No. 693,756. Patented Feb. 18, 1902.

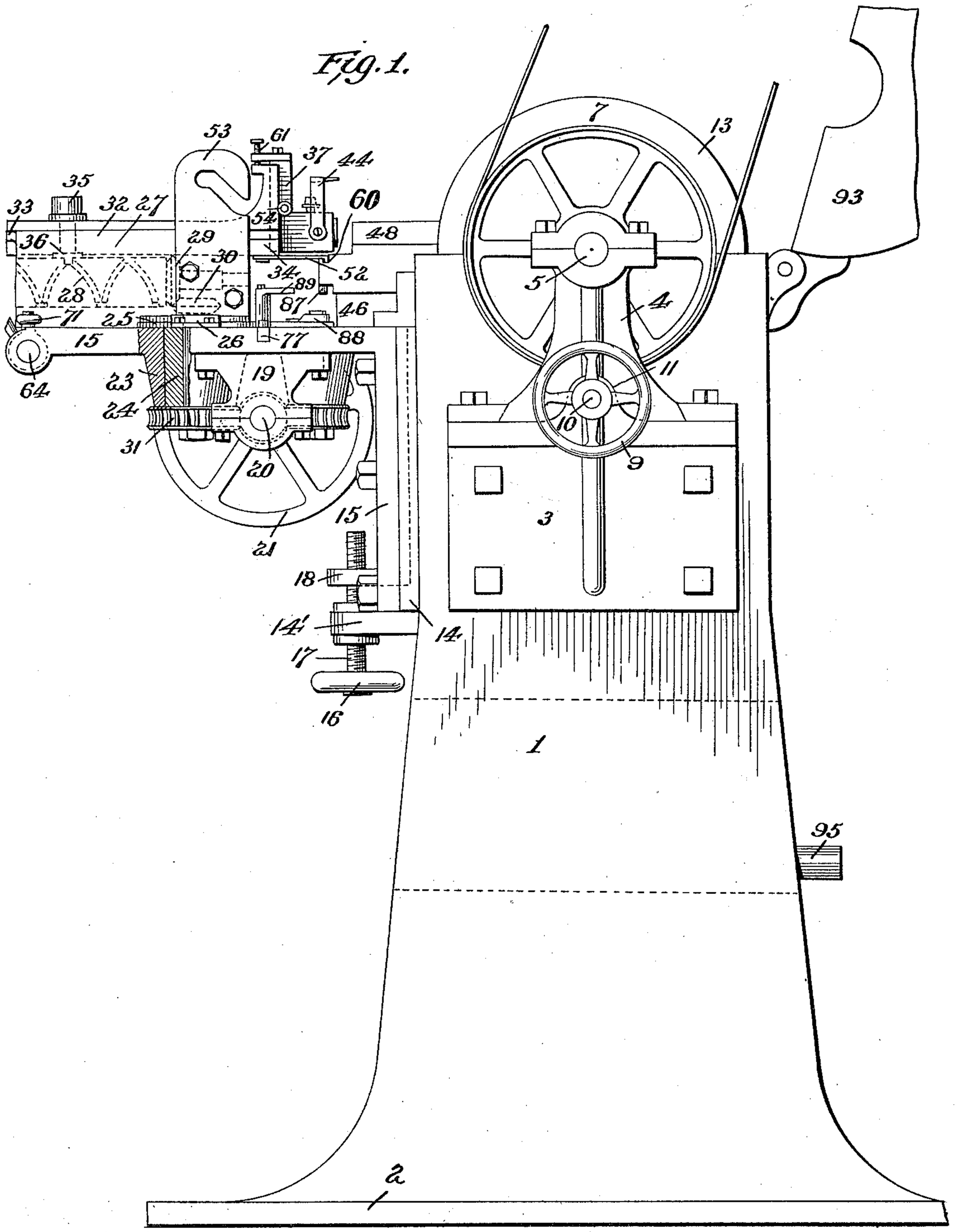
A. L. SWEET.

MACHINE FOR FINISHING KNIFE BLADES.

(Application filed June 7, 1901.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

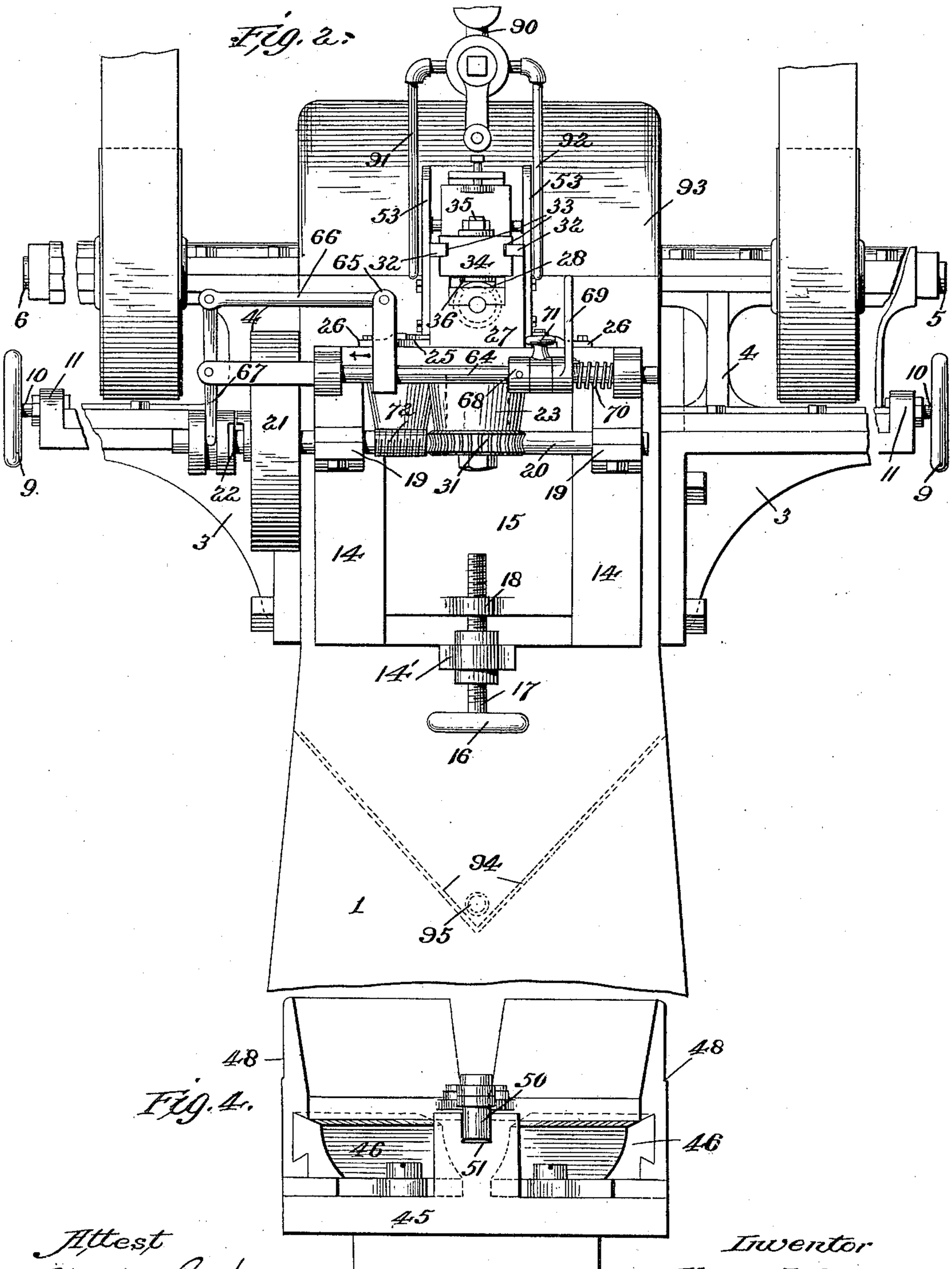

Fig. 4.

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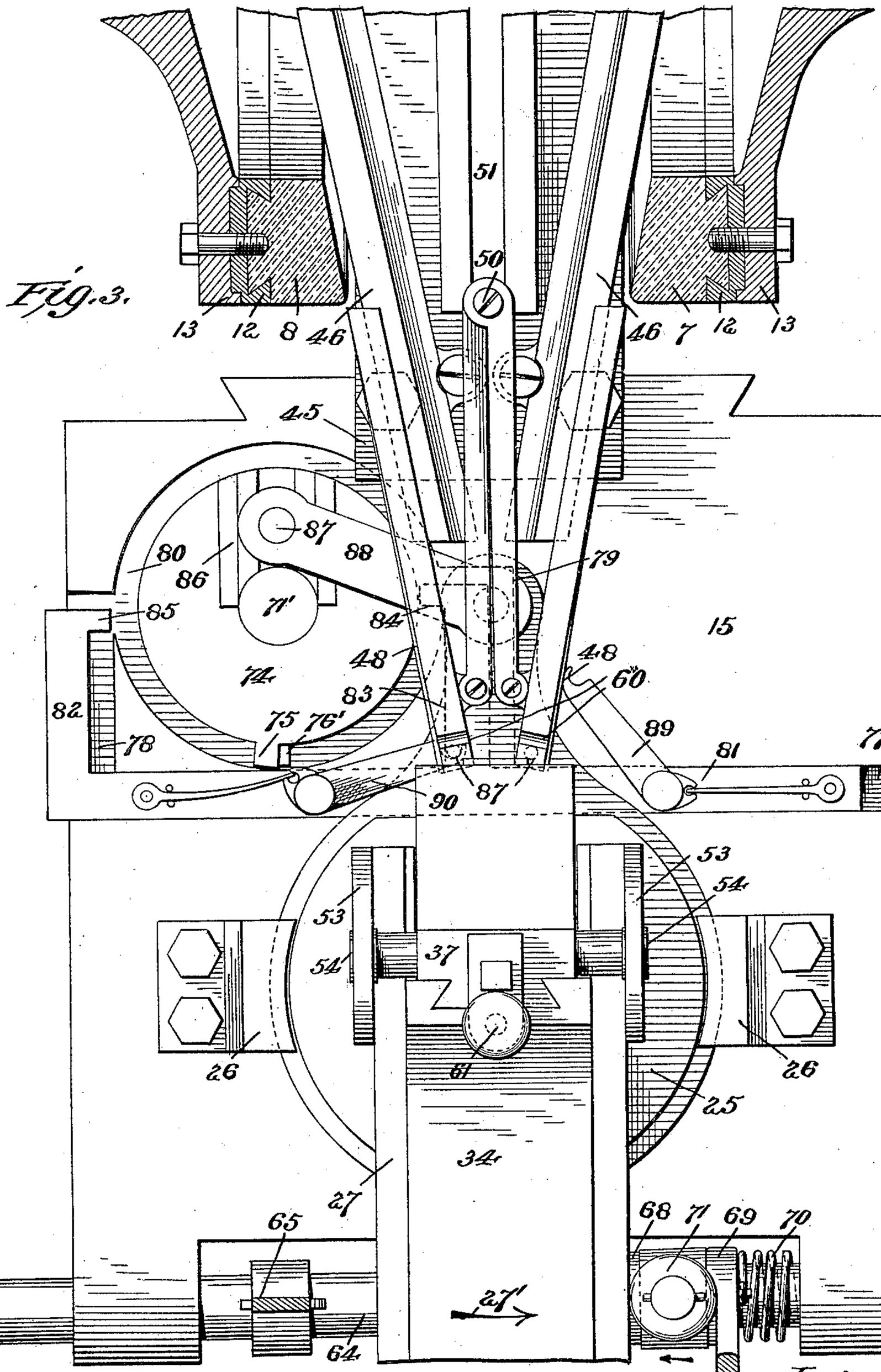
(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

Fig. 5.

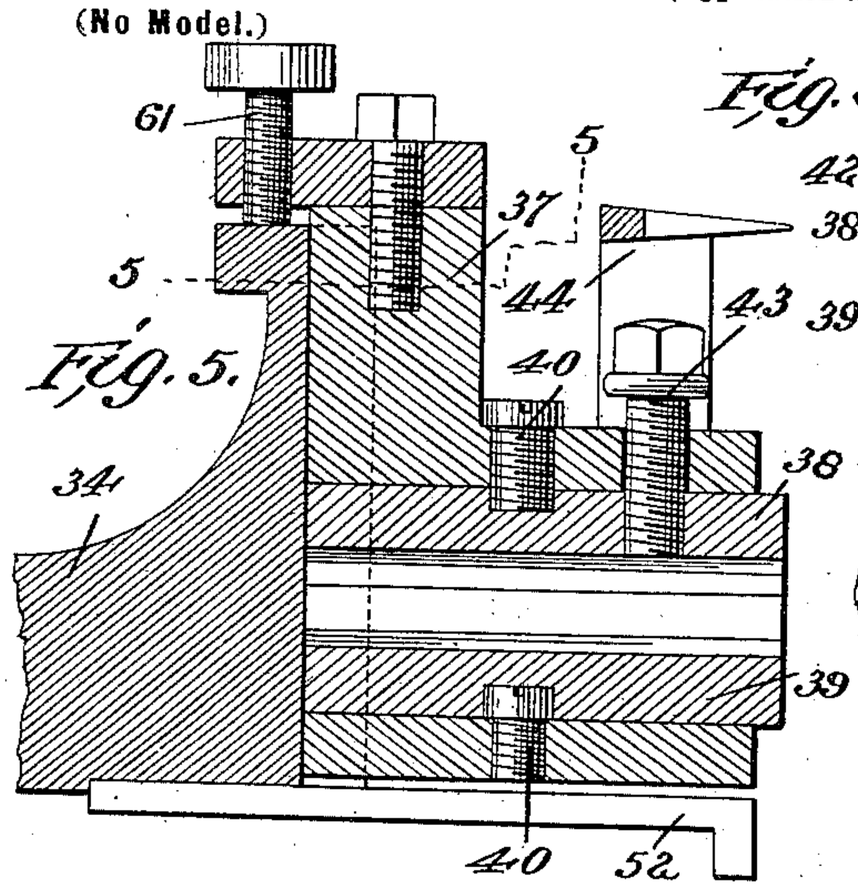

Fig. 8.

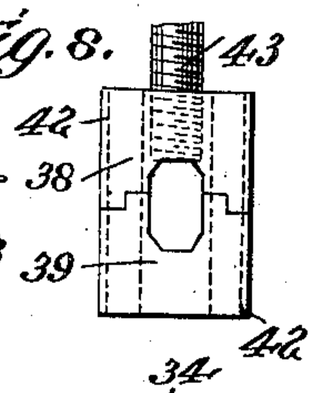

Fig. 9.

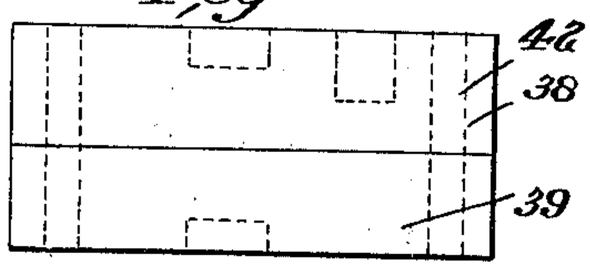

Fig. 7.

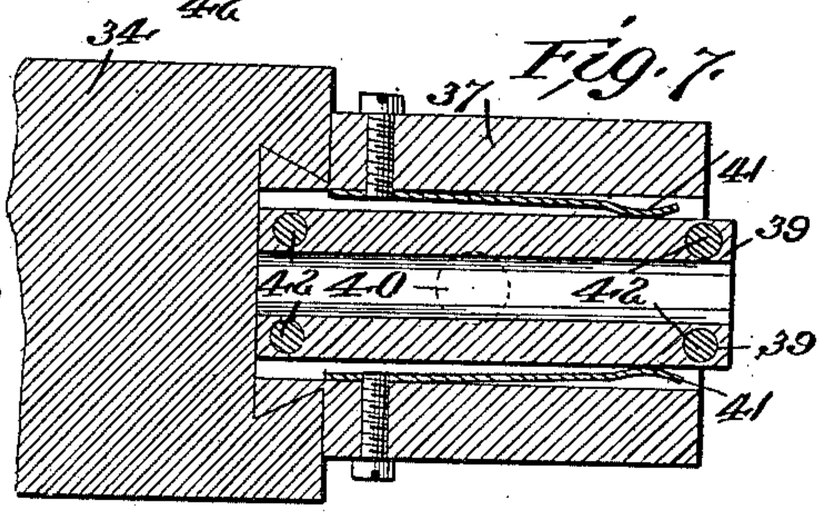

Fig. 6.

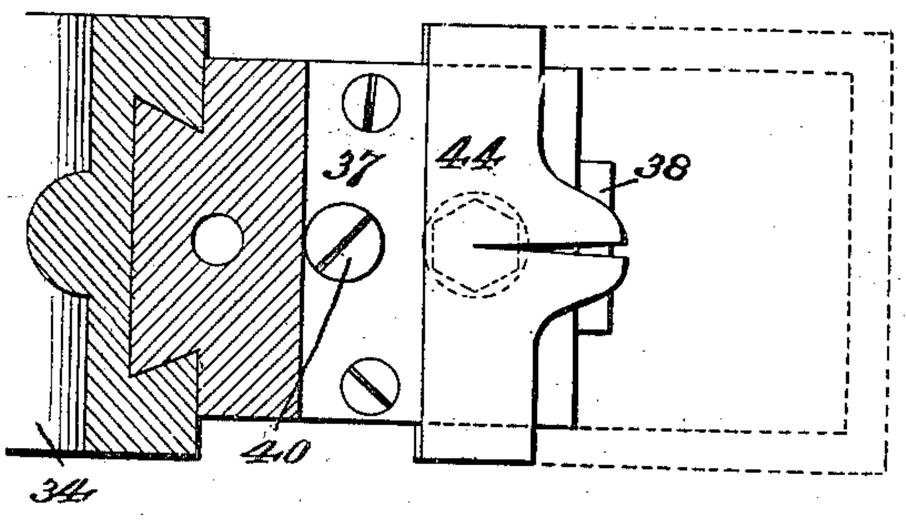

Fig. 11.

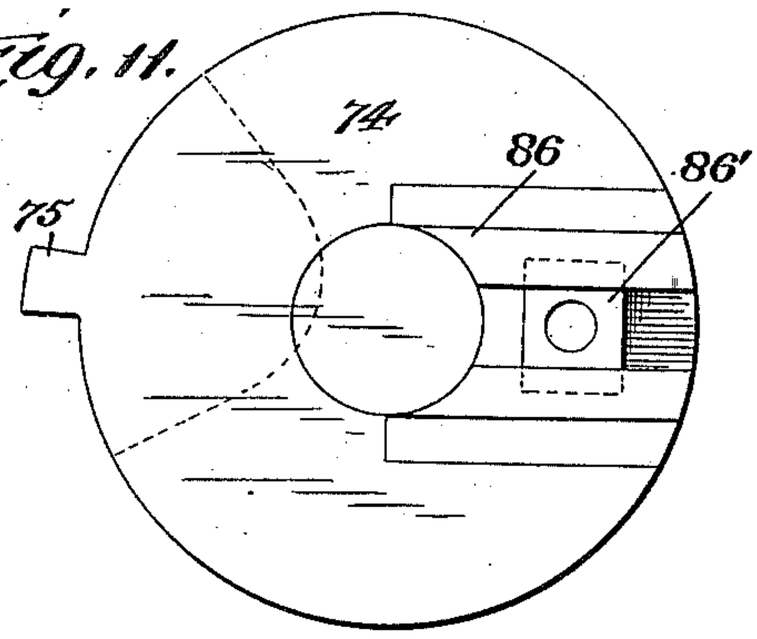

Fig. 10.

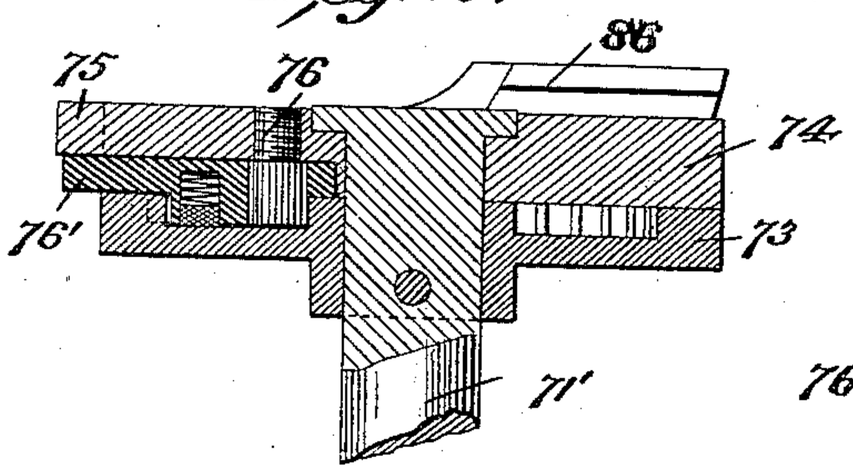

Fig. 12.

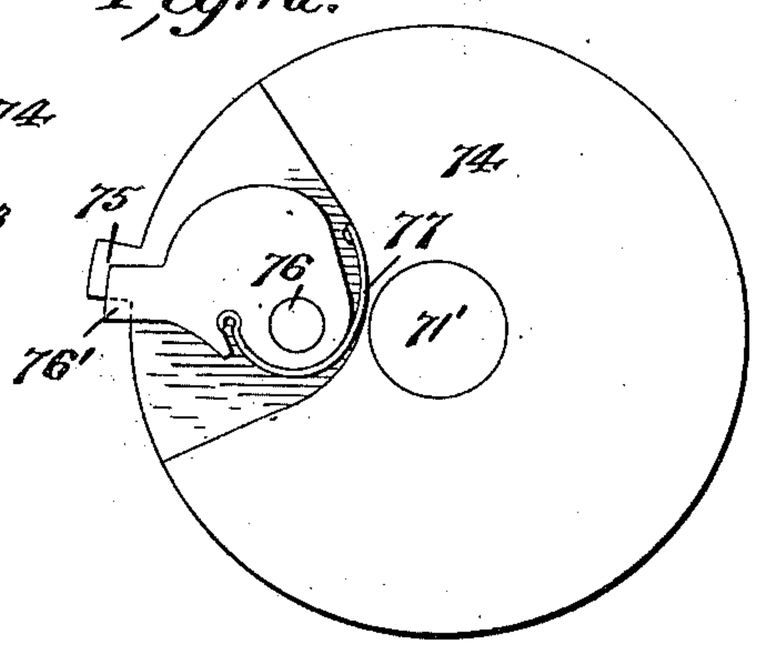

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Fig. 13.

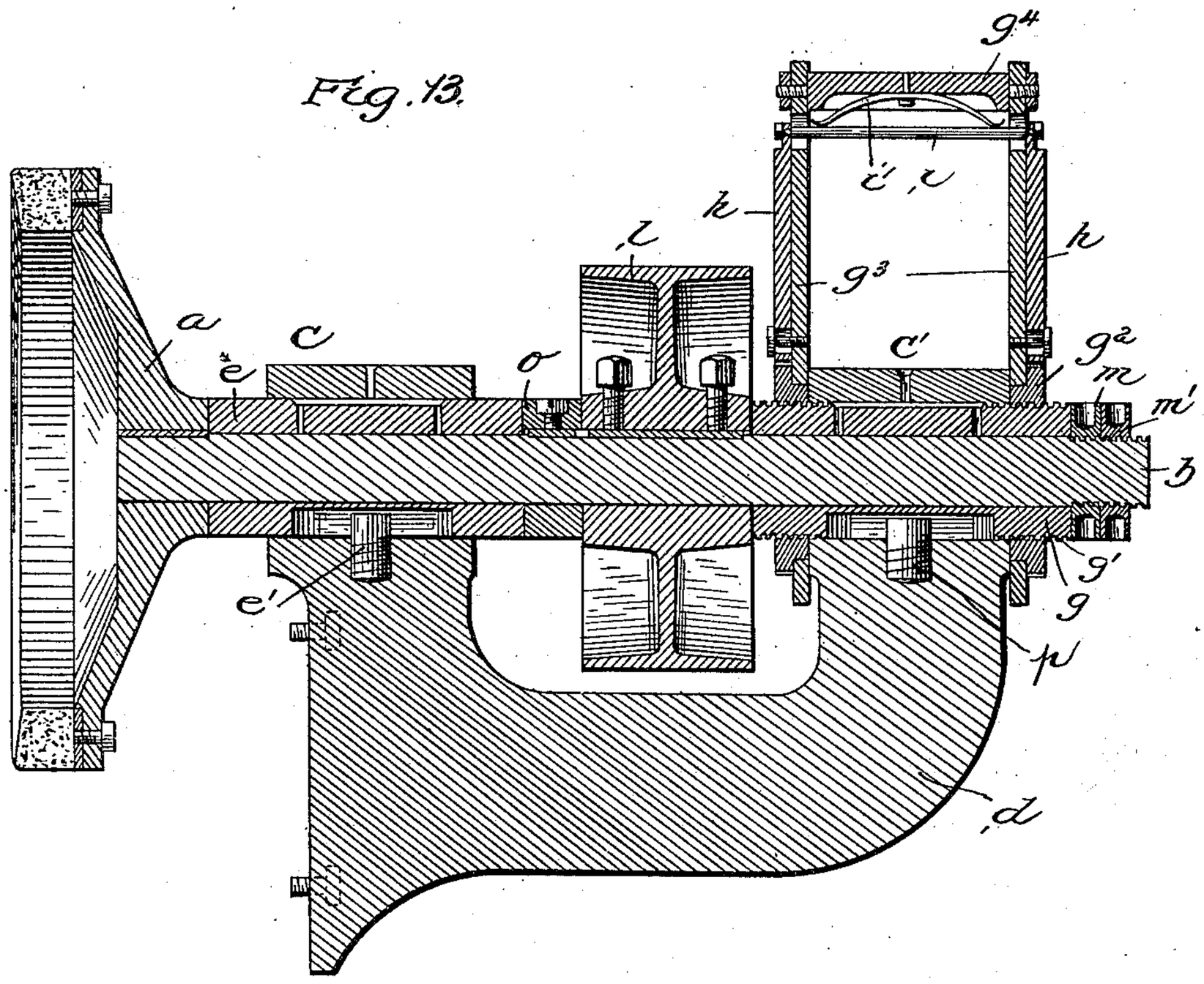
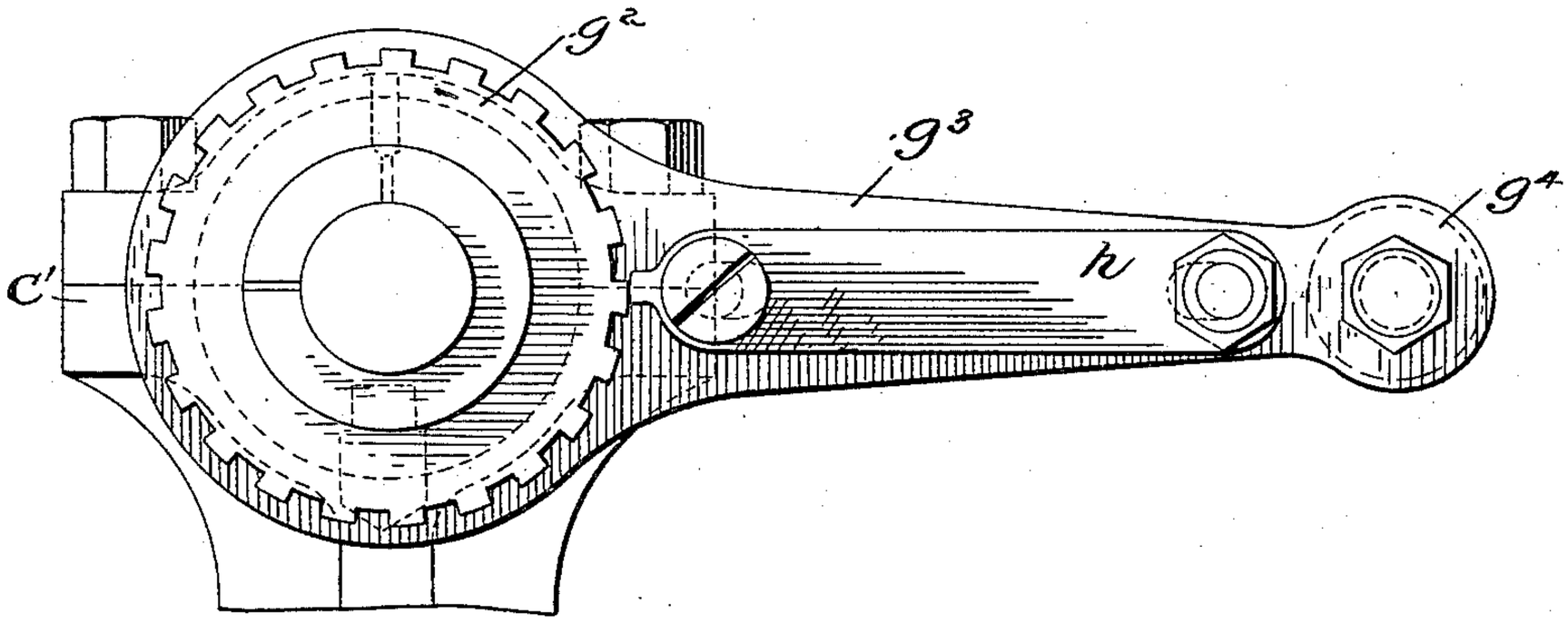


Fig 14.



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UNITED STATES PATENT OFFICE.

ALONZO L. SWEET, OF NORWICH, CONNECTICUT.

MACHINE FOR FINISHING KNIFE-BLADES.

SPECIFICATION forming part of Letters Patent No. 693,756, dated February 18, 1902.

Application filed June 7, 1901. Serial No. 63,557. (No model.)

To all whom it may concern:

Be it known that I, ALONZO L. SWEET, a citizen of the United States, residing at Norwich, New London county, Connecticut, have invented certain new and useful Improvements in Machines for Finishing Knife-Blades, of which the following is a specification.

My invention relates to machines for grinding knife-blades after they leave the forge preparatory to the polishing thereof. The machine is particularly designed for operating upon the blades of ordinary table-cutlery, and is intended to automatically grind the sides of a knife-blade to remove the scales and pits which are on the same when it leaves the forge, the operator only being required to place the knife to be operated upon in a chuck and remove the same therefrom at the completion of the operation thereupon and to start the carrier mechanism for the blade by means of a lever, this mechanism automatically stopping at the end of a complete operation upon a knife.

To this end the invention includes a pair of grinding-wheels, a chuck to hold the article to be operated upon, and an oscillating and reciprocating carrier for the chuck, which will feed the knife first to one wheel, running the blade across the grinding-face of the same to treat one side thereof and then to the other wheel, moving the blade across the grinding-face of the same to treat the reverse side of the blade.

It further includes means to hold the blade in contact with the grinding-wheels; and it further includes the mechanism for reciprocating the carrier and for oscillating the same at predetermined periods.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine; Fig. 2, an end view of the same; Fig. 3, a detail plan view of the part of the apparatus carried by plate 15, this view also showing in section a fragmentary part of the grinding-wheel; Fig. 4, a detail end view of the knife-guiding mechanism. Fig. 5 is a vertical sectional view of the knife-chuck and holder therefor. Fig. 6 is a sectional view on line 5 5. Fig. 7 is a horizontal sectional view. Fig. 8 is an end view of the chuck-jaws. Fig. 9 is a side elevation of the same. Fig. 10 is a detail sectional view of a part of the mechanism for oscillating the knife-carrier. Fig. 11 is a plan view of the same, and Fig. 12 is a view of the under side of a part of said mechanism. Figs. 13 and 14 are modifications of a structural detail.

The entire grinding and knife-carrying mechanism of the machine is supported upon a hollow column 1, having a base-flange 2, which rests upon the floor or other support for the machine and may be bolted thereto. To opposite sides of the column, near the top thereof, brackets 3 are bolted, in the horizontal portions of which guideways are provided to receive the bases of short standards or supports 4, which carry the shafts 5 and 6, upon the inner ends of which the grinding-wheels 7 and 8 are fixed. The standards are adjusted by means of hand-wheels 9, fixed to the ends of screws 10, passing through bosses 11 of the brackets 3 and threaded into the bases of said standards. These adjustments permit the grinding-wheels to be accurately positioned in relation to the way along which the work travels and to be shifted to compensate for wear to maintain the grinding-faces of the wheel in the predetermined position in relation to the path along which the work is moved.

In constructing the grinding-wheels a metal backing-disk 12, having a dovetail groove in the face thereof, is employed which has thereon a ring of emery. The ring is locked in place by forcing a portion of the same into the groove in the disk during the molding operation. The disks with the emery facings are bolted to carriers 13, fixed to the ends of the shafts 5 and 6.

Ribs 14, formed integral with the rear side of the column, provide a guideway in which the vertical portion of an angle-plate 15 is guided. This plate is adjusted vertically by means of a hand-wheel 16 and screw 17, held against longitudinal movement in a lug 14′, extending from the column, the threaded portion thereof engaging a threaded opening in a lug 18, projecting from the vertical portion of the angle-plate. From the opposite sides of the bottom of the horizontal portion of the angle-plates brackets 19 depend, in which the main drive-shaft 20 is journaled. One end of this shaft extends through one of the brackets and carries a drive-pulley 21 and clutch 22 for connecting the latter to the shaft. From approximately the center of

the under face of the horizontal portion of the angle-plate 15 a hollow boss 23 depends, in which is journaled a second hollow boss 24, depending from the under side of a turn-table 25, held in place on the angle-plate by oppositely-located clamps 26.

A casing 27, formed integral with or rigidly secured to the turn-table, is provided with ends having bearings for the journals of a double screw 28, contained between the walls of the casing. The journal at the forward end of the screw has a beveled gear 29 fixed thereto, which meshes with a corresponding gear 30, fixed to the end of a short shaft extending through boss 24 and carrying at its lower end a worm-wheel 31, which meshes with a worm on the main shaft 20. In this manner screw 28 is rotated from the main shaft.

To the upper edges of the sides of the casing 27 strips 32 are bolted to provide guide-ribs, which project into grooves 33 in the sides of a sliding carriage 34. The latter has a stud 35 journaled therein, provided with a tongue 36, which fits the grooves in the double screw. Thus as the double screw is rotated, as before mentioned, the sliding carriage will be reciprocated. The head of the carriage, at the forward end thereof, is provided with a dovetail vertical way into which a correspondingly-shaped rib projecting from the rear face of a chuck-casing 37 loosely fits. Within the casing jaws 38 39 are located for gripping the handle of the knife to be operated upon. The jaws are pivoted on two vertical screws 40, so that they may turn in a horizontal plane for a purpose to be hereinafter described, but are normally held in a central position by flat springs 41, fixed at one of their ends to the walls of the socket within the casing, their free ends pressing against said jaws. The jaws are held together by screws 42, passing through the same near each corner thereof.

After the handle of a knife is inserted in the receiving-socket between the jaws a clamping-screw 43, threaded in an opening in the upper jaw, is screwed down to bind the same in place. Working in connection with the chuck is a pivoted gage 44, which is swung down after a knife is placed in the chuck and before screw 43 is tightened up. After the knife is properly positioned in relation to the gage the screw 43 is tightened and the gage swung back out of the way.

Bolted to the face of the angle-plate and projecting in between the grinding-wheels through a cut-out portion in the top of the column is a plate 45, to which guide-bars 46 are bolted, the latter diverging from a point near the turn-table where the ends thereof are in close juxtaposition. Upon these bars the knife-blade holders are reciprocated by means to be described. Each holder is provided with a ledge 48 on the side nearest the adjacent emery-wheel, upon which the back of the blade to be ground is seated, and this ledge, which in width must be slightly less than the width of the back of the knife, converges from its widest part at the rear end of the holders toward the front end thereof, where it vanishes into the sides of said holders. To a stud projecting inwardly from near the front end of each holder a link is pivotally attached at one end, the opposite ends of said links being pivotally secured to each other by a pin 50, which extends through said ends and projects into a way 51, extending longitudinally of plate 45, centrally of the same. Thus the holders are connected up, so that when means are connected to one for reciprocating the same the other one will move in unison therewith. Each of the holders is provided with a recess 60, extending across its face at the rear end of the same, with which a hook 52, fixed to the forward end of the reciprocating carriage, is designed to engage. The holders are thus coupled to the carriage to reciprocate therewith, as will be explained in detail hereinafter.

At the end of the operation upon a knife the reciprocating carriage and holders are retracted their full limit, which brings the rear end of the latter in juxtaposition. The oscillating table at this time is in a position midway between the extreme positions assumed thereby during its oscillation.

To each side of the casting 27, at the front end of the same, a vertical plate 53 is bolted, in which corresponding slots are cut, inclining upwardly from the front edges of said plates.

At each side of the chuck rollers 54 are journaled, which as the carriage nears the completion of its rearward reciprocation enter said slots, and as the carriage continues to recede move up the incline walls of the same, thereby lifting the chuck, which raises the blade of the knife above the plane of the upper edges of the holders. This is the position the chuck is in at the end of a complete operation upon a knife. After a new knife to be operated upon is placed in the chuck and the drive-pulley thrown in, as will be hereinafter described, the oscillating table is operated and moves from its central position described to one of its extreme positions. This alines the carriage with one of the guide-bars and brings the hook 52 into position to engage with the holder guided on said bar. As the carriage feeds forward the chuck-rollers travel down the incline in plates 53, bringing the back of the blade of the knife against the ledge in the holder. The upper edges of the holder are beveled or curved, so as to guide the blade in its downward movement, the jaws of the chuck being flexibly supported, as before stated, to permit each guide to press the knife laterally a slight distance. To prevent the chuck dropping down too far, a limiting-screw 61 may be provided. The carriage is now reciprocated forward and back, the holder pressing the blade against the grinding-face of the emery-wheel. As the

carriage retracts the chuck is again raised, and while in this raised position the oscillating table is moved over into its other extreme position, the hook moved out of engagement with the first holder and into engagement with the second, the blade seated on the ledge on the second holder, and said holder reciprocated, thus bringing the opposite side of the knife-blade against the second emery-wheel.

The means for starting the machine and for automatically stopping the same at the completion of the work upon a knife will now be described. From the rear edge of the horizontal portion of the angle-plate 15 at each side thereof a lug depends in which a shaft 64 is keyed so as to have longitudinal movement. To this shaft an arm 65 is secured, connected at its other end by a link 66 to a pivoted lever 67, which engages with and controls the clutch for connecting the drive-pulley with the main shaft. A collar 68 is pinned to the shaft 64, against which a hub carried by a lever 69 loose on shaft 64 is pressed by a spiral spring 70, which also tends to hold the arm up, and a roller 71, journaled on an extension of the hub, in the path of the oscillating guide for the carriage—*i. e.*, casing 27. This spring tends to press the shaft 64 in the direction indicated by the arrow, so as to hold the clutch in. However, on the completion of the grinding of a knife-blade the rear end of the carriage-guide is swung against roller 71, forcing the same over against the tension of the spring and releasing the clutch, the machine at once coming to a stop. To start up, the lever 69 is depressed, carrying roller 71 below the edge of carriage-guide 27, freeing spring 70, which at once shifts shaft 64 longitudinally and throws in the clutch through the connections described. In the first movement of casing 27 the rear end thereof swings in the direction of arrow 27′, Fig. 3, and as the roller 71 is held depressed by the operator the casing will pass above the same. The operator may then release lever 69, and the casing 27 will hold the roller 71 down until it is swinging over toward the opposite side of the machine. The roller will assume its upright position as soon as it is freed from the casing and stand in a position to be struck and shifted by the casing 27 as the casing is again swung in the direction indicated by arrow 27′.

The mechanism for automatically oscillating the table at predetermined intervals will now be described. Extending through the angle-plate and a second boss depending therefrom is a shaft 71′, having a worm-gear secured to the lower end thereof, which meshes with a second worm 72 on the main shaft. Pinned to the upper portion of shaft 71′ is disk 73, having internal ratchet-teeth, the upper face of the angle-plate being recessed to receive the disk. Mounted loosely upon the extreme end of the shaft and held thereon by the head of the shaft bearing upon the upper side of the same is a disk 74, having a lug 75 projecting from the periphery of the same and a cut-out portion in its under face adjacent to said lug, in which a dog is located, the latter being pivotally connected to the disk by a pin 76. The dog is normally pressed outwardly into engagement with the teeth of the ratchet by a spring 77. The tail of the dog extends over the edge of the disk 73 and beneath the lug 75. Both the lug 75 and the tail 76′ of the dog in the rotation of the parts travel in an annular channel 80 in the face of the angle-plate surrounding said disks. A channel 77 in the face of the angle-plate, running transversely of the same and having two branches 78 79, which intersect with the channel 80, receives a bar 81, having two branches 82 83, which move in the branch channels 78 79 and are provided with inwardly-extending lips 84 85, designed to coact with lug 75 and the tail 76′ of the dog. The upper face of disk 74 is provided with a way 86, in which a nut 86′ is held, the latter being secured to the end of a pin 87, depending from one end of a link 88, the other end of which is pivotally connected to the end of the oscillation-table. During the rotation of the main drive-shaft the disk 73 is continuously rotated, and when the dog is in engagement with the ratchet-teeth thereof it rotates the disk 74 therewith. At the commencement of the operation of the machine the bar 81 occupies such a position that the lip 84 is held in the path of rotation of lug 75 and the tail 76′ of the dog. The connection between the link 88 and the disk 74 is in a position centrally between the extreme positions which the same assumes in the operation of the machine. Therefore, as before stated, the oscillating table is held in a central position. Assuming that the main shaft is now started, the disk 73 is rotated. The dog being in engagement rotates the disk 74, which pulls the link 88 over, moving the oscillating table in one direction the extreme limit of its movement. At this period lug 75 and tail 76 strike lip 84. The dog is immediately disengaged from the ratchet and the rotation of disk 74 arrested. The carriage now feeds forward, as before described, along the line into which it has been moved. At the rear end of each of the combined holders and guides a pin 87 depends, which is designed to engage with the end of one of the spring-held detents 89 90, pivoted to the bar 81, when said ends extend into the path of said pins. As the machine starts detent 90 is held retracted by the pin on the holder, which first receives the knife-blade, and detent 89 is pressed against the side of the adjacent holder 48 by its spring. As soon as the end of holder 48 passes the end of detent 89 in the forward stroke of the former the spring controlling the latter will throw the forward end of the same into the path of the pin 87, depending from said holder. As has been described before, the holders move in unison, so that the rearward movement of the carriage draws both of the said holders along, bringing the pin de-

pending from the holder out of use into engagement with the detent in its path and therethrough shifting bar 81, which moves lip 84 out of the path of lugs 75 and tail 76 and lug 85 into the path of the same. As soon as the tail 76′ is released the spring-pressed dog will reengage the ratchet, which will couple disk 74 to disk 73 again, and the two will rotate together until the lug and tail strike lips 85, when disk 74 will again be arrested. During the period lug 75 is moving from lip 84 to lip 85 the disk makes a one-half revolution, which through link connection moves the turn-table over into its opposite extreme position, and the carrier again moves forward and back, carrying the knife-blade against the second emery-wheel to grind the opposite face of the blade. When the bar 81 is shifted, the end of the detent 90 is brought into the path of the pin depending from the first blade-holder, so that on the second rearward movement of the carriage the bar 81 is again shifted in a reverse direction, again moving lip 84 into the path of lug 75 and tail 76 and releasing them from lip 85. The two disks again start to rotate in unison; but by the time they have made a quarter-rotation the carriage-guide 27 has engaged wheel 71 and through the beforedescribed mechanism thrown the clutch out, disconnecting the drive-pulley from the main drive-shaft, and the machine stops.

As before stated, the angle-plate may be adjusted vertically of the supporting-column. This permits the horizontal plane in which the knife-carrier and parts coöperating therewith work to be varied in relation to the emery-wheels, so that the knife-blade may be reciprocated across the said wheels in a plane centrally of the axles of the same or in planes to either side of said central position at the option of the operator.

It will be understood from the foregoing that the operator in starting the machine merely has to place a knife in the chuck and depress lever 69. The machine then automatically grinds both sides of the blades and comes to a complete stop when this is accomplished.

To supply the emery-wheels with water, a pipe 90 is provided with branches 91 92, which lead in through the hinged cap 93, provided to cover the upper portion of the wheel to prevent the water being thrown out by centrifugal force during the operation of the machine. At the insertion of the branch pipes with the main pipe a three-way cock is placed which may be automatically controlled by a lever connection to the oscillating part of the machine, so that the supply of water may be automatically cut off to one wheel and turned on the other as the knife-blade is transferred from one wheel to the other.

The column 1 is interiorly provided with synclinal walls 94, which form the bottom of a chamber provided to catch the dripping from the emery-wheels, and from this chamber a suitable outlet 95 leads.

In Figs. 13 and 14 a modification of the grinding-wheel support is illustrated. The grinding-wheel is shown at *a*, secured to the end of a shaft *b*, which passes through the bosses *c c′* of the bracket *d*, which is bolted to the side of column 1. A bronze bushing *e* surrounds the shaft *b* inside of boss *c*. This bushing is held against rotary movement by a pin *e′*, secured in boss *c*, having its head extending into a slot in said bushing. A similar but longer bushing *g* surrounds shaft *b* within boss *c′*. The opposite end portions of the bushing *g* are provided with threads *g′*, which project beyond the ends of said boss *c′* and are engaged by interior threads of ratchet-wheels g^2. Upon the hubs of the latter the ends of the arms g^3 are swiveled, the latter being connected by a cross-piece which provides a hand-grip g^4. Each arm carries a sliding detent *h*, designed to engage the teeth of the ratchet-wheels to couple the swiveled handle formed by said arms and hand-grip to the ratchet-wheels, so that the parts will turn together. The detents are connected by a cross-piece *i*, upon which a spring *i′*, secured to hand-grip g^4, bears, whereby the detents are normally held in engagement with the ratchet-wheels. To disengage the detents, the grip g^4 and cross-piece *i* are forced together against the tension of the spring. The drive-pulley *l* is suitably keyed to shaft *b* and abuts at one end the end of bushing *g*. The opposite end of said bushing abuts the face of an adjusting-nut *m*, screwed upon the end of shaft *b* and retained in place by a lock-nut *m′*. The nut *m* is adjusted on shaft *b* to bring the end of the hub *a* against one end of bushing *e*, a space-block *o* against the other end of said bushing, the hub of pulley *l* against block, and the end of bushing *g* against the hub. It will be apparent that with the parts in this position and the handle and ratchet-wheels coupled together a movement of the handle in either direction will impart a like movement to the ratchet-wheel and through the threaded connection between said wheels and bushing *g* shift the same axially. The bushing *g* is prevented from rotating by a pin *p*, screwed in boss *c′*, the head of which extends into a narrow slot in the under side of the bushing. By reason of the parts arranged on shaft *b* abutting each other any axial movement of bushing *g* will be imparted to shaft *b*, whereby the position of the wheel *a* will be altered.

I claim as my invention—

1. In a machine for grinding knife-blades in combination, a grinding medium, a knife-carrier and means for reciprocating the same to move the blade along the grinding medium and means for moving the carrier to shift the knife laterally in relation to said reciprocating movement to bring first one side and then the other side of the knife-blade against the grinding medium, substantially as described.

2. In a machine for grinding knife-blades, in combination two grinding devices, a knife-car-

rier and means for reciprocating the carrier to move the knife-blade across the grinding devices and means for oscillating the carrier to bring the blade into position to be ground by one device and then the other, substantially as described.

3. In a machine for grinding knife-blades in combination a grinding-wheel, a knife-carrier, a holder for pressing the blade of the knife against the wheel and means for automatically placing the blade of the knife in the holder and removing the same therefrom, substantially as described.

4. In combination in a knife-grinding machine, two grinding-wheels, a knife-carrier, a knife-blade holder for each wheel, and means for automatically placing the blade in one holder and for automatically transferring the same to the other holder, substantially as described.

5. In combination in a knife-grinding machine, two grinding-wheels, a knife-holder for each wheel, a carriage with means for reciprocating and oscillating the same, a chuck secured to the carriage and means for controlling the chuck to raise and lower the same whereby the knife-blade is placed in and removed from said holders, substantially as described.

6. In combination, a grinding device, a knife-carrier, a knife-blade holder and means for reciprocating the carrier and a coupling between the carrier and holder for reciprocating the latter with the former, substantially as described.

7. In combination, two grinding devices, a single knife-carrier, a knife-blade holder for each grinding device, and a device on the carrier adapted to engage either holder and means for reciprocating and oscillating the carrier, substantially as described.

8. In combination, two grinding devices, a knife-carrier, a knife-holder for each device, a fixed guide for each holder, means for reciprocating the carrier, means for oscillating the same to bring the carrier first into alinement with one holder and then the other, and a connection on the carrier adapted to engage either holder, substantially as described.

9. In combination, a grinding device, a knife-carrier, a chuck-casing, means for raising and lowering the chuck-casing, a knife-holder having a seat for the blade of the knife, the edge of the holder forming a guide to said seat, jaws in said casing for gripping the knife and means for yieldingly supporting the jaws to permit the same to swing in a horizontal plane substantially as described.

10. In combination, a grinding device, a knife-carrier, a knife-holder having a seat for the blade, the edge of the holder forming a guide thereto, a chuck-casing, means for raising and lowering said casing and gripping-jaws pivoted in the casing and springs interposed between the wall of the casing and the jaws, substantially as described.

11. In combination, oppositely-arranged grinding-wheels with means for rotating the same, a single knife-carrier with means for reciprocating the same, a guide-bar for each wheel, said bars being located between said wheels, a knife-blade holder guided on each bar, and means for changing the knife-blade from one holder to the other at the end of a full stroke of the carriage, substantially as described.

12. In combination, a grinding device with means for operating the same, a knife-carrier, means for reciprocating and oscillating the same, means for holding the knife-blade, and means for adjusting said carrier and operating means and said blade-holding means in relation to the grinding device, substantially as described.

13. In combination, a base-column, a grinding device supported thereby with means for operating the same, a plate adjustably supported on said column and a knife-carrier and operating means therefor carried by said plate, substantially as described.

14. The combination with a column and grinding means carried thereby, of a plate adjustably supported on said column, and a knife-carrier with means for reciprocating and oscillating the same and knife-blade-holding means supported on said plate, substantially as described.

15. In combination, two grinding devices, a reciprocating carriage with means for operating the same, a knife-holder operated thereby, a guide for said carriage and means for oscillating the guide, substantially as described.

16. In combination, two grinding devices, a carriage, a screw with means for rotating the same, a connection between the carriage and screw whereby the latter is reciprocated by the rotation of the former, a knife-holder secured to the carriage and a guiding device for the carriage with means for oscillating the same, said guiding device containing said screw, substantially as described.

17. In combination, two grinding devices, a carriage with means for reciprocating the same, a blade-holder for each grinding device having a seat for the knife-blade, a chuck for holding the knife moving with the carriage and slidably connected thereto to have independent movement, means for oscillating the carriage and means for automatically raising and lowering the chuck, substantially as described.

18. In combination, two grinding devices, a carriage with means for reciprocating the same, a blade-holder for each grinding device having a seat for the knife-blade, a chuck for holding the knife moving with the carriage and slidably connected thereto to have independent movement, means for oscillating the carriage, projections on the chuck and fixed inclined guides adapted to engage said projections during the movement of the carriage to raise and lower the chuck, substantially as described.

19. In combination, two grinding devices, a carriage with means for reciprocating the same, a guiding device for the carriage, means for oscillating the same to shift the carriage laterally, a blade-holder for each grinding device having a seat for the blade, a chuck having a sliding connection to the end of the carriage, plates secured to the forward end of the carriage, said plates having inclined guide-slots therein and projections on the chuck coöperating therewith in the reciprocatory movement of the carriage to raise and lower the chuck, substantially as described.

20. In combination, two grinding devices with means for operating the same, a carriage, a main drive-shaft, a drive-pulley, clutch mechanism for connecting the pulley to the shaft, means operated from the drive-shaft for reciprocating the carriage, a guiding device for the carriage, means for oscillating the same, driven from said shaft, mechanism for controlling the clutch, said oscillating guiding device coacting therewith to throw said clutch out, substantially as described.

21. In combination, two grinding-wheels, with means for rotating the same, a carriage, a knife-holder carried thereby for reciprocating the carriage, a guiding device for the carriage, means for oscillating the same driven from said shaft, a drive-pulley, clutch mechanism interposed between the pulley and the shaft, an arm having an engagement with the clutch mechanism to throw the same in or out, a reciprocating shaft, a connection between the shaft and said arm for controlling the latter from the shaft, a stop on the shaft, a spring, a device interposed between the spring and stop adapted to be held in the path of the oscillating guide, said spring being adapted to press said interposed device against the stop to shift the shaft and hold in the clutch, said oscillating guide striking the interposed device at the end of its movement in one direction whereby the said device and the reciprocating shaft are shifted against the tension of the spring and the clutch thrown out, substantially as described.

22. In combination, two grinding-wheels, with means for rotating the same, a carriage, a knife-holder carried thereby for reciprocating the carriage, a guiding device for the carriage, means for oscillating the same driven from said shaft, a drive-pulley, clutch mechanism interposed between the pulley and the shaft, an arm having an engagement with the clutch mechanism to throw the same in or out, a reciprocating shaft, a connection between the shaft and said arm for controlling the latter from the shaft, a stop on the shaft, a lever also mounted thereon, a device carried thereby held in the path of the oscillating guide when the lever is up, a spring for holding the lever up and for pressing the same against the stop, said oscillating guide in its movement striking said device to move the same and the reciprocating shaft against the tension of the spring whereby the clutch is thrown out and the machine stopped, said lever being adapted to be actuated manually to carry said device out of the path of the oscillating device, whereby the spring will again throw in the clutch, substantially as described.

23. In combination, two grinding-wheels, a carriage, a knife-holder fixed thereto, a drive-shaft, means driven therefrom for reciprocating the carriage, a guiding device for the carriage, means driven from said shaft for oscillating said device from a central position to one side and then back to the other and again to said central position during the period the carriage is making two complete forward and back reciprocations, a drive-pulley, clutch mechanism interposed between the same and the shaft, a device held under tension in the path of the oscillating guide, said device having controlling means for shifting the clutch, said oscillating guide striking and moving the device on its final return to said central position whereby the clutch is thrown out and held out, means for manually moving the device out of the oscillating guide, and means for shifting the device to throw in the clutch when said device is moved out of the path of the guide, said guide automatically holding the device out of its path during the first portion of its oscillatory movement, substantially as described.

24. In combination, two grinding-wheels, a carriage, a knife-holder fixed thereto, a drive-shaft, means driven therefrom for reciprocating the carriage, a guiding device for the carriage, means driven from said shaft for oscillating said device from a central position to one side and then back to the other and again to said central position during the period the carriage is making two complete forward and back reciprocations, a drive-pulley, clutch mechanism interposed between the same and the shaft, a device held under tension in the path of the oscillating guide, said device having controlling means for shifting the clutch, said oscillating guide striking and moving the device on its final return to said central position whereby the clutch is thrown out and held out, means for manually moving the device out of the path of the oscillating guide, and means for shifting the device to throw in the clutch when said device is moved out of the path of the guide, said guide automatically holding the device out of its path during the first portion of its oscillatory movement, said shifting means for the device returning the same to its position into the path of the oscillating device at the completion of the first part of the oscillatory movement of the guiding device, substantially as described.

25. In combination, two grinding-wheels, a carriage, means for reciprocating the same and oscillating device providing a guide for the carriage and means for giving said device its oscillatory movement comprising a main

drive-shaft, a disk, connection between the disk and said device, and means for rotating the disk driven from the main shaft, substantially as described.

26. In combination, two grinding-wheels, a main drive-shaft, a carriage, means for reciprocating the same, driven from said shaft, a pivoted guiding device for the carriage, and means for intermittently oscillating the same on its pivot comprising a disk, a link connection from the face thereof to the guiding device, and clutch mechanism between said disk and drive-shaft with means for throwing the same in and out, substantially as described.

27. In combination, a grinding device, blade-holding means, a carriage, a main drive-shaft, means driven from said shaft, for reciprocating the carriage, a connection between the carriage and said holding means for reciprocating the latter in unison with the former, a chuck for the knife secured to the carriage, a pivoted guiding device for the carriage and means for oscillating said device comprising a disk, a link connection between said disk and guiding device, a clutch between the main shaft and said disk for rotating the latter and means for throwing said clutch in and out to give said disk an intermittent movement, said means being controlled by said knife-blade-holding means, substantially as described.

28. In combination, two grinding-wheels, a carrier, a knife-holder carried thereby, a knife-blade holder for each wheel, means for guiding the same, a main drive-shaft, means for reciprocating the carrier and blade-holders therefrom, a guiding device for the carrier and means for oscillating the same to transfer the blade from one holder to the other, said means comprising a disk, a link connection pivotally secured at one end eccentrically of the disk and at its opposite end to said device, a supplemental shaft driven from the main shaft, a clutch connection between the supplemental shaft and the said disk, a reciprocating bar carrying means for releasing said clutch and means carried by the bar coacting with said blade-holders for controlling the bar, substantially as described.

29. In combination, two grinding-wheels, a carrier, a knife-holder carried thereby, a knife-blade holder for each wheel, means for guiding the same, a main drive-shaft, means for reciprocating the carrier and blade holders therefrom, a guiding device for the carrier and means for oscillating the same to transfer the blade from one holder to the other, said means comprising a disk, a link connection pivotally secured at one end eccentrically of the disk and at its opposite end to said device, a supplemental shaft driven from the main shaft, a ratchet fixed thereto, a spring-pressed dog carried by the disk normally held in engagement with the ratchet, a reciprocating bar, stops carried thereby located on opposite sides of the disks, a tail on said dog, one of said stops being always in the path of said tail whereby said dog will be tilted out of engagement with the ratchet when it strikes said stop and the disk disconnected therefrom, means on the disk coacting with said stops to arrest the rotary movement of the disk when the dog is tilted, pins depending from the blade-holders, a connection between the holders whereby the same are reciprocated in unison, and detents pivoted to the bar, one of said detents coacting with the pin on one of the holders on each rearward reciprocation of the holders, whereby said bar is shifted on each rearward reciprocation of the holders to free the stop then in engagement with the tail of the dog and to move the oppositely-arranged stop in the path of the same, substantially as described.

30. In a grinding-machine, two grinding-wheels, a carrier for the article to be ground, means for oscillating the same to bring said article into contact with one wheel and then the other, a main water-supply pipe, branch pipes leading therefrom to said grinding-wheels, a cock controlling the supply from the main pipe to the branch pipes and means interposed between the cock and the oscillating means for controlling the latter, substantially as described.

31. In a grinding-machine, a hollow supporting-column, grinding-wheels supported thereon, mechanism for holding and controlling the article to be ground also supported thereon, a water-feed, synclinal walls extending between the interior walls of the column forming therewith a drip-chamber and an outlet therefor, substantially as described.

32. In combination, a grinding-wheel, a supporting-bracket, a shaft carrying said wheel, and means for shifting the shaft axially comprising a handle swiveled on said shaft and means interposed between the same actuated by the movement thereof for converting the rotation thereof into a reciprocating movement and imparting the same to said shaft, substantially as described.

33. In combination, a grinding-wheel, a shaft carrying the same, a bracket having bearings therefor, interposed bushings, one of said bushings having a threaded portion, a ratchet-wheel having a corresponding threaded portion engaging the same said wheel abutting the bracket, means for holding the latter bushing against rotation, a swiveled handle, a detent carried thereby for coupling the same to said ratchet-wheel, and a nut threaded on said shaft abutting said bushing, substantially as described.

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

ALONZO L. SWEET.

Witnesses:

REUBEN S. BARTLETT,

WILLIAM W. IVES.