(No Model.) 4 Sheets—Sheet 1.

A. JOHNSTON.

POLISHING MACHINE.

No. 534,394. Patented Feb. 19, 1895.

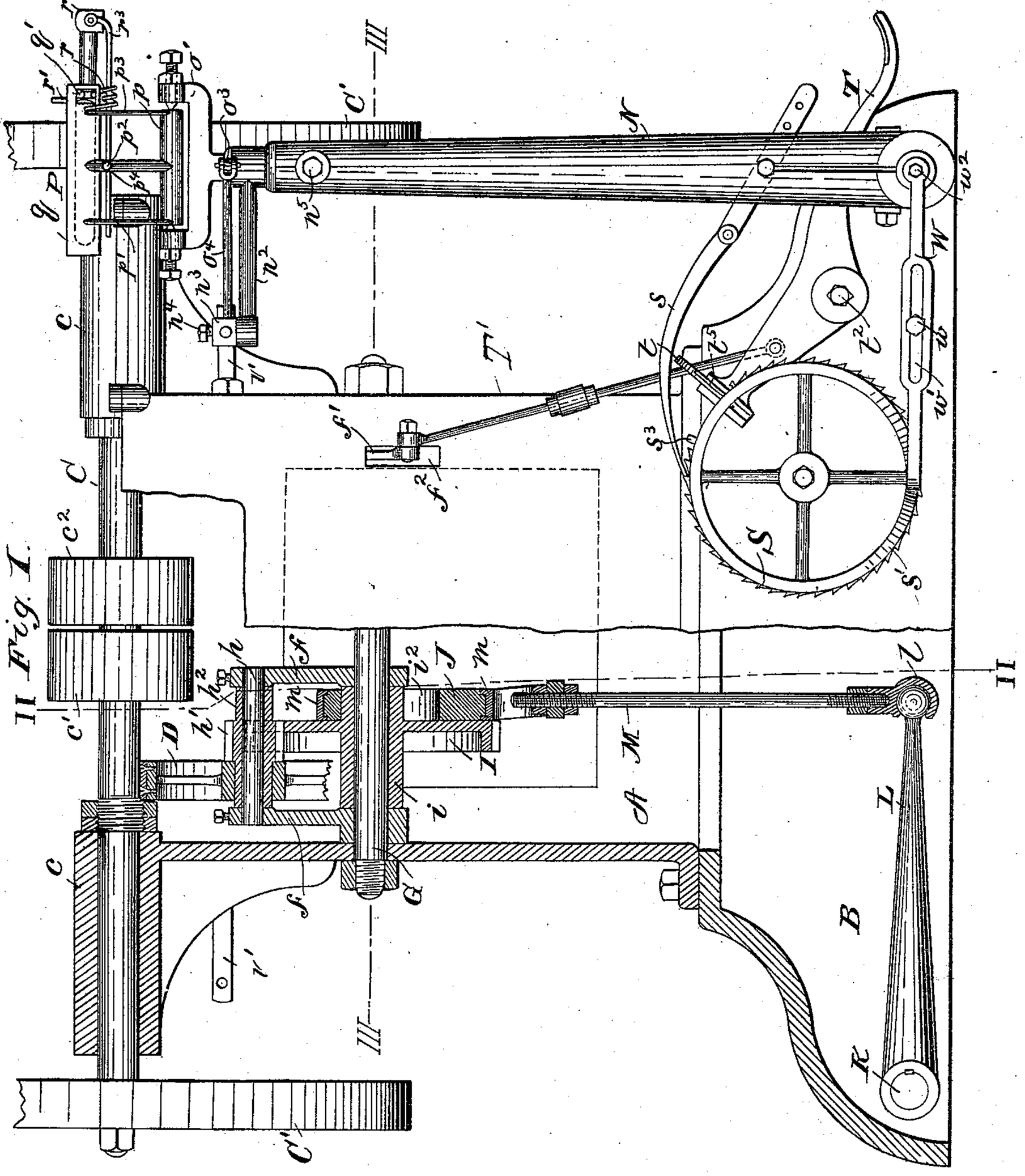

Fig. I.

Witnesses.
W. R. Edelen.
Peter Lewis.

Inventor.
Allen Johnston
by Pollock Macro
his attorneys.

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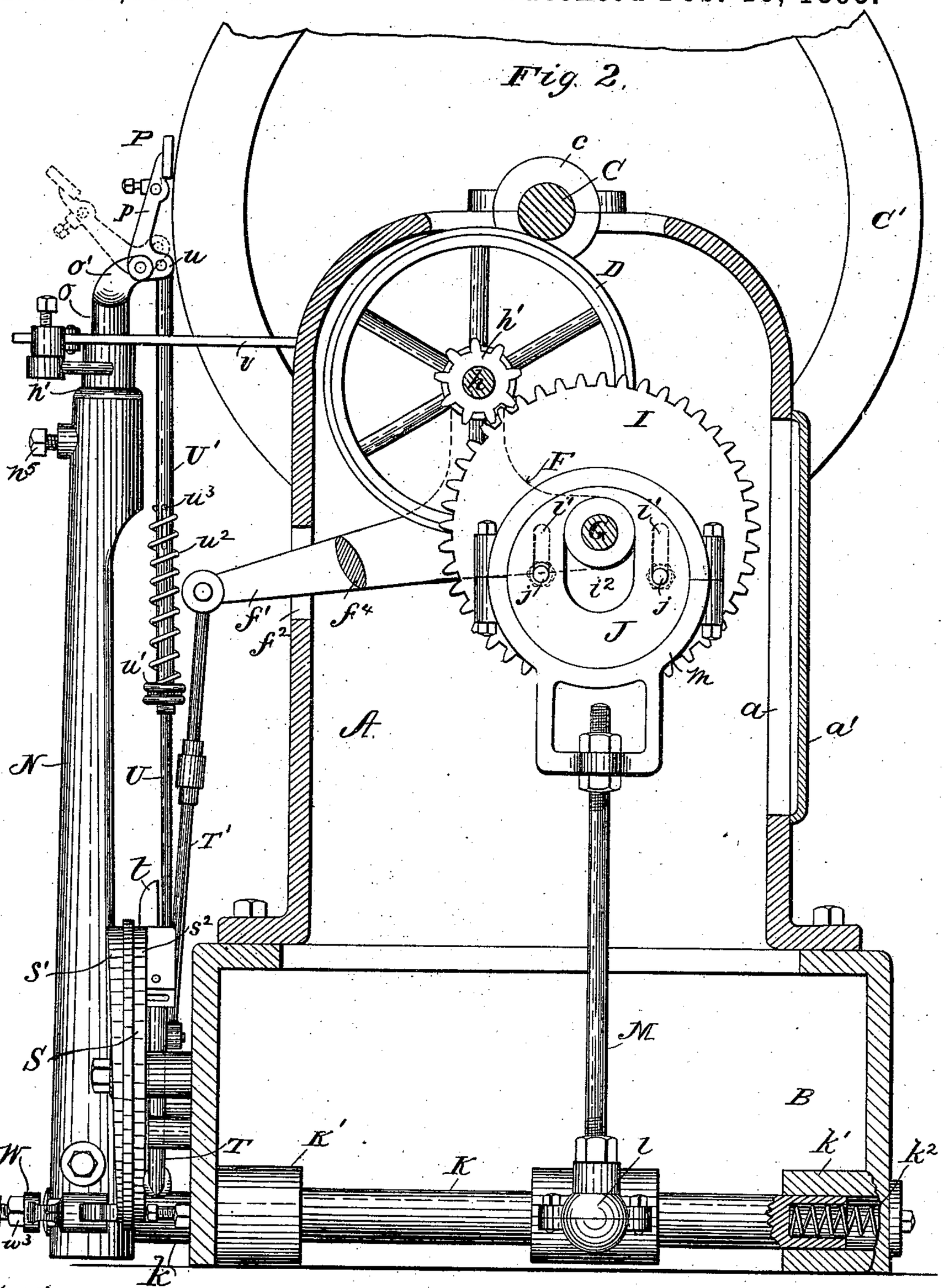
Fig. 2.



Witnesses.
W. R. Edelen.
Percy Lewis.

Inventor.
Allen Johnston
by Pollard Mears,
his attorneys.

(No Model.) 4 Sheets—Sheet 3.

A. JOHNSTON.

POLISHING MACHINE.

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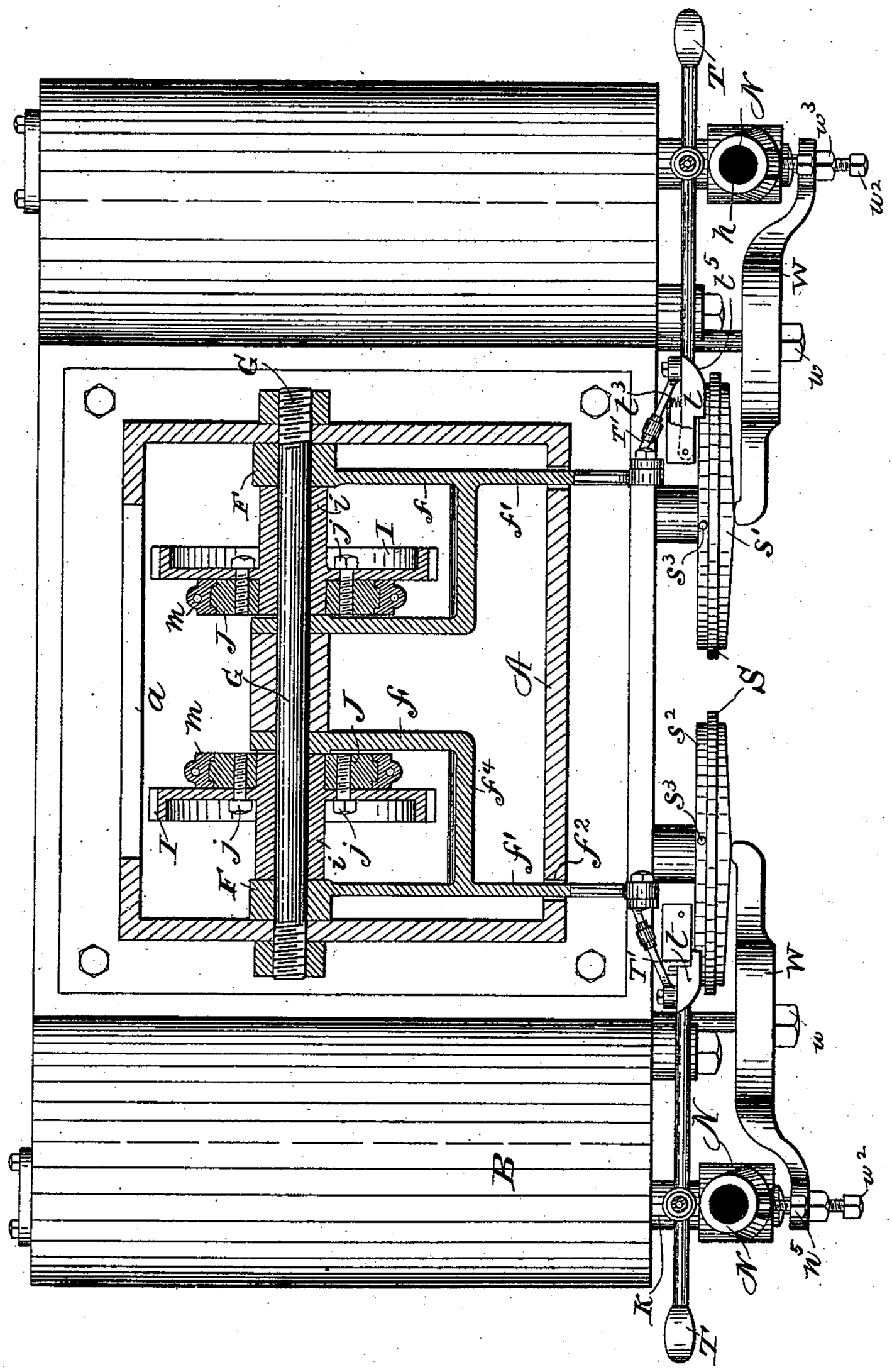
Fig. 3.



Witnesses
W. R. Edglen.
Peter Lewis.

Inventor.
Allen Johnston
by Pollock & Mauro
his attorneys

(No Model.) 4 Sheets—Sheet 4.

A. JOHNSTON.

POLISHING MACHINE.

No. 534,394. Patented Feb. 19, 1895.

Fig. 5.

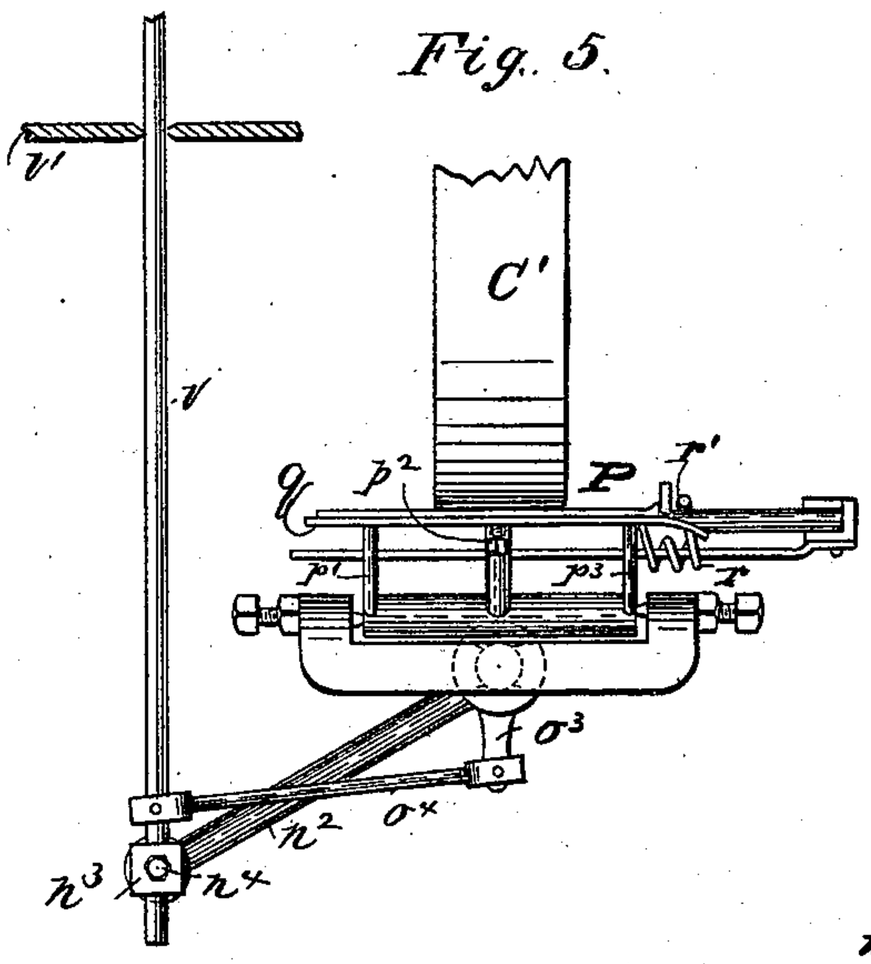


Fig. 4.

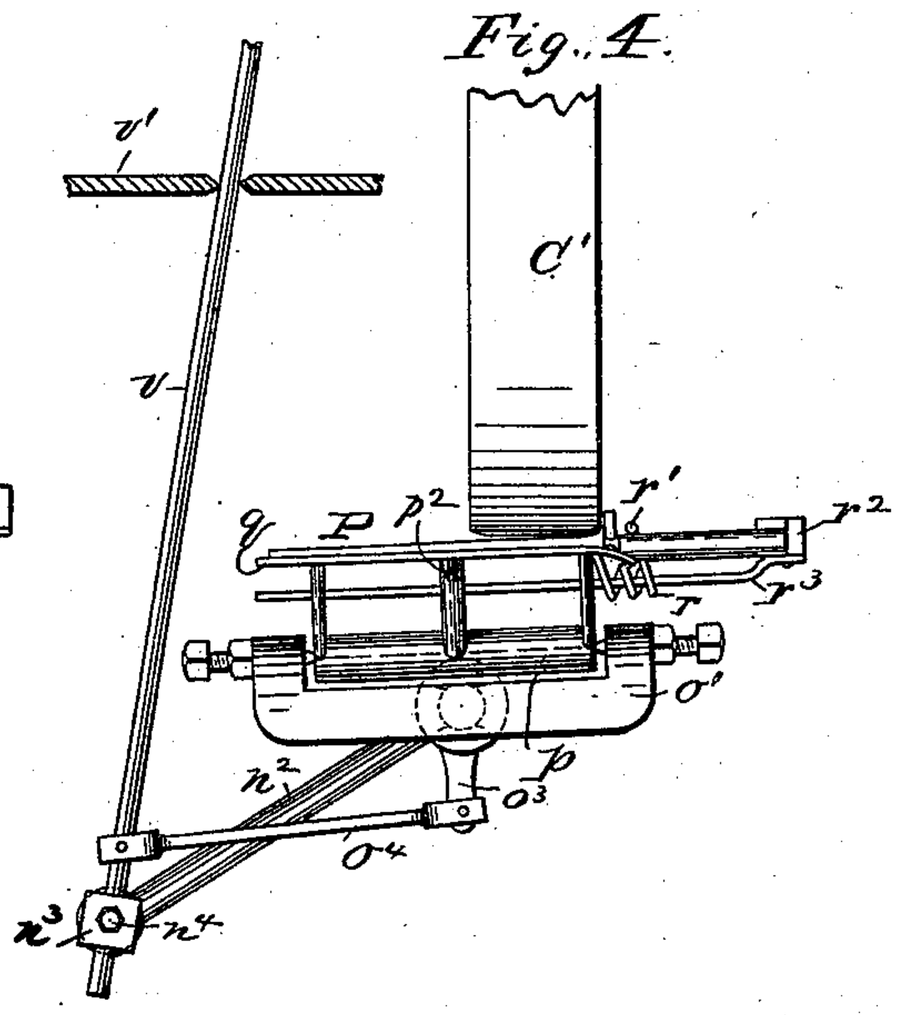


Fig. 6.

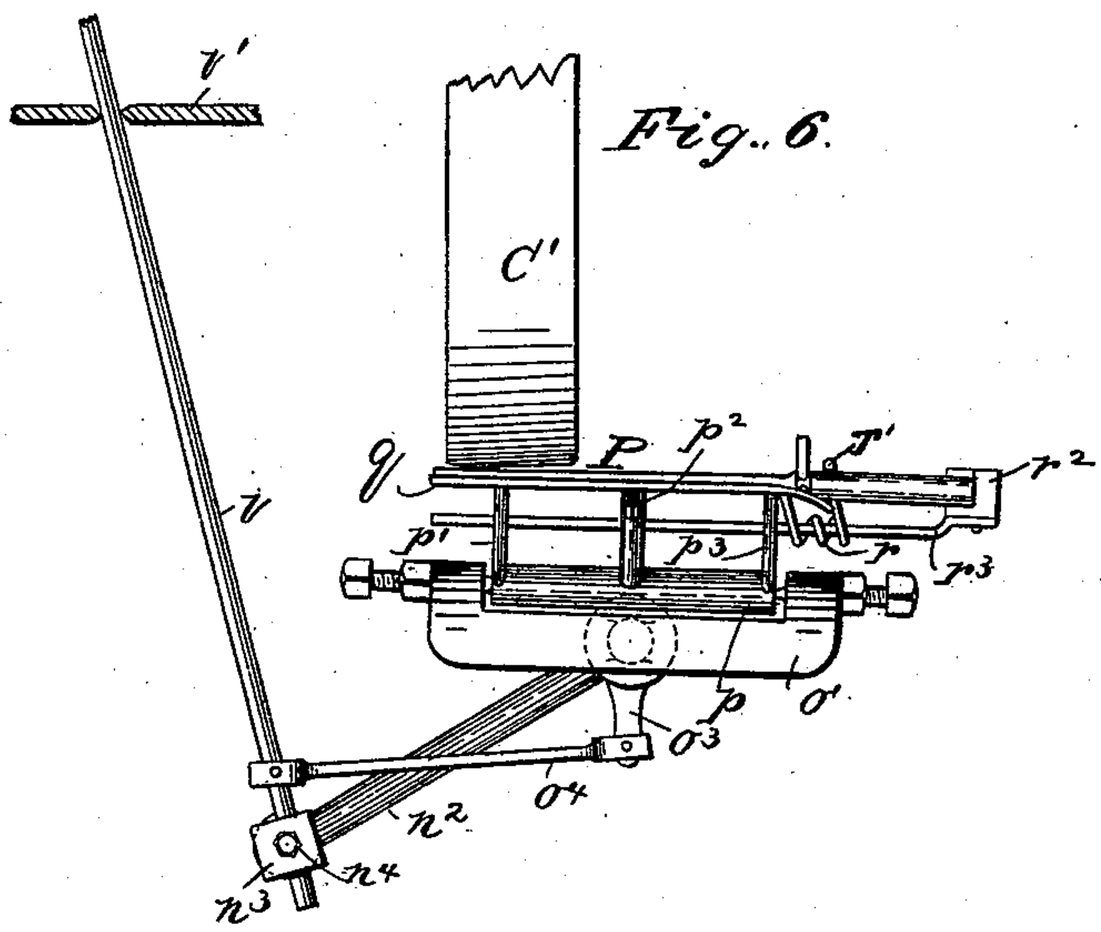
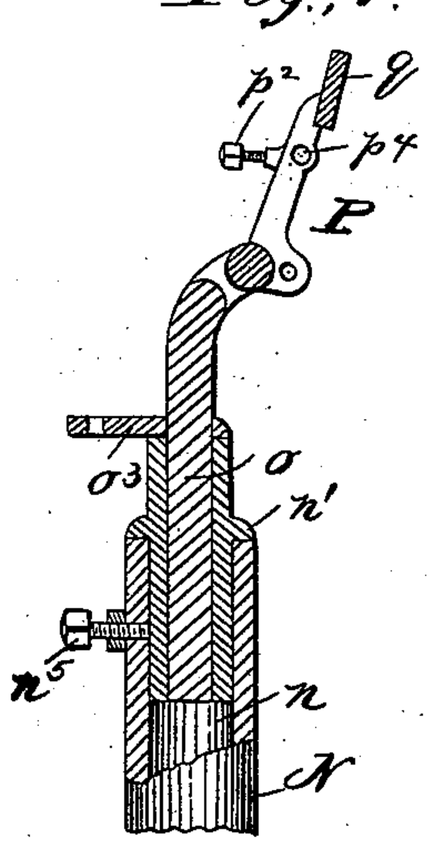


Fig. 7.



Witnesses.
H. R. Edgerton.
Percy Lewis.

Inventor
Allen Johnston
by Poole & Maurer
his attorneys.

UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

POLISHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 534,394, dated February 19, 1895.

Application filed October 16, 1894. Serial No. 526,066. (No model.)

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, of Ottumwa, Iowa, have invented a new and useful Improvement in Polishing-Machines, which is fully set forth in the following specification.

This invention has reference to machines for polishing metal surfaces, particularly knife-blades, and in some respects resembles the invention described in my application filed April 18, 1894, Serial No. 507,987.

In the machine described in my said application polishing blocks were employed in combination with a reciprocating work-holder for the knife-blades. The polishing blocks and knife-blades were held in contact by a yielding pressure, and mechanism was provided to produce three distinct movements of the blocks relatively to the blades, in addition to the reciprocatory movement of the latter, already referred to. According to the present invention, wherein I preferably employ a rotating polishing wheel, these conditions are reversed and of the four relative movements—(viz: first, the movement of the polishing surface over the knife-blade; second, the longitudinal reciprocation of the blade across the polishing wheel; third, the rocking motion of the blade in the line of reciprocation, and fourth, the lateral rocking of the blade)—the first only is produced by the movement of the polishing wheel, while the last three are produced by the movement of the knife-blade.

Referring to the use of the four movements above mentioned the first is necessary in order to give the polishing effect to the blade, the second presents the surface of the blade from end to end to the polishing surface; while the third and fourth compensate respectively for the longitudinal taper of the blade toward its end, and the lateral convexity of the faces thereof, said movements all co-operating to present every portion of the surface to the polishing wheel.

In accordance with this invention each face of the knife-blade is separately presented to the polishing wheel. In order to secure the best results I prefer to employ a double machine, comprising two complete polishing mechanisms one for each face of the knife-blade located at opposite sides of the main frame and which may be termed respectively the right and left handed polishing mechanisms. As the two mechanisms are in all respects similar, except that the parts in each are reversed with reference to the surface being polished, the description thereof will be in the singular, it being understood that it refers to either mechanism.

The holder for the knife-blade is so mounted that the surface to be polished is brought into contact with the polishing wheel for a predetermined period of time, at the expiration of which the movements of the holder are arrested and the latter is swung away from the polisher, so that the polished blade can be replaced by another which is to be operated upon. Assuming that one surface of the blade so removed has been polished in the right handed polishing mechanism, it is then placed in the holder of the left hand mechanism and its opposite face polished. This transfer of the blade is preferable (if not necessary) mainly on account of the difference in thickness between the back and cutting edges of the knife. If it were attempted to polish both faces of the blade by simply turning the knife over in its holder, after polishing one surface, it will be seen that the thick back edge will be brought into the position formerly occupied by the thin cutting edge, and in such position it would be difficult to produce the best results without some readjustment of the holder or its connections. Such adjustment and attending inconvenience and delay is avoided by employing another polishing mechanism, which is preferably adjusted to polish the other face of the blade. The arrangement of the two mechanisms on the same frame is a matter of convenience, since they may, of course be separate machines.

Any suitable mechanism may be employed in carrying out my invention, but that which is preferred in order to attain the most satisfactory results, is illustrated in the accompanying drawings, to which reference is made in the following description, and in which—

Figure 1, is a front elevation, partly in section, of a double machine employing my invention. Fig. 2, is a vertical section on line II—II of Fig. 1, looking to the left. Fig. 3, is a horizontal section on line III—III, Fig. 1.

Figs. 4, 5 and 6 illustrate relative positions of the polishing wheel and work-holder during the longitudinal rocking movement of the latter. Fig. 7 is a detail of the connection between the work-holder and the upper end of its supporting standard.

Referring to the drawings A represents the main frame, having an opening *a* through which access can be had to inclosed parts, said opening being closed by a cover *a'*. B is the base upon which frame A is supported, and C is the main shaft having bearings in boxes *c c* at at the top of frame A, said shaft carrying idler pulley *c'* and fast pulley c^2 through which latter motion is communicated thereto. At each end shaft C has a polishing wheel C' C' such as are well known on the market, made of any suitable material as emery of suitable grade, leather or cloth.

Having thus described the mechanism for producing the first of the four movements hereinbefore referred to, I will now proceed to describe that for producing the other three movements, each in its turn.

The second or longitudinal reciprocating movement of the blade across the polishing wheel.—Journaled on a shaft G which passes through and is secured in the frame A, is a rocking-frame F comprising two side bars *f f* through one end of which the shaft G passes constituting the journal for the frame F. The bars *f f*, one of which is extended forwardly as at *f'* through a slot f^2 in the frame A, are connected by a tie-rod f^4. At their upper extremities the bars *f* are connected by a shaft or axle *h* carrying a pinion *h'*. Said pinion *h'* has an elongated hub h^2 the end faces of which abut against the inner faces of the bars *f f* thereby preventing endwise movement of the pinion. Keyed on hub h^2 at one side of the pinion *h'* is a friction wheel D, adapted to make contact with and receive motion from the shaft C when the frame F is raised through means hereinafter described. Between the bars *f f* and having a bearing on the shaft G is a gear wheel I, which also has an elongated hub *i* abutting at its ends against the inner faces of the side bars. Located at one side of the gear wheel I around the hub *i* thereof is an eccentric J adjustably secured to said wheel by bolts *j j* passing through slots *i' i'* therein. To permit of the proper adjustment, the opening i^2 in the eccentric plate, through which the hub *i* passes, is elongated.

A horizontal rock-shaft K extending at right angles to main shaft C, has suitable bearings in the base B, one end *k* of said shaft projecting through the wall of the base. The bearings for the shaft consist of inwardly extending bushings *k'*, on the base around said shaft, in one of which is located a coil spring k^2 which exerts its tension to move the shaft toward the left, as illustrated in Fig. 2, for purposes hereinafter mentioned. On rock-shaft K is keyed an arm L connected at its free end by a ball and socket joint *l* with a pitman M which receives motion from the eccentric J by means of a concentric ring or strap *m* adjustably connected with the pitman. To the projecting end *k* of the shaft K is secured a vertical standard N having a socket *n* in its upper end in which a socket piece *n'* is adjustably secured by a bolt n^5 (Fig. 7). Said socket piece *n'* is made in the form of a sleeve and constitutes a socket for a swivel pin *o* with which the parts for supporting the knife-holder are connected. The swivel pin *o* carries a yoke *o'* through the arms of which pass suitable bolts, the pointed inner ends of which engage in suitable depressions in the ends of a cylindrical bar *p* thereby forming a pivot upon which the knife-holder frame is swung.

The holder-frame comprises the bar *p* and the holder proper *q* arranged parallel with and connected to bar *p* by cross bars *p' p² p³*. Holder P is formed of a flat strip bent away from the polishing wheel at one end and formed with an opening *q'* therethrough. A spring *r* is secured to the rear face of the plate *q*, coiled several times beneath the latter and its free end *r'* bent upwardly in front of the curved end of the holder, so that the tension of the spring forces its end *r'* toward the holder. When a knife is placed in the holder the end *r'* of the spring is forced back and allowed to rest against the knife, one face of which is placed against the flat face of the holder, the bolster of the knife projecting into the opening *q*.

In order to support and steady the handle end of the knife and prevent endwise movement of the latter I provide a recessed block r^2 in which the extreme end of the handle rests, said block being supported by a rod r^3 which passes through the coils of spring *r* and is adjustably secured in an opening p^4 in the connecting bar p^2.

The oscillation of the standard N with rock-shaft K imparts to the work, in the holder carried by standard N, its longitudinal reciprocatory motion across the polishing surface.

Before describing the third and fourth movements I will explain the mechanism whereby the polishing when begun, continues for a definite period of time, at the expiration of which the work-holder is automatically thrown out of its operative position and all its movements arrested.

A ratchet wheel S turning upon a suitable axle is located at the side of base B and moved step by step by a pawl *s* connected with oscillating standard N. The rim of the wheel S is made wider than the teeth so that it extends beyond the teeth at both sides thereof. The part *s'* of the rim at the outside of the wheel is made wider at one side than at the other, forming a cam for purposes hereinafter referred to. The part s^2 of the rim at the inside of the wheel constitutes a rest for a spring-actuated latch *t* pivoted in the outer end of a foot lever T, which is pivoted at t^2. Said latch is provided with a spring t^3 pressing it against the rim of wheel S. Nor-

mally, *i. e.*, when the machine is at rest, the latch is below the edge of rim s^2 and bears against the face or side thereof; but when treadle T has been depressed a sufficient distance the latch springs over the wheel rim s^2 where it remains until a pin s^3 on the part s^2 of the rim makes engagement with the inclined surface t^5 on the latch and shoves it off the rim, allowing the treadle to drop through the weight of the parts connected thereto. The end of treadle T carrying the latch is connected with extension f' of one of the bars f of the tilting frame F by a rod T'. Hence when the foot lever is depressed, the frame F is raised throwing the friction-wheel D into engagement with shaft C thereby setting the machine into operation, which continues until the pin s^3 forces the latch off of the rim of wheel S as above described.

The mechanism for automatically throwing the work-holder away from the polishing-wheel to the position shown in dotted lines in Fig. 2, is as follows:—A rod U is pivoted at its lower end to the foot-lever (between its fulcrum and the end to which power is applied) and at its upper end slides in a tube U'. Said tube U' is pivoted to an ear u on bar p of the holder frame, its screw threaded lower extremity being engaged by a nut u'. A coil spring u^2 encircles tube U' resting between the nut u' and a pin u^3 on the rod U, said pin projecting through slots in the sides of the tube U'. When the foot lever is depressed the knife-holder is swung over against the polishing wheel and spring u^2 slightly compressed, thereby holding the surface to be polished against the polishing wheel with a yielding pressure. Upon the disengagement of the latch t from the rim of the ratchet-wheel and the consequent elevation of the outer end of the foot lever, the rod U and tube U' (the pin u^3 reaching the ends of the slots) are moved upwardly throwing the holder frame back to a convenient position for replacing the knife therein by another to be polished.

The third or rocking movement of the blade in the line of reciprocation is produced by turning the knife-holder frame on its swivel connection. (See Fig. 7.) Swivel pin o has an arm o^3 and socket piece n' has an arm n^2 much longer than arm o^3 and extending in a direction obliquely thereto. Arm n^2 carries a block n^3 pivoted thereto, in which a rod v is held by a set bolt n^4. The free end of rod v passes loosely through an opening in stud v' secured to the main frame A. Arm o^3 is connected with rod v by a bar o^4 having forked ends which are pivoted to the arm and rod respectively. Now it will be clear that as the knife holder is oscillated from a mean position, as shown in Fig. 4, to the extreme position shown in Fig. 5 the lever v will be caused to approach the position occupied by the arm o^3 which will consequently be moved to the right through bar o^4 causing the handle end of the knife in the holder to be rocked toward the polishing wheel, and when oscillated to the extreme position shown in Fig. 6, the direction of movement is just the reverse of that above described and the point of the blade is rocked toward the polishing wheel.

The fourth, and last movement, the lateral rocking of the blade is due to the endwise movement of the shaft K which is accomplished by the movement of the cam-shaped edge of the rim s' of the ratchet-wheel S, making contact with and moving one end of a rod W, which moves against the head of bolt w as a pivot point, said bolt passing through a slot w' in rod W and being screwed into the base B. At its other end the rod W carries an adjustable bolt w^2 which makes contact with the end of shaft K and is secured in its adjusted position by a set nut w^3. From the connections as above described it will be seen that as the ratchet wheel S is rotated (from the position shown in Fig. 1) the increasing width of the rim s' rocks the rod W moving the shaft K to the right (Fig. 2) and compressing spring k'. After the widest part of the rim s' has passed the rod W the spring k' moves the shaft K to the left, holding the rod in contact with the wheel rim. This endwise movement of the shaft K shifts the position of the standard N toward and away from the polishing wheel producing a very slight oscillation of the lower part of the holder-frame and consequent rocking of the blade against the surface of the wheel.

From the foregoing description it is to be understood that the four relative movements, all of which I deem essential to the production of the best results, are produced simultaneously although they differ in rapidity. As for example, it will be observed that during each reciprocation of the knife-blade across the polishing wheel, from one end to the other, it is also rocked longitudinally from one extreme position (Fig. 4) to the other (Fig. 6) whereas, the lateral rocking movement of the blade from one extreme position to the other occurs only once during each half revolution of the ratchet wheel S. These conditions may be changed however, and one or more of the movements omitted as desired.

It will furthermore be obvious that some of the improvements, though described in connection with a polishing machine, may be used in grinding machines, the operations of grinding and polishing being analogous.

It will be understood therefore that in so far as the mechanism described is applicable to, and could be usefully employed for, operations other than polishing, the invention is not limited to the latter.

Having thus described my invention, what I claim as new is—

1. In a machine for polishing knife-blades and other articles, the combination with a movable polishing surface, of a vertical reciprocating standard, a work-holder pivotally mounted on the upper end of said standard in front of the polishing surface so as to ro-

tate in a horizontal plane, and means for imparting a rotary movement to said work-holder during the reciprocation of the standard, whereby a longitudinal rocking movement of the work in the line of reciprocation is produced, substantially as described.

2. In a polishing machine the combination with a movable polishing surface, of a reciprocatory standard, a yoke swiveled in the upper end of said standard so as to rotate in a horizontal plane, a work-holder horizontally pivoted in said yoke, and means for rotating the yoke on its swivel and for swinging the holder on its pivot during the reciprocation of the standard, whereby simultaneous rocking movements of the work both in and transversely to the line of reciprocation are produced, substantially as described.

3. In a polishing machine the combination with a polishing wheel, of a reciprocatory work-holder, mounted to oscillate in the line of reciprocation and also transversely thereto, and means for imparting to the work-holder simultaneous rocking movements in both these directions, substantially as described.

4. In a polishing machine, the combination with the polishing wheel, of a horizontally pivoted holder for the knife to be polished, means for operating the holder to present the knife to the polishing wheel for a predetermined period and for automatically swinging the work-holder on its pivot away from the polishing wheel at the expiration of such period, substantially as described.

5. The combination with the wheel, of a work-holder, mechanism for moving the latter to bring different parts of the work into contact with the wheel, a rod or pitman pivoted to said holder and adapted to move it into and out of its operative position, a latch connected with said rod and normally engaging the rim of a wheel, and means for disengaging said latch at a predetermined point, substantially as described.

6. The combination with the wheel, of a work-holder, a pivoted frame, driving gears and connections for said work-holder partly carried by said frame, means for pressing the work against the wheel, a rod for moving the work-holder into and out of its operative position, a treadle connected with said frame and with said rod, whereby the work-holder can be put in position and its driving mechanism started, a latch for maintaining the treadle in position and a releasing device for disengaging said latch at a predetermined point, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALLEN JOHNSTON.

Witnesses:
A. G. HARROW,
ALFRED BRIGGS.