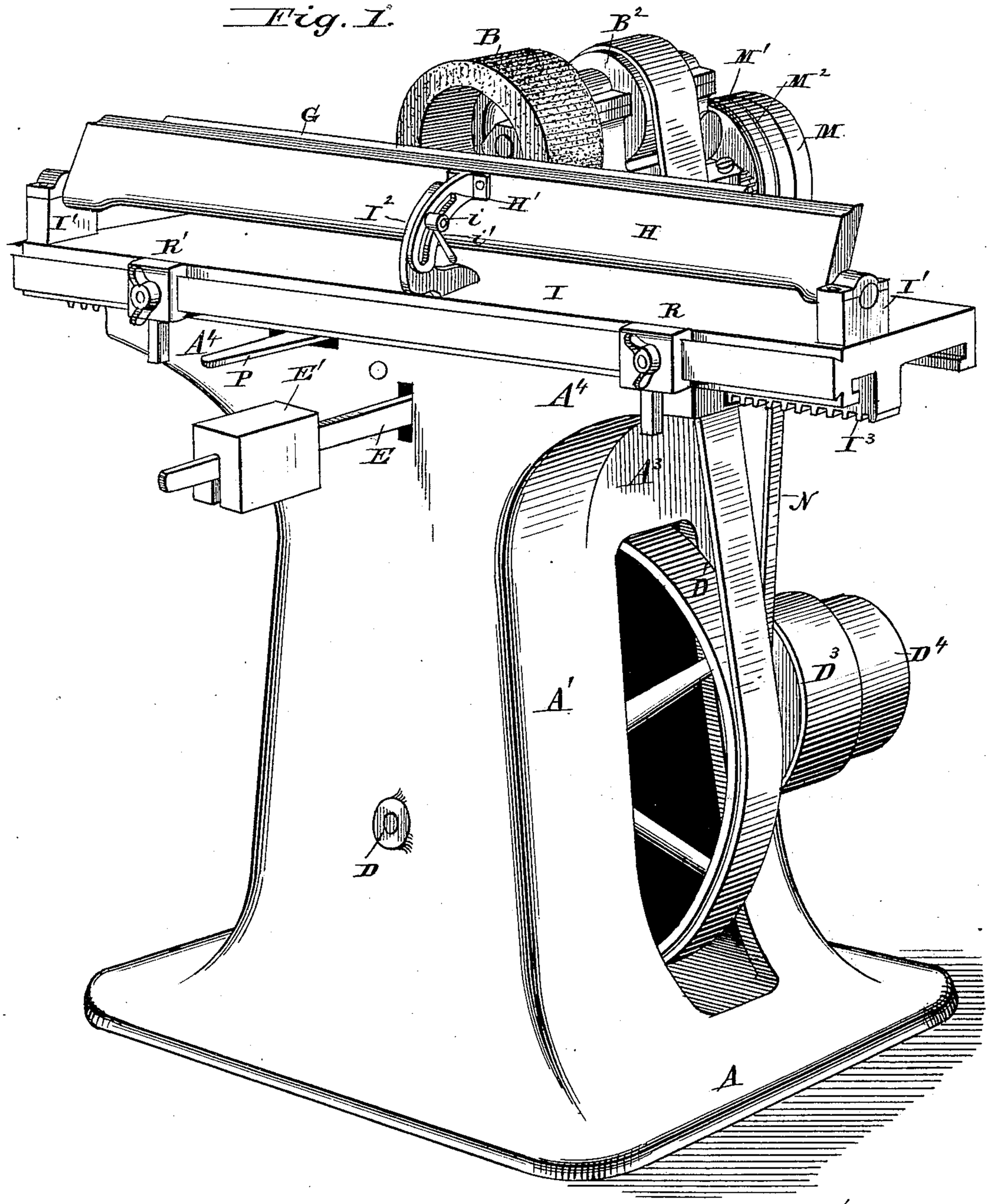
(Model.) 3 Sheets—Sheet 1.

W. H. DOANE.

Grinding Machine.

No. 238,366. **Patented March 1, 1881.**

Fig. 1.



Attest
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A. G. Eib

(Model.) 3 Sheets—Sheet 2.

W. H. DOANE.

Grinding Machine.

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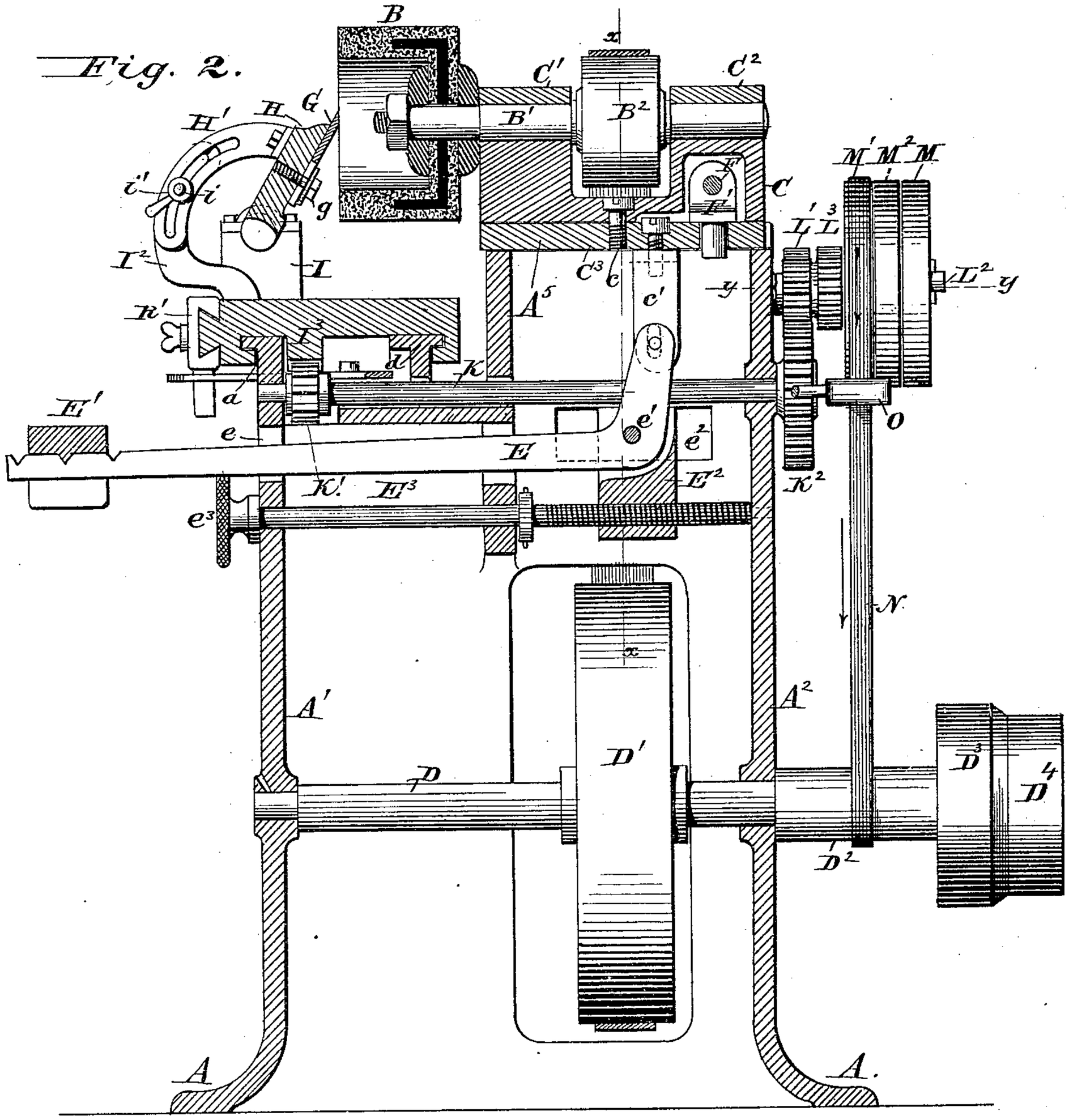
Fig. 2.



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(Model.)

3 Sheets—Sheet 3.

W. H. DOANE.

Grinding Machine.

No. 238,366. Patented March 1, 1881.

Fig. 3.

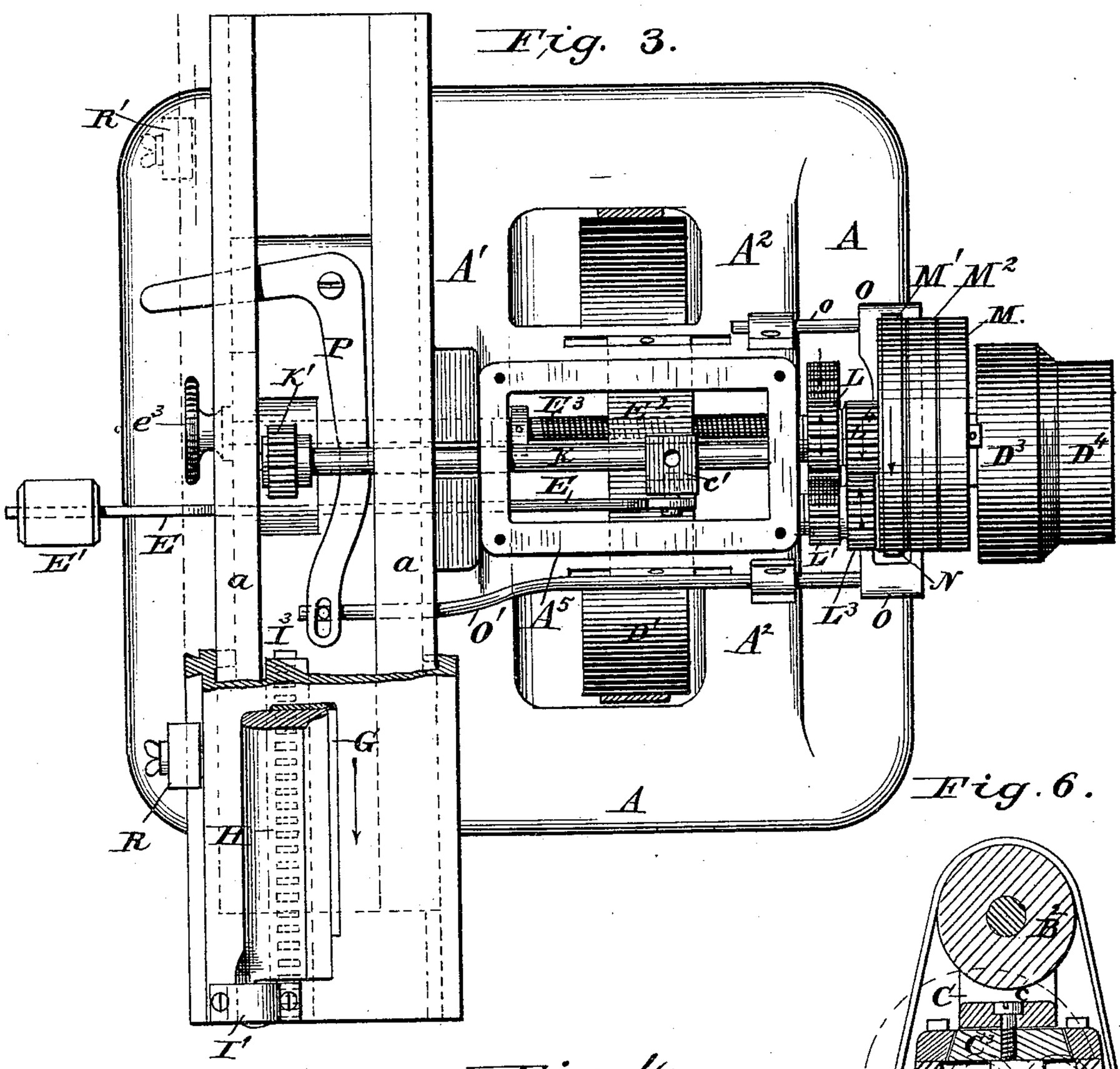


Fig. 6.

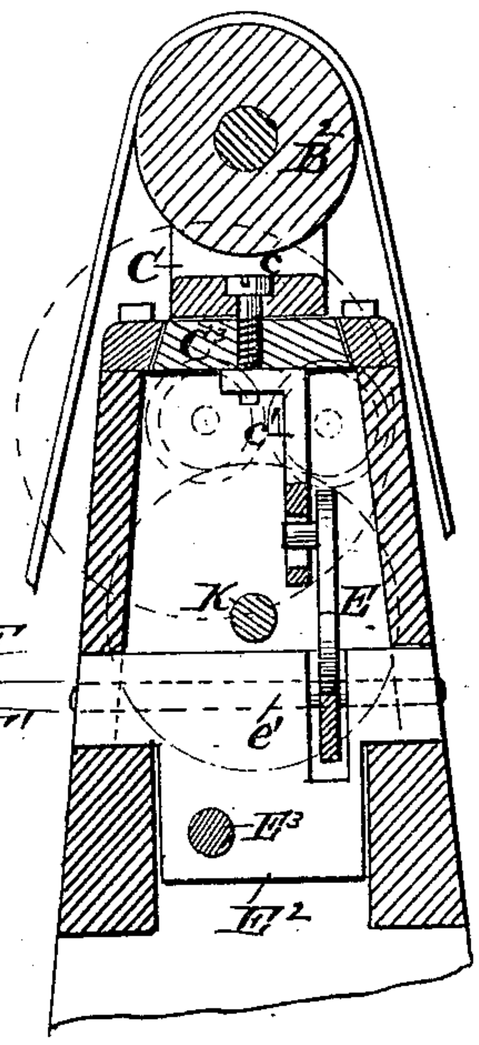
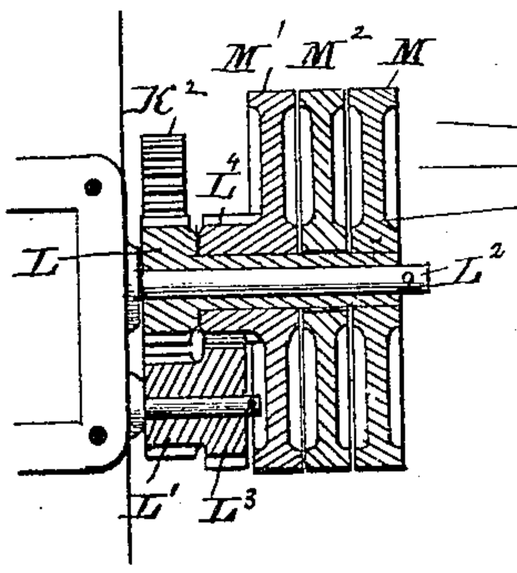


Fig. 4.

Fig. 7.



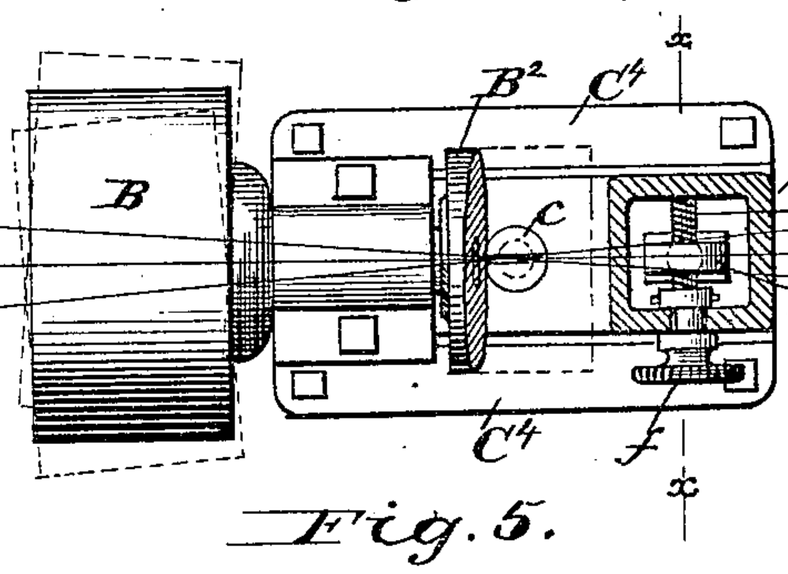
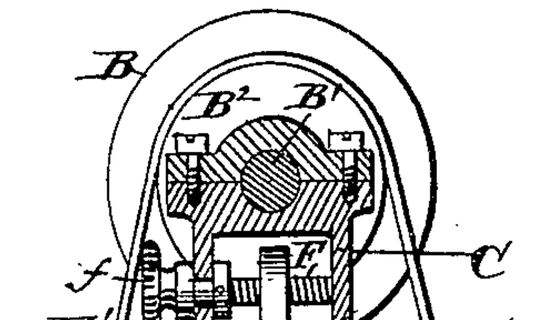


Fig. 5.



Attest:
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM H. DOANE, OF CINCINNATI, OHIO.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 238,366, dated March 1, 1881.

Application filed May 6, 1880. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DOANE, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Grinding-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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to a grinding-machine specially adapted for the grinding of planing-knives of all kinds.

One object of the invention is to make the machine automatic in grinding to a determined point and then stopping its grinding action, so that after it has been properly set and started by the attendant he may leave the machine and attend to other work, assured that the machine will grind to the desired extent and no further, although it will continue to run until stopped on the return of the attendant.

Another object of the invention is to adapt the machine to grind either a flat or concave edge on a planer-knife.

Another object of the invention is to reduce the cost of the framing and impart to it greater rigidity.

To these ends the invention consists of certain combinations, set forth in claims at the close of this specification, and made up out of mechanical devices, of which the following are the principal: A grinding-wheel in the form of a cup emery-wheel; a knife-carriage for traversing the knife along the grinding-surface of the grinding-wheel; a head-stock for carrying the grinding-wheel; automatic feed devices for feeding the grinding-wheel to a determinate point; adjusting devices for setting the grinding-wheel at a greater or less angle to the knife; a frame especially adapted in construction to the requirements of the machine.

In order that my invention may be fully understood, I have illustrated in the annexed drawings, and will proceed to describe, the best form thereof so far devised by me, with the understanding that the details of construction may be greatly varied.

In the annexed drawings, Figure 1 is a perspective view of my improved automatic grinding-machine. Fig. 2 is a vertical transverse section of the same, some parts being drawn in elevation. Fig. 3 is a plan view as the machine appears on the removal or breaking away of some of its upper parts. Figs. 4 to 7 are detail views.

The same letters of reference are used in all the figures in the designation of identical parts.

The main frame of the machine consists of a single piece of casting, from the base-plate A of which rise the hollow or cored standards A′ and A^2, merged into one near their upper ends by cross-webs A^3. The standard A′ is constructed with a head, A^4, provided with parallel longitudinal rails *a a*, for the support of the knife-carriage. The frame is also formed with an elevated seat, A^5, for the support of the head-stock and certain other parts of the machine. The open space between the standards A′ A^2 and the base A and webs A^3 of the frame forms a gap for the fly-wheel pulley of the machine. This construction of the main frame affords not only rigidity, but enables me to do away with separate braces and ties and fitting of parts.

The grinding-wheel B is a cup emery-wheel, mounted to overhang the knife-carriage, and designed to grind with the annular surface of its edge at its open end. It is suitably secured to its head upon the overhung end of the horizontal shaft B′, mounted in the bearings C′ and C^2 of the head-stock C. A pulley, B^2, is secured to the shaft B′, and is driven by a belt from the fly-wheel pulley D′ on the main shaft D of the machine. The head-stock is pivoted at *c* to its base plate or slide C^3, which is fitted on the horizontal top of the seat A^5 between removable guides C^4 C^4, so that it may slide toward and away from the knife-carriage crosswise of the same. The slide C^3 is provided with a downwardly-projecting arm, *c′*, which extends into the hollow seat A^5, and is pivoted to the short upwardly-projecting arm of an elbow-lever, E, the long arm of which extends in a substantially horizontal direction through

the standard A′ of the main frame, and carries on its outer end a shiftable weight, E′. This weighted lever forces the head-stock forward, so as to hold the edge of the grinding-wheel to its work with a pressure that may be regulated by adjustment of the weight E′. The slot *e* in the standard A′ of the main frame determines the extent of downward movement of the long arm of the lever E, and consequently the extent of forward movement or feed of the grinding-wheel from a given point. The grinding-wheel is thus fed automatically to a given point, on reaching which the feed ceases, and no further grinding can occur, although the machine may continue to run indefinitely. In order to conveniently adjust the grinding-wheel to the knife and determine the feed, as also to compensate for the wear of the grinding-wheel, I make the fulcrum of the lever E adjustable. To this end the fulcrum-pin *e′* is secured to or mounted in a fulcrum-block, E^2, fitted in horizontal guideways e^2 in the webs A^3. The fulcrum-block is constructed with a screw-threaded nut, in which the screw-threaded portion of a shaft, E^3, operates. The shaft E^3 extends to the front side of the standard A′, and is provided with a suitable hand-wheel, e^3, by which it may be turned to shift the fulcrum-block E^2.

The knife is traversed back and forth in front of the grinding-wheel by means which will be presently described. In order that the grinding-wheel may be adjusted to clear the edge of the knife at the non-grinding side in grinding a flat edge, and may also be adjusted so as to grind a concave edge on a knife, if required, the head-stock can be turned on its pivot *c* so as to throw the grinding-edge of the wheel into a position at a greater or less angle to the traversing knife, as indicated in Fig. 4. This is effected by a screw, F, which is mounted in the side of the head-stock, and operates in a swiveling nut, F′, projecting up from the slide C^3 into a recess in the head-stock. The screw F is provided with a suitable hand-wheel or knob, *f*, by which it may be turned. In grinding a flat edge, the head-stock is turned but slightly on its pivot *c*, just sufficient to clear the non-grinding side of the wheel from the knife. To grind a concave edge on a knife, the head-stock must be turned on its pivot so as to throw the grinding-edge of the wheel into a position of considerable angularity to the knife, as will be readily understood.

The knife G is presented to the grinding-wheel by the knife-holder H, constructed with journals at its ends, by which it is mounted in bearings I′ on the knife-carriage I. The knife-holder is constructed or provided with a slotted segment, H′, which moves on a stud, *i*, secured to a standard, I^2, of the knife-carriage. A nut, *i′*, is used to secure the segment H′ on the standard I^2 after the knife-holder has been adjusted or turned at the proper inclination with respect to the grinding-edge of the grinding-wheel, so that the latter will grind the proper bevel on the knife. The knife may be secured to the holder by any suitable means. As most planer-knives are slotted, it is practicable to secure them by clamping-screws *g*. The knife-carriage is mounted on the ways *a a* of the main frame, and is constructed on its under side with a longitudinal rack, I^3, which meshes with a pinion, K′, on the shaft K, which extends to the rear of the machine and carries at its rear end a spur-wheel, K^2. This shaft K is rotated alternately in one direction and in the other, to traverse the knife-carriage back and forth, by a pair of spur-wheels, L and L′, which both mesh with the spur-wheel K^2, and are drivers and idlers alternately. The spur-wheel L is mounted to turn loosely on the shaft L^2, and has an elongated sleeve or hub, to which the pulley M is secured. The spur-wheel L′ turns on a stud projecting from the main frame, and is connected to a spur-wheel, L^3, which is driven by a spur-wheel, L^4, mounted to turn loosely on the sleeve of spur-wheel L, and is rigidly connected with a pulley, M′, which also turns on said sleeve. A loose pulley, M^2, is also mounted on said sleeve between the pulleys M and M′. A belt, N, runs from a long pulley, D^2, on the driving-shaft D, adapted to run on either one of the three pulleys M, M′, and M^2. When the belt runs on the pulley M the shaft K will be rotated in a direction reverse from that in which it will be rotated when the belt runs on the pulley M′, and it will stand still whenever the belt runs on the pulley M^2. The position of the belt is controlled by belt-shifter O, connected to a shifter-rod, O′, which is, in turn, pivoted to a shifter-lever, P, located under the knife-carriage, and constructed with a bent arm, which projects through and beyond the front side of the main frame.

In order that the belt N may be shifted automatically from pulley M to pulley M′, and vice versa, I provide the knife-carriage with a pair of adjustable tappets, R and R′, adapted to strike the projecting end of the bent arm of the shifting-lever P. By adjusting the tappets on the carriage the traverse of the latter may be regulated to suit knives of different lengths.

The shifter O is supported and guided at one end by the shifter-rod O′, and at the other end by the guide-rod *o*, as shown in Fig. 3.

The driving-shaft D is provided with the usual fast pulley, D^3, and loose pulley D^4, for the driving-belt.

It has been before stated herein that the lever E, in feeding the grinding-wheel forward to the knife, is controlled in its movement by a weight, E′; but it will be apparent that in this instance a spring would be the equivalent of said weight.

With a cup grinding-wheel, grinding with its ring-face, and adapted to be adjusted as described, it is practicable to grind either a flat edge or a concave edge, as may be re-

quired, until the grinding-ring is entirely worn away.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a knife-grinding machine, the combination, substantially as before set forth, of the rotating cup grinding-wheel, the traversing knife-carriage, automatic means for feeding the grinding-wheel to a determinate point, on reaching which the grinding ceases, and automatic means for stopping the feed of the grinding-wheel at that point.

2. The combination, substantially as before set forth, of a traversing knife-carriage, a cup grinding-wheel, and means for adjusting said wheel to run at a greater or less angle to the knife, whereby either a flat or concave edge may be ground on the knife.

3. In a knife-grinding machine, the combination, substantially as before set forth, of the movable head-stock of the grinding-wheel, the traveling knife-carriage, the weighted lever for automatically feeding the head-stock to a determinate point, and means for stopping the head-stock at that point.

4. The combination, substantially as before set forth, of the head-stock, the weighted feed-lever, and the adjustable fulcrum-block of said lever.

5. The combination, substantially as before set forth, of the head-stock, the weighted feed-lever, the fulcrum-block thereof, and the screw for adjusting said fulcrum-block.

6. The combination, substantially as before set forth, of the automatic-feeding head-stock, pivoted to its base-plate or slide, and means for turning the wheel-carriage on its pivot to throw the cup grinding-wheel into position for grinding either flat or concave.

7. The combination, substantially as before set forth, of the pivoted head-stock, the swiveling nut, and the screw.

8. A knife-grinding machine, substantially as before set forth, combining in its construction the following elements, viz: first, a frame consisting of a column cast with a longitudinal bed, a transverse elevated seat, and a longitudinal gap; second, a traversing knife-carriage mounted on said longitudinal bed; third, a grinding-wheel mounted on a head-stock, which is supported on said transverse elevated seat; fourth, a driving-pulley located in said longitudinal gap, and supported on a shaft mounted in bearings of said frame.

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

W. H. DOANE.

Witnesses:

CHAS. G. JONES,

GEO. F. MEYERS.