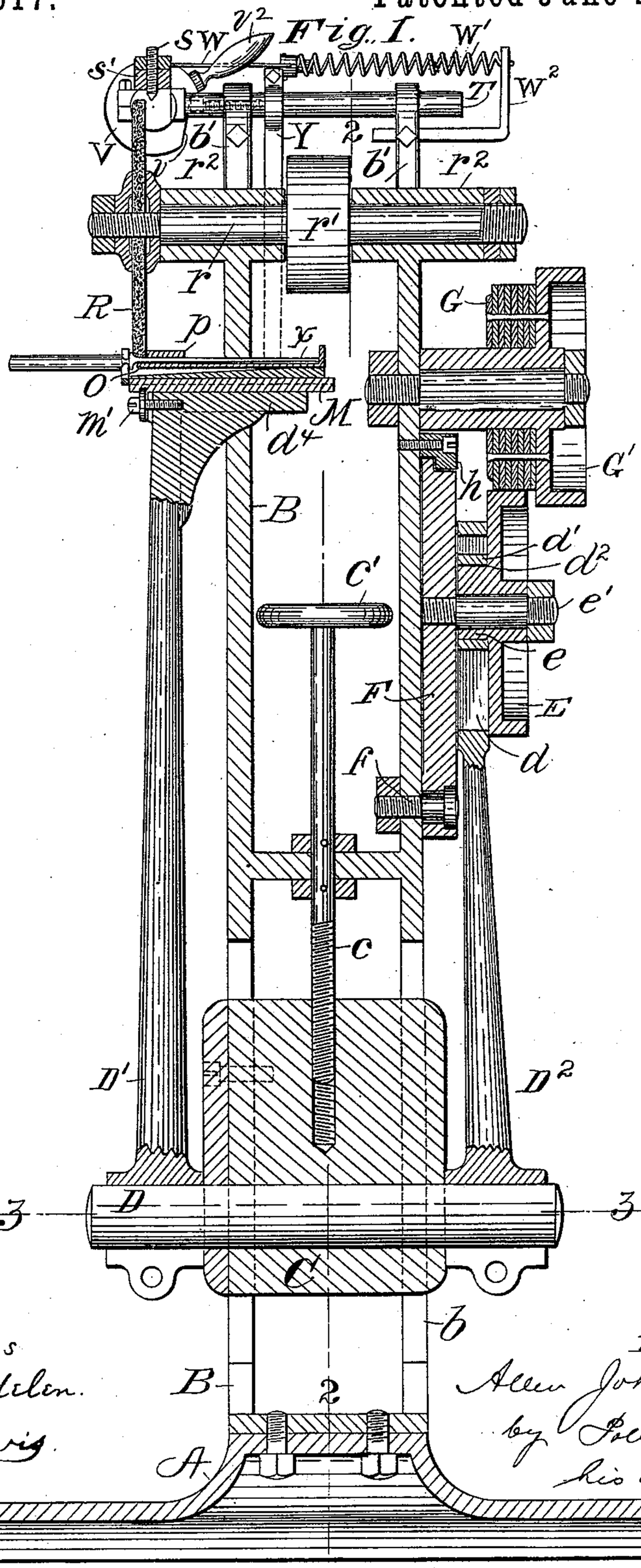
(No Model.) 6 Sheets—Sheet 1.

A. JOHNSTON.

CUTLERY BOLSTER GRINDING MACHINE.

No. 541,617. Patented June 25, 1895.

Fig. 1.



Witnesses
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Geo. Lewis.

Inventor.
Allen Johnston
by Foster Freeman
his attorneys

(No Model.) 6 Sheets—Sheet 2.

A. JOHNSTON.

CUTLERY BOLSTER GRINDING MACHINE.

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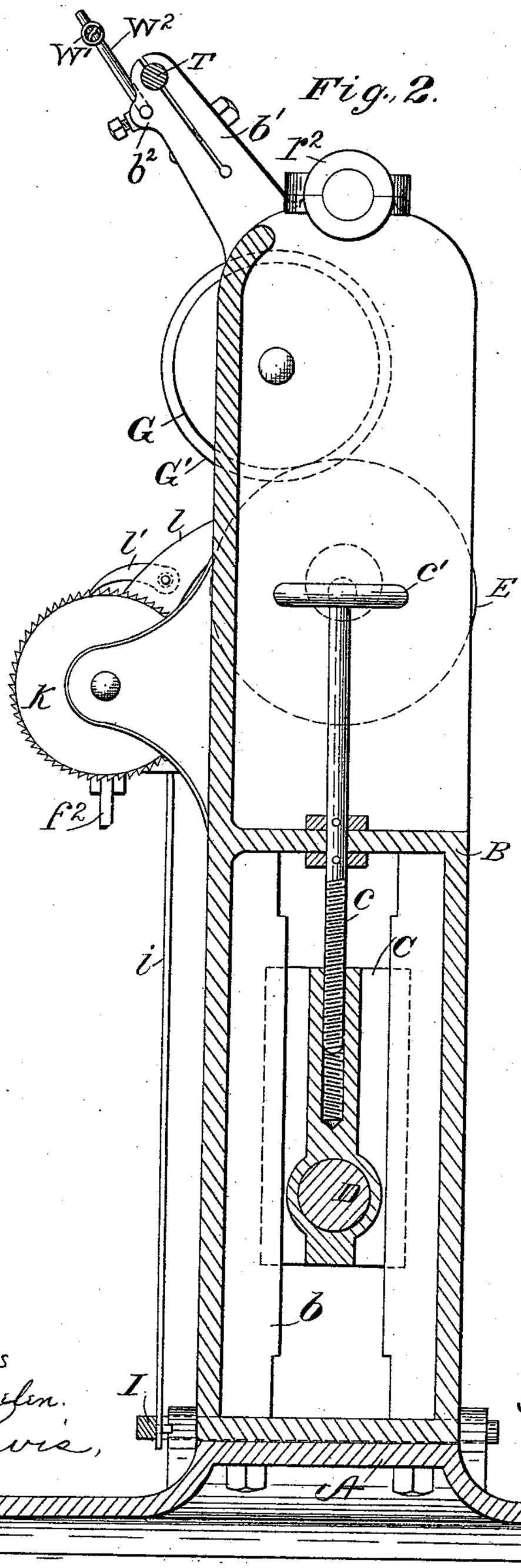
Fig. 2.



Witnesses
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(No Model.) 6 Sheets—Sheet 3.

A. JOHNSTON.

CUTLERY BOLSTER GRINDING MACHINE.

No. 541,617. Patented June 25, 1895.

Fig. 4.

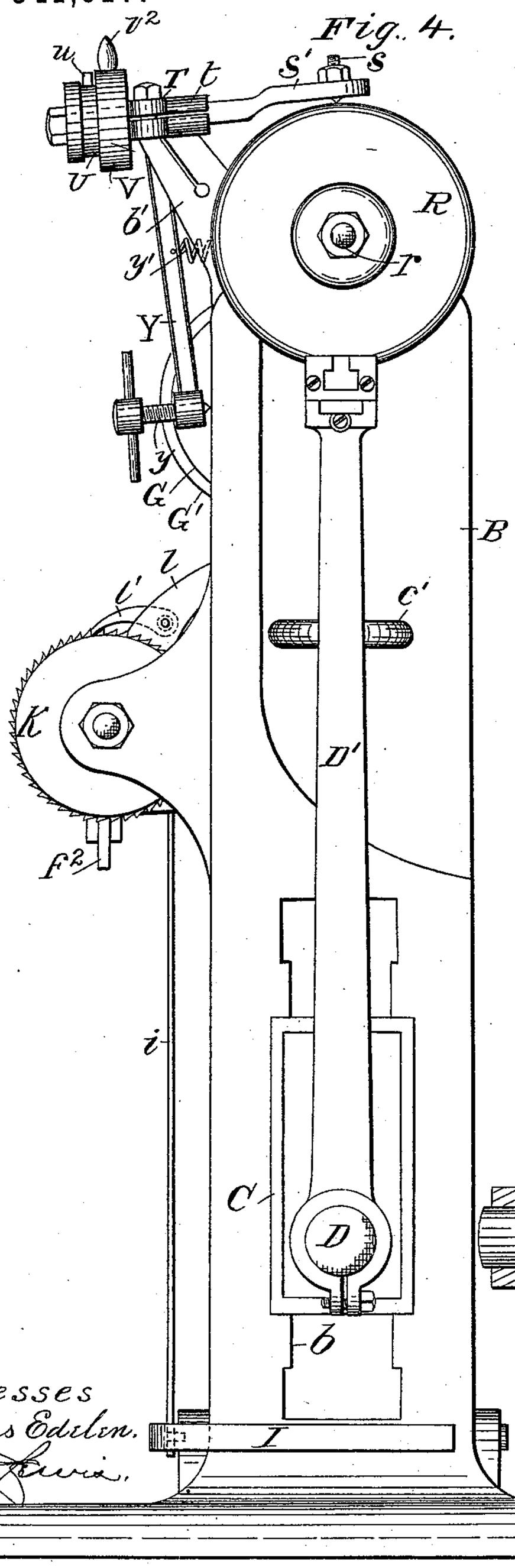


Fig. 9.

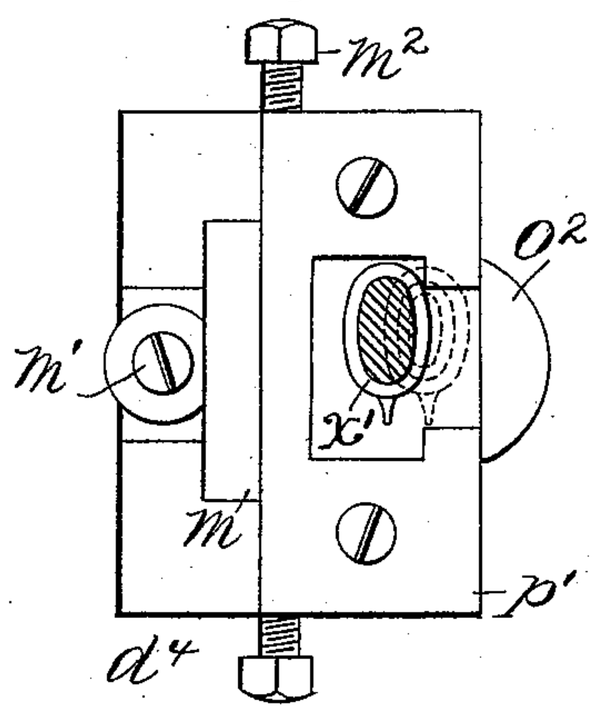


Fig. 11.

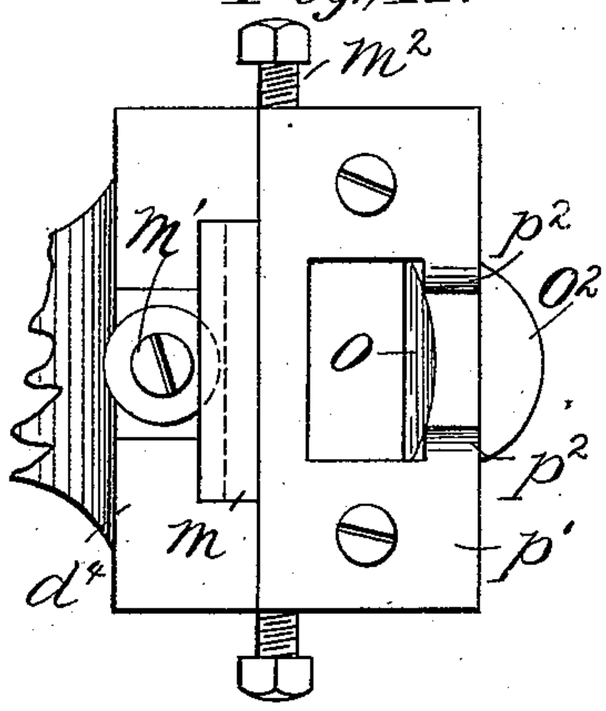
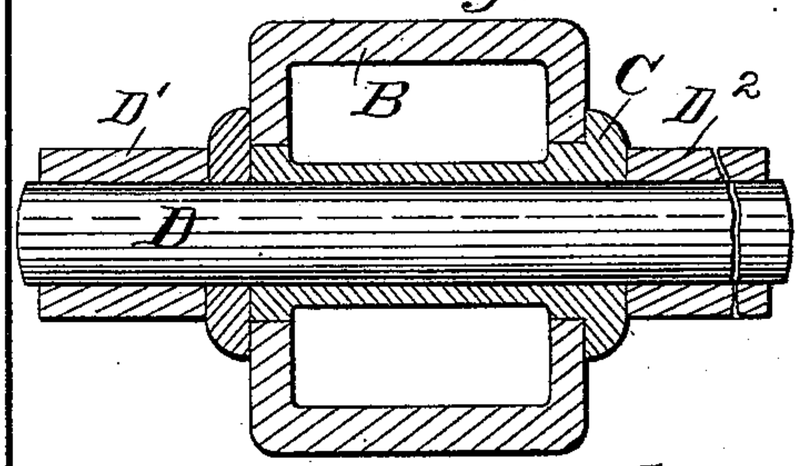


Fig. 3.



Witnesses
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(No Model.) 6 Sheets—Sheet 4.

A. JOHNSTON.

CUTLERY BOLSTER GRINDING MACHINE.

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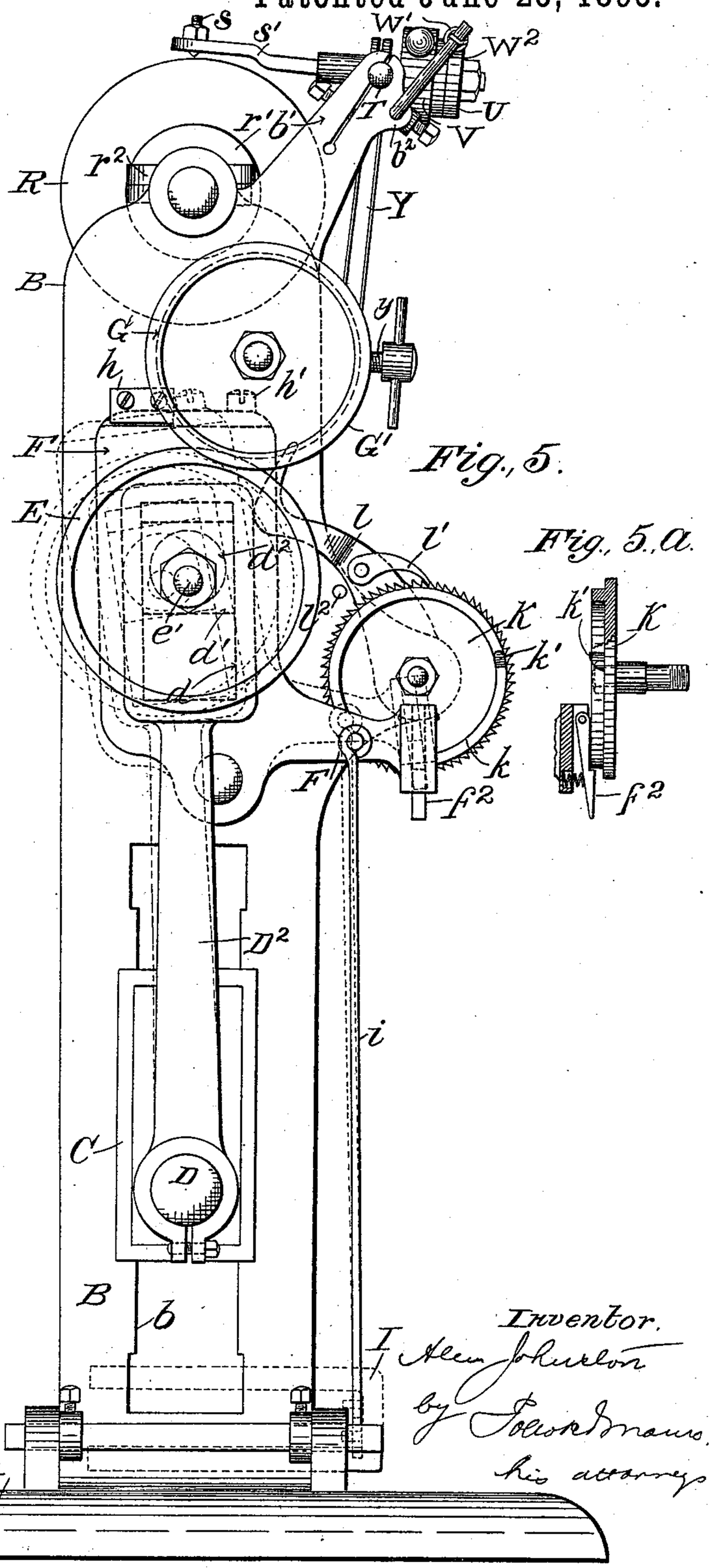

Fig., 5.

Fig., 5.a.

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(No Model.) 6 Sheets—Sheet 5.

A. JOHNSTON.

CUTLERY BOLSTER GRINDING MACHINE.

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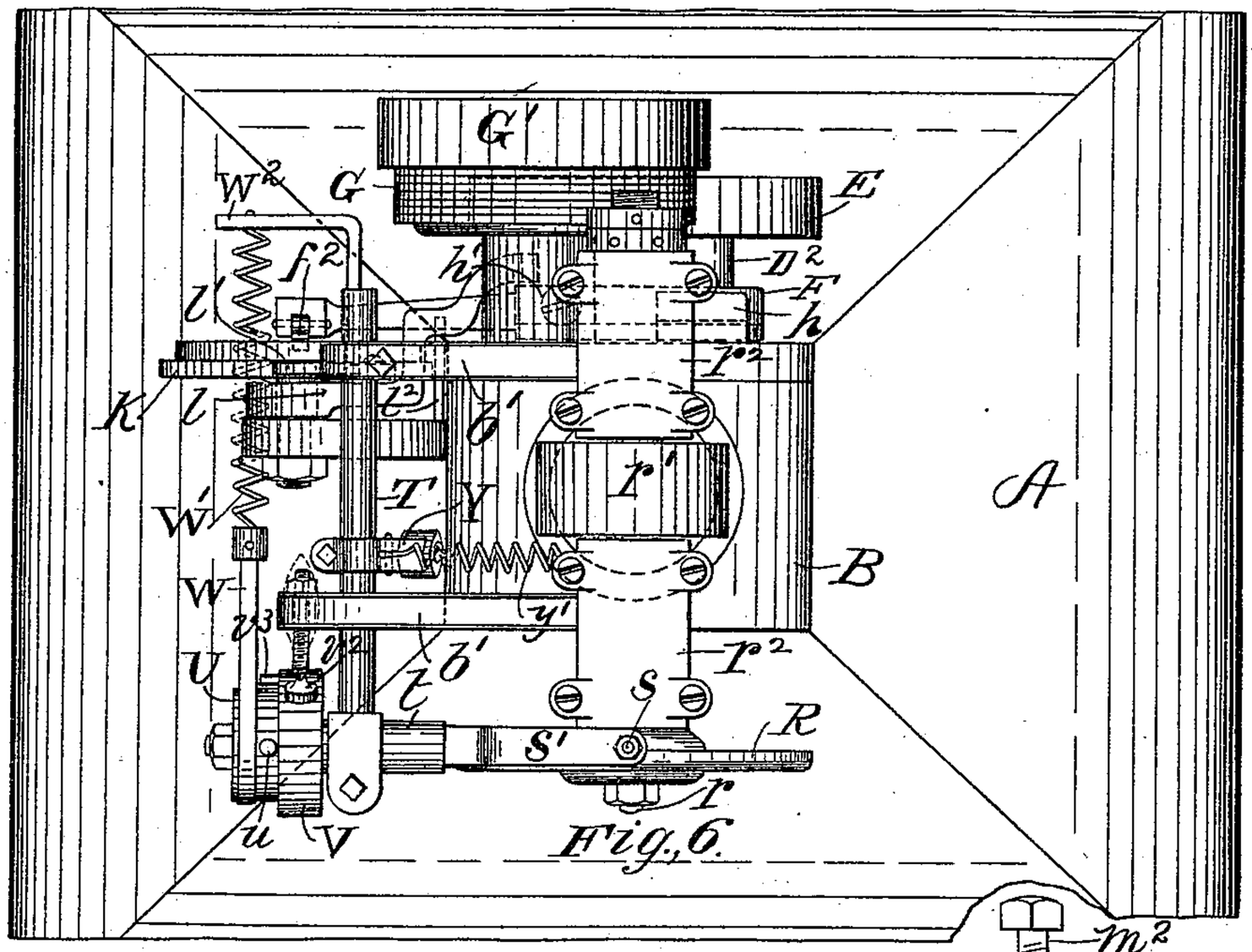

Fig. 6.

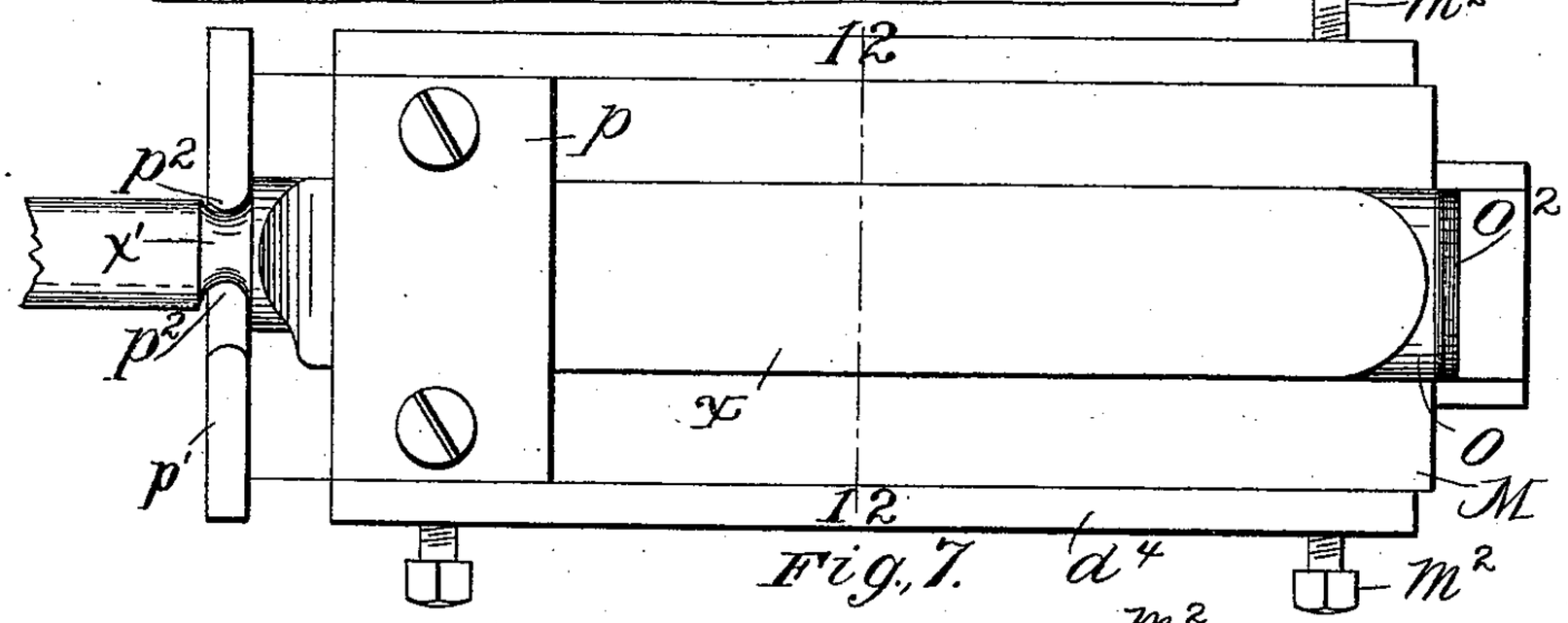

Fig. 7.

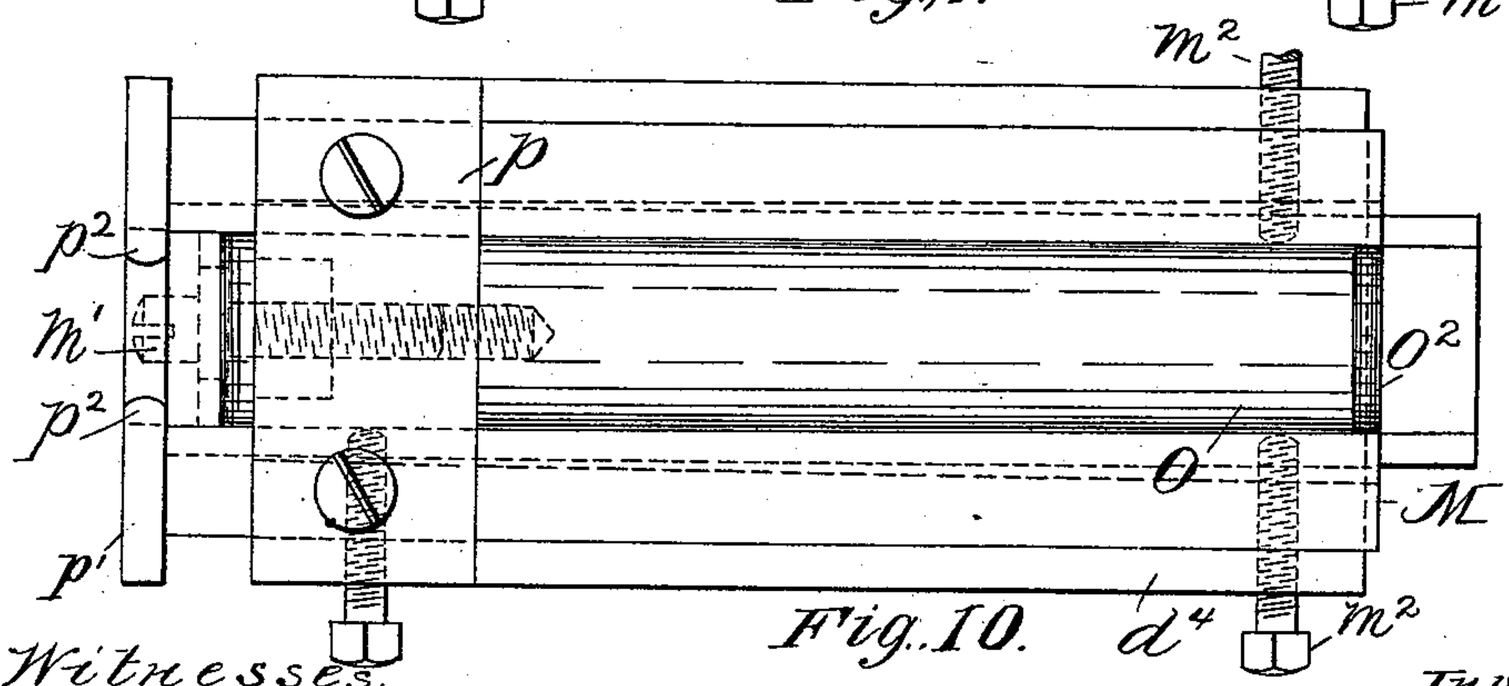

Fig. 10.

Witnesses.
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(No Model.) 6 Sheets—Sheet 6.

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CUTLERY BOLSTER GRINDING MACHINE.

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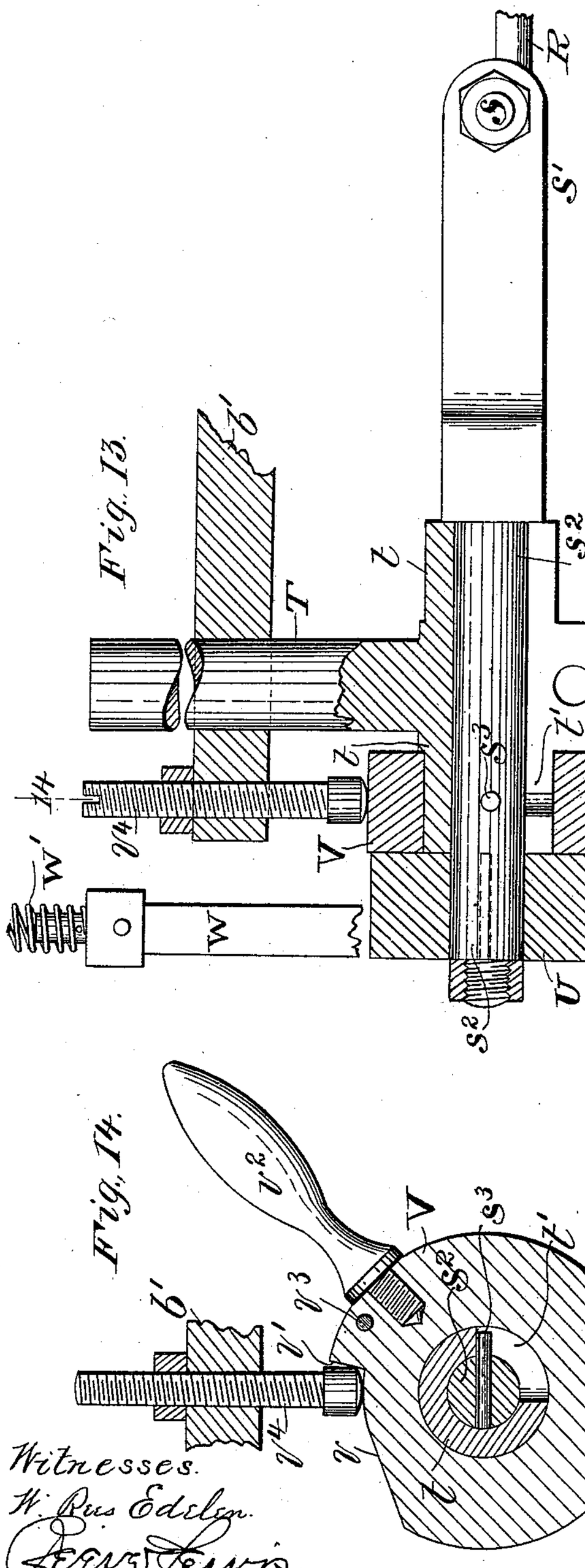

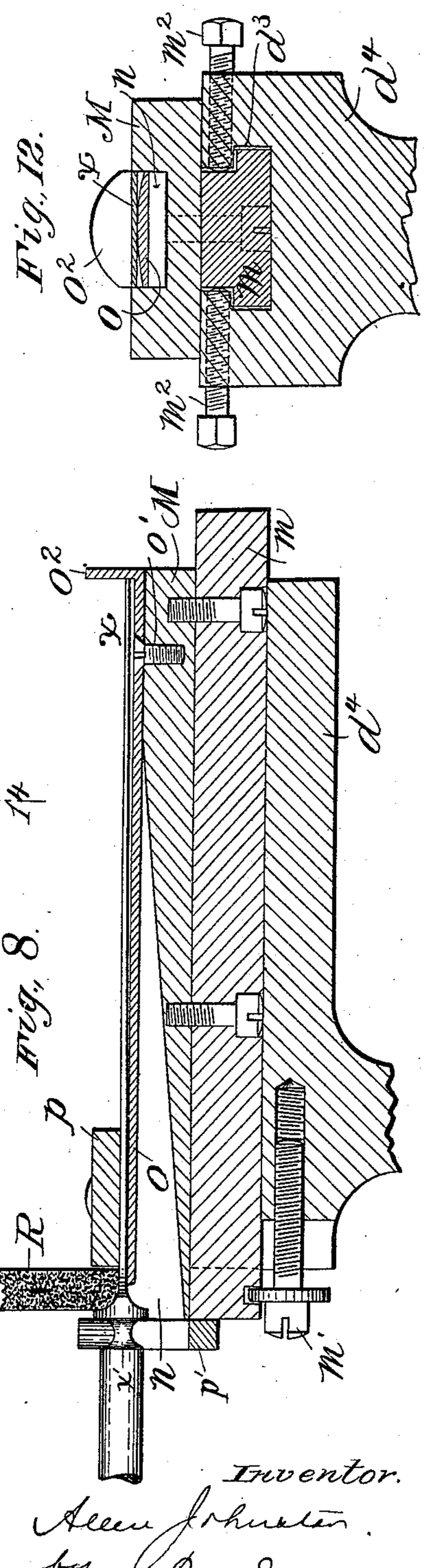

Witnesses.
W. Bus Edelen.
Geo. Lewis.

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Allen Johnston.
by Edelen & Mauro,
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UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

CUTLERY-BOLSTER-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 541,617, dated June 25, 1895.

Application filed March 5, 1895. Serial No. 540,627. (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 Cutlery-Bolster-Grinding Machines, which improvement is fully set forth in the following specification.

This invention has reference to machines for automatically grinding the bolsters of knives and forks.

In my Patent No. 534,396, dated February 19, 1895, I have described mechanism for automatically grinding the top or ridge and the neck or groove of the bolster. To complete the grinding of the bolster it therefore remains to grind the front edge or that part which we may term the "face" of the ridge or flange thereof, adjoining the blade of a knife or the prongs of a fork. To accomplish this latter step by automatic means and with efficiency and regularity on each and every article ground is the object of this invention.

Although the invention herein described is, of course, applicable to the grinding of the bolsters of forks, I will for the sake of convenience particularly refer to its operation in connection with knives.

The front edge or face of the bolster has a concave curved surface which must join the flattened face of the blade evenly. It is also necessary that this surface be symmetrical and uniform on both sides of each and every article ground. This can, with considerable difficulty, be accomplished in the ordinary blade grinding machine; but it is found in practice that owing to the irregularity in the knife blanks at this point and to the uneven wear of the grinding wheel, that the latter quickly gets out of shape and requires frequent truing. Such truing being an expensive operation the accomplishment of which requires some skill and experience; it is much more economical to employ a separate grinder for this purpose, more uniform results being also secured thereby.

According to the present invention the face of the bolster on each side of the knife is ground separately, one side being ground and then the knife turned over in its holder to grind the other side. The knife with its holder is reciprocated across the grinder a predetermined number of times, the material being removed to a certain extent, which is determined by a suitable gage. Adjacent to the grinding wheel is located a truing tool or device which the operator may cause to make proper movements across the edge of said wheel, at any stage of the operation.

The advantageous features above referred to as well as others will be readily understood from the following description with reference to the accompanying drawings, wherein—

Figure 1 is a vertical section through a machine embodying my invention. Fig. 2 is a section on line 2 2, Fig. 1. Fig. 3 is a section through Fig. 1 on line 3 3. Fig. 4 is a front, and Fig. 5 a rear elevation. Fig. 5^a is a detail of the spring-actuated latch f^2. Fig. 6 is a top plan view. Fig. 7 is a plan view of the work-holder. Fig. 8 is a section thereof; Fig. 9, an end view. Figs. 10 and 11 are views similar to Figs. 8 and 9 with the knife removed, and Fig. 12 is a section on line 12 12 of Fig. 7. Fig. 13 is a detail view, partly in section and partly in elevation, of a portion of the mechanism for operating the truing device; and Fig. 14 is a section on line 14 14 of Fig. 13.

I will first describe the mechanism for imparting movement to the work-holder and for controlling the same.

Referring to the drawings A represents the base or pedestal upon which the frame B of the machine rests. The frame B has vertical slots *b b* in the sides thereof, in which a slide C engages, being adjusted to different heights by a screw *c*, driven by a hand wheel *c'*. In the slide C is journaled a shaft D, carrying at one end a vibratory arm D' and at the other a driving pitman D^2. Said pitman D^2 is formed at its upper end with a rectangular opening *d* in which slides a block *d'* having a circular opening d^2 therethrough. Movement is communicated to the block *d'* by the eccentrically arranged hub *e* on the back of a wheel E, which latter rotates on an axis *e'* screwed into a tilting plate or frame F pivoted to the back of the frame B at *f*. Wheel E is rotated by frictional contact with friction wheel G secured to belt pulley G', rotating on suitable bearings.

The tilting frame or plate F is at its free end held in proper position by being dovetailed under the edge of a block *h* secured to the frame B against which block a stop *h'* on the said plate makes contact to limit the

movement thereof. An arm on the frame F carries at its outer end a spring actuated latch f^2 adapted when the frame is tilted to the right (as shown in Fig. 5), by the operator pressing his foot upon a treadle I connected to arm F′ by a rod i, to engage over the flange k at the side of a ratchet-wheel K. Such engagement continues holding wheel E in engagement with friction wheel G′, driving the mechanism, until a pin k' on flange k releases the latch f^2 from the latter, allowing frame F to tilt to the position shown in dotted lines Fig. 5, thereby disengaging wheels E and G′ and stopping the machine. Ratchet wheel K is rotated by a dog l' pivoted to a lever l having its fulcrum on the axis of said ratchet wheel, its free end projecting into contact with the upper end of pitman D^2 the oscillation of the latter moving the lever. The dog l' moves over one tooth at a time, which is limited by a stop pin l^2.

The work-holder consists of a block M, having a flanged strip m secured to its under side, said strip slidingly engaging in an undercut groove d^3 in a bracket d^4 at the upper end of reciprocatory arm D′ and being longitudinally adjustable in said groove by a screw m', being retained in its adjusted position by set bolts m^2. The block M is formed with a recess n extending the length thereof, gradually diminishing in depth toward the rear end of the block. Located in this recess and longitudinal therewith is a flat spring plate o having an angular extension o^2 at one end, constituting a stop against which the end of the blade of a knife x abuts, the edges of the latter fitting between the walls of the recess preventing sidewise movement. Spring plate o is secured to the block by screw o'. A plate p is also secured to block M and bridges transversely across the front end of recess n above the spring plate o, constituting a gage in the grinding operation, as will be hereinafter described.

The parts of the machine should be so adjusted, when in operation, that the gaging or under surface of the plate p will lie in the same plane with the straight surface of the periphery of the grinding wheel (hereinafter described) otherwise the face of the bolster will be ground too much or too little to conform to the adjacent surface of the knife blade.

A substantially U-shaped plate p' is screwed onto the forward end of block M around the recess n, and has inwardly extending lugs p^2 p^2 having rounded edges at the extremity of the arms thereof. The lugs p^2, p^2 are adapted to project into the neck or groove x' of the bolster of knife x (as shown in Fig. 7) to prevent endwise movement thereof in its holder.

I will next describe the truing device with its connections and mechanism for operating the same. Preliminarily, however, I will refer to the grinding wheel R on shaft r carrying driving pulley r' and journaled in bearings r^2, r^2 on the frame B. In order to properly conform to the desired shape of the face of the bolster the edge of the grinding wheel should be flat at its inner edge and curved or rounded off at its outer edge (as shown in Fig. 8). The object of the truing device is therefore to maintain the edge of the wheel in substantially this contour.

The truing tool s pointed with a diamond or other substance, is mounted above wheel R in the flattened end s' of a shaft s^2. A sleeve t encircles shaft s^2 being formed integrally with a rod T sliding in bearings in arms b', b' on the frame B. Slot t' formed in sleeve t for about a quarter of its circumference, receives a pin s^3 on shaft s^2, whereby the rotary movement of the latter is limited to about a quarter of a revolution. At its end shaft s^2 carries a disk U rigidly secured thereto adjacent to sleeve t, a second disk V having a portion of its circumference in the form of a cam surface v. Said cam surface terminating adjacent to a shoulder v', bears on the sleeve adjacent to disk U. Cam disk V can be rotated on its axis by a handle v^2, and carries a pin v^3 adapted after making about a quarter of a revolution to engage a pin u projecting from the periphery of disk U, thereby rotating the latter also. The periphery of disk V bears against a pin v^4 against which shoulder v' normally abuts, said pin being adjustably screwed into arm b' of frame B. A flexible strap w is secured at one extremity on the periphery of disk U and at the other is suitably connected with a coiled spring w', held at one end by a fixed rod w^2 adjustably secured in an ear b^2 on one of the arms b'. A depending bar Y rigid on the rod T carries at its lower extremity an adjusting screw y whereby the said rod (with its associated parts) can be tipped more or less, against the tension of a spring y' connecting therewith at one extremity and at its other extremity fixed to one of the bearings r^2 for shaft R.

The operation of the machine is as follows: The knife x to be operated upon is placed in the work holder by depressing spring plate o and sliding the blade along said plate, between the arms of U-shaped plate p, until the end thereof abuts against the angular extension o^2 of said plate. The handle of the knife is then released, permitting the spring to force the same upwardly, bringing the face or front edge of the bolster into contact with the periphery of the grinding wheel R and at the same time engaging one of the lugs p^2 of plate p' with the neck or groove of the knife. The operator then depresses treadle I, thereby tilting frame F and engaging latch f^2 over the flange k of wheel K, reciprocating the work-holder through mechanism before described. The work-holder makes two reciprocations (*i. e.*, from right to left, and vice versa) to every tooth of the ratchet wheel K (which proportion may be varied at pleasure) which continues until the pin k' on flange k of said wheel (rotated by dog l' and arm l) disengages latch f^2 therefrom allowing frame F to tilt to the left, as shown in dotted lines in Fig. 5,

thereby stopping the machine. As the face of one side of the bolster is ground down, the knife is fed against the wheel by spring-plate *o* until the blade comes into contact with the gage plate *p* which determines the extent of the grinding. The knife is then turned over in its holder and the operation repeated to grind the other side of the bolster. During the grinding operation the periphery of the grinding wheel must be periodically dressed up by the truing tool. This is effected by the operator grasping handle v^2 rotating disk V the cam surface *v* thereof engaging pin v^4 sliding rod T in its bearings and moving the truing tool in a straight line across the inner edge of the periphery of wheel R. As the disk V is rotated further pin v^3 thereon comes in contact with a pin *u* (which normally assumes a vertical position through the action of the spring *w'*, stop *w* and disk U rotating shaft s^2 until pin s^3 carried thereby comes into contact with the end of slot *t'* in sleeve *t*) causing shaft s^2 to rotate and consequently the truing tool which is thereby caused to impart the proper curvature to the rounded edge of the wheel R. The spring *w'* moves the parts in a reverse direction to that just above described, returning the same to their normal positions.

The truing tool may be brought into contact with the periphery of the grinding wheel as it is worn down (and hence its diameter decreased) by the movement of the bar Y through adjusting screw *y* as hereinbefore described. The work-holder may also be elevated through the slide C, screw *c* and hand wheel *c'*, to bring the gaging surface flush with the periphery of the grinding wheel.

Suitable modifications of the mechanism herein described, or other embodiments of the principles of my invention, may be made without departing from the spirit thereof.

Machines constructed in accordance with my invention are also adaptable, when desirable, to produce a polishing effect, involving merely a substituting for the grinding wheel of a polishing wheel of an analogous character.

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

1. In a bolster grinding machine the combination with the work-holder and the grinding surface, of means for pressing the work against said surface, and a gage for limiting the grinding of the bolster, having its gaging surface flush with the grinding surface, substantially as described.

2. In a bolster grinding machine the combination with the work-holder and the grinding surface, of means for pressing the work against said surface, a gage for limiting the grinding of the bolster, and means for adjusting the gaging surface to compensate for the wear of the latter with reference to the grinding surface, substantially as described.

3. In a bolster grinding machine the combination with the reciprocating work-holder and the grinding surface, of means for pressing the work against said surface, a gage for limiting the grinding of the bolster, having its gaging surface flush with the grinding surface, and means for longitudinally adjusting the work-holder, substantially as described.

4. In a bolster grinding machine the combination with the grinding wheel, of a work-holder consisting in part of a spring, against which the article to be ground rests for pressing the same against the surface of the wheel and a gage with which the article is adapted to make contact for limiting the movement of said article under the pressure of the spring, substantially as described.

5. In a bolster grinding machine the combination with a grinding wheel, of a reciprocatory work-holder for carrying the work across the periphery of the grinding wheel, longitudinally therewith, means for reciprocating said work-holder a predetermined number of times and for automatically stopping the operation of the machine at the termination thereof, and a gage for limiting the grinding effect on the work, substantially as described.

6. In a bolster grinding machine, a work-holder comprising a block having a recess therein in which the article to be ground lies to prevent sidewise movement thereof, a spring in said recess upon which the article is supported and whereby it is pressed against the grinding wheel, and a gage across said recess above the article, for limiting the grinding effect thereon, substantially as described.

7. In a bolster grinding machine, the combination with a grinding wheel, the peripheral surface of which is straight in the direction of its axis, at one edge thereof, and rounded off or convexly curved at its other edge, of a truing tool, and means for moving said tool across the periphery of the wheel in a straight line to conform to the corresponding portion of the peripheral surface of the grinding wheel and also causing the same to describe an arc of a circle to correspond with the rounded or convexed portion of said surface, to impart the desired contour thereto, substantially as described.

8. In a bolster grinding machine the combination with a grinding wheel, of a truing tool therefor, a shaft at the end of which said tool is mounted, and means for moving said shaft forward for a predetermined distance and then rotating the same, to impart the desired contour to the edge of the grinding wheel, substantially as described.

9. In a bolster grinding machine the combination with a grinding wheel, of a truing tool therefor, a shaft at the end of which said tool is secured, arranged in proximity to the periphery of said wheel, and parallel with the direction of rotation thereof, means for moving the shaft forwardly in the direction of the axis of the grinding wheel carrying the truing tool partially across the periphery of the

wheel in a straight line, and means for rotating the shaft at the termination of said movement, causing the truing tool to move in a curved line across the remainder of the peripheral surface, substantially as described.

10. In a bolster grinding machine the combination with a grinding wheel, of a truing tool therefor, a shaft at the end of which said tool is secured arranged in proximity to the periphery of said wheel, and parallel with the direction of rotation thereof, a cam for moving the shaft forwardly in the direction of the axis of the grinding wheel, carrying the truing tool partially across its peripheral surface in a straight line, clutch-mechanism thrown into operation at the termination of said movement to rotate the shaft causing the truing tool to move in a curved line across the remainder of the peripheral surface, and a spring for reversing said movements and returning the parts to their normal positions, substantially as described.

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

ALLEN JOHNSTON.

Witnesses:
J. T. HACKWORTH,
G. BINKS.