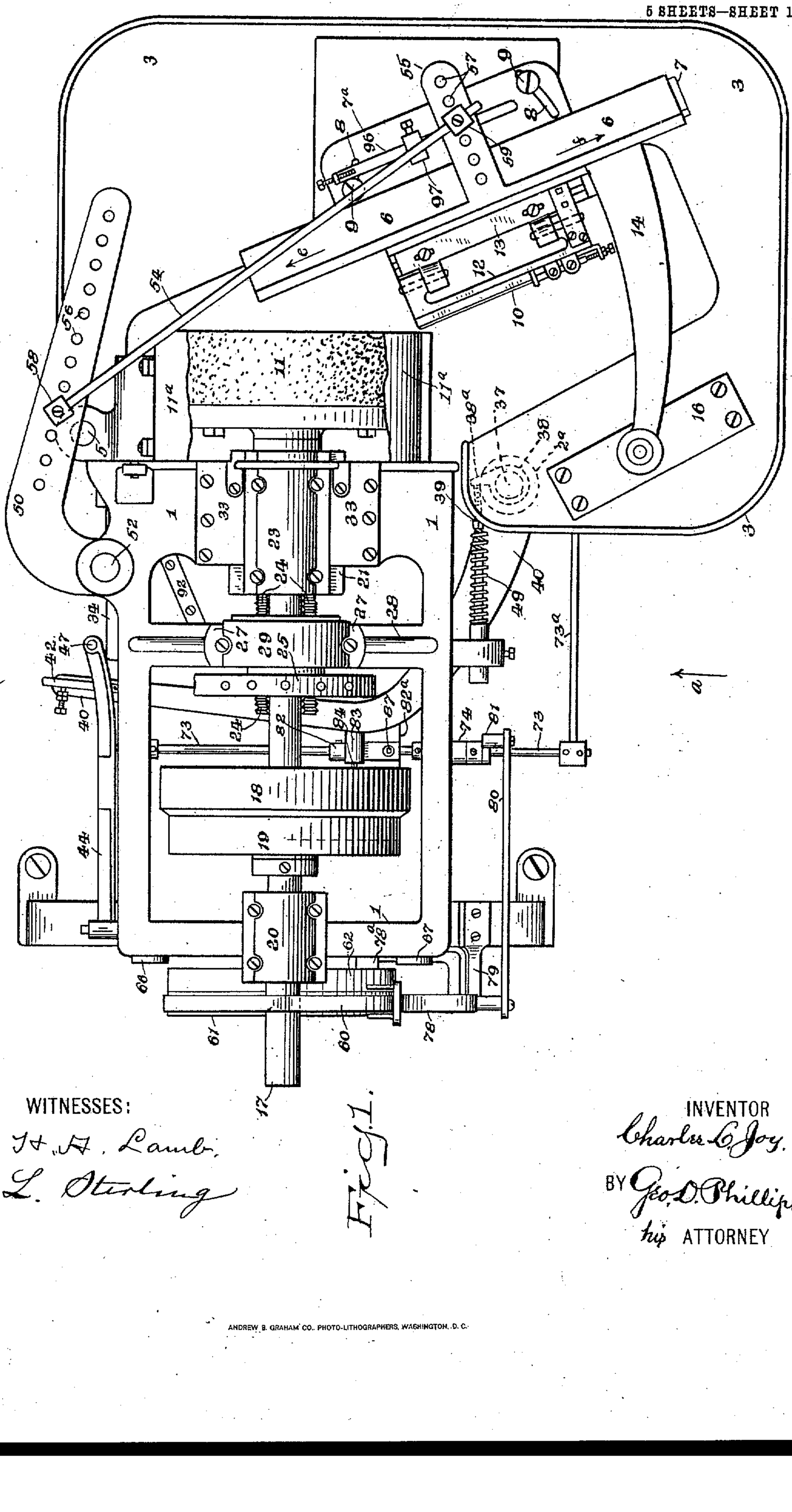
C. L. JOY.

CUTLERY GRINDING MACHINE.

APPLICATION FILED MAY 21, 1909.

961,864. Patented June 21, 1910.

5 SHEETS—SHEET 1.



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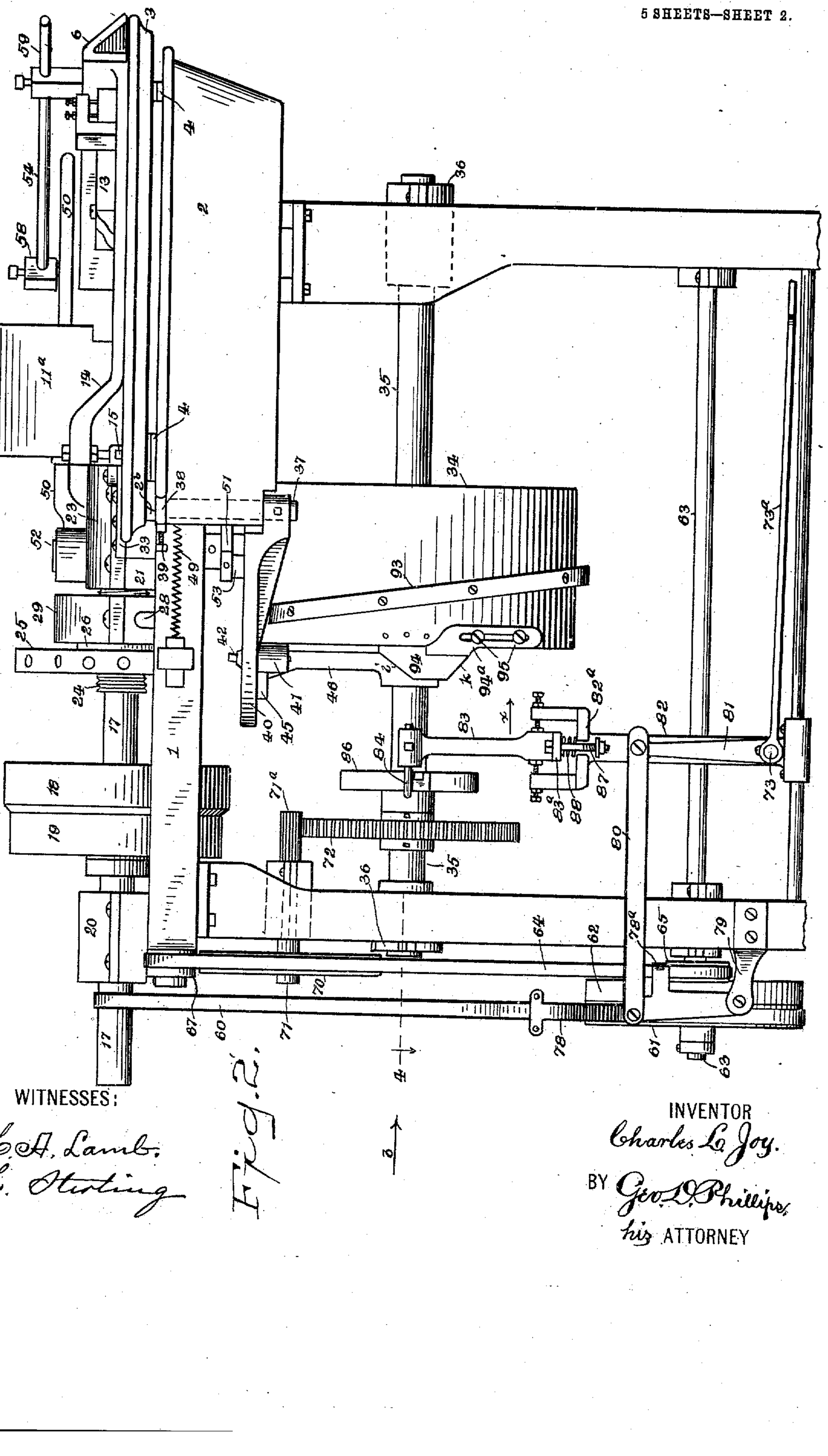

Fig. 2.

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Fig. 3.

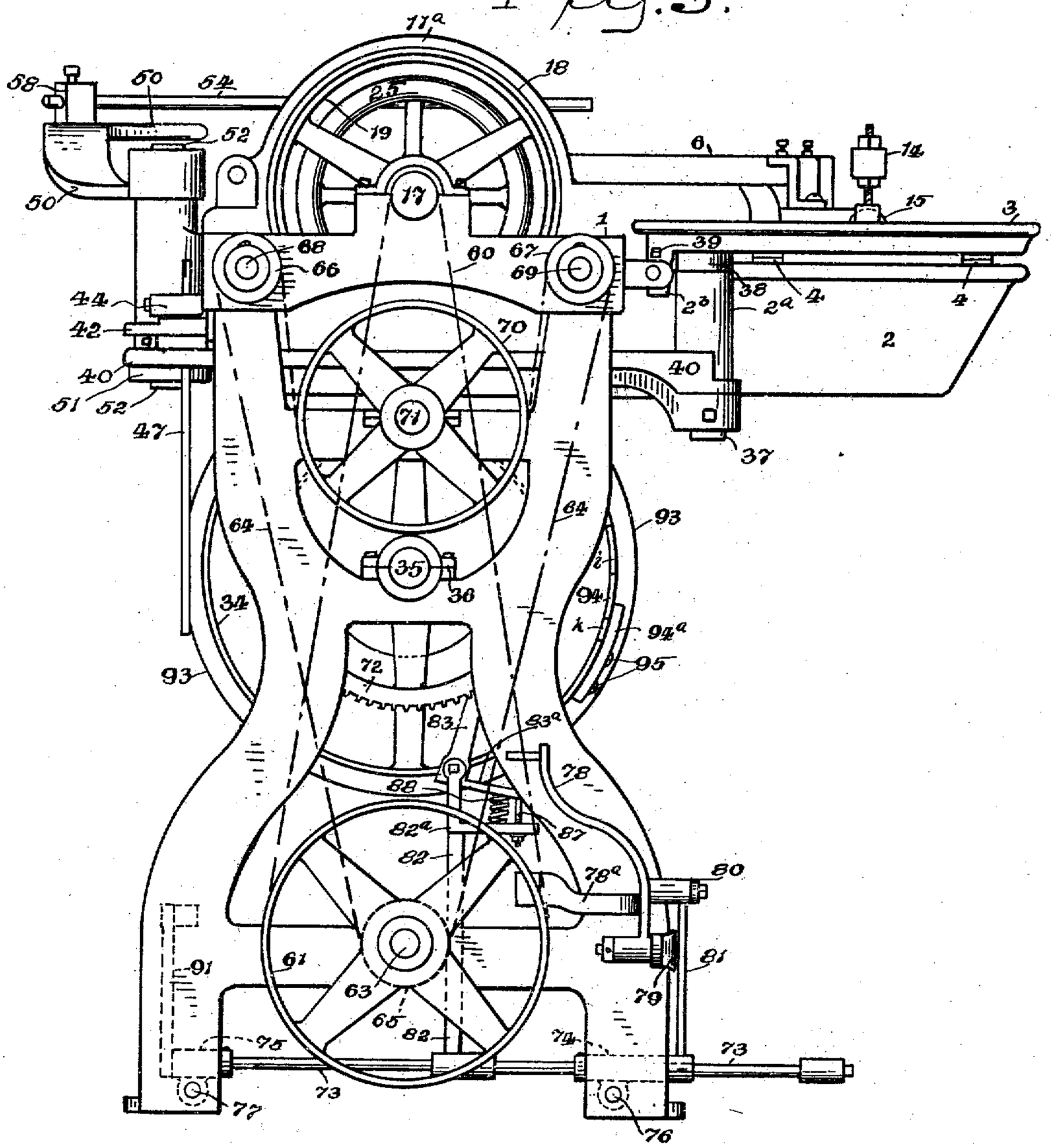

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Fig. 4.

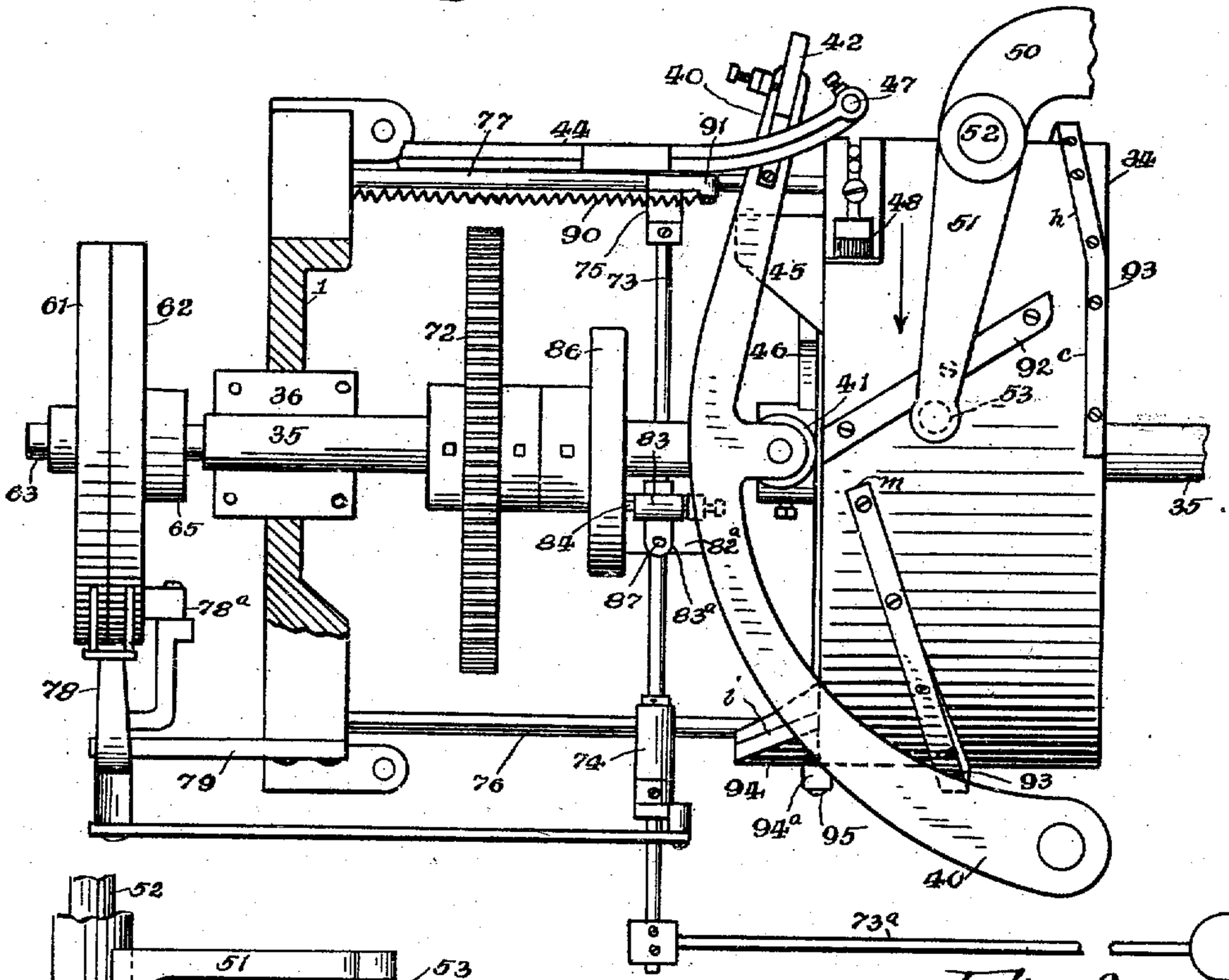


Fig. 6.

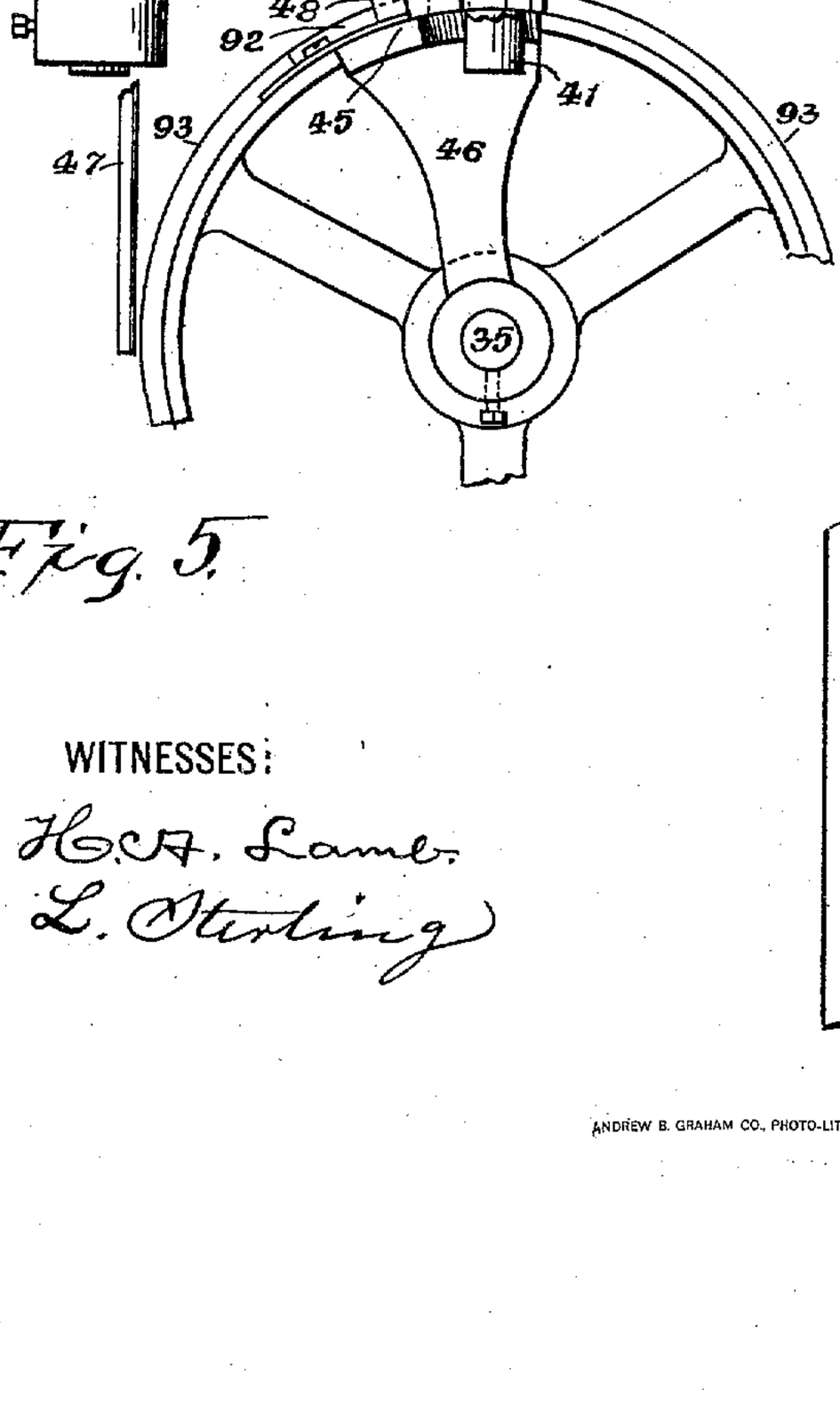
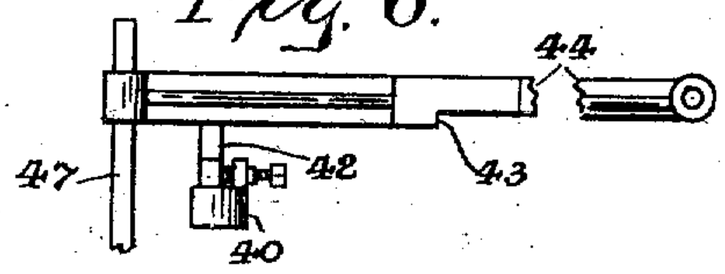


Fig. 5.



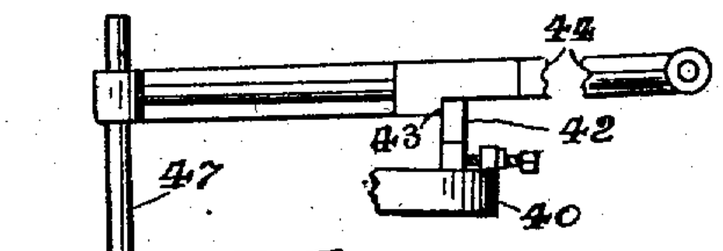
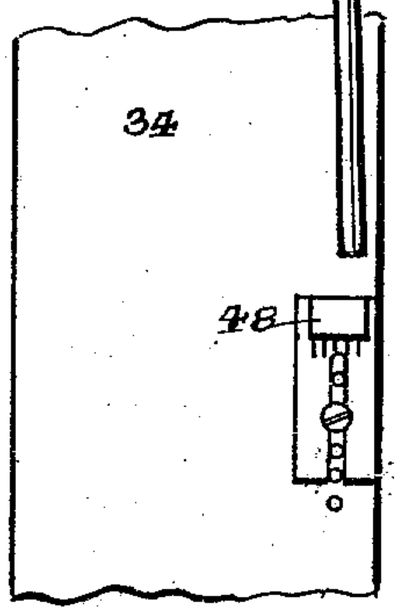


Fig. 7.



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5 SHEETS—SHEET 5.

Fig. 8

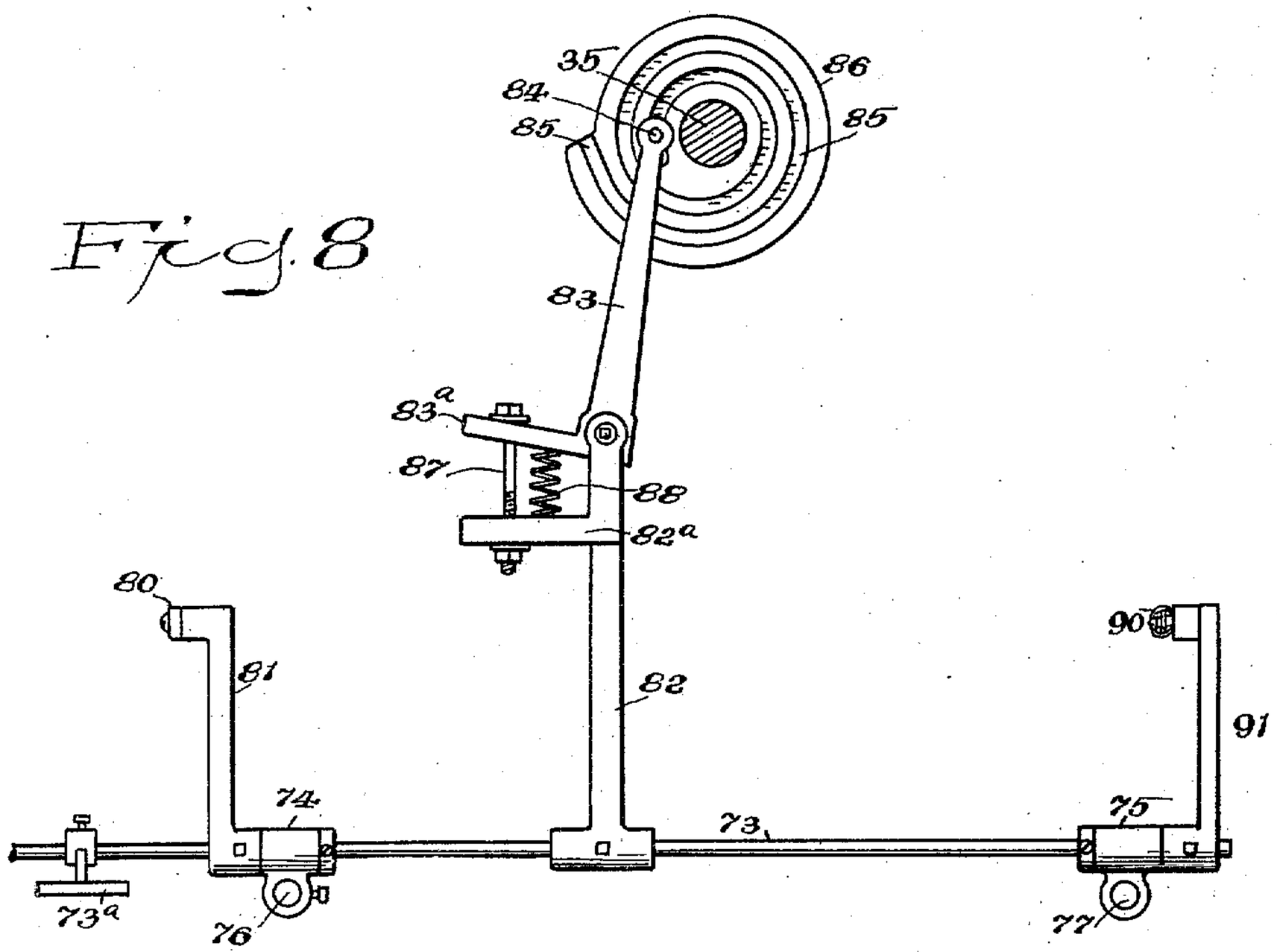
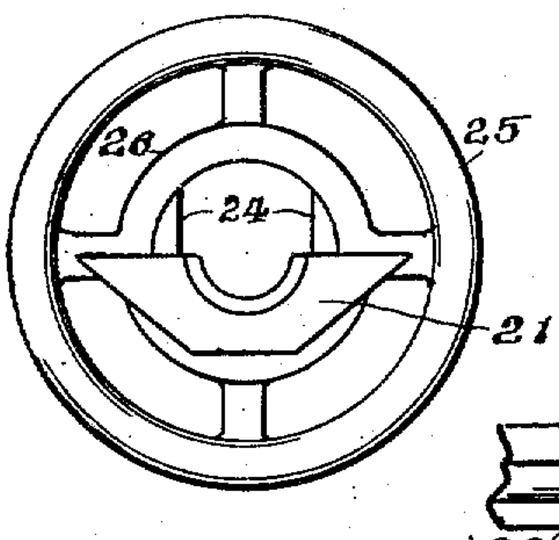


Fig. 9.

Fig. 10.



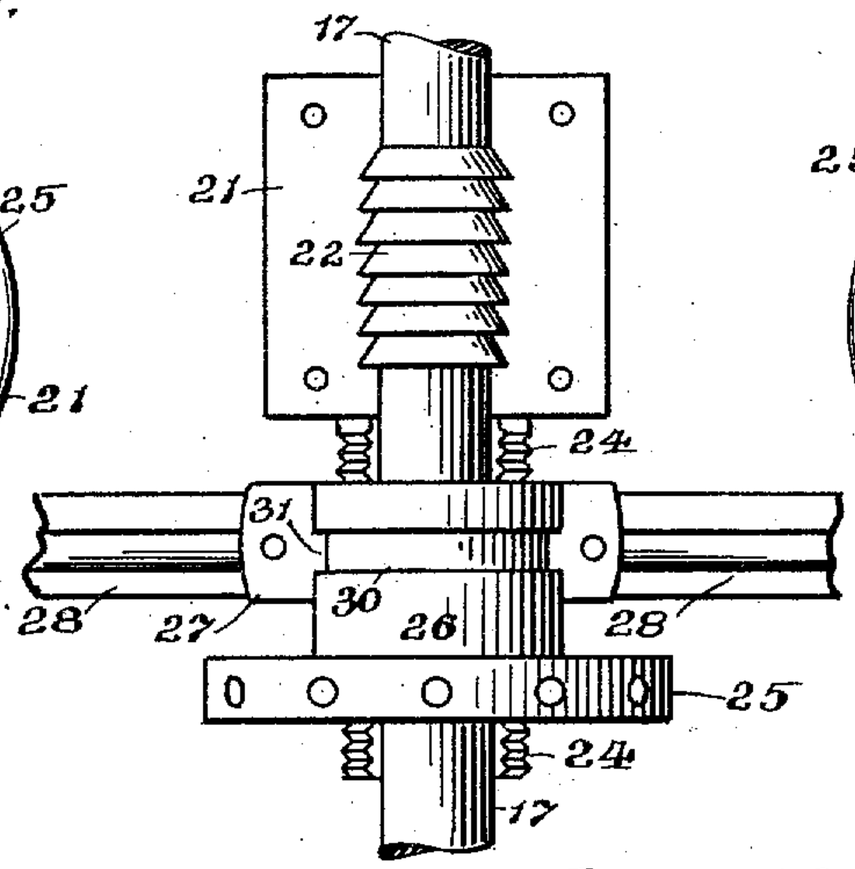


Fig. 11.

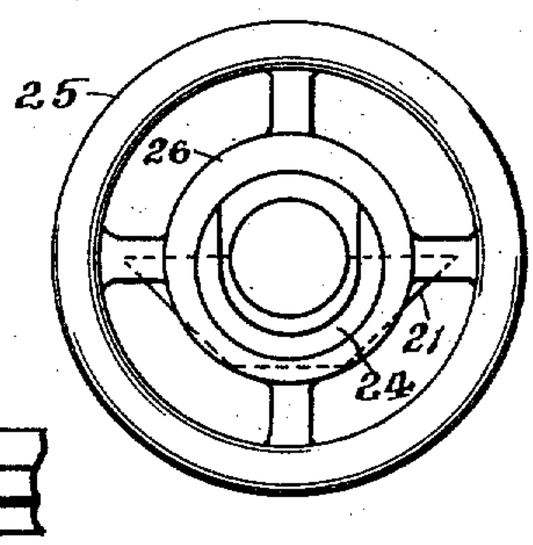
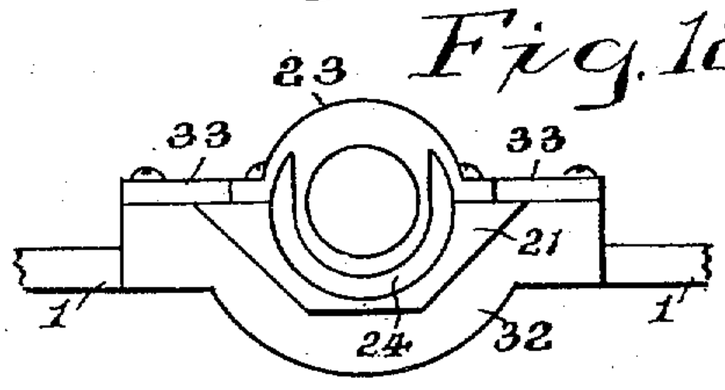


Fig. 12.



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UNITED STATES PATENT OFFICE.

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CUTLERY-GRINDING MACHINE.

961,864. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed May 21, 1909. Serial No. 497,540.

To all whom it may concern:

Be it known that I, CHARLES L. JOY, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Cutlery-Grinding Machines, of which the following is a specification.

My invention relates to an improvement in cutlery grinding machines, and it consists in certain details of construction to be more fully set forth in the following specification.

To enable others to understand my invention, reference is had to the accompanying drawings in which:

Figure 1 represents an upper plan view of the machine and broken view of the grinding wheel cover; Fig. 2 is a side elevation looking in the direction of arrow *a* of Fig. 1, also broken view of the legs of the machine; Fig. 3 is an end elevation of the machine looking in the direction of arrow *b* of Fig. 2; Fig. 4 is a slightly enlarged view of the cam drum and mechanism connected therewith, also broken view of the treadle rod, cam drum shaft, carriage operating lever, and sectional view of the rear machine legs on line 4 of Fig. 2; Fig. 5 is a broken view of the cam drum and roll of the plate operating lever and trip rod for said lever; Fig. 6 is a detail broken view of the trip rod mechanism and end view of the plate operating lever; Fig. 7 is a broken view of the cam drum, plate operating lever, trip rod arm showing the plate operating lever temporarily locked thereto; Fig. 8 is a detail view of the belt shifting mechanism and sectional view of the cam drum shaft; Fig. 9 is a broken view of the driving shaft and cross rib of the machine, also an upper plan view of the sliding box in which the shaft is anchored against endwise movement, and the hand wheel for longitudinally adjusting the shaft; Figs. 10 and 11 are detail elevations of opposite sides of the hand wheel and sliding box; and Fig. 12 is an end elevation of the sliding box and its support, also broken view of a cross rib of the machine of which the support is an integral part.

Referring to Figs. 1 and 2 the frame or bed 1 and the sink or pan 2 are integral with each other, and the plate 3 is movably supported on the projections 4 of the pan 2 and is pivotally mounted on the stud 5 projecting from the bed. The plate 3 carries the knife supporting mechanism comprising the carriage 6 mounted on the support or track 7. The foot 7^a of the track is provided with the slots 8 and screws 9 by means of which it is horizontally adjusted with respect to the knife 10 and the grinding wheel 11 having the cover 11^a. The knife holder 12 is pivotally mounted on the adjustable support 13 of the carriage. The arm 14 of the carriage carries at its end the roller 15 (Figs. 2 and 3) contacting with the plate 16 (Fig. 1) to support or counterbalance the overhanging weight represented by the knife holder and its support.

The main driving shaft 17, carrying the grinding wheel 11, tight pulley 18 and loose pulley 19, has its rear end journaled in the box 20, and its front end journaled in the sliding box 21, and said shaft is longitudinally adjustable in the manner and for the purpose presently to be described.

Referring to Figs. 1, 9, 10, 11 and 12, and particularly to Fig. 9, a portion of the shaft journaled in the box 21 is enlarged and such enlarged portion is provided with the serrations 22 registering with corresponding serrations in the box 21 and cap 23 (Fig. 1) whereby the box, cap and shaft are coupled together. Integral with the box is the hollow or U-shaped threaded extension 24 open at the top to admit the shaft and having a bore large enough to afford plenty of clearance for said shaft. The hand wheel 25 has a threaded bore in its hub 26 to register with the threaded extension of the box. This hub is journaled in the box 27 of the crosspiece 28 of the machine frame and is retained therein by the cap 29 shown at Figs. 1 and 2. The hub of the hand wheel has the groove 30 registering with the internal rib 31 of the box 27 whereby the hand wheel is anchored against longitudinal movement.

Referring particularly to Figs. 1 and 12, the box 21 is slidably mounted in the bearing 32, forming an integral part of the frame 1, and is normally retained in said bearing by the caps 33. By the arrangement and mechanism just described, the hand wheel is actuated to give a longitudinal movement to the shaft 17 and adjust the position of the grinding wheel with respect to the knife.

The cam drum 34 is mounted on the shaft 35 journaled in the boxes 36 of the machine frame as shown at Fig. 2. This drum is ac-

tuated to swing the plate 3 to and from the grinding wheel as follows: 37 is a short vertical shaft journaled in the boss 2ª of the pan 2, and carries at its upper end the collar 38 having the finger 38ª shown at Fig. 1. Referring also to Figs. 2 and 3, 2ᵇ is a downward projection of the plate 3 and integral therewith, and extending through said projection is the screw 39 whose point contacts with the beforementioned finger 38ª.

On the lower end of the vertical shaft 37 is secured the long lever 40 carrying the roll 41 intermediate of its ends, and the block 42 (Figs. 1, 4, 6 and 7) on its free end adapted to engage the shoulder 43 of the pivotally supported arm 44 when said lever is thrown out by the cam 45. This cam, see also Fig. 5, forms part of the arm 46 mounted on the cam shaft 35 and is adjustable thereon so as to throw the long lever 40 away from the cam drum and swing the plate 3 toward the grinding for the purpose to be hereinafter more fully described. The rod 47 in the free end of arm 44 is adapted to be engaged by the lug 48, adjustably secured to the cam drum, to lift said arm and release the lever 40 at each revolution of said drum, and when thus released, the spring 49 (Figs. 1 and 2) will carry the lever in toward the cam drum and also swing the plate 3 away from the grinding wheel. The carriage 6 is actuated to have a reciprocatory movement across the face of the grinding wheel through the medium of the arms 50 and 51. The former being secured to the upper end of the short vertical shaft 52 and the latter at the lower end of said shaft as seen at Figs. 3 and 5. The arm 51 carries the roll 53 adapted to engage cam ribs on the cam drum for the purpose presently to be more fully described.

54 is a rod which connects the arm 55 of the carriage 6 with the arm 50. Holes 56 and 57 in said arms are for the adjustment of the swivel blocks 58 and 59 to shorten or lengthen the travel of the carriage for different lengths of knives.

The driving shaft 17 runs continuously, while the cam drum shaft 35 is driven and halted at certain periods by means of the following mechanism: Referring to Figs. 1, 2 and 3, the driving belt 60 connects the projecting end of the driving shaft 17 with the tight and loose pulleys 61 and 62 mounted on the shaft 63, while the belt 64 is driven from the small pulley 65 on said shaft. This belt passes around the small pulleys 66 and 67 mounted on the studs 68 and 69 projecting from the upper end of the machine frame and also around the large pulley 70 to rotate the same. This large pulley is mounted on the short shaft 71 whose inner toothed end 71ª meshes with the gear 72 on the cam shaft.

73 is the treadle rod carrying the treadle lever 73ª and is journaled in the bearings 74 and 75 (see also Fig. 8), which bearings are adjustably mounted on the machine brace rods 76 and 77. The shipper 78, pivoted on the bracket 79, is actuated through the medium of the bar 80 connecting said shipper with the arm 81 of the treadle rod.

82 is a standard or support adjustably mounted on the treadle rod having the head 82ª to which is pivotally supported the arm 83 carrying the pin or traveler 84 at its upper end adapted to engage with the spiral groove 85 in the face of the plate 86 on the cam shaft. This spiral groove determines the number of revolutions that the cam drum is to make, and, as represented, is capable of making two revolutions before it is brought to a state of rest as follows: If two revolutions are required, the bolt 87, connecting the foot 83ª of arm 83 and the head 82ª of the standard 82, is set to permit the traveler 84 being located at the inner end of the spiral groove so that, when the treadle 73ª is depressed to carry the belt 60 over on to the tight pulley 62, it also rocks the treadle rod 73 to carry the support 82 and arm 83 in the direction of arrow *x* (Fig. 2) far enough to clear its contact with the exterior of the plate 86, whereupon the spring 88 will throw the traveler carrying arm 83 toward the cam shaft as far as the bolt 87 will permit, which bolt being properly set will locate the traveler opposite the inner end of the groove 85, and, as soon as the treadle is released, the spring 90 (Figs. 4 and 8) carried by the arm 91 on the treadle rod, will rock said rod in the opposite direction and carrying the traveler into the inner end of the groove as shown at Fig. 8. When the traveler has run out of the groove 85, the spring 90 will carry the belt on to the loose pulley and stop the cam shaft. If required to stop the cam shaft at one revolution, the bolt 87, as before mentioned, will be adjusted so that the spring 88 will only throw the arm 83 in far enough to bring the traveler 84 midway between the outer and inner ends of the groove 85. Enlarging this spiral groove or scroll will, of course, increase the number of revolutions of the cam shaft before it is stopped.

Operation: Referring to Figs. 1 and 4, it being understood that the treadle has been actuated to start the rotation of the cam drum shaft as before explained, the plate 3 is swung back to carry the knife away from the grinding wheel, and, while in this position, the roll 53 of the arm 51 is in contact with the inclined rib 92 of the now rotating cam drum. This rib will actuate the long arm 50 to move outward and rapidly draw the carriage 6 in the direction of arrow *e* until the inner corner (not shown) of the grinding wheel is opposite the base or corner of the knife blade next to the

bolster. As soon as this point is reached the inclined face of the cam 45 will engage the roll 41 of lever 40 and carry said lever out and lock it to the arm 44 as shown at Fig. 7. This outward movement of said lever 40 will swing the plate 3 toward the grinding wheel with the corner of said wheel at the base of the blade. While said lever and plate are in motion, the roll 53 will lie against the straight face *c* of the cam rib 93, which face represents the neutral position of the carriage 6 with respect to its longitudinal movement. When the incline face *h* of the cam rib 93 engages the roll 53, the carriage will be moved slowly in the direction of arrow *f* to grind the blade from bolster to point, which will require one revolution of the cam drum. When the knife blade has passed across the grinding wheel, the trip lug 48 will engage the rod 47 and lift the arm 44 and release the lever 40, whose inward movement, as before stated, will swing plate 3 away from the grinding wheel. To prevent the roll 41 slamming directly against the edge of the cam drum, it will first engage the incline face *i* of the cam 94 (see also Fig. 2) and roll gradually and easily against the drum. This cam 94 has the tail-piece 94[a] whereby it is adjustably secured to the drum by the screws 95. Its opposite face *k* serves two purposes, viz., to engage with the roll 41 and relock the lever 40 should said lever become accidentally unlocked before the grinding was completed, and also for grinding knives having no bolster.

When the cam drum has made one revolution and the lever 40 has been released by the trip lug 48 as before mentioned, the roll 53 will be at the extreme point *m* of the cam rib 93. Now, if the belt shipping mechanism is set for one revolution only, the cam drum will stop at this point, but if set for two revolutions, the roll will instantly be engaged by the rib 92 for an inward idle movement of the carriage for a second grinding. This automatic regrinding of the blade is a very important and economical feature in machines of this character. Heretofore it has been customary to set the grinding wheel so that it will take off all of the rough stock from the knife when once passed across the face of the grinding wheel and to polish after this cut. This grinding cut is necessarily a heavy one and especially so where the surface of the knife is very rough and uneven, and by reason of the springing back of the knife under this heavy cut, the ground surface will be comparatively rough and uneven and will require more time and effort to produce a satisfactory finished surface by the polishing operation.

With my improved arrangement, when a batch of knives require double grinding, the first travel of the carriage will remove the rough stock and automatically return the carriage for a second and finished grinding which will leave the surface of the knife in a condition to be readily finished on the polishing wheel. When a batch of knives having a forged or rolled surface capable of being removed by one grinding is to be ground, the machine can readily be set, as before mentioned, to stop at the completion of the single grind. To stop the rotation of the cam shaft instantly, the brake finger 78[a], forming part of the belt shipper 78, will be forcibly brought against the inner edge of the pulley 62.

When the carriage 6 is run in to place the corner of the knife opposite the corner of the grinding wheel, it is imperative that this position should be exactly located each time, but the wear of the joints of the different parts of the mechanism connected with the actuation of the carriage will soon develop so much lost motion that the definite location of the knife is more or less uncertain. To overcome this difficulty, I have arranged the adjustable stop rod 96 (Fig. 1), located in the block 97, secured to the foot 7[a] of the carriage support or track 7 and the adjusting screw 98 in the end of said rod. This screw will be set so that when the arm 55 of the carriage contacts therewith, all lost motion will be taken up and the exact position of the knife will be located with respect to the corner of the grinding wheel.

The exact construction of my several improvements is immaterial, as these can be varied without departing from the spirit of my invention.

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

1. In a cutlery grinding machine, the combination with a grinding wheel, a knife holder reciprocating carriage and a track therefor, means for operating the carriage, of an adjustable stop adapted to contact with the carriage and hold said carriage in a fixed position, until all lost motion in the carriage actuating mechanism is taken up.

2. In a cutlery grinding machine, the combination with a grinding wheel, a pivoted plate carrying a knife holder reciprocating carriage, a cam drum, a pivoted lever carrying a roll, of a cam adjustably supported independently of the cam drum and adapted to engage the roll and swing the lever away from the cam drum and thus cause the plate to swing toward the grinding wheel, means for temporarily locking the lever in its outward position, and means for releasing the lever at each revolution of the cam drum to throw the plate away from the grinding wheel.

3. In a cutlery grinding machine, in combination, a grinding wheel, a pivoted plate

carrying a knife holder reciprocating carriage, a cam shaft, a cam drum mounted thereon, means on the drum for actuating the carriage, a lever for actuating the plate toward the grinding wheel, means for actuating and means for temporarily locking said lever, means for rotating the cam shaft one or more revolutions through the medium of a plate having a spiral groove in its face, a traveler for said groove, said traveler connected with the means for rotating the cam shaft, means for releasing the carriage carrying plate actuating lever at every revolution of the cam drum, and means for swinging it toward the grinding wheel.

4. In a cutlery grinding machine, the combination with a cam shaft carrying a cam drum and the mechanism actuated by said drum to grind a knife, and the driving means for rotating said shaft, of a rotating element having a spiral groove therein, a traveler for said groove, means for connecting said traveler with the shaft driving mechanism to stop the same when the traveler is not actuated by the groove, said groove of sufficient length to permit of one or more revolutions of the cam drum shaft, and means for adjusting the traveler with respect to the number of said revolutions required.

5. In a cutlery grinding machine, a driving shaft carrying a grinding wheel, a sliding box in which the shaft is journaled, a support for the box, means connected with the shaft to prevent its longitudinal movement in the box, said box having a hollow threaded extension embracing the shaft, a hand wheel having a threaded bore mounted on said threaded extension, means for rotatively anchoring said wheel against endwise movement so that, when said wheel is rotated, the shaft is longitudinally adjusted, for the purpose set forth.

6. In a cutlery grinding machine, a driving shaft carrying a grinding wheel, a longitudinally movable box in which the shaft is journaled, means connected with the shaft to prevent its longitudinal movement in the box, said box having a hollow threaded extension open at the side to admit the shaft, a hand wheel having a threaded bore mounted on said threaded extension, means for rotatively anchoring said wheel against endwise movement so that, when said wheel is rotated, the shaft is longitudinally adjusted, for the purpose set forth.

7. In a cutlery grinding machine, in combination with a cam shaft and its cam drum and mechanism actuated by said drum, and mechanism for rotating said shaft, of a rotating member having a spiral groove of sufficient length to permit of one or more revolutions of the cam drum, a traveler for said groove, means connecting the traveler with the cam drum rotating mechanism to stop the same when the traveler is not actuated by the spiral groove, and means for adjusting the traveler with respect to the number of revolutions required.

8. In a cutlery grinding machine, in combination with a pivoted plate carrying a knife holder reciprocating carriage, a grinding wheel, a cam drum and means for actuating the carriage, a lever for actuating the plate toward the grinding wheel, of an adjustable cam for actuating the lever and means for temporarily locking the lever, an adjustable lug on the drum for unlocking the lever at every revolution of the drum, and adjustable means on the drum to ease the return movement of the lever.

Signed at New Haven in the county of New Haven and State of Connecticut this 12th day of May A. D. 1909.

CHARLES L. JOY.

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