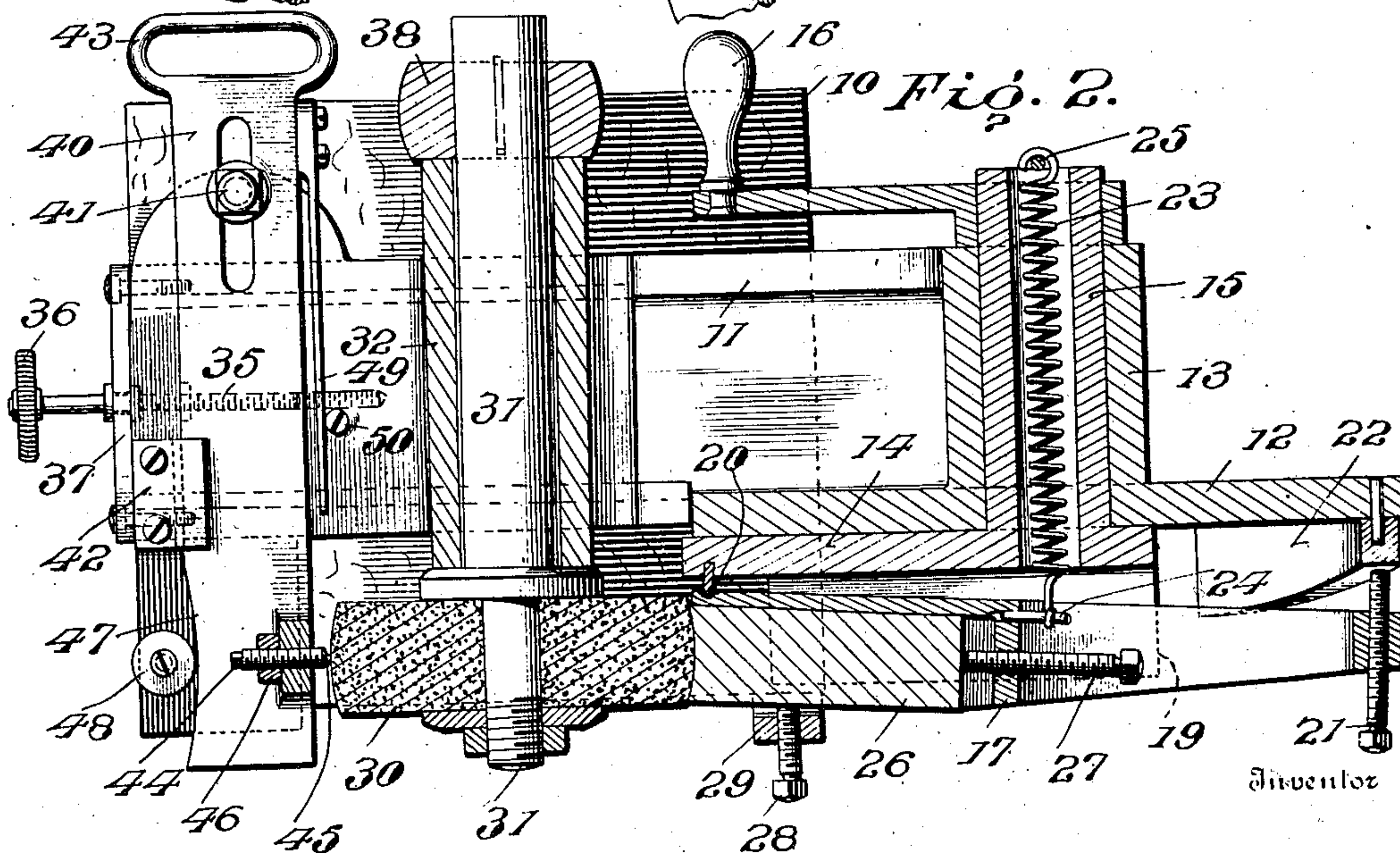
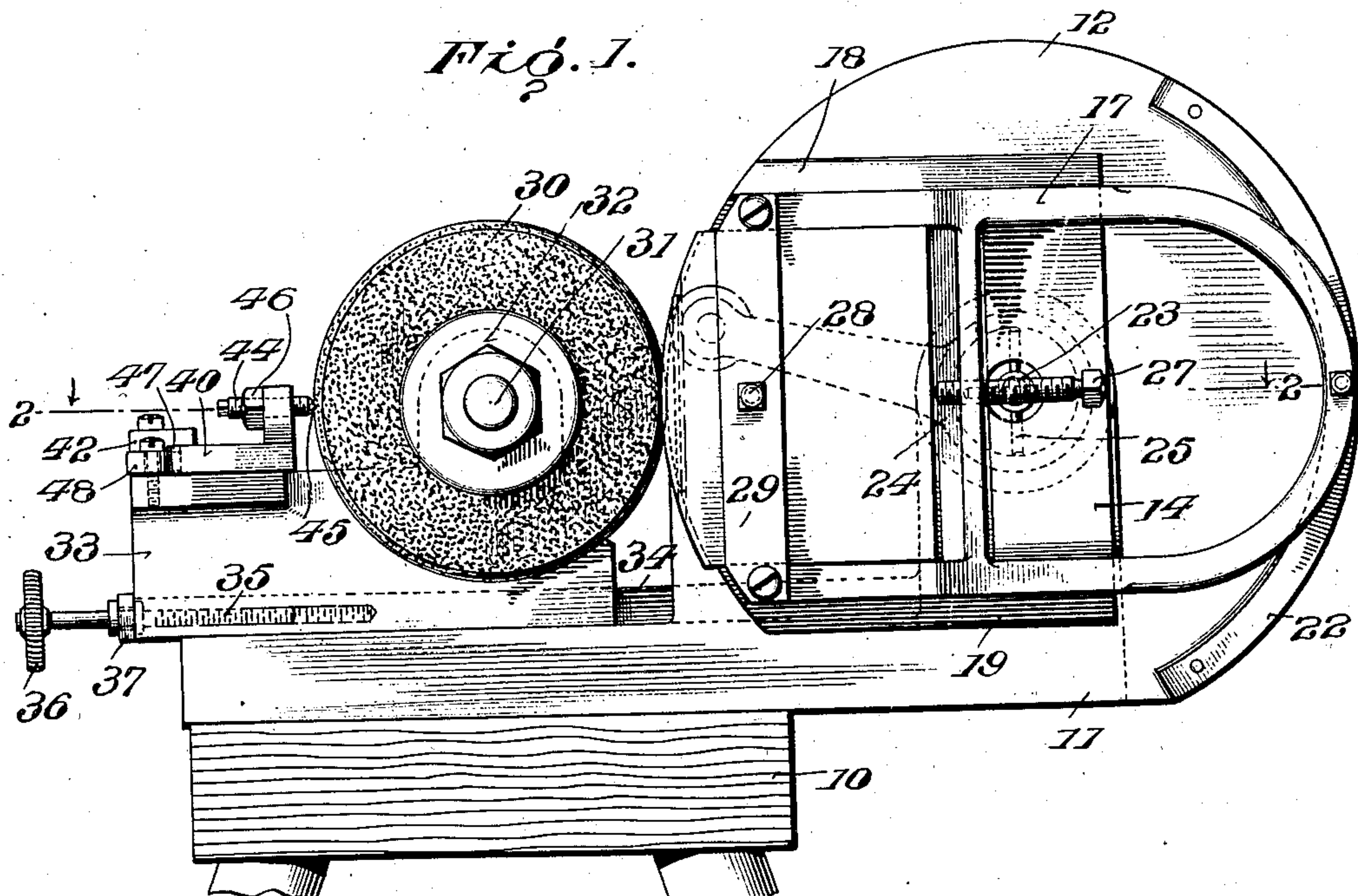


No. 850,014.

PATENTED APR. 9, 1907.

A. JOHNSTON.
GRINDING MACHINE.
APPLICATION FILED MAY 26, 1906.

3 SHEETS—SHEET 1.



Witnesses
J. R. Thompson.
Arch C. Fitzhugh.

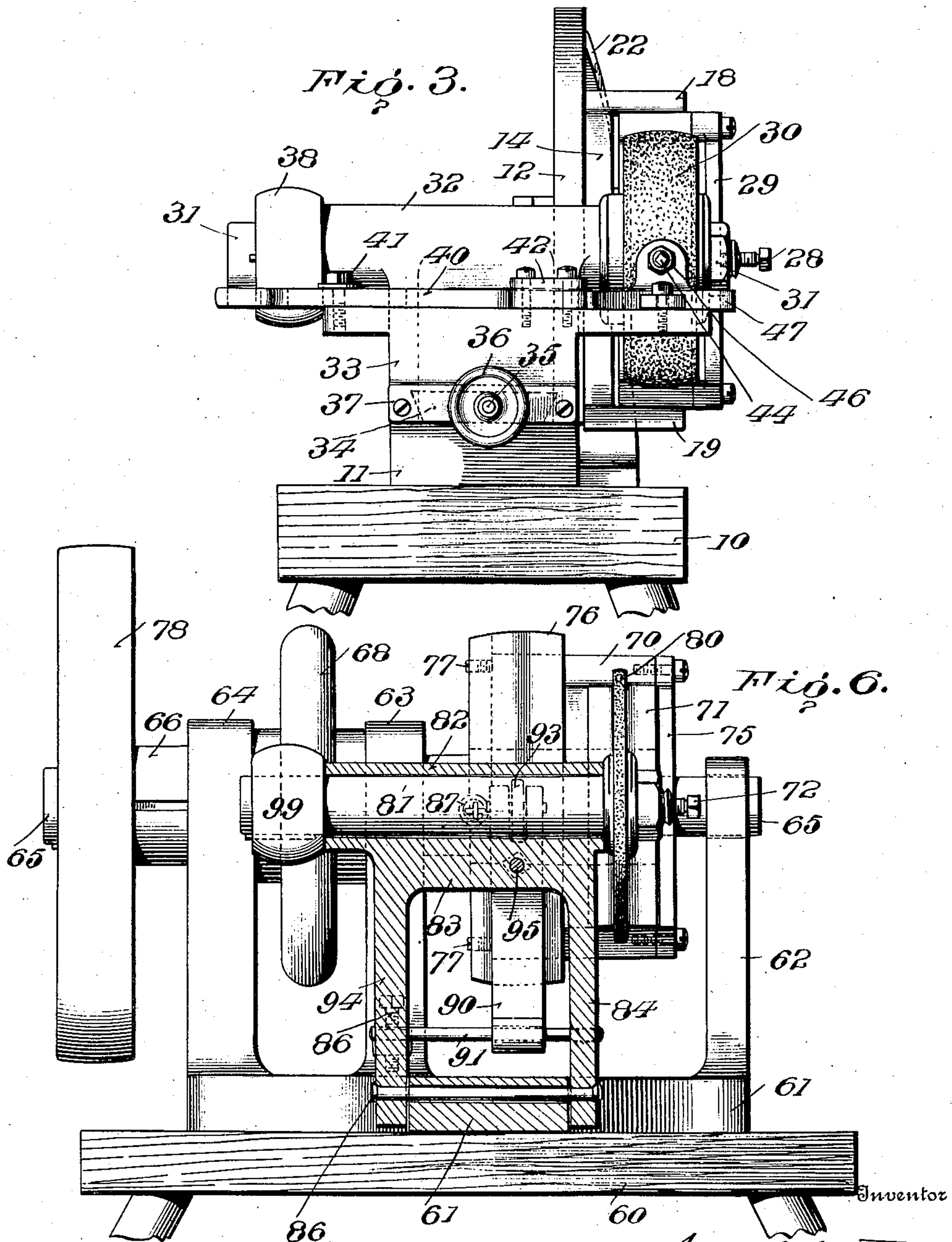
By Allen Johnston,
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3 SHEETS—SHEET 2.



Witnesses
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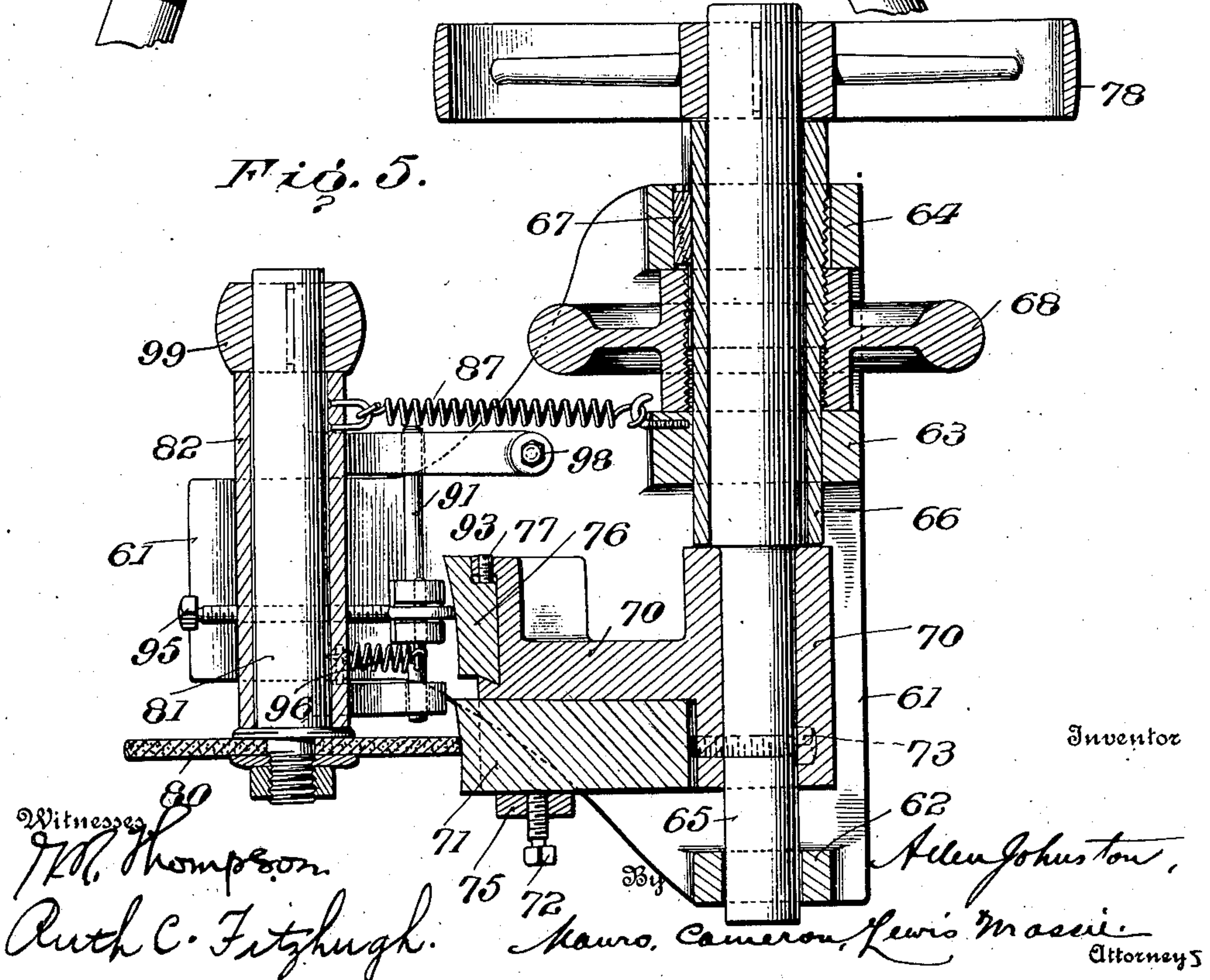
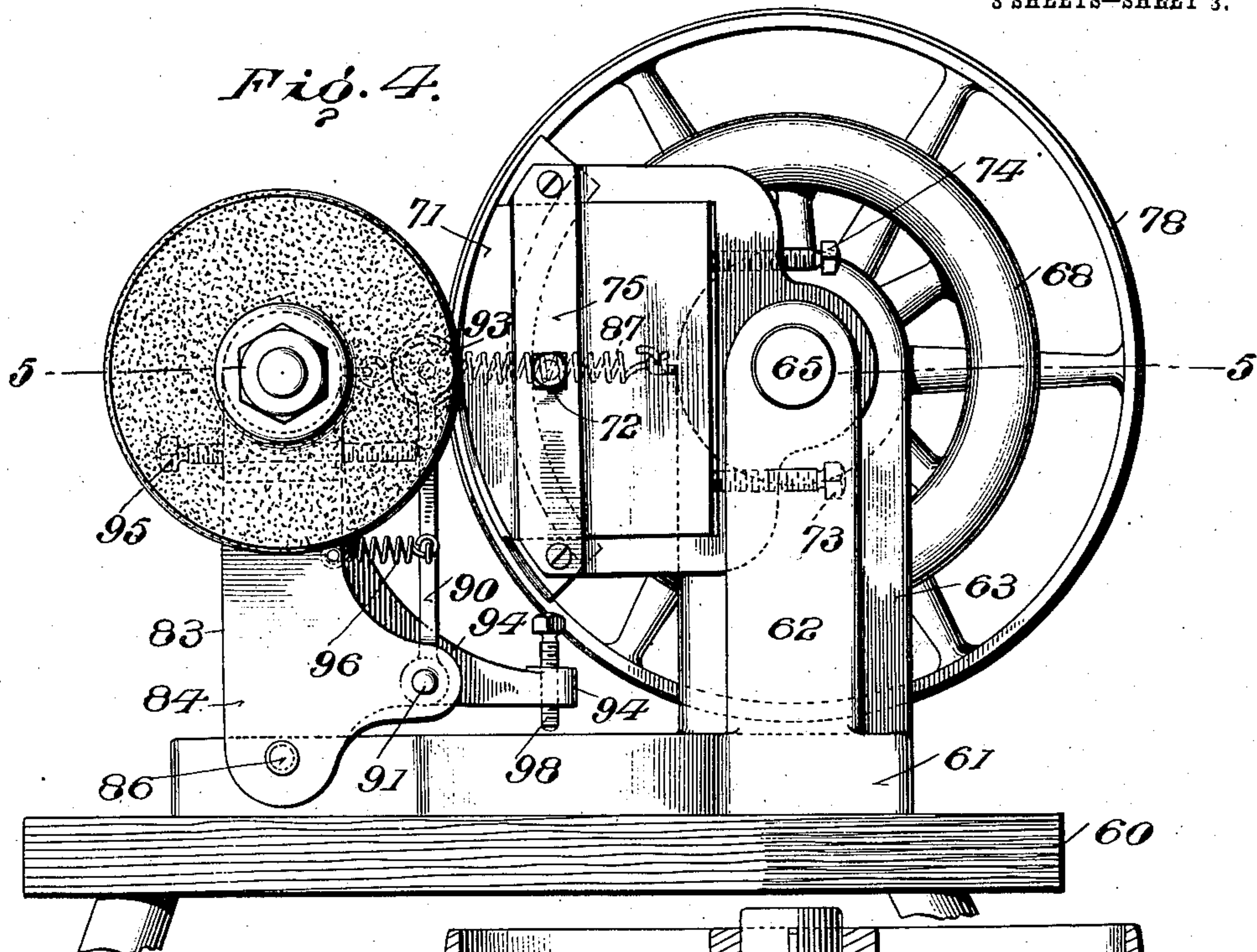
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

GRINDING-MACHINE.

No. 850,014.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed May 26, 1906. Serial No. 318,900.

To all whom it may concern:

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

In my Patent No. 611,323, dated September 27, 1898, I have illustrated and described a grinding-machine particularly adapted to grind upon dies used for rolling or otherwise forging the blades of table-knife blanks a surface having a "twist" which is the counterpart of the twist to be imparted to each surface of the blade. The term "twist" is here used to designate those characteristics of the surfaces of the knife-blade resulting from, first, its taper along the back or non-cutting edge from the thickest part at the handle to the point of the blade; second, its cutting edge of uniform thickness from end to end, and, third, its transverse taper from its relatively thick back or non-cutting edge to its thinner cutting edge, this taper gradually decreasing from the handle end of the blade to the point thereof in accordance with the longitudinal taper of the back edge. While the blade-surfaces having such twist are preferably slightly convex in a transverse direction, (requiring corresponding concavity in the die-surfaces,) they may also be straight.

My present invention relates principally to specific embodiments of the generic invention of said patent, in which embodiments the grinding-surface is the peripheral edge of a suitable grinding-wheel.

This invention also embraces other points of improvement fully explained hereafter in conjunction with the accompanying drawings, wherein—

Figure 1 is a front elevation, Fig. 2 a horizontal sectional view on line 2 2 of Fig. 1, and Fig. 3 an end view from the left of Fig. 1, of one embodiment of the invention. Fig. 4 is a front elevation; Fig. 5, a horizontal sectional view on line 5 5 of Fig. 4; and Fig. 6, an end view, partly in section, from the left of Fig. 4 of another embodiment of the invention.

Referring first to Figs. 1, 2, and 3, 10 is a bench or table upon which the base or main casting 11 of the machine is mounted.

12 is a vertically-disposed plate formed integrally with base 11 at one end thereof,

said plate having through its center an opening about which a sleeve-bearing 13 projects rearwardly from the plate, said bearing being also preferably formed integral with the base 11.

14 is a turn-table having a rearwardly-projecting hollow stem 15 extending through the bearing 13 and rotatably supporting the turn-table in the latter. A handle 16, attached to the projecting end of the stem 15, affords means whereby an operative of the machine may rotate the turn-table in its bearing. Work-holder 17 fits closely between two parallel edge flanges 18 and 19 at the upper and lower edges, respectively, of turn-table 14 and is fulcrumed on a knife-edge 20 on the turn-table. An adjusting-screw 21, passing through the non-fulcrumed end of the work-holder, bears against a curved inclined track 22, said track being fixed upon plate 12 by suitable pins, whereby the track may be readily removed and replaced by one of opposite or different inclination, according to the direction and degree of twist it is desired to impart to the surface being ground. A spiral spring 23, fixed at one end to a pin 24 on the work-holder and extending through the hollow stem 15 of the turn-table 14 to a pin 25, across the end of the opening through said stem, yieldingly holds the work-holder 17 in engagement with the knife-edge 20 and the track 22, permitting a gradual tilting or inclination of the work-holder on its knife-edge as the turn-table and work-holder are rotated relatively to said fixed inclined track. The work, such as die-block 26, is adjusted to the proper position and held in place on the work-holder by means of clamping-bolts 27 and 28, the latter passing through a bridge-piece 29 of the work-holder.

30 is a grinding-wheel fast on its shaft 31, which is approximately parallel to the axis of rotation of the turn-table and the work-holder thereon, said shaft being journaled in sleeve-bearing 32 of a carrier 33, the latter having an undercut or dovetailed groove or slideway along its under face engaging a corresponding dovetailed rib 34 on the base 11 of the machine. A hand-operated feed-screw 35, having at its outer end a hand-wheel 36, is mounted to rotate in a cross-bar 37 on the slide 33, the threaded end of said feed-screw engaging a screw-threaded open-

ing in the rib 34. Suitable sleeves or flanges on the feed-screw shaft on opposite sides of the cross-bar 37 permit the feed-screw to turn in said cross-bar and impart movement to the slide 33 as the threaded end of the shaft turns in the threaded opening in the fixed rib 34, thereby advancing carrier 33 and with it the grinding-wheel 30 to bring the latter to proper position relative to the work-holder and the work carried thereby. Rotary movement may be imparted to the grinding-wheel by a suitable belt (not shown) passing over a pulley 38 on shaft 31.

From the foregoing description it will be readily understood that in the operation of the machine after the grinding-wheel has been brought to proper position relative to the work-holder and the work carried thereby the operative by manually turning the work-holder by means of the hand-lever 16 gradually advances or feeds the surface to be ground to the periphery of the rotating grinding-wheel, during which movement the advance of the bolt 21 along the inclined track 22 gradually varies the tilt or inclination of the work-holder and the work, thereby causing the desired twist to be imparted to the surface ground, the latter having a longitudinal curvature the approximate radius of which is the distance between the axis of rotation of the work-holder and the peripheral surface of the grinding-wheel.

As shown in the drawings, the grinding-wheel has a convex peripheral grinding-surface, thereby imparting to the ground longitudinally-curved surface of the die a corresponding lateral concavity. The convexity of the peripheral grinding-surface may vary according to the work to be done, or said surface may, if desirable, be laterally straight. As frequent truing is necessary to preserve the desired shape of the grinding-surface of the wheel, means have been provided whereby said truing may be accomplished without removing the grinding-wheel from the machine.

40 is a slide-bar having therethrough an elongated slot through which a bolt 41 passes into engagement with the slide 33. A block 42, fastened to said slide, has a flange which overhangs the edge of slide-bar 40 and holds the latter to its position. At one end the slide-bar has a handhold 43, by which the operative may grip the bar and move it on the slide 33 when bolt 41 is loosened. At its other end the slide-bar carries a truing device consisting of an adjustable screw 44, carrying at its outer end a diamond or other suitable truing-point 45 and adapted to be fixed in any desired position of adjustment by set-nut 46. The edge of the slide-bar opposite the truing device is concavely curved, as at 47, and is adapted to be held in engagement with a roller 48, mounted on the slide 33, by the action of a flat spring 49, fastened at one

end to the slide-bar and at its other end bearing against a screw-stud 50 on the slide 33. When it is desired to true the peripheral surface of the wheel, the truing device is adjusted to such position that the diamond or other truing-point 45 will engage the grinding-surface, whereupon the operative after loosening the set-bolt 41 grasps the handhold 43 and moves the slide-bar to traverse the truing device back and forth across the grinding-surface, the concave surface 47 cooperating during this movement with the fixed roller 48 to move the truing-point through an arc corresponding to the convexity which it is desirable to impart to the grinding-surface.

In the embodiment of the invention shown in Figs. 4, 5, and 6, 60 is a bench or table upon which the base or main casting 61 of the machine is mounted. 62 63 64 are upright arms on the base 61, the arm 62 providing a journal for supporting one end of a horizontally-disposed shaft 65, adapted to move longitudinally in said bearing. At its other end said shaft is surrounded by a tubular bearing-sleeve 66, which latter is adapted to move longitudinally in a bearing in the arm 63. A longitudinal groove in bearing-sleeve 66 is engaged by a spline 67, fixed in an opening in the arm 64, through which opening said sleeve and the shaft 65 project. This spline permits longitudinal movement of the sleeve 66, but prevents rotation thereof. Sleeve 66 is screw-threaded for a portion of its length and is engaged by the interior screw-threads of an opening through the hub of a hand-wheel 68, the ends of said hub bearing against opposite faces of the arm 63 and 64, whereby upon rotation of said hand-wheel the screw-thread connection imparts to the sleeve 66, and hence to the shaft 65 and parts fixed thereto, a longitudinal movement for moving the work across the edge of the grinding-wheel, as more fully explained hereafter. 70 is a work-holder fixed on shaft 65 to rotate therewith. 71 is the work, such as a die-block, adjusted to the desired position and fixed in the work-holder by set-bolts 72, 73, and 74, the bolt 72 passing through a bridge-piece 75, extending over the work. 76 is a form-block removably secured to the work-holder adjacent to the work by screws 77, the surface of said form-block exactly conforming to the shape of the surface which it is desired to impart to the work 71. The surface of this form-block acts as a guide to the grinding-wheel in its action upon the surface being ground, as fully explained hereafter. 78 is a pulley fixed on shaft 65 and adapted to be driven by a suitable belt (not shown) to slowly rotate said shaft and with it the work-holder to gradually advance or feed the work to the grinding-wheel, while the operative by manipulating hand-wheel 68 imparts longitudinal movement to shaft 65 and parts fixed

thereto, thereby moving the work across the edge of the grinding-wheel in a transverse direction. The sleeve 66 bears at one end against the hub of the work-holder fixed on the shaft 65 and at its other end against the hub of the pulley 78, also fixed on said shaft, so that movement imparted to said sleeve by the action of the hand-wheel 68 is also imparted to shaft 65 and parts connected thereto. 80 is the grinding-wheel fixed to its shaft 81, the latter being journaled in a tubular bearing 82 at the upper end of a frame 83, the latter having depending arms 84 94, through the lower ends of which pivot-pin 86 passes, said pivot-pin also traversing a narrow portion of the base-plate 61 of the machine. Frame 83 is thus mounted to oscillate on pivot-pin 86, a spring 87, fastened at one end to tubular member 82 and at its other end to arm 63, acting to yieldingly hold the grinding edge of the wheel in engagement with the work being ground; but under control of the form-block 76, as will now be explained. A bar 90, supported at its lower end by shaft 91, extending between the arms 84 94 and free to turn on said shaft, carries at its upper end a small wheel or roller 93, adapted to bear against the surface of form-block 76. An adjusting-bolt 95, engaging a screw-threaded opening through carrier 83, bears against the bar 90 and serves to adjust the position of the wheel 93 with relation to the peripheral edge of the grinding-wheel, thereby determining the depth of cut to be made by the grinding-wheel upon the work. A spring 96 serves to hold bar 90 against the end of the adjusting-bolt 95. 97 is an extension of the arm 94, carrying a stop-bolt 98, adapted to strike against the base of the machine and limit the movement imparted to the carrier and parts mounted thereon by the spring 87 when the work-holder and the work have been rotated past the grinding-wheel and to a position in which the completed work may be removed and other work to be ground inserted in the work-holder. 99 is a small pulley on the grinding-wheel shaft 81, whereby the latter may be rotated by a suitable belt. (Not shown.)

In the operation of the machine of Figs. 4-6 a piece of work 71 having been fastened in place in the work-holder the shaft 65 is slowly rotated through the pulley 78, and as the work slowly advances or is fed to the grinding-wheel the operative manipulates hand-wheel 68 to impart movement to the shaft 65, the work-holder fast thereon, and consequently to the work 71 and the form-block 76, during which movement said form-block coöperates with the wheel 93 and bar 90 to impart to frame 83 slight oscillatory movement, conforming to the transverse curvature of the form-block 76 at different points along its longitudinally-curved surface, and conse-

quently causing the grinding-wheel to impart to the surface ground a shape exactly conforming to that of the form-block.

What I claim is—

1. In a grinding-machine for grinding dies for rolling knife-blades, the combination with a grinding-wheel; of a work-holder adapted to present a die to the peripheral edge of the grinding-wheel, said grinding-wheel and work-holder being relatively movable to advance or feed the die relative to the peripheral grinding-surface of the wheel; and means for imparting relative movement to the grinding-wheel and work-holder to grind a longitudinally curved and twisted surface on the die.

2. In a grinding-machine for grinding dies for rolling knife-blades, the combination with a grinding-wheel; of a work-holder adapted to present a die to the peripheral edge of the grinding-wheel, said grinding-wheel and work-holder being relatively rotatable to advance or feed the die relative to the peripheral grinding-surface of the wheel; and means for imparting relative movement to the grinding-wheel and work-holder to grind a longitudinally curved and twisted and laterally-concave surface on the die.

3. In a grinding-machine for grinding dies for rolling knife-blades, the combination with a grinding-wheel; of a work-holder adapted to present a die to the peripheral edge of the grinding-wheel, said work-holder being rotatable on an axis approximately parallel to the axis of rotation of the grinding-wheel to advance or feed the die to said wheel; and means for imparting relative movement to the grinding-wheel and work-holder to grind a longitudinally curved and twisted surface on the die.

4. In a grinding-machine for grinding dies for rolling knife-blades, the combination with a grinding-wheel; of a work-holder adapted to present a die to the peripheral edge of the grinding-wheel, said work-holder being rotatable on an axis approximately parallel to the axis of rotation of the grinding-wheel to advance or feed the die to said wheel; and means for relatively tilting the grinding-wheel and work-holder during said feed movement to impart a twist to the longitudinally-curved surface ground on the die.

5. In a grinding-machine for grinding dies for rolling knife-blades, the combination with a grinding-wheel; of a work-holder adapted to present a die to the peripheral edge of the grinding-wheel; means for rotating said work-holder on an axis to advance or feed the die longitudinally relative to the peripheral grinding-surface of the wheel; and means causing the grinding-wheel to advance toward and recede from the die as the latter is being ground and fed longitudinally, thereby grinding on the die a longitudinally curved and twisted surface.

6. In a grinding-machine for grinding dies
for rolling knife-blades, the combination with
a grinding-wheel; of a work-holder adapted
to present a die to the peripheral edge of the
5 grinding-wheel; means for rotating said
work-holder on an axis to advance or feed the
die longitudinally relative to the peripheral
grinding-surface of the wheel; and means
causing the work-holder to advance toward
10 and recede from the grinding-wheel as the die

is being ground and fed longitudinally,
thereby grinding on the die a longitudinally
curved and twisted surface.

In testimony whereof I have signed this
specification in the presence of two subscrib- 15
ing witnesses.

ALLEN JOHNSTON.

Witnesses:

J. T. HACKWORTH,
THOS. RODGERS.