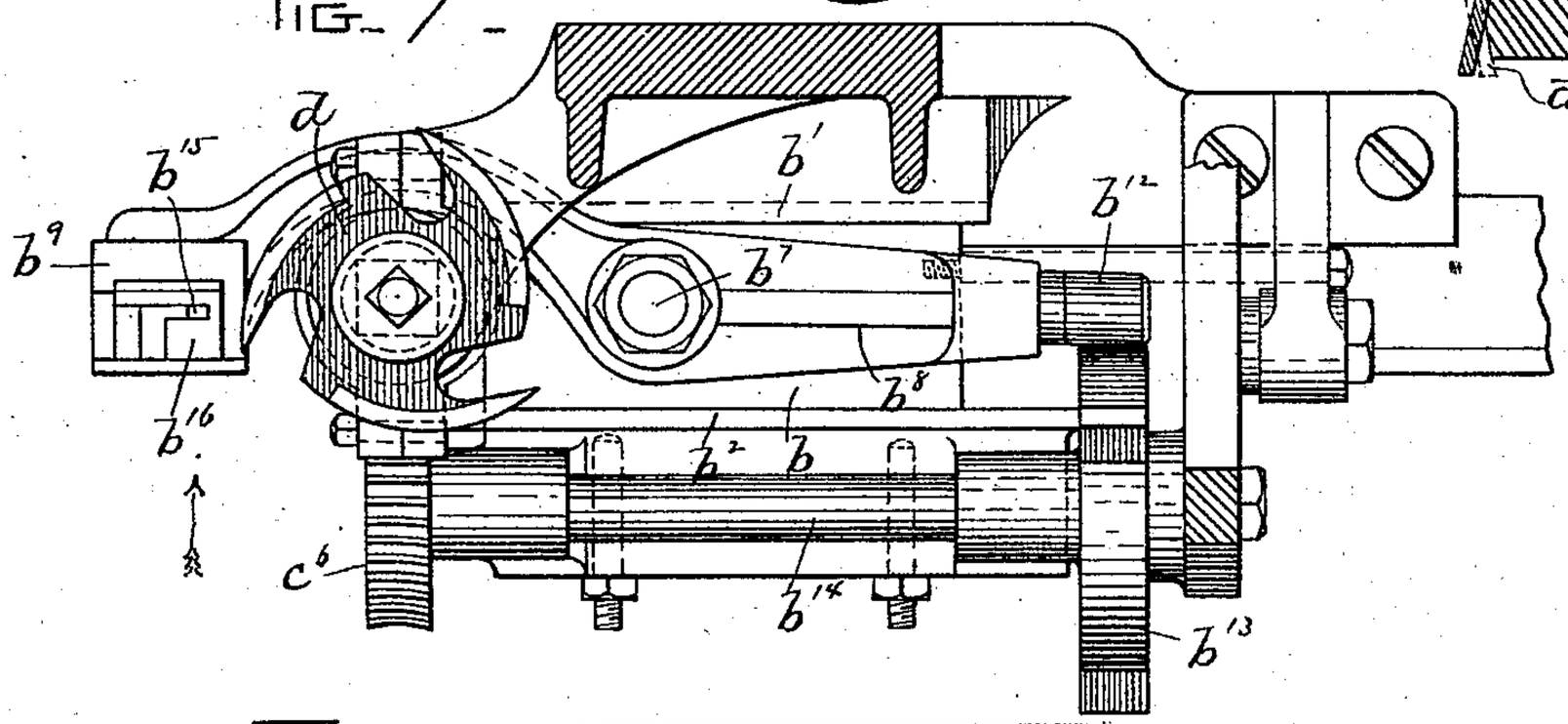
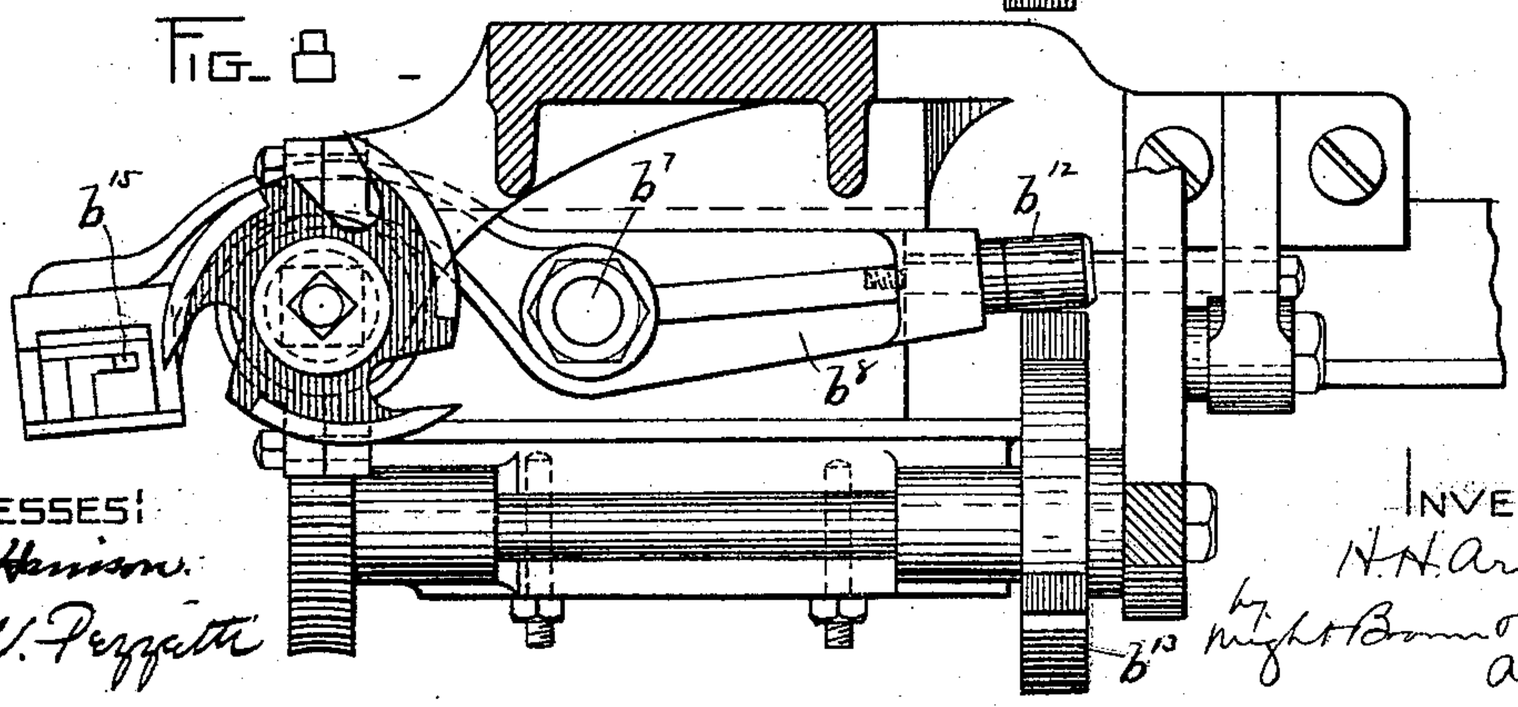


FIG. 8.



WITNESSES:
A. D. Harrison.
P. W. Pezzetti

INVENTOR:
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attys.

UNITED STATES PATENT OFFICE.

HENRY H. ARNOLD, OF ROCKLAND, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE EPPLER WELT MACHINE COMPANY, OF BOSTON, MASSACHUSETTS.

SOLE CHANNELING AND TRIMMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 575,867, dated January 26, 1897.

Application filed June 18, 1896. Serial No. 596,063. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. ARNOLD, of Rockland, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Sole Channeling and Trimming Machines, of which the following is a specification.

This invention relates to machines for cutting a channel in the tread-surface of the outer sole of a welted boot or shoe after the sole has been tacked or otherwise temporarily attached to the inner sole, said channel receiving the outer portions of the stitches that connect the outer sole to the welt.

The invention has for its object to provide a machine of this class adapted not only to channel the tread-surface of the outer sole, but also to round or trim the edge of the sole, the location of the channel and of the trimmed edge being determined by the upper of the boot or shoe.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figures 1 and 2 represent side elevations of my improved machine. Fig. 3 represents a front elevation. Fig. 4 represents a section on line 4 4 of Fig. 3. Fig. 5 represents a section on line 5 5 of Fig. 4. Fig. 6 represents a section on line 6 6 of Fig. 4. Figs. 7 and 8 represent views similar to Fig. 5, showing the channeling-knife and its carrying-lever in different positions. Fig. 9 represents a section on line 9 9 of Fig. 1. Fig. 10 represents a perspective view of the channeling-knife and the block to which it is attached. Fig. 11 represents a section on line 11 11 of Fig. 1. Figs. 12 and 13 represent diagrammatic views illustrating the form of the knives of the cutter-head and their action upon the edge of the sole.

The same letters indicate the same parts in all the figures.

In the drawings, a represents the supporting-frame.

b represents a slide movable in inclined guides b' b^2 on the supporting-frame and connected at its upper end by a rod b^3 with a lever b^4, which is pivoted at b^5 to the frame a and is normally held at one end of its movement by a spring b^6, connected at one end to said lever and at the other end to the frame. To the slide b is affixed a stud b^7, on which a lever b^8 is mounted to oscillate. On one end of said lever is a guide b^9 for the knife-carrier b^{10}. The other end of the lever b^8 has a trundle-roll b^{12}, which is arranged to be acted on by a cam b^{13}. Said cam is mounted on a shaft b^{14}, journaled in inclined bearings on the frame a. The channeling-knife b^{15} is secured to a knife-block b^{16}, which is fitted to oscillate on the carrier b^{10}, as usual in machines of this class, so that the block tips automatically to enable the knife to conform to the inclination or curvature of the portion of the sole on which it is acting.

c represents a shaft journaled in bearings on the frame a and provided with a pulley c', on which runs a belt c^2, driven by a shaft (not shown) and running over idle-pulleys c^3 c^3 on a shaft c^4, which is journaled in bearings in the frame a. To the upper end of the shaft c is affixed a cutter-head d, having knives d' d' arranged to trim the edge of a sole which is interposed between the knife-block b^{16} and the feed-wheel e, hereinafter described.

The shaft c has a worm c^5, which meshes with a worm-wheel c^6 on the cam-shaft b^{14} and imparts rotary motion to the latter. The lever b^8, which supports the channeling-knife, is oscillated by the rotation of the cam b^{13} when the work is being pressed forward against the channeling-knife, this pressure holding the trundle-roll b^{12} against the cam. The lever b^8 has such freedom of movement, however, that when there is no pressure of the work against the channeling-knife the trundle-roll b^{12} stands out of the path of the projections of the cam b^{13}, as shown in Fig. 8, so that the knife-carrier and knife receive no movement, the knife being positively reciprocated only when the work is being pressed against it in the direction indicated by the arrow in Fig. 7, thus pressing the trundle-roll b^{12} against the cam. This is an important feature of my invention, its object being to prevent the knife from mutilating the channel by moving back and forth therein when there is no actual pressure of the end

of the channel against the knife, as when the feed-wheel *e* slips on the work without moving it. This slipping of the feed-wheel is liable to happen, it being necessary to employ a comparatively weak feed in a machine of this character.

e' represents the feed-wheel-operating shaft, which is journaled in a bearing e^2 on a slide e^3, the latter being movable in guides e^4 e^5 on the supporting-frame. Said shaft has at one end a gear e^6, which is connected by an intermediate gear e^7 with a gear e^8 on the cam-shaft b^{14}, the feed-shaft *e'* receiving motion from the cam-shaft b^{14} through said gears. On the opposite end of the feed-shaft is formed a beveled pinion e^9, which, as here shown, is integral with the shaft and meshes with a beveled pinion e^{10}, affixed to the short shaft e^{12}, Fig. 5, which carries the feed-wheel *e*. The said shaft e^{12} is journaled in a bearing in a downwardly-projecting ear e^{13}, formed on the slide e^2.

The relative arrangement of the feed-wheel *e*, knife-block b^{16}, and cutter-head *d* is such that when the portion of the sole to be channeled is inserted between the feed-wheel and knife-block in position to receive a channel from the knife b^{15} the edge of the sole will be presented to the cutter-head *d*, the knives of which are formed to trim said edge at a distance from the channel determined by the adjustment of the knife-carrier b^{10}. Said carrier is adjustable by movements of the slide *b* in its guides, the slide being normally held at the upper extreme of movement by the spring b^6 and movable forward by a treadle (not shown) connected with the lever b^4 by a rod *i*, connected with said lever at 2, a lever affixed to a rock-shaft i^2, which is journaled in the frame *a*, said lever being connected with the rod *i* at 3, and a connection i^3 between the lever *i'* and the treadle. The rod *i* has an arm i^4, which is movable between two stop-screws i^5 i^6 on the frame *a*. The stop i^5 limits the movement of the channeling-knife by the spring b^6, and the stop i^6 limits the movement of the knife in the opposite direction by pressure of the operator's foot on the treadle.

The cutter-head *d* has no adjustment, and when the slide *b* is adjusted to move the knife-carrier toward the cutter-head the trimmed edge is formed nearer the channel than is the case when the slide *b* is adjusted in the opposite direction. The feed-wheel *e* is also adjustable toward and from the cutter-head by movements of the slide e^3 and bearing e^2 in the guides e^4 e^5. The slide e^3 is normally held at the upward extreme of its movement (the feed-wheel being at the minimum distance from the cutter-head *d*) by a spring *j*, which is attached at one end to the frame *a* and at its other end to a lever *j'*, which is pivoted at j^2 to the frame and engaged with a stud j^3 on an arm j^4, affixed to the bearing e^2. A stop-screw j^5 limits the movement of the slide by the spring *j*. A bell-crank lever j^6, pivoted at j^7 to the frame *a*, has one of its arms connected by a rod j^8 with the lever *j'*, its other arm projecting downwardly in position to be moved by the knee of the operator. When the lever j^6 is moved in the direction indicated by the arrow in Fig. 3, it moves the feed-wheel outwardly from the cutter-head *d*. To the rod j^8 is adjustably secured by means of a set-screw a collar j^{10}, which is provided with a stud or screw j^{22}, adapted to engage a slot j^{23} in a lever j^{12}, which is affixed to the rock-shaft i^2, previously referred to. The object of the collar j^{10}, stud j^{22}, and lever j^{12} is to enable the operator, by moving the bell-crank lever j^{12} in the direction indicated by the arrow in Fig. 3, to simultaneously move the feed-wheel and the channeling-knife in opposite directions, the feed-wheel being moved inwardly and the channeling-knife outwardly to adjust them at their maximum distance apart when the shoe-sole has an edge of varying width, as in the so-called "Scotch-edge" soles. To accomplish this result, the stud j^{22} is passed through the slot j^{23}, so that an upward movement of the rod j^8 will cause a corresponding movement of the lever j^{12}, rock-shaft i^2, and lever *i'*. In other words, the collar j^{10} and lever j^{12} enable the channeling-knife to be moved inwardly by the operator at the same time that he moves the feed-wheel outwardly.

The knife-carrier b^{10} is movable longitudinally in the socket or guide b^9, so that the channeling-knife can be moved away from the feed-wheel to permit the insertion and removal of a sole and to adapt the knife to soles of different thickness. The carrier b^{10} is provided with a downwardly-projecting stud b^{20}, having a nut b^{21}, which receives pressure from a spring b^{22}, seated on a fixed bracket b^{23}. The spring normally holds the channeling-knife at its highest position. A treadle (not shown) is connected through a rod *k*, bell-crank lever *k'*, and link k^2 with the stud b^{20}, and is arranged so that a pressure of the operator's foot causes the depression of the knife-carrier and the channeling-knife.

Operation: The operator in presenting a sole to the channeling-knife and edge-trimming cutter-head first depresses the knife-carrier b^{10}, then inserts the sole edge between the knife-block and feed-wheel, the latter bearing against the side of the upper and the top surface of the welt. The knife-carrier and feed-wheel are then adjusted relatively to the cutter-head, as the operator may desire, by the means described, and the machine is set in motion. The feed-wheel moves the shoe forward, causing the channeling-knife to cut a channel in the face of the sole and the cutter-head to trim the edge of the sole. In case the feed-wheel slips on the work, thus causing a temporary cessation of the feed movement, the oscillating motion of the channeling-knife also ceases, because there is then no pressure against it to keep the trundle-roll b^{12} operatively engaged with the cam b^{13}. Mutilation of the sole, such as would

be likely to occur if the channeling-knife were allowed to move positively in the channel while the sole is at rest, is thus prevented.

The edge-trimming knives *d'* are provided with cutting edges which are inclined relatively to the axis of the cutter-head and therefore give a shearing cut, which enables said knives to trim the edge more neatly and with less liability to form burs or ragged edges on the corners than would be the case if the cutting edges were parallel with the axis of the cutter-head.

The inclination of each cutting edge is preferably the reverse of that of the next cutting edge, so that in one knife the part which acts on the welt will be in advance of the part that acts on the edge of the body of the sole, while in the next knife the part that acts on the body of the sole will be in advance of the part that acts on the welt. In Fig. 12 I show the relative inclinations of the cutting edges *d'*, one being shown in full lines and the other in dotted lines. These inclinations I term "longitudinal" to distinguish them from the lateral inclinations hereinafter described. The said cutting edges are also slightly inclined laterally, so that one will trim from the welt partly across the sole *s*, but not down to the tread-surface, while the next will trim from the tread-surface partly across without trimming the upper corner of the welt *w*. Fig. 13 shows in full and dotted lines the relative lateral inclinations of two cutting edges.

The described longitudinal and lateral inclinations enable the cutter to trim the edge of a sole with a shearing cut which exerts a pressure from each corner of the sole edge inwardly toward the center of the edge, thus avoiding the formation of a bur on either corner.

If desired, the cutter-head may have one or more blades the cutting edges of which are vertical or parallel with the axis to remove the slight angle formed on the center of the sole edge by the lateral inclination of the cutting edges above described.

I claim as my invention—

1. In a machine of the character specified, the combination of a rotary cutter-head provided with sole-edge-trimming knives, a feed-wheel movable toward and from the axis of the cutter-head, means for rotating the feed-wheel, and knife-carrier also movable toward and from the axis of the cutter-head, and provided with a channeling-knife and means for oscillating said carrier.

2. In a machine of the character specified, the combination with a rotary cutter-head provided with sole-edge-trimming knives, and a feed-wheel adjacent thereto, of a knife-carrier provided with a channeling-knife, a lever supporting said carrier, a slide to which said lever is pivoted, means for oscillating said lever, and means for moving the slide to adjust the channeling-knife toward and from the cutter-head.

3. In a machine of the character specified, the combination with a rotary cutter-head having sole-edge-trimming knives and a feed-wheel adjacent thereto, of a knife-carrier having a channeling-knife, a lever supporting said carrier, a slide to which said lever is pivoted, a rotating cam adjacent to the lever and arranged to coöperate with the feed-wheel in oscillating the lever and channeling-knife, and means for moving the slide to adjust the channeling-knife toward and from the cutter-head.

4. In a machine of the character specified, the combination with a rotary cutter-head, having sole-edge-trimming knives and a channeling-knife and its holder or carrier adjacent thereto, of a feed-wheel, a sliding or movable support in which said wheel is journaled, means for rotating said wheel, and means for moving the said slide to adjust the feed-wheel toward and from the cutter-head.

5. In a machine of the character specified, the combination of a feed-wheel, a knife-carrier having a channeling-knife, an oscillatory lever supporting the knife-carrier, and a rotating cam arranged to act on said lever, the lever and cam being relatively arranged so that there is no operative engagement between them when the work is not moved by the feed-wheel, substantially as and for the purpose specified.

6. In a machine of the character specified, a rotary cutter-head having longitudinally and reversely inclined cutting edges.

7. In a machine of the character specified, a rotary cutter-head having longitudinally and reversely inclined cutting edges which are also inclined laterally.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of June, A. D. 1896.

HENRY H. ARNOLD.

Witnesses:
A. D. HARRISON,
P. W. PEZZETTI.