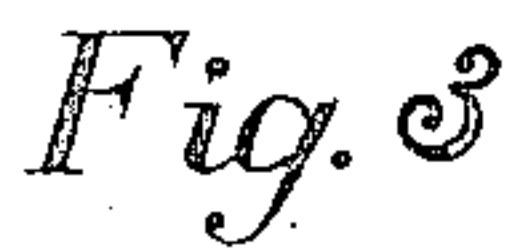
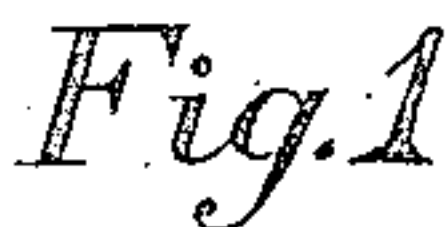


APPLICATION FILED APR. 17, 1906.

Patented May 18, 1909.

3 SHEETS—SHEET 1.



Inventor:

B. M. W. Hanson,

By his Attorney,

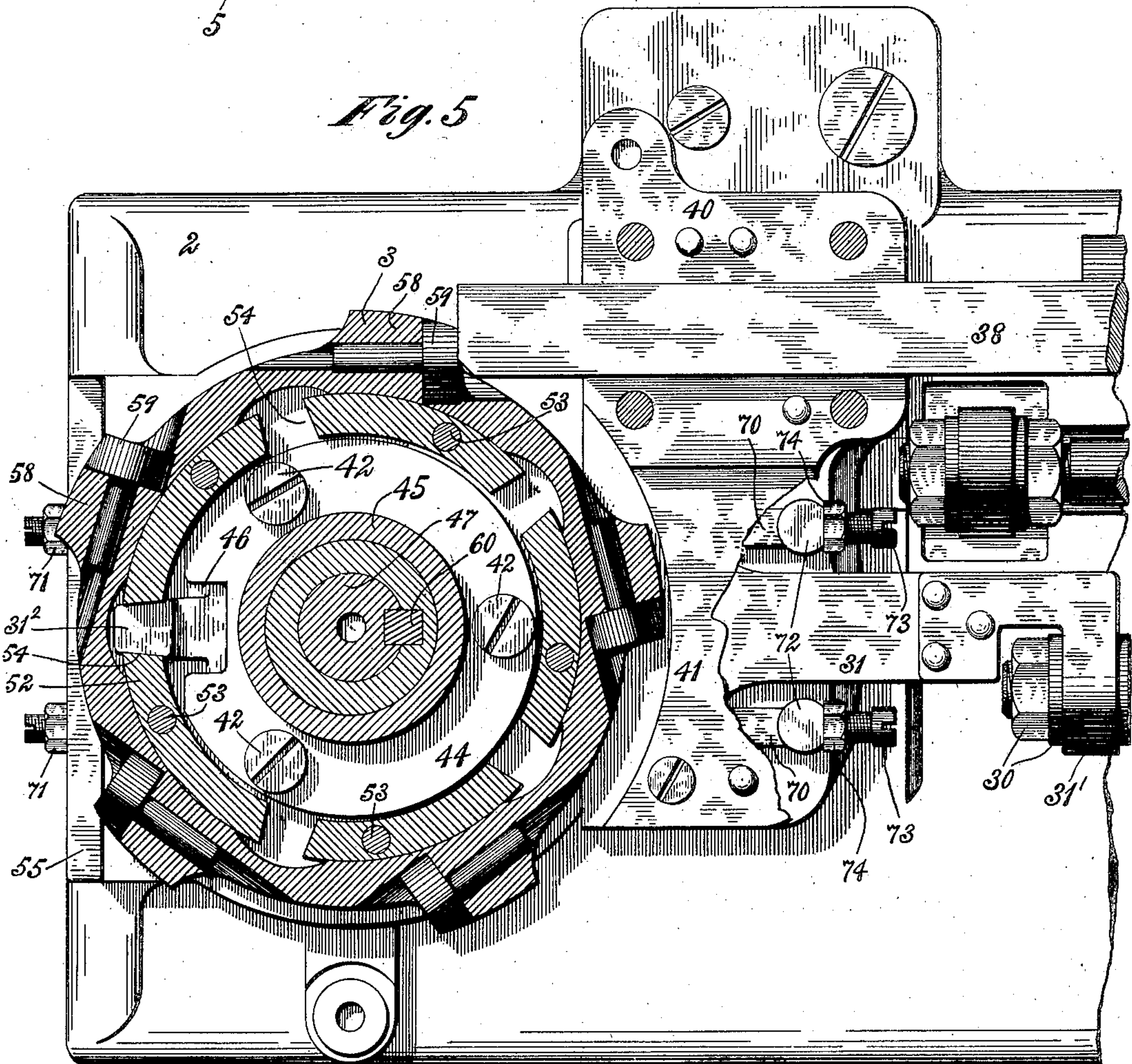
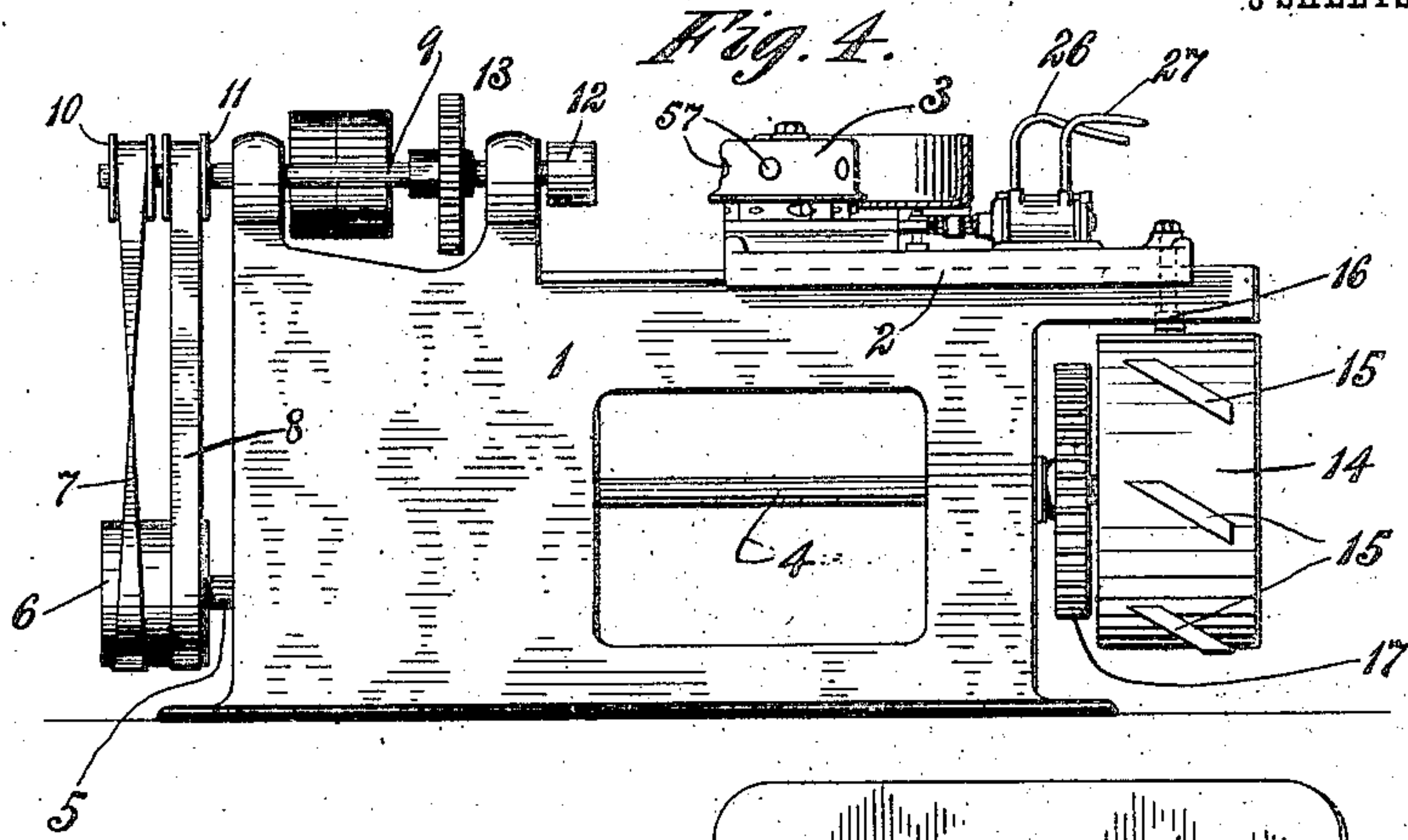
W. C. S. Chatzoff

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INDEXING MECHANISM.
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921,983.

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3 SHEETS—SHEET 2.



Witnesses:

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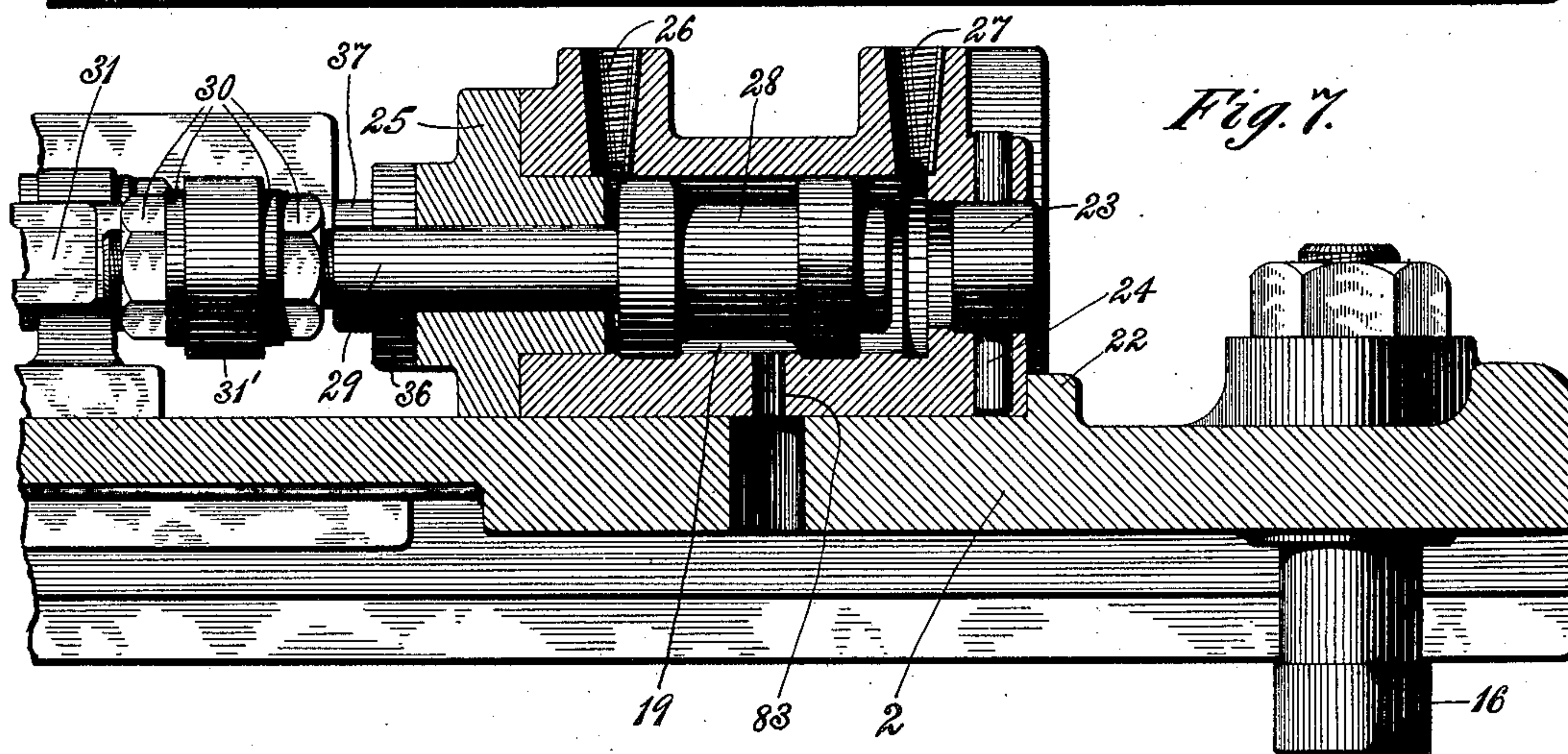
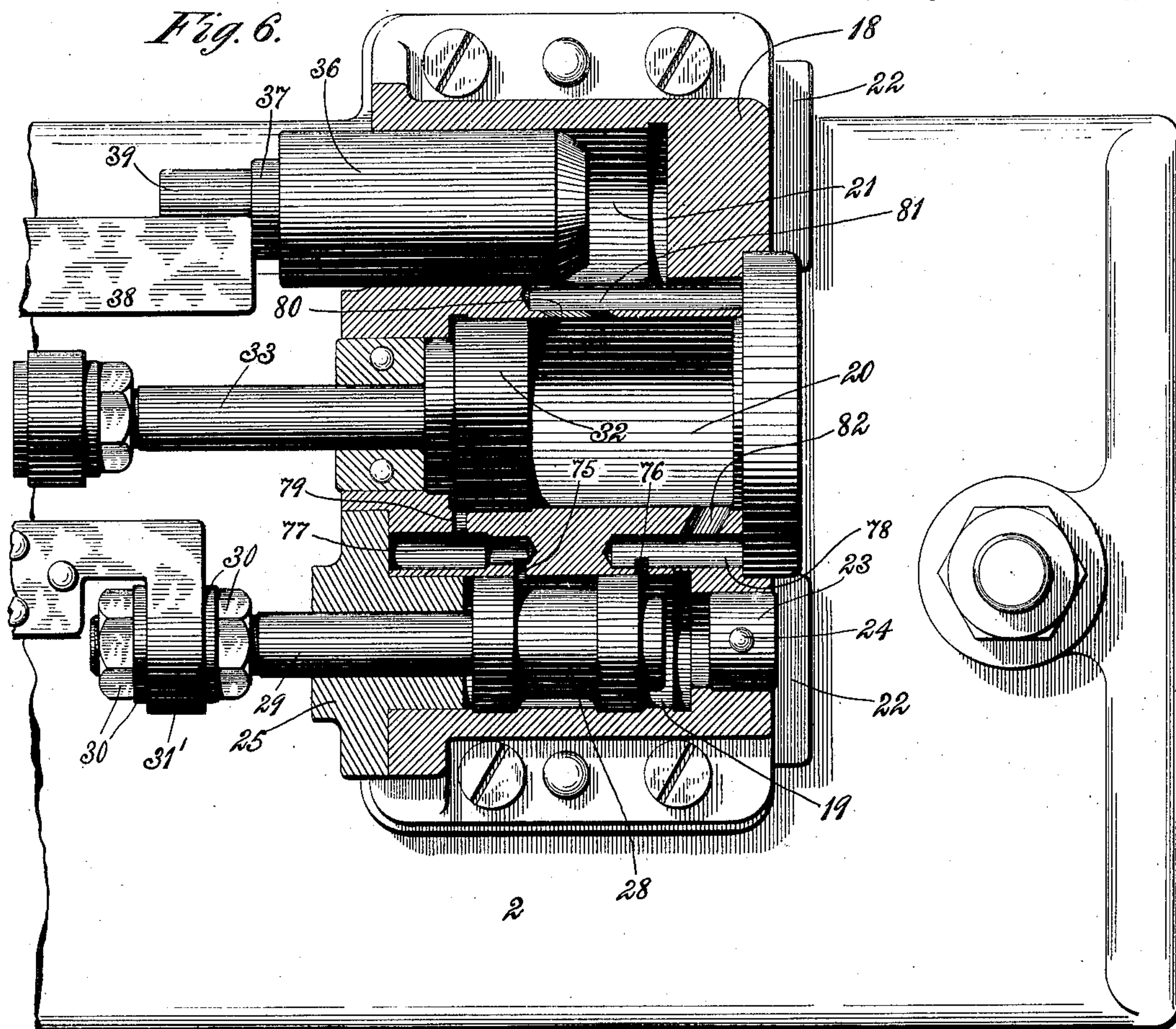
M. F. Bridgman

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Patented May 18, 1909.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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INDEXING MECHANISM.

No. 921,983.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed April 17, 1905. Serial No. 255,940.

To all whom it may concern:

Be it known that I, BENGT M. W. HANSON, a citizen of Sweden, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Indexing Mechanism, of which the following is a specification.

This invention relates to indexing mechanism, and more especially to that class of such mechanism employed for intermittently rotating tool-supports, although it is not limited to any special use.

In the preferred embodiment of the invention a rotatable support is locked, indexed and arrested by devices actuated by fluid-pressure; but many of said devices are peculiar, and may be operated in other ways without departure from the invention.

Primarily the object of the invention is the provision in connection with a rotatable element of improved means for locking and releasing, indexing and stopping said element.

A further object of the invention is the provision of improved means actuated by fluid-pressure for accomplishing the results above set forth.

A further object of the invention is the provision of a series of slides for locking and releasing, indexing, and stopping the tool-support or other device.

Other objects of the invention will be hereinafter set forth.

In the accompanying drawings, Figure 1 is a plan view, largely in horizontal section, of a form of machine in which my invention is embodied. Fig. 2 is a longitudinal, vertical section on line 2—2 of Fig. 1. Fig. 3 is a detail, partially in section, of part of the indexing-devices. Fig. 4 is a side elevation of a machine in which my invention is embodied. Fig. 5 is a section on line 5—5 of Fig. 2. Fig. 6 is a horizontal section of the fluid-pressure cylinders, showing the pistons in elevation, and Fig. 7 is a longitudinal, vertical section on part of line 2—2 of Fig. 1, showing one of the chambers, and the piston therein for actuating the locking-bolt on an enlarged scale.

Like numerals designate similar parts throughout the several views.

Referring to the drawings, the numeral 1 in Fig. 4 designates the frame of the machine, and on this frame, which may be of any suitable kind, is mounted a slide 2 carrying

a turret 3, provided with usual openings for the reception of tools. Journaled in the frame is a shaft 4, driven by gearing actuated by a pinion (not shown) on a shaft 5, also journaled in the frame and carrying a drum 6 over which a crossed-belt 7 and a straight belt 8 are passed.

Designated by 9 is a chuck-spindle carrying pulleys 10 and 11, respectively, said pulleys being clutched to the spindle 9 in such a way (not shown), that no matter what may be the direction of rotation of said spindle the drum 6 will always be driven in the same direction. Upon the end of spindle 9 is a chuck 12, and for driving said spindle ordinary back-gearing, designated in a general way by 13, may be employed.

Driven by the shaft 4 is a cam-drum 14, having cams 15 for acting upon a roller-stud 16 depending from the turret-slide 2 through a slot in the frame. Shaft 4 carries at its right-hand end a pinion (not shown), which engages with a gear 17 for driving the cam-drum.

As thus far described the parts shown may be regarded as conventional, and specifically as constituting no part of the present invention.

Any means desired may be employed to drive the cam-drum, and any form of chuck-spindle may be used without departure from the invention.

Designated by 18 is a casting having a series of cylinders 19, 20 and 21, said casting being supported upon the turret-slide 2, and abutting at its rear end against flanges 22 thereof, as shown more clearly in Figs. 6 and 7. A plug 23 closes the rear end of the cylinder 19, and said plug is secured in place by a pin 24, while the forward end of said cylinder is closed by a flanged plug 25 bored to receive a piston-rod, as will be hereinafter explained.

Communicating with the top of the cylinder 19 are a pair of pipes 26, 27, respectively, through which motive-fluid under pressure, for instance, compressed air, is delivered at the proper times to each end of the cylinder, as will be hereinafter described. In the cylinder is mounted a piston 28, shown as of spool-shape, although the form is immaterial, and the rod 29 of said piston is threaded at its inner end, and is provided with nuts and washers 30 for securing it in a bore of an angular projection 31' of a slide 31, for actu-

ating a locking-bolt hereinafter described. In cylinder 20 is a piston 32, the rod 33 of which is coupled in a similar manner to a slide 34, having rack-teeth 35, for a purpose hereinafter stated. In the cylinder 21 a piston 36 is mounted, and said piston is provided at its inner end with a reduced extension 37. A slide 38 having an offset lug 39 is actuated by the piston 36, for a purpose hereinafter explained. Each of the slides 31, 34 and 38 is fitted in guideways in a raised intermediate part 40 of the turret-slide, and said guideways are covered by cap-plates 41 (as shown in Figs. 1 and 2).

Secured to the part 40 of the slide 2 by screw-bolts 42, one of which passes through a spacing-washer 43, is a circular block 44 having an axial cone-seat 45, said block being notched or slotted at 46 for a purpose hereinafter stated. A bolt 47 passes through this cone-seat and through a bushing 48 inserted in an opening in the part 40 of the turret-slide, and below said bushing is provided with a circular flange 49. Keyed to this bolt is a turret 3 having a tubular depending projection 51, said projection being conical exteriorly to fit the cone-seat 45.

A locking-ring 52 is secured by bolts 53 in the chambered lower part of the turret, and said ring is provided with a series of peripheral slots 54 in its depending periphery, as shown in Figs. 1, 2 and 5. A rabbeted portion 41' in the cap-plate 41 sustains one side of the turret and the other side rests upon a bar 55, rabbeted to receive the head of a screw 56 by which it is secured to the end of the slide 2. Usual tool-sockets 57 are formed in the turret, and adjacent to its lower end perforated bosses 58 are provided for the reception of the shanks of headed stops 59, which coact with the slide 38 in a manner hereinafter explained. A key 60 secures the turret to the bolt 47 and the head 47' of said bolt bears against the top of the turret, as illustrated in Fig. 2.

Mounted on a reduced lower end 47² of the bolt 47 is a ratchet 63, having a groove in its hub to receive a spline 64, as illustrated in Figs. 2 and 3. Loosely surrounding the ratchet 63 is a chambered disk 65, to the upper surface of which a toothed segment 66 is secured by rivets 66', said segment being in mesh with the rack 35 of slide 34. Mounted on a pivot 67 of the chambered disk 64 is a pawl 68, which is held in engagement with the ratchet 63 by a spring 69 secured to the periphery of said disk. At its inner end the slide 31 is extended vertically to form a locking-dog 31², said dog engaging the slots 54 in locking-ring 52, and when retracted fitting in the slot 46 of the circular block 44.

To take up wear of the locking-bolt slide 31, adjustable gibs 70 are provided, said gibs having threaded ends passing through the bar 55, and being equipped with nuts 71

bearing against the outer side of said bar, as shown in Fig. 2 and Fig. 5. Posts 72 rising from the slide 2 are provided with threaded seats for the reception of screws 73 bearing against the ends of the gibs 70, and check-nuts 74 lock said screws against movement after they have been adjusted.

As above stated the locking-bolt slide 31 is actuated by the piston 28 in the cylinder 19, and when fluid under pressure is admitted to the inner end of said cylinder by pipe 26 the said slide and its locking dog 31² will be withdrawn to permit of a partial rotation of the turret to bring another tool into position to operate on the stock. Ports 75 and 76 are formed in the inner wall of the piston-chamber 19, and said ports communicate, respectively, with passages 77 and 78 in the casing 18. As the locking-slide is withdrawn and when the end of the piston 28 uncovers the port 75, fluid will rush through said port 75, into passage 77, and from said passage through a port 79 into piston-chamber 20, where it acts against piston 32, thus operating the rack 34, rotating the disk 64 and its pawl 68, and turning the turret to bring a new tool into position. As piston 32 withdraws it will pass a port 80 opening into a passage 81 of casting 18 in communication with the piston-chamber 21, and fluid will then enter said chamber, advance said piston and shoot the slide 38 forward to engage one of the stops 59, and arrest further rotation of the turret. As the operation is completed the supply of motive-fluid is cut-off from pipe 26 by suitable valve-mechanism (not shown) and is turned into the pipe 27, thereby forcing the locking-bolt slide 31 forward and causing its dog to enter the notch 54 opposite the same and again lock the turret against rotary movement. A port 76 leads from the cylinder 19 into the passage 78, and leading from said passage to the rear side of the piston-chamber 20 is a port 82, through which the fluid rushes when the piston 28 passes by said port 76, to thus actuate the piston 32 and jack-slide 35, and rotate the disk 64, to cause the pawl 68 to slip over the ratchet 63, and engage a new tooth thereof. These actions are repeated as long as the machine is in operation, the motive-fluid being alternately switched from the pipe 26 to pipe 27, and exhaust taking place through the ports 83 in the slide 2 and casting 18 and communicating with the cylinder 19.

After the piston 36 has been advanced to shoot the stop-slide 38, exhaust from cylinder 21 takes place through the passages 81, port 80, cylinder 20, port 82, passage 78, port 76, cylinder 19, and ports 83, thus leaving the piston 36 free to be forced into the cylinder 21 by slide 38 and the turret-stop 59 in engagement therewith as the turret rotates, but when the piston 32 retreats in its cylinder 20 far enough to uncover the port 80, motive-

fluid will rush into cylinder 21 back of the piston 36 and will immediately actuate the same to throw the slide 38 forward to coact with the next stop 59, and again arrest the turret. It will thus be seen that the pistons 28 and 32 act as valves for each other and for the piston-cylinder 21, thus insuring the proper timing of the parts operated by said pistons, and controlling the movement of the turret. A cap or guard 84 is bolted to the under side of slide 2 for the purpose of protecting the parts carried by the lower end of the vertical shaft 47.

While the operation of the machine is fully disclosed in the foregoing description a résumé of the same will now be given. With the parts in the positions illustrated in the drawings, all of the pistons have been driven forward the turret has been turned, arrested and locked, and exhaust from the series of cylinders has taken place through the ports and passages described. When in the operation of the machine it is necessary to index the turret, fluid is admitted to the pipe 26, and the piston 28 is forced back to withdraw the locking-dog 31², and when said piston passes by the port 75, fluid will enter the inner end of chamber 20 and will actuate the piston 32, which, through the means described, will rotate the turret and push back the locking-slide 38. When the piston 32 is retracted past the port 80 fluid from the cylinder 20 will enter cylinder 21, force forward piston 36, and advance the slide 38 to a position where its end will intercept the stop 59 of the turret being brought into position, thus arresting the movement of said turret. By then diverting the supply of fluid from pipe 26 to pipe 27 the locking-slide is advanced, and the turret-rotating slide is also advanced to carry the turret-actuating pawl back of the next tooth in ratchet 63 in readiness for a new operation.

Changes may be made in various details of the mechanism shown and described without departure from the invention. So too, the slides for performing the various operations described may be actuated by various means different from those shown and described without departure from the invention. It is furthermore, distinctly to be understood that the invention is generally applicable for indexing purposes, and is not limited in scope to use with turret-lathes.

Having thus described my invention, what I claim is—

1. The combination, with a tool-carrying turret, and with a shaft to which said turret is secured, of a notched locking-ring carried by the turret; a slide having a locking-dog; a piston connected to said slide; a piston-cylinder having ports; means for supplying fluid under pressure to said piston-cylinder; a second piston-cylinder having ports communicating with the other cylinder; a rack; a piston in the second cylinder for actuating said rack; a carrier; a toothed segment rigid with the carrier; and means actuated by said carrier for indexing the turret-shaft.

2. The combination, with a support, of a piston-cylinder; means for supplying motive-fluid under pressure to said cylinder; a piston in the cylinder; a slide connected to the piston-rod; a rack carried by said slide; a vertical shaft; a rotary carrier loose upon said shaft; a segment rigid with said rotary carrier, and in mesh with the rack; a pawl mounted on the rotary carrier; a disk having ratchet-teeth rigid with the vertical shaft; a chambered tool-carrier keyed to the vertical shaft; a locking-ring having a series of notches, said ring being secured in the chamber of the tool-carrier; a slide having a dog for entering the notches of the locking-ring; a piston-cylinder communicating with the first-mentioned cylinder; and a piston in the second cylinder, said piston being connected to the second slide.

3. The combination, with a plate having flanges, of a casting provided with a series of communicating cylinders, said casting being secured to the plate and abutting against said flanges; a piston in each cylinder; means for supplying motive-fluid to one of the cylinders; slides actuated by the pistons; a tool-carrying turret mounted on the plate; means actuated by one of the slides for locking and releasing said turret; means actuated by another slide for indexing said turret; and stop-devices on the turret cooperating with nother of the slides.

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

BENGT M. W. HANSON.

Witnesses:

SOLON E. DAVIS,
CARL E. STEIDEL.