(No Model.)

4 Sheets—Sheet 1.

A. B. LANDIS.

GRINDING MACHINE.

No. 446,148. Patented Feb. 10, 1891.

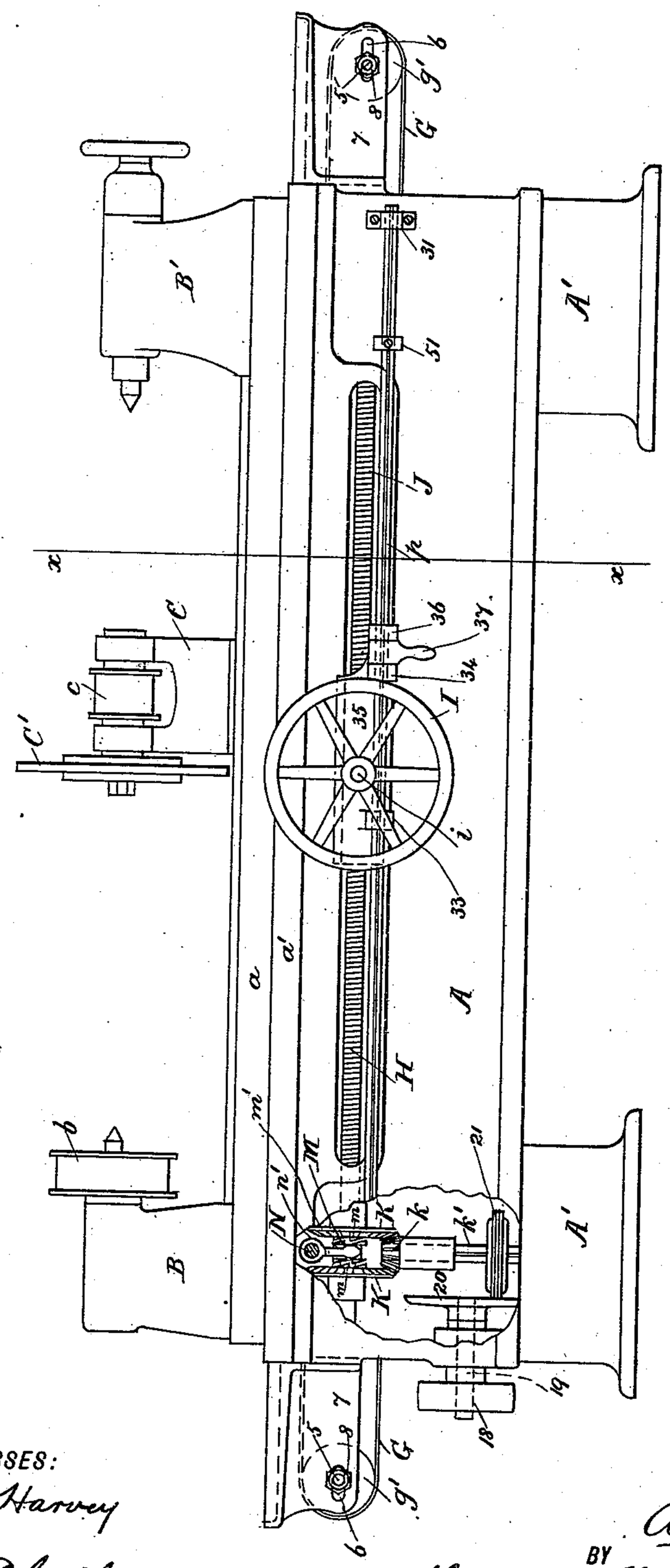

Fig. 1.

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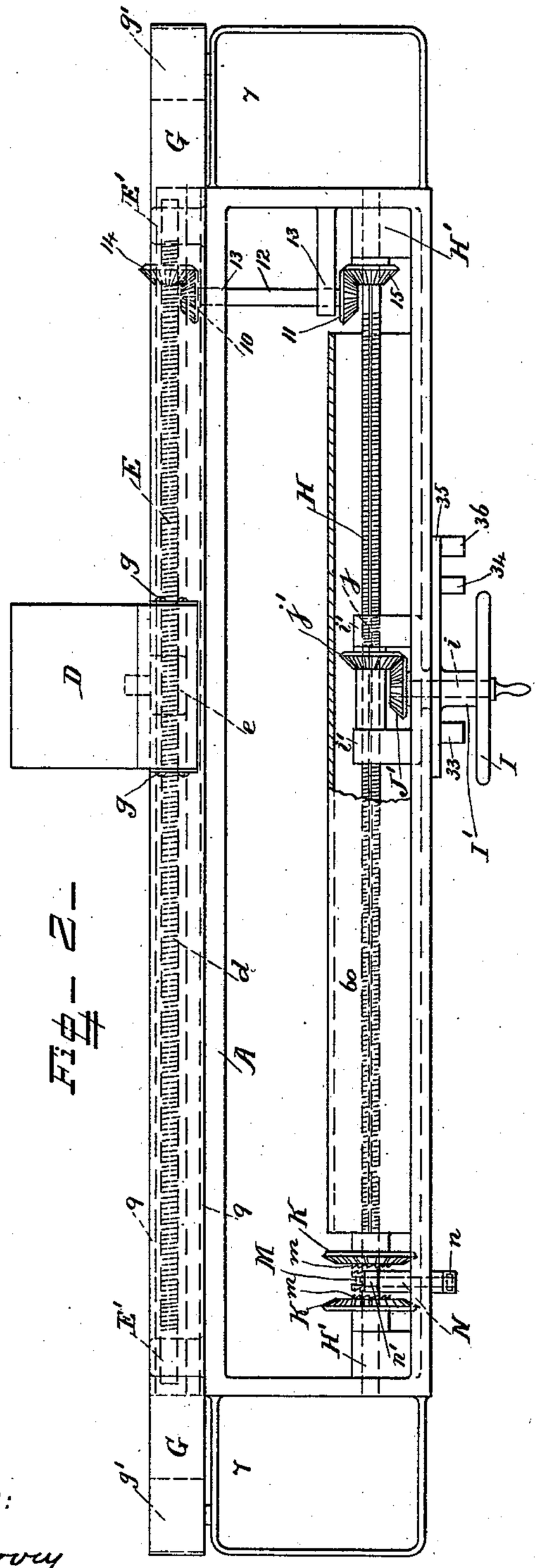

Fig. 2.

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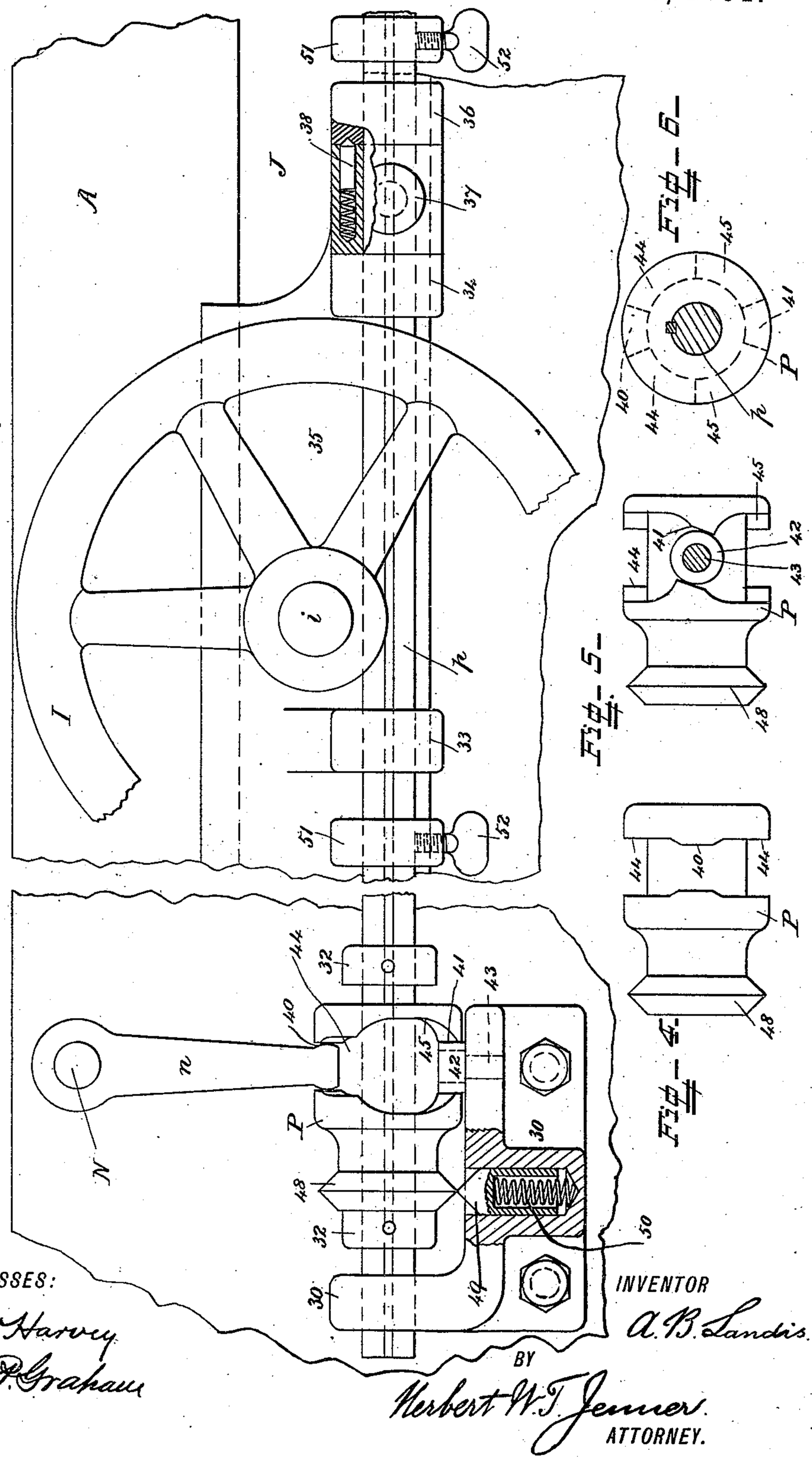

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

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(No Model.)

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A. B. LANDIS.

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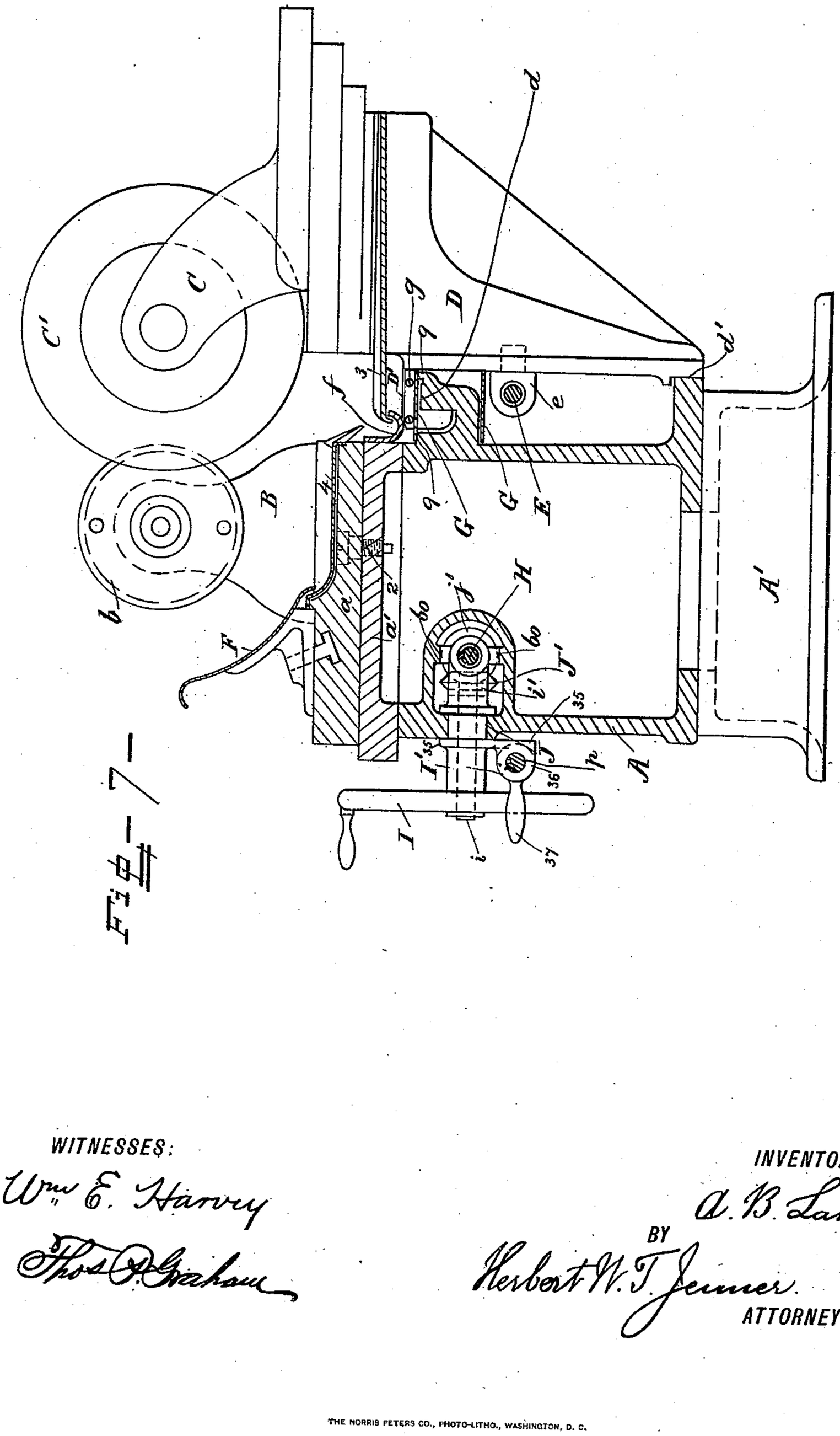

FIG. 7.

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UNITED STATES PATENT OFFICE.

ABRAHAM B. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,148, dated February 10, 1891.

Application filed November 8, 1890. Serial No. 370,771. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM B. LANDIS, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, 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.

This invention relates to grinding-machines; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a front view of the machine with the bed partly broken away at one end to show the internal mechanism. Fig. 2 is a plan view of the bed from above with the top plate removed to show the longitudinal traversing mechanism. Fig. 3 is a detail front view of the tappet-reversing mechanism drawn to a larger scale. Fig. 4 is a plan view from above, and Fig. 5 is a plan view from below, of the oscillating tappet. Fig. 6 is an end view of the said tappet. Fig. 7 is a cross-section through the bed of the machine, taken on the line *x x* in Fig. 1.

A is the bed of the machine, mounted on the supports A′, and *a* is the table, pivoted centrally upon the pin 2, (see Fig. 7,) engaging with the top plate *a′* of the bed.

B is the head-stock, provided with the driving-pulley *b*, and B′ is the foot-stock, both of which are mounted upon the table *a* in the usual manner.

C is the grinding-head, provided with the grinding-wheel C′ and driving-pulley *c*.

D is the carriage, which supports the grinding-head and which slides longitudinally, with its hook-shaped flange D′ resting upon the upper horizontal guide *d* and with its lower portion resting against the lower guide *d′*, projecting from the bed A.

E is a screw journaled in bearings E′ at the rear of the bed, and *e* is a nut secured to the carriage and engaging with the said screw, so that the carriage is traversed longitudinally by revolving the screw.

F is the fender, and 3 and 4 are guide-plates for conducting the water from the grinding-wheel into the trough *f*, which discharges it at one end of the machine.

G is a guard of flexible material, such as india-rubber, leather, or thin sheet metal, the ends of which are secured to the carriage by the screws *g*. This guard extends over the full length of the flat upper guide *d* and moves back and forth with the carriage. The loops of the guard are supported by the pulleys *g′*, which are journaled upon the pins 5, which slide in the longitudinal slots 6 of the brackets 7, secured to the opposite ends of the bed. The flexible guard is kept taut by sliding the pins in the slots and clamping them by the nuts 8 on the ends of the pins. The guard moves back and forth with the carriage in close proximity to the guide *d* and its sides rest upon the ledges 9 on the bed, so that the guard does not touch the oily surface of the guide. The guard prevents the fine particles from the grinding-wheel from falling on the guide, which would become worn away if these particles were allowed to become embedded in its surface.

The screw E is revolved to effect the longitudinal traverse of the carriage in the following manner:

H is a screw journaled in bearings H′ at the front part of the bed and operatively connected to the screw E, so that both screws revolve simultaneously. This is effected by means of the beveled toothed wheels 10 and 11, secured upon the cross-shaft 12, journaled in bearings 13 at the end of the bed, and the beveled toothed wheels 14 and 15, secured upon the screws E and H and gearing into the said wheels 10 and 11. The two screws are hereby positively connected.

The traverse by hand is effected by the hand-wheel I, which is secured on the shaft *i* journaled in the sleeve I′. The sleeve I′ slides longitudinally in the long slot J in the front of the bed, and is provided with a forked end *i′* having a screw-threaded hole *j*, which engages with the screw H. A guide 60 inside the bed also serves to steady the rear end of the sleeve.

J′ is a beveled toothed pinion secured upon the end of the shaft *i*, and *j′* is a beveled toothed pinion gearing into the pinion J′ and splined to the screw H. The screws E and H

have their screw-threads alike in pitch, so that when the hand-wheel is turned the carriage and the sleeve I′ are both traversed longitudinally in the same direction, and the hand-wheel is always kept in the same position with regard to the grinding-wheel and preferably directly in front of it. This is very important when the bed of the machine is long, as if the hand-wheel did not move longitudinally the operator would have to leave it to examine the work in front of the grinding-wheel.

The automatic traverse of the carriage is effected in the following manner:

K K are two beveled toothed wheels journaled upon the end of the screw H, and *k* is a beveled toothed pinion, which gears into both the said wheels and drives them constantly in opposite directions. The pinion *k* is secured upon the vertical shaft *k′*, and is revolved continuously by means of the driving-belt pulley 18, which is secured on the shaft 19 journaled in the end of the bed. A friction-disk 20 is secured upon the shaft 19, and 21 is a friction-wheel splined to the shaft *k′* and revolved by contact with the disk 20. A central toothed clutch M is splined upon the end of the screw and engages with the clutches *m* upon the wheels K K, and is provided with the circumferential groove *m′*.

N is a cross-shaft journaled in the bed, and *n* is an arm secured to the front end of the said shaft for engaging with the oscillating tappet. An arm *n′* is also secured to the rear end of the shaft N and engages with the groove *m′* of the clutch M.

P is the oscillating tappet splined to the rod *p*, which is supported in the brackets 30 and 31 secured to the bed. The tappet has a limited longitudinal movement between the collars 32 secured on the rod *p*. The rod *p* is moved longitudinally at the ends of the traverse by the lugs 33 and 34, which project from the plate 35, which is secured to the sleeve I′, which supports the hand-wheel. A lug 36 also projects from the plate 35 near the lug 34, and 37 is a handle for oscillating the tappet splined to the rod *p* between the lugs 36 and 34. A spring-actuated catch 38 of ordinary construction is provided for coupling the handle 37 to the lug 36, so that the handle and rod will not change their positions unless turned forcibly by hand.

The oscillating tappet P is provided with a narrow straight stop-groove 40 at the top and an inclined guide-groove 41 at the bottom, and when the handle is in its middle position, as shown in Fig. 3, the groove 40 fits closely against the end of the arm *n*. The guide-groove 41 also fits closely to a projection on the bracket 30, and this projection preferably consists of the roller 42, which is journaled on the pin 43 projecting upwardly from the said bracket. In this position the central clutch is held out of gear with the clutches on the revolving wheels on each side of it. Working-grooves 44 are formed in the tappet on each side of the stop-groove 40, and these grooves are a little wider than the stop-groove. Clearance-grooves 45 are also formed in the tappet on each side of the guide-groove, and all the said grooves are connected to the next adjacent grooves by curved or inclined portions so that there are no sharp or square shoulders, which would prevent the tappet from being oscillated by the handle 37. A V-shaped wheel 48 is formed on the hub of the tappet, and 49 is a spring-actuated bolt provided with a V-shaped upper end and supported in a hole 50 in the bracket 30. The apex of the head of the bolt 49 bears against the sharp edge of the wheel 48 when the handle is in its central position. The central clutch is thrown into gear with one or the other of the side clutches by moving the handle up or down according to the desired direction of traverse. The movement of the handle up or down oscillates the tappet and brings one or the other of the working-grooves 44 into engagement with the end of the arm *n*, and the inclination of the guide-groove 41, which bears against the stationary roller, moves the cam for a short distance longitudinally. This motion permits the spring-actuated bolt to bear against one side or the other of the wheel 48, and the upward pressure of the said bolt moves the tappet longitudinally and causes the arm *n* to throw the central clutch into gear with one or the other of the clutches on the revolving wheels. This longitudinal movement of the tappet is rendered possible because the same oscillation of it which brought one of the working-grooves 44 into gear with the end of the arm *n* also brought one of the wide clearance-grooves 45 over the roller 42.

When the starting of the traverse-gear has been effected, by moving the handle up or down, according to the desired direction of motion, as previously described, the traversing gear is reversed at each end of the travel of the carriage by means of the collars 51, which are adjustably secured on the rod *p* by the thumb-screws 52. The lugs 33 and 34 strike the collars 51 and move the rod *p* longitudinally at the ends of the traverse of the carriage, and the collars 32 strike against the end of the tappet and move it longitudinally, operating the arm *n* and throwing the central clutch out of gear with the clutch on one of the revolving wheels. The working-grooves 44 are wider than the end of the arm *n*, because the movement of the rod *p* only throws the central clutch out of gear with one clutch and it is thrown into gear with the opposite clutch by means of the spring-actuated bolt 49 and the wheel 48. The clearance in the working-grooves permits the wheel 48 to be moved over the apex of the V-shaped head of the bolt for a sufficient distance to secure a working bearing against its side and insure the tappet being shot in the right direction by the spring-actuated bolt to complete the reversal of the traversing mechanism.

The reversal of the traverse mechanism is

effected at any point by first oscillating the tappet-rod to release the tappet from the stationary projection and then moving the rod and tappet longitudinally.

What I claim is—

1. The combination, with the bed provided with a longitudinal guide, of a sliding carriage for supporting the grinding-head, and a flexible guard secured to the carriage and extending over the whole length of the guide.

2. The combination, with the bed provided with a longitudinal guide and raised ledges at each side of the guide, of a sliding carriage provided with a flange bearing on the said guide between the ledges and adapted to support the grinding-head, and a flexible guard secured to the carriage and extending over the whole length of the guide with its sides resting on the said ledges, whereby the said guard is prevented from coming in contact with the guide.

3. The combination, with the bed provided with a longitudinal guide, of a sliding carriage for supporting the grinding-head, the longitudinally-adjustable pulleys journaled at the ends of the bed, and a flexible guard passing around the said pulleys and extending over the guide with its ends secured to the carriage.

4. The combination, with the bed and the sliding carriage for supporting the grinding-head, of a traversing device, such as a revoluble screw located at the rear of the bed and adapted to move the carriage, a sliding hand-wheel at the front of the bed, a second traversing device, such as a revoluble screw, for moving the hand-wheel longitudinally, and intermediate driving mechanism positively connecting the two said traversing devices, the two said traversing devices being adapted to traverse the carriage and the hand-wheel with equal speed, whereby the hand-wheel and the carriage may preserve the same relative position with regard to each other, substantially as set forth.

5. The combination, with the bed provided with a longitudinal slot in front, of the sliding carriage for supporting the grinding-head, a screw journaled at the front of the machine, intermediate driving mechanism operatively connecting the said screw with the carriage, a sleeve sliding in the said slot and provided with a screw-threaded hole engaging with the said screw, a cross-shaft journaled in the said sleeve and provided with a hand-wheel outside the bed, a beveled toothed wheel splined to the said screw, and a beveled toothed wheel secured on the end of the cross-shaft, whereby the said screw may be revolved to move the hand-wheel and the carriage simultaneously along the bed.

6. The combination, with the bed provided with a longitudinal slot in front, of the screw journaled in the bed behind the slot, the sleeve sliding in the said slot and provided with a screw-threaded hole in its rear end for engaging with the said screw, a guide inside the bed for supporting the rear end of the sleeve, a cross-shaft journaled in the sleeve, the hand-wheel and the beveled toothed pinion secured on the said shaft, and the beveled toothed pinion splined to the said screw and sliding longitudinally with the said sleeve, substantially as and for the purpose set forth.

7. The combination, with the bed provided with a longitudinal slot in front, of the carriage for supporting the grinding-head and provided with a nut, the screw at the rear of the bed engaging with the said nut, a similar screw at the front of the bed behind the said slot, driving mechanism positively connecting the two said screws and causing them to revolve simultaneously, the sleeve sliding in the said slot and engaging with the said screw behind it, the cross-shaft journaled in the said sleeve, the hand-wheel and the beveled toothed pinion secured on the said shaft, and the beveled toothed pinion splined to the said screw at the front of the bed and moving longitudinally with the sleeve, substantially as and for the purpose set forth.

8. The combination, with the central clutch splined on the front traverse-screw, of the cross-shaft provided with an arm engaging with a groove in the said clutch, and a second arm *n*, also secured on the said shaft, the oscillating tappet provided with a working-groove loosely engaging with the end of the arm *n*, the V-shaped wheel on the said tappet, the spring-actuated bolt provided with a sharp-pointed head engaging with the said wheel, and a longitudinally-movable rod supporting the said tappet and provided with collars near each end of the said tappet, substantially as and for the purpose set forth.

9. The combination, with the pivoted arm *n* for operating the reversing-clutch, of the oscillating rod provided with a handle, the tappet splined to the said rod and provided with the narrow stop-groove, the inclined guide-groove, and the working and clearance grooves around its periphery, and a stationary projection engaging with the said inclined guide-groove, whereby the arm *n* may be held in its central position by the stop-groove and moved in either direction by oscillating the tappet, substantially as and for the purpose set forth.

10. The combination, with the pivoted arm *n* for operating the reversing-clutch, of the oscillating rod, a handle splined to the said rod, the traversing plate provided with lugs for moving the handle along the rod and keeping it near the hand traverse-wheel, the tappet also splined to the said rod and provided with the narrow stop-groove, the inclined guide-groove, and the working and clearance grooves around its periphery, and a stationary projection engaging with the said inclined guide groove, substantially as and for the purpose set forth.

11. The combination, with the pivoted arm *n* for operating the reversing-clutch, of the oscillating rod provided with a handle, the

collars on the rod, the traversing plate provided with lugs for striking the said collars at the ends of the traverse, the tappet splined to the said rod and provided with the narrow stop-groove, the inclined guide-groove, and the working and clearance grooves around its periphery, a stationary projection engaging with the said inclined guide-groove, the V-shaped wheel on the tappet, the spring-actuated bolt provided with a sharp-pointed head engaging with the said wheel, and the collars secured to the said rod near the ends of the tappet, substantially as and for the purpose set forth.

12. The combination, with the pivoted arm *n* for effecting the reversal of the traversing mechanism, of a single rod supported at the front of the machine and provided with a projecting handle, a tappet provided with grooves of peculiar form and operatively connected with the said rod and with the arm *n*, substantially as set forth, a stationary stop, and an automatic shooting-bolt also operatively connected with the said tappet, whereby the operations of stopping, starting, and reversing are effected by oscillating the said rod and moving it longitudinally, according to the desired direction of traverse, substantially as and for the purpose set forth.

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

ABRAHAM B. LANDIS.

Witnesses:
D. M. GOOD, Jr.,
HERBERT W. T. JENNER.