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H. A. AXTELL.

GRINDING AND FINISHING MACHINE.

No. 560,887. Patented May 26, 1896.

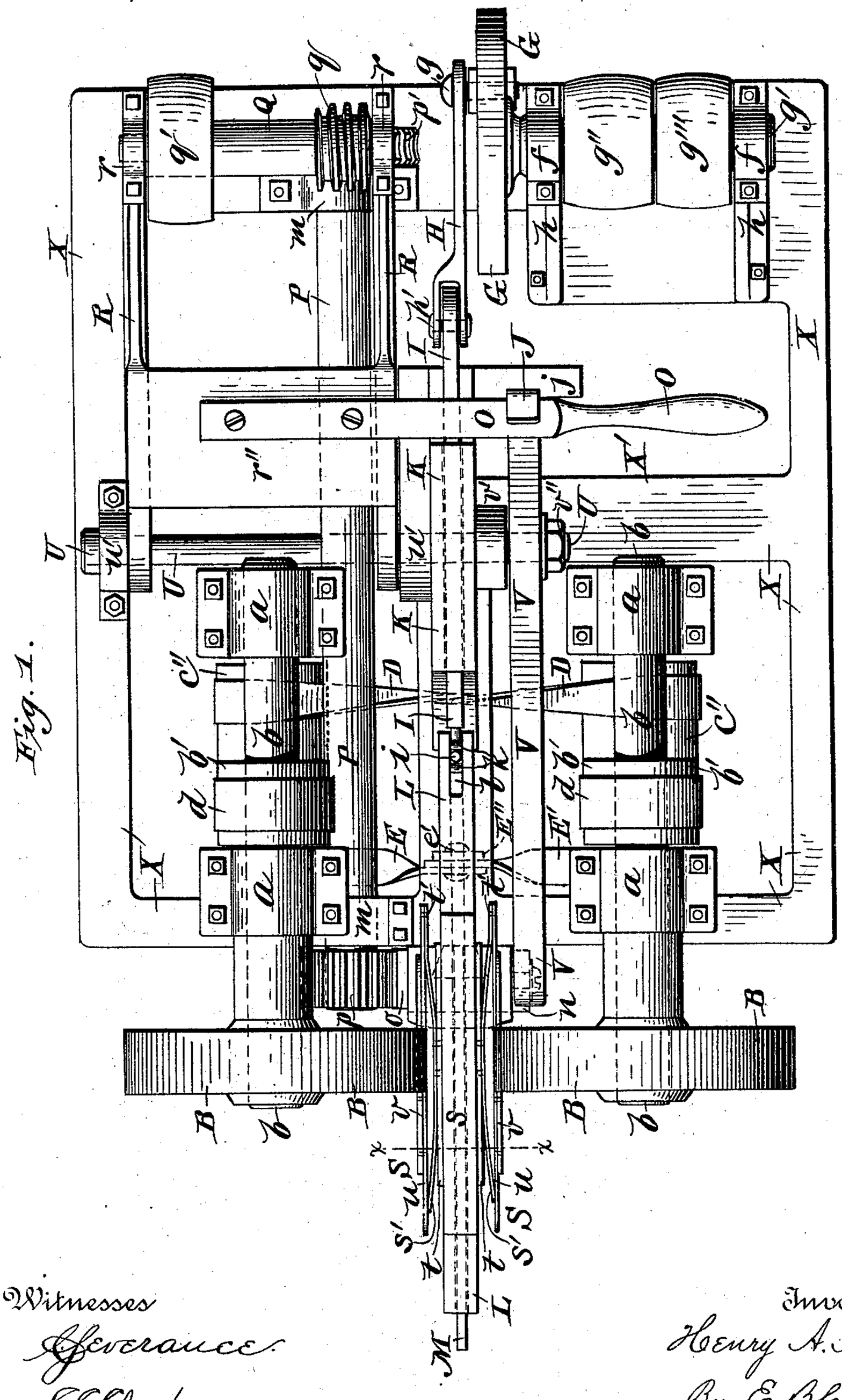

Fig. 1.

Witnesses
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Fig. 2.

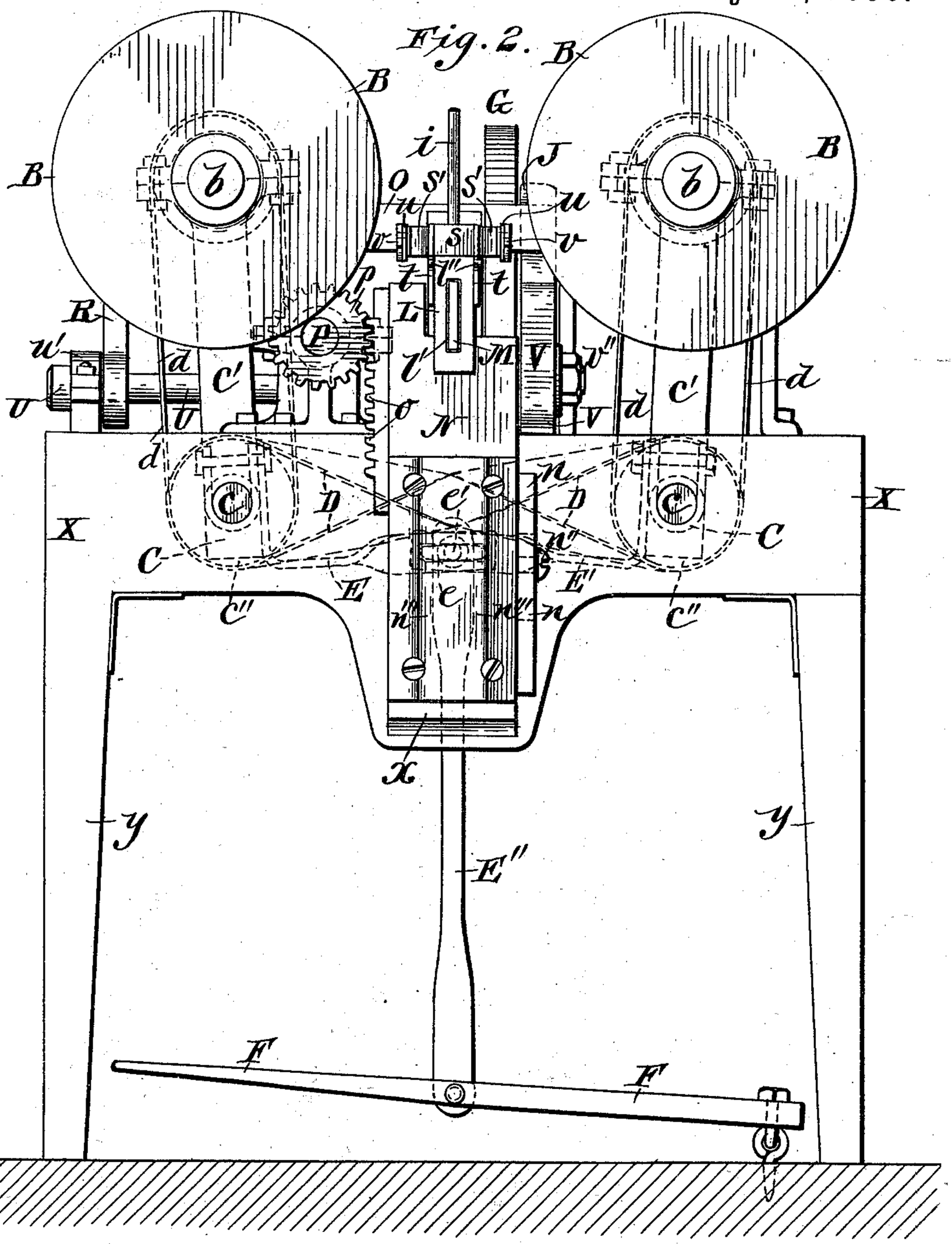
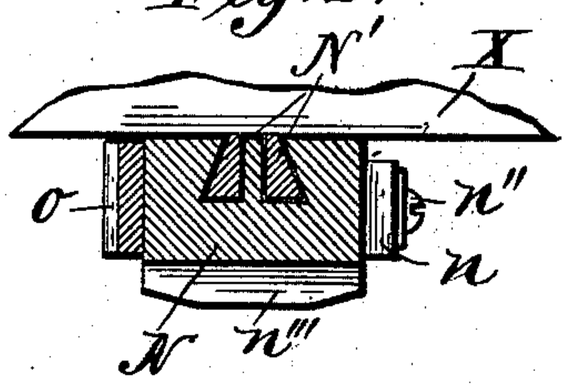


Fig. 2a



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(No Model.) 5 Sheets—Sheet 3.

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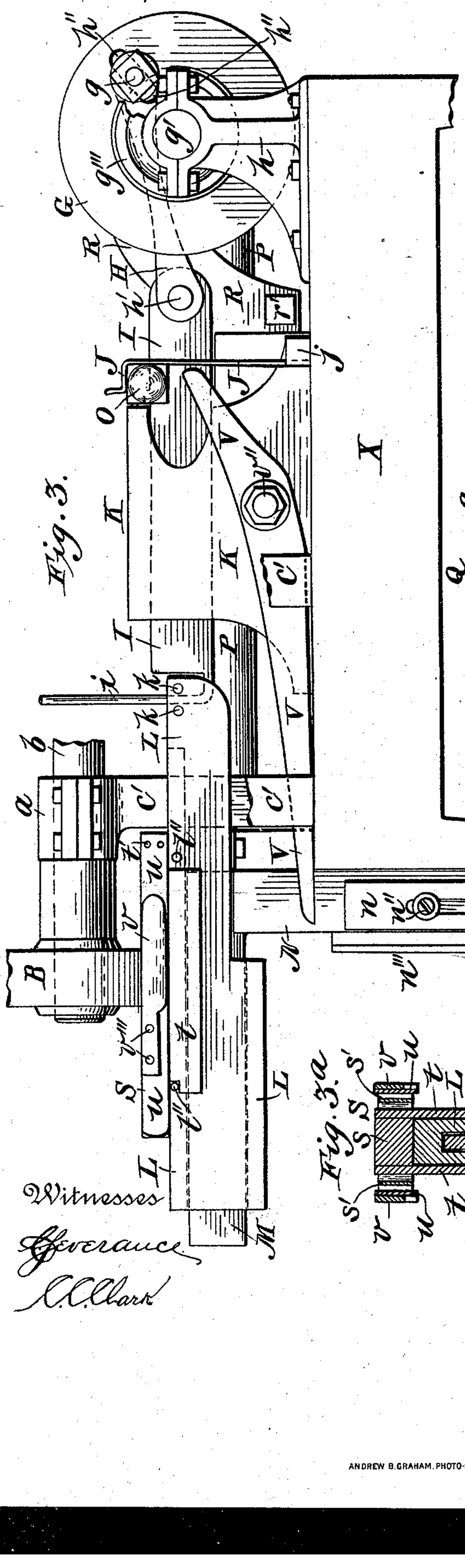

Fig. 3.

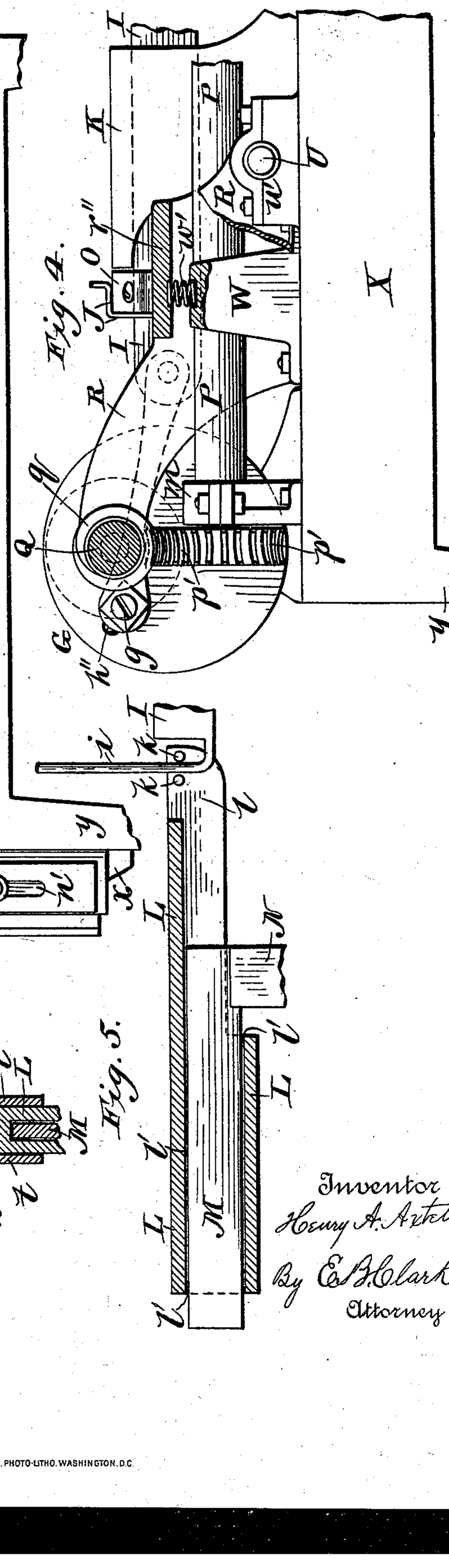

Fig. 4.

Fig. 3a.

Fig. 5.

Witnesses
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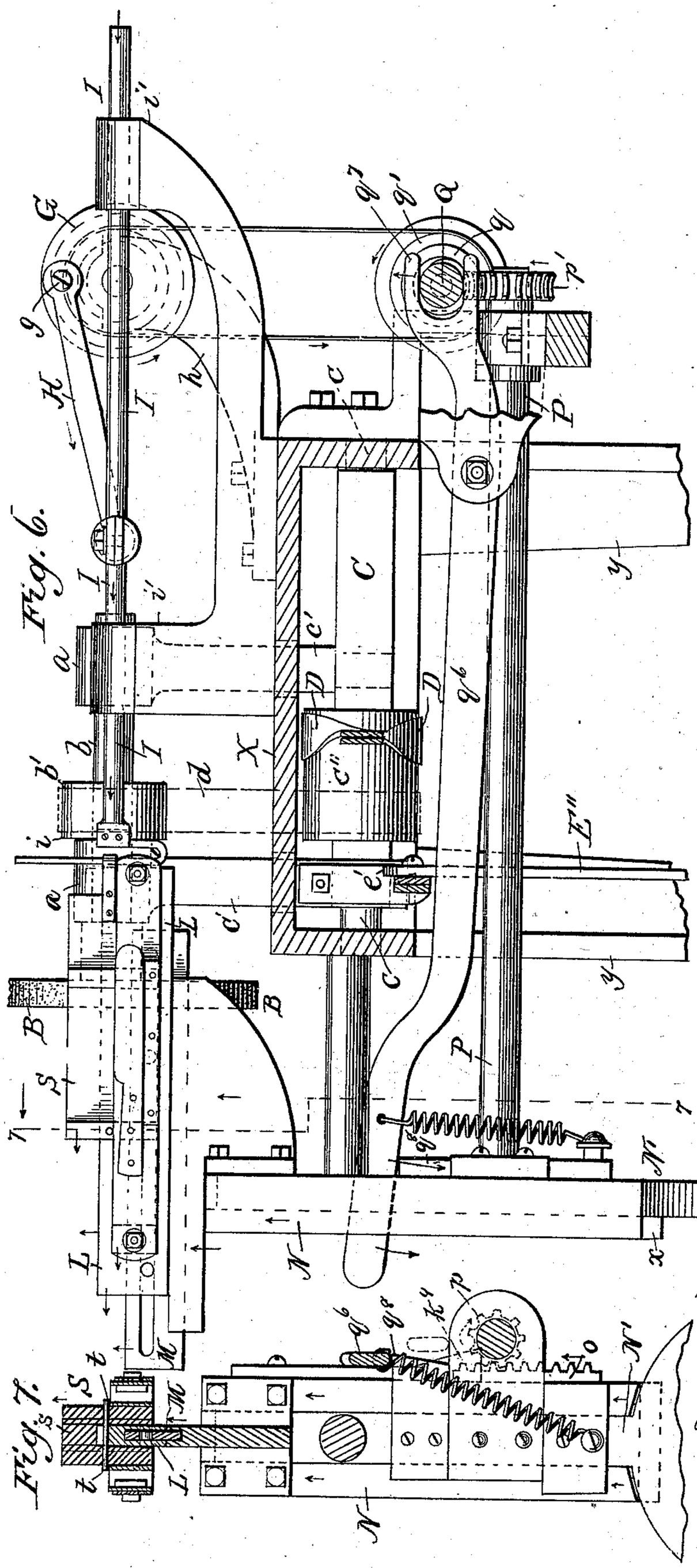

Fig. 6.

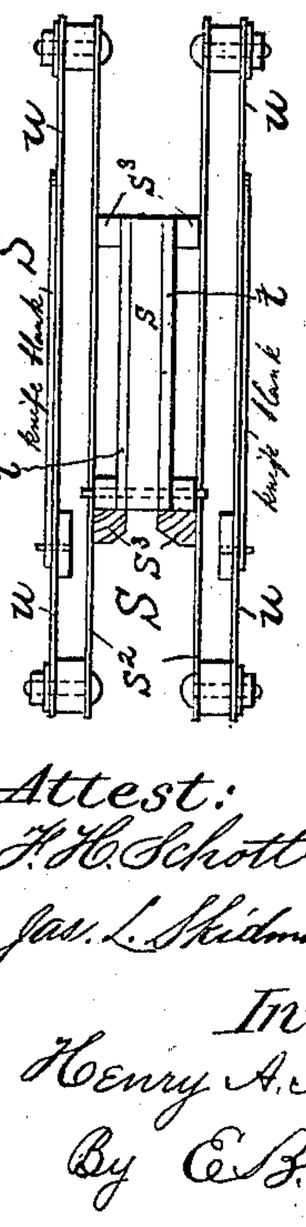

Fig. 10.

Fig. 7.

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(No Model.) 5 Sheets—Sheet 5.

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GRINDING AND FINISHING MACHINE.

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Fig. 9.

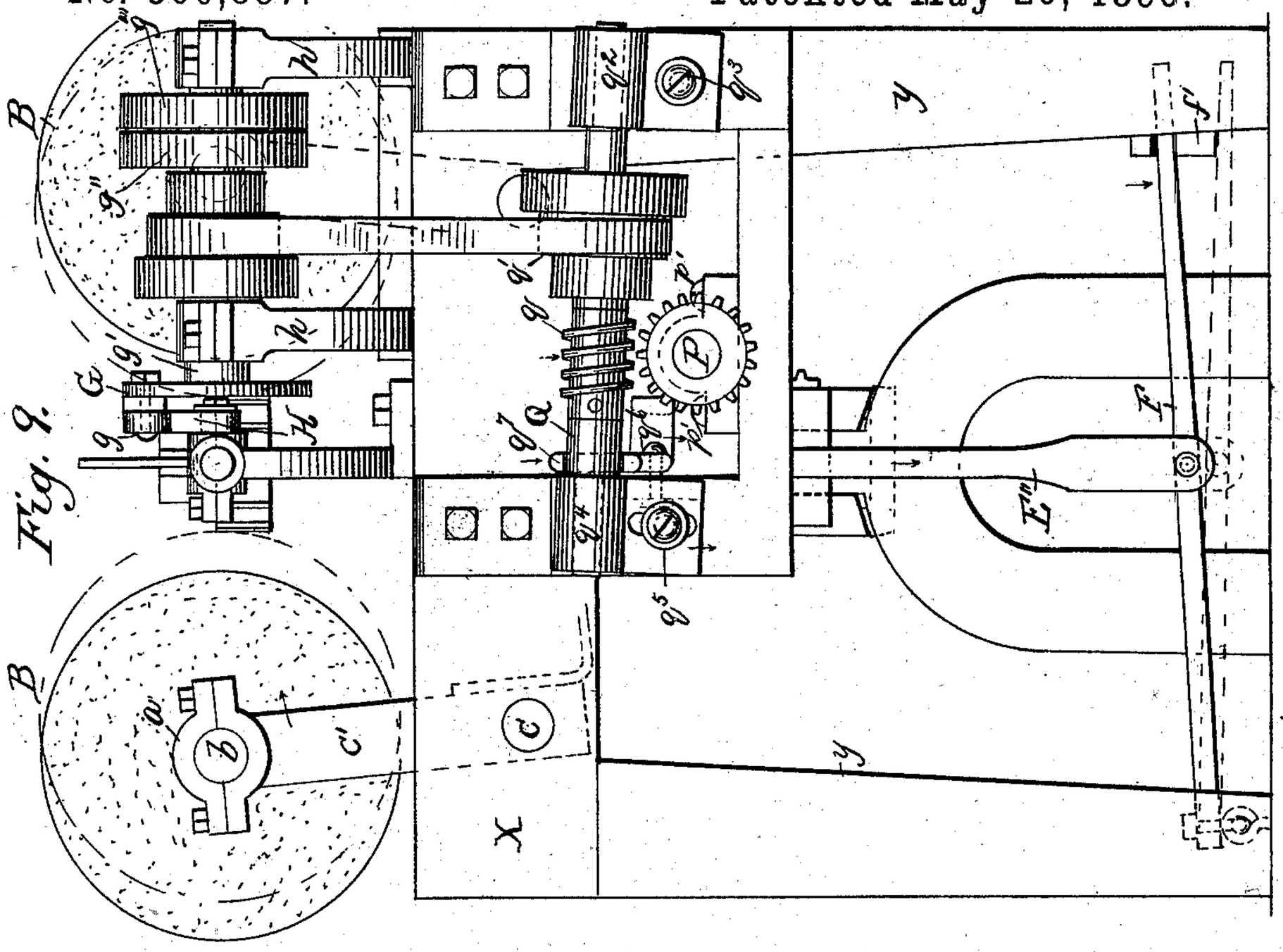
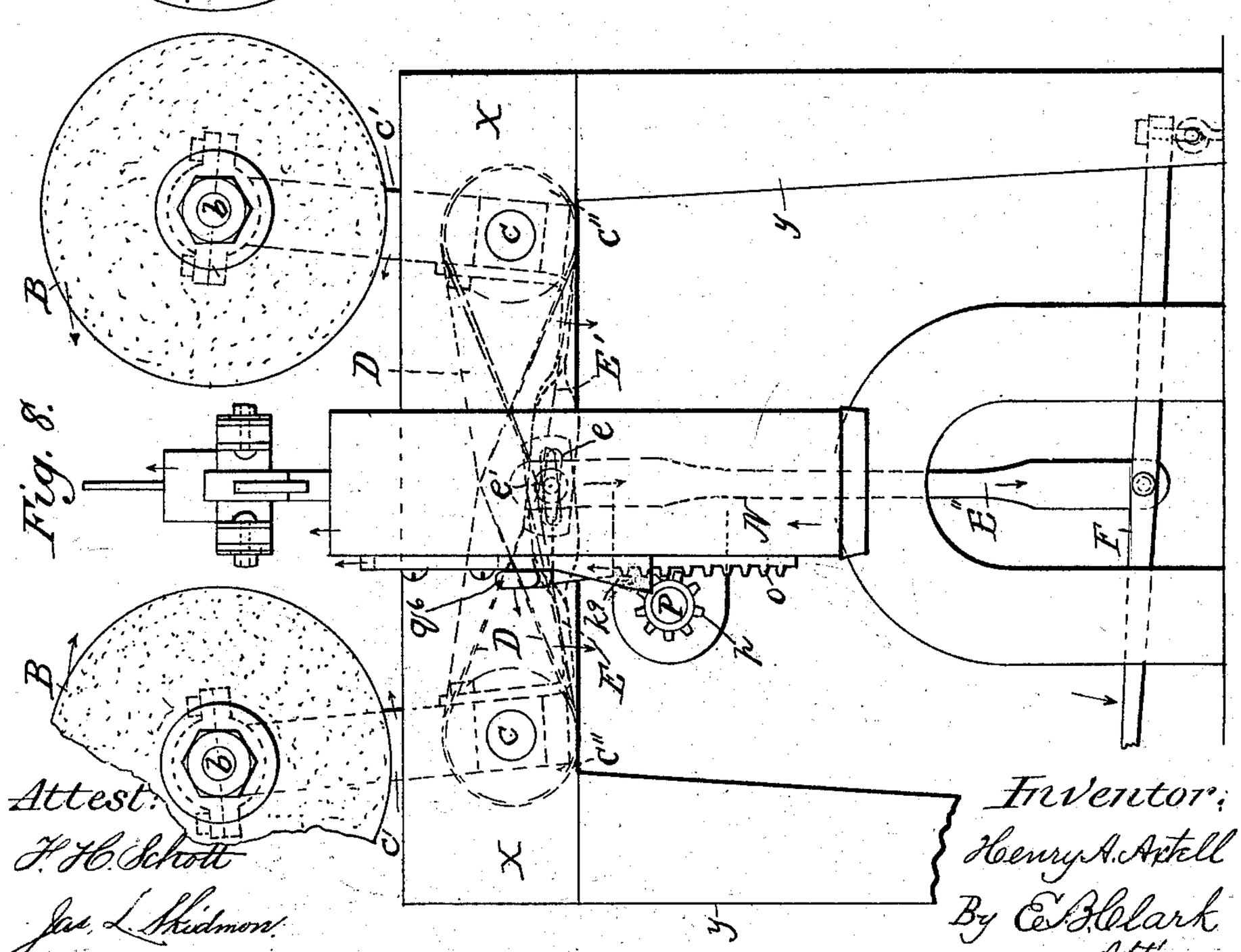


Fig. 8.



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Inventor:
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UNITED STATES PATENT OFFICE.

HENRY A. AXTELL, OF SHELBURNE FALLS, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO R. N. OAKMAN, JR., OF GREENFIELD, MASSACHUSETTS.

GRINDING AND FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,887, dated May 26, 1896.

Application filed May 25, 1894. Serial No. 512,394. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. AXTELL, a citizen of the United States, residing at Shelburne Falls, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Grinding and Finishing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to grinding and finishing machines adapted particularly for grinding and finishing the blades of knives and similar articles, said invention being an improvement on that set forth and claimed in my application filed August 25, 1893, Serial No. 484,040.

The object of my invention is to provide for automatically moving the blade-holder frame up between a pair of grinding or finishing wheels, and then automatically releasing said frame and allowing it to drop down to its normal position.

Another object of my invention is to provide for giving the blade-holder frame a longitudinal reciprocating movement at the same time that it is being automatically raised and lowered between the grinding or finishing wheels, so that the blades shall be traversed back and forth their full length in contact with the peripheral surfaces of said wheels.

Another object is to provide an improved yielding blade holding and finishing device secured to the reciprocating and vertically-movable frame, whereby the blade is constantly given a light uniform pressure upon the peripheral surfaces of the grinding or finishing wheels. In my machine two knife-blades are preferably secured, one on each side of the yielding holding device, and both are subjected at the same time to the action of a pair of grinding-wheels turning in opposite directions and capable of being moved at will toward or from the blade-holding device during their rotary movements—that is, so that their peripheral edges shall be moved toward or from each other. After the revolving grinding or finishing wheels have been swung or moved toward each other they may be locked in the desired position by any suitable device and also be automatically released, so as to move apart at the right moment.

The objects of my invention are attained by the peculiar construction and combination of parts constituting the mechanism, as will be hereinafter particularly described.

My improved machine is illustrated in the accompanying drawings, in which—

Figure 1 represents a top plan view of the machine. Fig. 2 represents a front end elevation thereof. Fig. 2ª represents a horizontal sectional detail view of the fixed and movable members of the standard. Fig. 3 represents a side elevation of the upper part of the machine with certain parts broken away for better showing the construction and operation of the remaining parts, the view being from the right-hand side of the machine. Fig. 3ª represents a transverse section of the blade-holding device on line $x\,x$, Fig. 1. Fig. 4 represents a side elevation of a part of the machine, partly in section, the view being from the left-hand side of the machine and illustrating a portion of the gearing for raising and lowering the blade-holding frame. Fig. 5 represents a longitudinal sectional detail view of the blade-holding frame. Fig. 6 represents a side elevation (similar to Fig. 3) of a portion of the machine with certain modifications hereinafter referred to. Fig. 7 is a section on line 7 7 of Fig. 6. Figs. 8 and 9 are front and rear views, respectively, of a machine embodying certain modifications hereinafter described. Fig. 10 is a detail plan view of a modified form of blade-holding device hereinafter described.

The working parts of my machine are mounted upon a main frame or table X, having legs y.

A pair of grinding or finishing wheels B B are secured upon the shafts b b, mounted in suitable journal-boxes a, which are supported by vertical vibrating standards c', Figs. 2 and 3, connecting them to the pair of horizontal rock-shafts C, having journals c resting in suitable boxes in the frame of the machine. The shafts b are provided each with a pulley b', and the rock-shafts C are provided each with a long pulley c'', as shown in Figs. 1 and 2. The standards c' may be connected

to the rock-shafts C in any suitable manner, so as to be supported thereby. For instance, the lower end of each standard may be reduced in size and fitted to a hole or socket in the shaft, as indicated in Fig. 6. A cross-belt D passes around the pulleys c'', so as to turn them in opposite directions, and belts d d connect each of the pulleys c'' with the pulleys b' on shafts b, which carry the grinding or finishing wheels. A power-belt (not here shown) from any prime motor on power-shaft may also be passed over one of the pulleys c''. By means of the cross-belt D the grinding-wheels are rotated in opposite directions—that is, toward each other downward. The main portion of each rock-shaft C, between the journals c, may be made square, and to the said shafts are secured the pair of rocking levers E E'. (Shown in full lines, Fig. 1, and dotted lines, Fig. 2.) Said levers E E' are provided at their inner ends with slots e, through which is passed a pin or bolt e', having suitable heads or nuts for loosely connecting the levers together. The vertical rod E'' is also connected by the pin e' to the levers E E', and at its lower end is pivotally connected to the lever F, which at one end is attached to the floor or other support, as shown in Fig. 2. By means of these levers and connecting-rod the shafts C may be given a rocking motion, so as to move the grinding or finishing wheels B toward or from each other, as desired. In this machine the blade-holding frame is given a longitudinal reciprocating movement between the grinding or finishing wheels, and for this purpose I provide the rotary disk G, having adjustably secured to it an eccentric-pin g. The disk G is provided with a radial slot h'', in which is adjusted and secured the pin g by means of suitable nuts. The disk G is secured upon the short horizontal shaft g', supported in journal-boxes f at the tops of the standards h h, which are secured to the frame X. A fixed pulley g'' and a loose pulley g''' are mounted upon the shaft g'. Pitman H connects with disk G by the eccentric-pin g, and also by means of pin h' with the longitudinal connecting-rod I, which latter has its bearing in the longitudinal guideway formed in the standard K.

The connecting-rod I, though shown flat in Figs. 1, 3, 4, and 5, is in practice preferably made round, as shown in Fig. 6, and supported in two bearings or guide-journals i' i' at the tops of the standards on the frame. The forward end of the connecting-rod I is provided with the upwardly-bent engaging link or pin i, which stands vertically, as shown in Figs. 2 and 3, and passes into the vertical slot l and between two transverse pins k, forming a vertical eye of the reciprocating frame L. This form of coupling between rod I and frame L permits the latter to rise and fall while the connection is maintained.

The reciprocating frame L of the blade-holder is slotted at its rear end, as shown, and is provided with a longitudinal passage or guideway l', in which is inserted the flat horizontal bar M for holding the frame. The bar M is rigidly secured to the top of the vertically-movable post or standard N, as shown in Figs. 3 and 5. The standard is composed of two dovetailed members—viz., the movable member N and the fixed member N', Fig. 2ª. The member N' is rigidly secured to the end of the frame X and has at the bottom a fixed stop or foot-piece x, as shown in Figs. 2 and 3.

To the side of the movable standard N is adjustably secured a catch-block or stud n, having a vertical slot n', through which is passed a set-screw n'' for securing it in the desired position to the standard N, and such catch-block is adapted to strike against the outer end of the tripping-lever V. In case the movable standard N is not sufficiently heavy to fall when released a metallic weight n''' is secured to it, as shown in Figs. 2 and 3. In practice, however, the standard and blade-holding frame will be made of metal and will readily fall from the raised position between the grinding-wheels when the operating-gearing is released. A rack-bar o is secured to the side of standard N and is engaged by the pinion p on the longitudinal shaft P, as shown in Figs. 1 and 2.

The automatic feed-motion mechanism will now be described, as follows: The longitudinal shaft P is mounted in journal-boxes m at each end of the frame X and has secured to its front end the pinion p and to its rear end the worm-wheel p', Fig. 4, with which engages the worm q. The gearing for operating the worm-wheel, shaft P, and its pinion is mounted in a movable frame R, which is preferably pivotally connected by a transverse shaft or pin U, secured in the boxes u' u', as shown in Figs. 1 and 4. The frame R is provided with a transverse tie-rod r' and a transverse top plate r'', and at its rear end is provided with the journal-boxes r, in which is set the transverse shaft Q, carrying the worm q and a pulley q'. A standard W is secured to the main frame X, centrally below the top plate r'' of frame R, and in the top of said standard is secured a spiral spring w', which bears upward against the top plate r'', Fig. 4, for automatically raising the frame R and its worm q out of engagement with the worm-wheel p'. A handle-bar O is secured to the top plate r'' of frame R and extends transversely across the machine, as shown in Fig. 1, and is engaged by the vertical flat spring J, which is secured at its lower end to a block j and is bent at its upper end to engage said bar O, Fig. 3. A long bent tripping-lever V is pivotally connected to the transverse pin U and is held in place thereon by the washer v' and nut v'', as shown in Figs. 1 and 3. When in its normal position, lever V extends at its rear end nearly to spring J and at its front end extends over the top of the catch-block n on the vertically-

movable post N, as shown in Fig. 3. It will therefore be understood that as the standard N is moved upward the catch-block *n* will raise the front end of lever V and cause the rear end thereof to press upon spring J and force its upper bent end off from the handle-bar O, so that the movable frame R wiil be released and raised by the spiral spring *w'*, thereby disengaging the worm *q* from the worm-wheel *p'*.

I do not wish to be confined to the particular construction of releasing mechanism above described for automatically permitting the movable standard and knife-holding frame to fall after having been raised between the pair of grinding-wheels, as other forms of releasing mechanism may be readily devised by a skilled mechanic. For instance, (see Figs. 6 and 9,) the shaft Q, carrying the worm-wheel *q*, may be supported in adjusting-journals, one of which, *q''*, is pivoted at q^3 and the other, q^4, is arranged to move vertically on a guide-stud q^5, which passes through a slot formed in the plate of the journal-box, as indicated in Fig. 9. The shaft and its journal q^4 may be raised sufficient to disengage the worm *q* from worm-wheel *p'* by means of a lever q^6, pivoted below the frame and having a forked end q^7 embracing shaft Q. This pivoted lever may extend forward and rest upon a stud q^8, projecting from the side of the fixed standard N' and may be automatically pushed off from such stud by an inclined dog k^9, fixed upon the movable standard, so as to cause it to fall and thereby raise shaft Q and disengage the gear *q*, as above explained. This modified construction is within my invention for automatically releasing the movable standard and causing it to fall from the raised position between the grinding-wheels.

My blade-holding device S is constructed for quickly applying and disengaging it from the reciprocating frame L, and in the form shown in the drawings is made with a top plate *s*, having secured to it two side plates *t t*, which in practice embrace the frame L, as shown in Fig. 3ª. To the middle portion of the side plates *t* are riveted two flat semi-elliptical springs *s'*, Fig. 1, the securing-rivets or other means passing only through their middle portions, thus leaving their ends free from said side plates. To the inner ends of the springs *s'* there are riveted at *t' t'* the lateral blade-supporting plates *u u*, while the outer ends of said springs simply bear loosely upon the inner surfaces of said plates *u*. The knife-blades *v* are secured to the plates *u* in any convenient manner, as by rivets or screws, as indicated at *v'''*. The side plates *t* are notched at one end and are held from endwise movement by the lateral pins *l''* in frame L. The flat springs *s'* cause the blades *v* to be pressed by a light yielding but uniform pressure upon the grinding or finishing surfaces of the wheels, so that superior results are obtained in practical operation. Other forms of springs may be used, such as coiled springs or rubber springs.

My invention in the blade-holding device is not confined to the details of construction above described; but it is important that the blade-holding plates *u* shall be made yielding, and in practice they may be connected at both ends to flat spring-plates s^2, (see Fig. 10,) which in turn are secured at about a third of their length from their outer ends to rigid posts s^3, so that there shall be no rocking motion to the device when being subjected to the action of the grinding-wheels.

In Fig. 1 the grinding or finishing wheels B are shown as moved toward each other into working position while the blade-holder is in its lowered position preparatory to being raised up between the wheels. In Fig. 2 the grinding or finishing wheels B are shown as moved or swung apart while the blade-holder is in its lowered position for readily removing the blade-holding device from its frame.

The machine having been constructed and set up as above described, and shown in the drawings, the operation is very simple and may be conducted as follows: The blade-holding frame being lowered in its normal position and the grinding-wheels swung apart, as shown in Fig. 2, the blade-holder S is fixed in position on the reciprocating frame L, the grinding-wheels are set in motion, and the belt is shifted onto the fixed pulley *g''*, thereby revolving disk G and setting in motion the longitudinal reciprocating frame L. The worm *q* is made to engage its wheel *p'* by forcing down the frame R and engaging or locking the bar O by the spring-catch J. The wheels B are now moved into operative position by forcing down the foot-lever F, and the standards of said wheels are preferably locked in the desired position by any suitable means, such as by the engagement of the end of the lever F under a stop *f'*. (See Fig. 9.) The post or standard N of the blade-holding frame will now be moved gradually upward by its gearing, while at the same time the frame L will be reciprocated longitudinally between the revolving wheels B, so as to subject both blades in the holding device to a uniform grinding or finishing action of the wheels along their entire lengths. Just as the movable standard N reaches the limit of its upward movement the catch-block or stud *n*, secured to its side, acting on the tripping-lever V, causes it to force the bent end of spring-catch J off from the handle-bar O, thereby releasing the movable frame R, which is thrown upward by its spring *w'*, thereby causing its worm-gear *q* to be disengaged from the worm *p'* and permitting the standard N to fall back to its normal position, resting upon the foot-piece or stop *x*. The handle-bar O may again be locked under the bent spring-catch J, causing the gear-wheels *q* and *p'* to be engaged and thereby again raising the

blade-holder frame between the wheels B B. The blades having been suitably ground or finished, the wheels B B are released from their locked position and moved backward and the blades changed on the holding device, or a new device having blades secured to it substituted for the one just in use. In practice the holding-frame L will be rapidly reciprocated between the grinding or finishing wheels, while the upward movement of the standard N is comparatively slow, so that a pair of blades may be ground or finished during one upward movement of the standard N.

I do not claim herein the combination, with a holder for the article to be ground or finished, of grinding or finishing wheels, oscillating supports for said wheels, and mechanism connecting said supports, whereby the wheels may be quickly and simultaneously moved toward and from the holder, as the same forms the subject-matter of a claim in my said application first-above referred to.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a grinding and finishing machine, the combination with a grinding or finishing wheel, of a blade-holder, a vertically-movable frame, and gearing for raising said frame and holder adjacent to the said wheel, and tripping mechanism for releasing said frame from the gearing, substantially as described.

2. The combination with a revoluble grinding or finishing wheel, of a vertically-movable frame carrying a blade-holder, mechanism for raising said holder-frame, tripping mechanism for releasing the frame and permitting it to descend, and means for giving it a longitudinally-reciprocating motion, substantially as described.

3. The combination with a pair of revoluble grinding or finishing wheels, of a blade-holder frame, power mechanism for automatically raising and lowering said frame between the peripheral edges of said wheels, and mechanism operating at the same time, to impart longitudinal motion to said frame for traversing the blades back and forth over the grinding or finishing surfaces, substantially as described.

4. The combination with a pair of grinding or finishing wheels and means for moving their peripheral surfaces toward and from each other, of a vertically-movable blade-holder frame, mechanism for raising and lowering it between said wheels, and means for longitudinally reciprocating it with the blades in contact with the grinding or finishing surfaces, substantially as described.

5. The combination with a grinding or finishing wheel, of a vertically-movable blade-holding frame, having a rack-bar, a pinion meshing therewith, and operating-gearing for raising said frame and automatic releasing devices for lowering said frame, substantially as described.

6. The combination with a grinding or finishing wheel, of a vertically-movable blade-holding frame having a catch-block or dog, and a rack-bar, a shaft carrying a pinion meshing with said rack and a gear-wheel, an actuating-gear mounted in a movable spring-pressed frame, a spring-catch engaging said frame, and a tripping-lever adapted to bear upon said spring and release the frame and also to be tilted by said catch-block in the blade-holding frame, whereby the gear-wheels are automatically disengaged and the blade-holding frame lowered to its normal position, substantially as described.

7. The combination with a vertically-movable standard having a horizontal guide-bar, of a longitudinal reciprocating blade-holding frame mounted on said guide-bar and having a vertical eye or link at one end, a connecting-rod having a vertical pin, and mechanism for reciprocating said frame, substantially as described.

8. The longitudinal reciprocating frame, L, mounted upon the guide-bar, M, said guide-bar being connected to the vertically-movable standard, N, said frame having a vertical eye at its rear end, in combination with a connecting rod or bar, having a vertical connecting link or pin, *i*, and a suitable crank and gearing for reciprocating said frame, L, substantially as described.

9. In combination with a holding-frame, the blade-holding device having lateral plates embracing said frame, the semielliptical springs, *s'*, secured to said plates, and the blade-supporting plates, *u*, attached at one end to said springs, substantially as described.

10. In a grinding and finishing machine, the combination with a holding-frame, of the blade-holding device, having a lateral spring and a lateral blade-supporting plate attached thereto, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY A. AXTELL.

Witnesses:
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C. W. HAWKS.