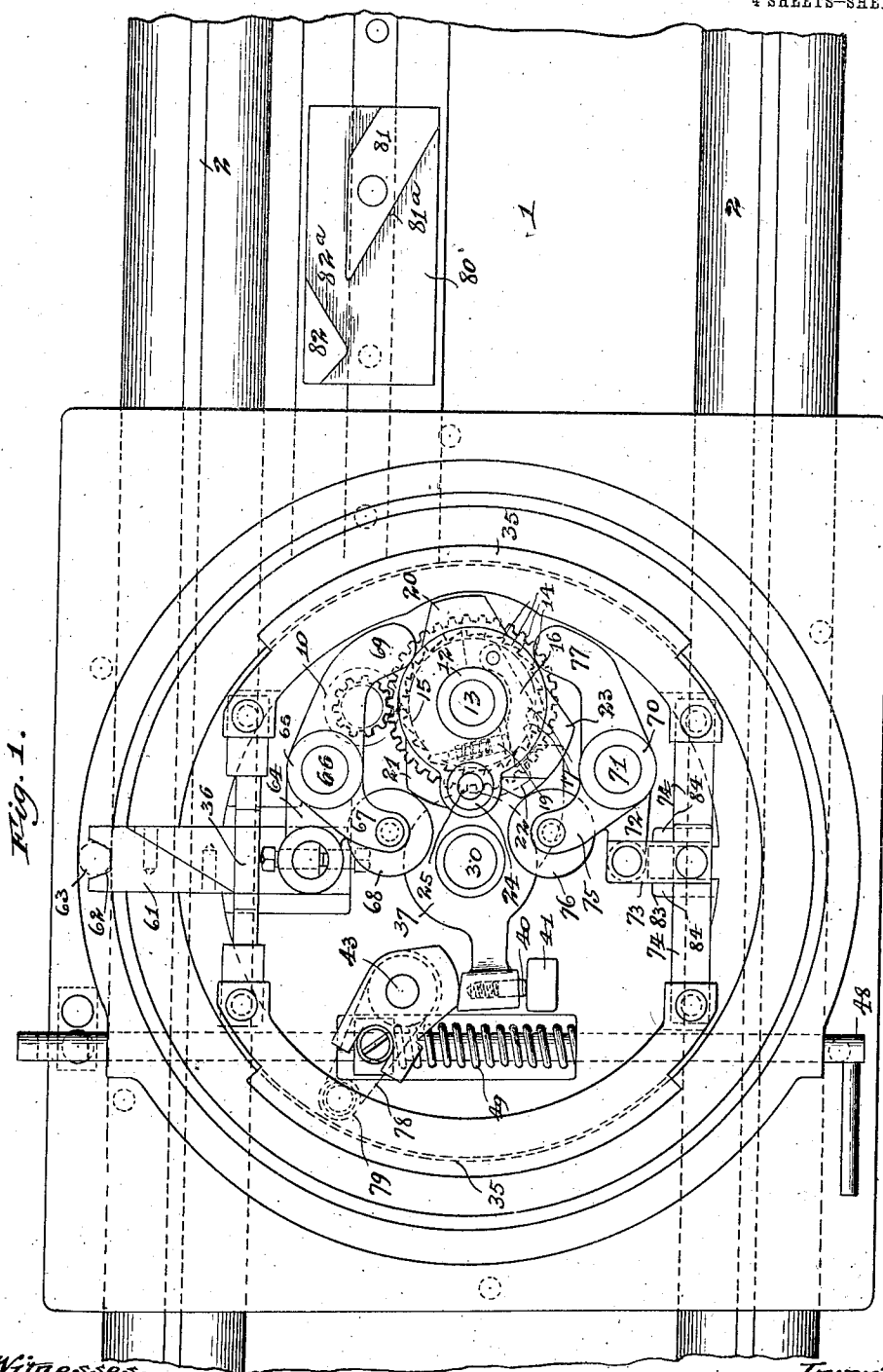
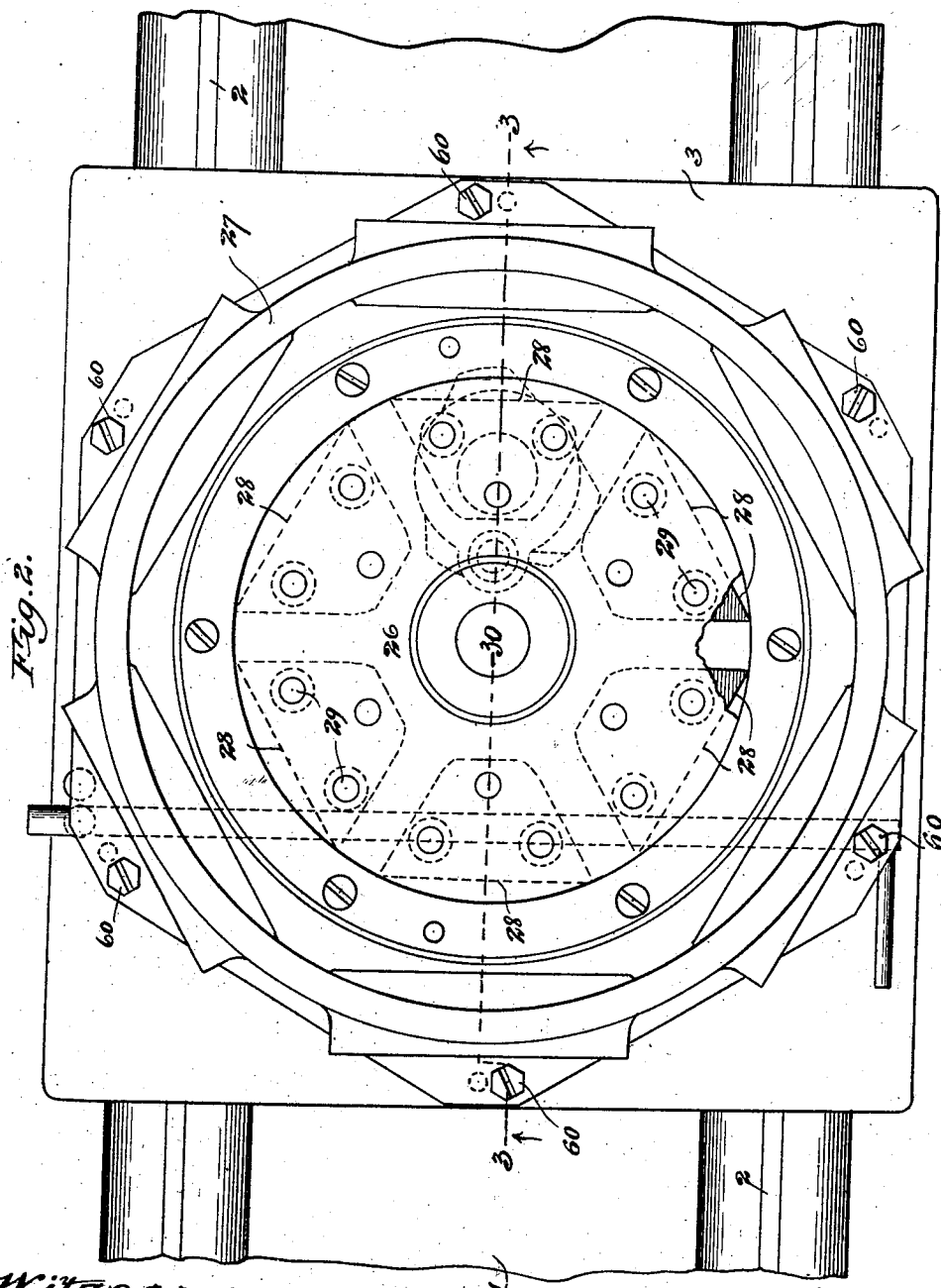




Witnesses,
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 TURRET ROTATING, CENTERING, AND LOCKING MECHANISM FOR TURRET LATHES.
 APPLICATION FILED FEB. 21, 1911.
 1,047,270.
 Patented Dec. 17, 1912.
 4 SHEETS—SHEET 2.



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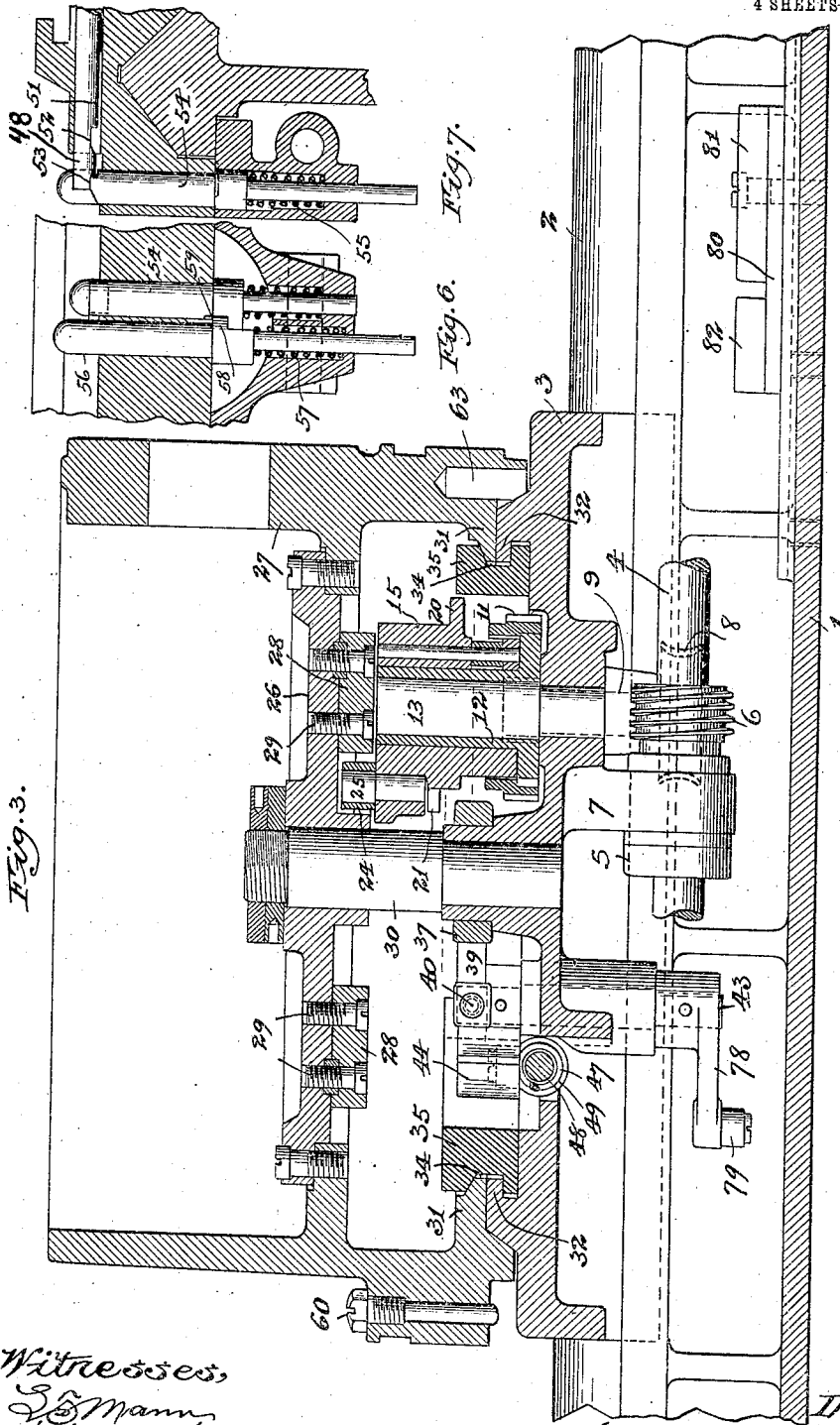
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Fig. 5.

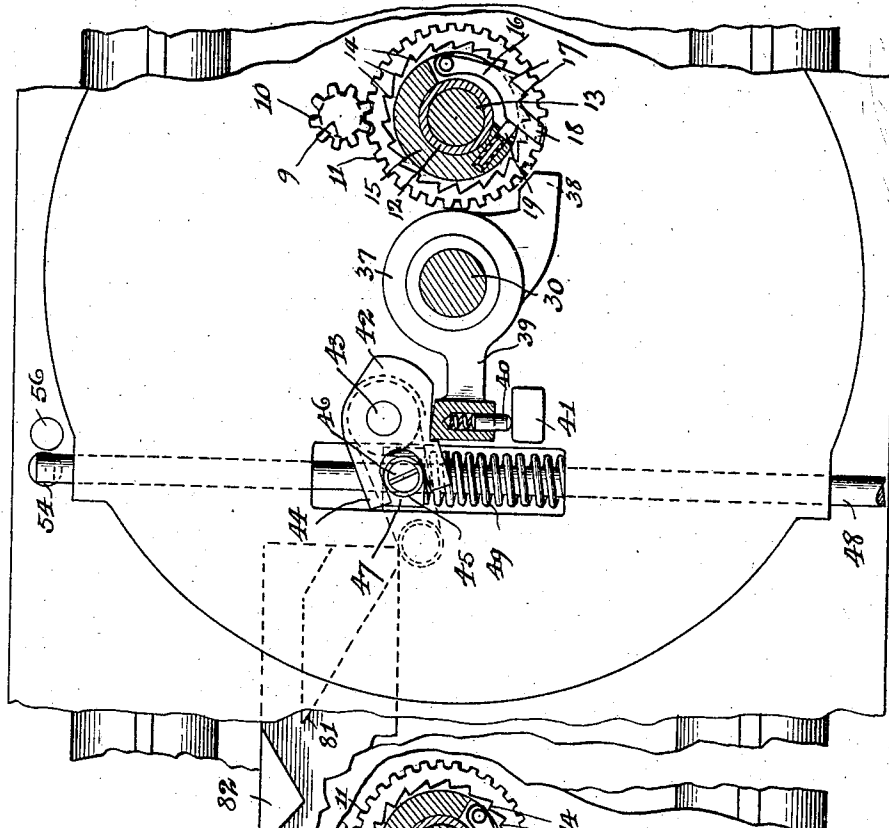
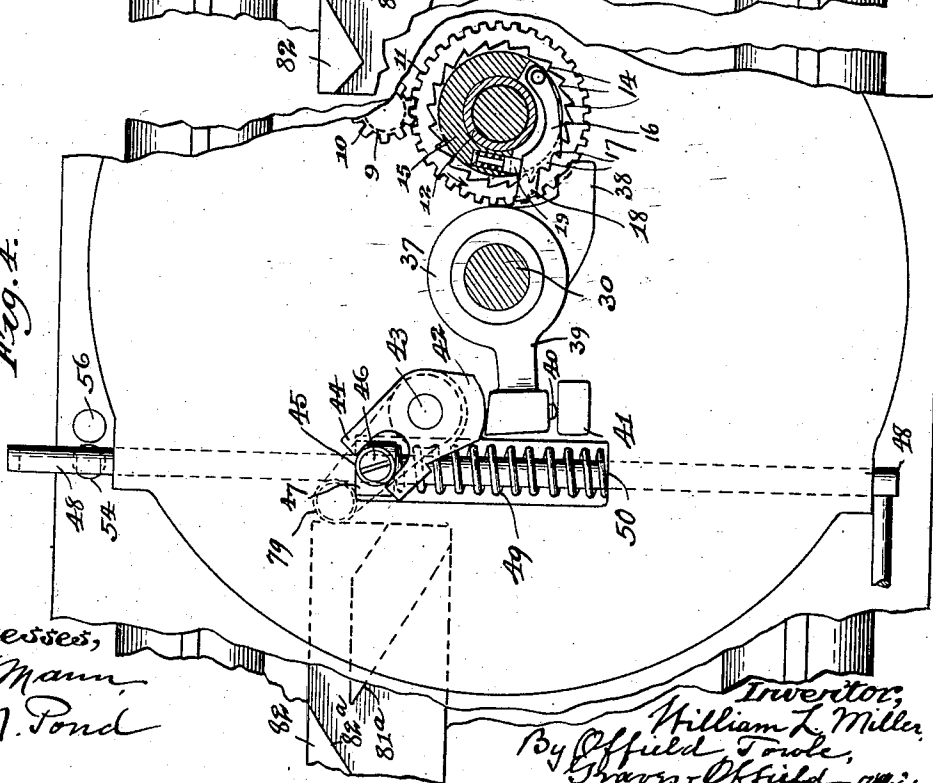


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM L. MILLER, OF MADISON, WISCONSIN, ASSIGNOR TO GISHOLT MACHINE COMPANY, OF MADISON, WISCONSIN, A CORPORATION OF WISCONSIN.

TURRET ROTATING, CENTERING, AND LOCKING MECHANISM FOR TURRET-LATHES.

1,047,270.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed February 21, 1911. Serial No. 610,076.

To all whom it may concern:

Be it known that I, WILLIAM L. MILLER, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Turret Rotating, Centering, and Locking Mechanism for Turret-Lathes, of which the following is a specification.

This invention relates to the art of automatic turret lathes, and has reference more particularly to a new and improved mechanism for effecting and controlling the turning movements of the turret-head.

The main object of the invention is to provide an improved mechanism of this character which shall be simple in construction, reliable in use, capable of producing a continuous or uninterrupted turning movement through the space represented by one or more faces of the turret that may be empty or unoccupied by tools, and in which each tool-carrying face of the turret, as it moves into working position, is accurately centered or positioned with reference to the work in the chuck-jaws.

To this and other minor ends the invention consists in the novel mechanism hereinafter more particularly described and pointed out in the appended claims.

The invention, and its mode of operation will be readily understood by reference to the accompanying drawings in which I have shown one practical embodiment of the same, and in which—

Figure 1 is a top plan view of a portion of the machine bed and the turret-slide mounted thereon. Fig. 2 is a top plan view similar to Fig. 1, but showing also the turret-head mounted on the turret-slide. Fig. 3 is a central vertical section on the line 3—3 of Fig. 2. Figs. 4 and 5 are fragmentary top plan views of the turret-slide, with parts of its contained mechanism omitted for clearness, and showing different positions of the clutch-controlling mechanism. Figs. 6 and 7 are detail vertical sectional views, in planes at right-angles to each other, showing the detent mechanism which automatically locks and releases the clutch-controlling mechanism.

Referring to the drawings, 1 designates a portion of the machine bed in which are

formed longitudinal inverted V-ways 2, on which latter is mounted the turret-slide 3.

4 designates a continuously rotating shaft mounted parallel with the ways of the bed and splined to the hub 5 of a worm 6; said worm and its hub being carried by a hanger 7 depending from the slide 3. The worm 6 engages and drives a worm-wheel 8 (Fig. 3) on the lower end of a short vertical shaft 9 journaled in the slide 3, the upper end of said shaft carrying a pinion 10 (Fig. 5) that meshes with and drives an annular gear 11 that is keyed on the lower end of a sleeve 12 in turn journaled upon an upstanding stud 13 in the upper face of the turret-slide. The inner periphery of the gear 11 is formed with ratchet teeth 14 (Figs. 4 and 5); and rotatably mounted upon the sleeve 12 is an outer sleeve 15 which has pivotally mounted in a lateral slot thereof a dog 16 provided with teeth 17 adapted to engage the ratchet teeth 14, and a projecting nose 18 by which the dog is disengaged and held disengaged from the ratchet by means hereinafter described. The dog is normally urged into engagement with the annular ratchet by a spring-pressed pin 19 slidably mounted in the sleeve 15 and bearing against the inner face of the dog 16 (Figs. 4 and 5). The sleeve 15 is provided with four laterally projecting cam-shaped lugs 20, 21, 22, and 23, located in different horizontal planes and designed to actuate in both directions certain oscillating levers which, in turn, actuate a centering-bar which centers the turret-head and a pair of internal gibs which lock the turret-head to the slide when the turret-head is stationary.

24 designates a roller mounted on the upper end of a stud 25 set eccentrically in the upper end of a sleeve 15. This roller, as the sleeve 15 rotates, enters successively between radial grooves formed on the underside of the horizontal plate 26 of the turret-head 27; these radial grooves being conveniently formed between sector-shaped blocks 28 that are secured to the underside of the plate 26 as by screws 29; the positions of these blocks and the radial grooves or spaces formed therebetween being best illustrated by dotted lines in Fig. 2. The turret-head 27 is itself journaled centrally upon an upstanding

stud or shaft 30 mounted centrally in the slide 3; the annular bottom 31 of the head 27 resting upon an undercut annular way 32 formed on the slide 3; the inner edges of the parts 31 and 32 registering with each other, and the upper edge of the part 31 of the head being beveled or chamfered, as shown in Fig. 3, to fit correspondingly shaped grooves 34 in the outer sides of a pair of gibs 35, that are connected at one end by an adjusting rod 36.

The clutch formed by the internal ratchet 14, the dog 16, and the spring-pin 19, and through which a turning movement is imparted to the turret-head at the proper times, is controlled by mechanism which will next be described.

Pivotally mounted on the central bearing boss of the slide 3 in which the stud 30 is mounted is a lever 37, one arm 38 of which projects toward the clutch and normally holds the dog 16 out of engagement with the ratchet-ring through engagement with the nose 18 of said dog, as shown in Fig. 1. The other arm 39 of said lever carries a slidable spring-actuated pin 40 that abuts against a stop 41 on the slide 3, and thus tends to urge the lever in a direction to retract the arm 38 from the dog 16 and allow the latter to engage the ratchet-ring of the clutch. The arm 39 of the lever is, in turn, controlled by a cam-block 42 fast on a vertical shaft 43 journaled in the slide 3 and having a forked arm or extension 44 that straddles a roller 45 on a stud 46 in turn mounted on a collar 47 that is keyed to a rod 48 slidably mounted in and transversely of the slide 3. Surrounding the rod 48 is a coil-spring 49, one end of which abuts against the collar 47, while its opposite end abuts against a fixed stop 50, herein shown as the end wall of a slot in the slide 3 within which the spring 49 lies. One end of the rod 48 is formed on its lower side with a flattened portion 51 (Fig. 7) and outwardly of the latter with two notches 52 and 53, respectively. Cooperating with these notches is a vertically slidable catch 54 mounted in the edge portion of the slide 3 and normally urged upwardly by a spring 55. The catch 54 is, in turn, controlled as to its downward movement by a pin 56 slidably mounted alongside the catch 54, normally urged upwardly by a spring 57, and carrying a lateral projection 58 that plays with a rectangular notch 59 formed in the side of the catch 54; the pin 56, when depressed, carrying down with it the catch-pin 54 through the engagement of the lateral projection 58 with the lower end of the notch 59. The upper end of the pin 56 is rounded, as shown in Figs. 6 and 7; and each face of the turret-head carries a screw 60 having a rounded lower end, as shown in Fig. 3, whereby when any one of said screws is adjusted

downwardly to such an extent that its lower end will engage and depress the pin 56, the cooperating catch-pin 54 is forced downwardly sufficiently to carry its upper end out of engagement with the notch of the rod 48 with which it may be engaged.

Slidably mounted in the slide 3 (Fig. 1) radially thereof is a bar 61 having a notched outer end 62. The main function of this bar is to accurately center or position the turret-head after the latter has been turned to a new position and approximately centered therein by the engagement of the roller 24 with one of the grooves between two adjacent blocks 28, although it also serves as a locking device auxiliary to the locking gibs 35; and to these ends the notched end of said bar cooperates successively with a series of pins 63 secured in the lower edge of each face of the turret-head 27. The inner end of this bar 61 is suitably connected with one arm 64 of a three-arm lever 65 pivoted on an upstanding stud 66 in the slide 3. Another arm 67 of this lever carries a roller 68 which is engaged at the proper time in the rotation of the sleeve 15 by the cam 21 whereby to force the bar 61 outwardly into centering and locking engagement with a pin 63. The third arm 69 of said lever is subsequently engaged by the cam 20, during the rotation of the sleeve 15, to retract the bar 61 preliminary to the turning movement of the turret-head. On the opposite side of the sleeve 15 is another three-arm lever 70 pivotally mounted on a stud 71 set in the slide 3; one arm 72 of said lever having a link connection 73 with a pair of toggle arms 74 that are pivoted to the free ends of the locking gibs 35. Beneath the link 73 and pivotally connected to the outer end of the latter and to the inner ends of the toggle arms 74 is a block 83 that is slidably mounted between a pair of guides 84, whereby the gibs 35 are held against rotation with the turret-head. Another arm 75 of said lever carries a roller 76 that is engaged at the proper time by the cam 22 to straighten the toggle 74 and force the gibs 35 into locking engagement with the turret-head and slide. The third arm 77 of said lever is engaged at the proper time by the cam 23 to retract or release the gibs 35 through the arm 72, link 73, and toggle 74.

It will be apparent from the foregoing description that the mechanism through which the clutch-dog 16 is thrown out of driven engagement with the clutch-ratchet 14 is actuated by the spring 49 when the catch-pin 54 is retracted to release the rod 48. The mechanism whereby the clutch-dog 16 is released from the restraining engagement of the lever arm 38 and permitted to be thrown into driven engagement with the clutch-ratchet 14 by the spring-pin 19 as the turret-slide approaches the limit of its

outward or backward travel on the ways 2 of the bed will now be described.

Keyed to the lower end of the shaft 43 is a horizontal arm 78 (Fig. 3) carrying on the lower side of its free end a roller 79. Adjustably secured to the bed 1 at a suitable point thereon is a plate 80 having on its upper surface a pair of cam-blocks 81 and 82, preferably cast integral with plate 80, the working or operative cam-faces of which are shown at 81^a and 82^a. The cam-faces 81^a and 82^a of these blocks are engaged by the roller 79 during the backward and forward traverse of the turret-slide, respectively.

The operation of the mechanism may be briefly described as follows: In the forward position of the turret, as when a tool carried by the working face thereof has completed its feed or working movement, the parts are in the relative positions shown in Fig. 1, wherein the inner notch 52 of the rod 48 is engaged by the catch-pin 54, and the spring 49 is under slight compression, and wherein also the cam 42 is engaged with the arm 39 of lever 37, and the other arm 38 of said lever is engaged with the nose 18 of the dog 16 holding the latter disengaged from the constantly rotating clutch-ratchet 14. Before the turret-slide reaches the limit of its backward movement (the backward and forward movements being effected by the usual lead-screw, not shown) the roller 79 engages the inclined face 81^a of the cam 81, thereby moving the clutch-controlling parts to the relative positions shown in Fig. 5, wherein the rod 48 has been retracted until its outer notch 53 is engaged with the catch-pin 54, as shown in Fig. 7, the spring 49 has been fully compressed, and the cam 42 has been swung out of engagement with the lever-arm 39, thereby releasing the dog 16, and allowing it to clutch with the constantly rotating ratchet 14, whereby the cam-sleeve 15 is turned through a single revolution and the engagement of the roller 24 with the grooves between the sector blocks 28 turns the turret-head to bring a new face thereof into working position. During such rotation of the cam-sleeve 15, the cams 20 and 23, through engagement with the lever arms 69, and 77, respectively, first retract the centering bar 61 and the locking gibs 35, so that the turret-head may turn freely on the slide; and when the turning movement has been completed the cams 21 and 22, respectively, engage the rollers 68 and 76 and force the centering bar 61 and gibs 35 outwardly into their centering and locking positions, respectively. During the turning movement of the turret-head, one of the pins 60 strikes the upper end of pin 56, through the latter depressing catch-pin 54, releasing the rod 48, and allowing the spring 49 to throw the

clutch-controlling parts to the relative positions shown in Fig. 4, wherein the upper end of the catch-pin 54 engages the flattened lower surface 51 of the rod 48, and the lever arm 38 is thrown inwardly into a position to engage the nose 18 of the dog as soon as the latter reaches the lever 38, thereby separating the clutch-members and arresting further rotation of the turret-head. Meanwhile, the backward traverse of the turret-slide having been arrested and its forward traverse thrown in, as the slide moves forward the roller 79 engages the inclined surface 82^a of the cam 82, moving the rod 48 inwardly until the notch 52 engages the upper end of catch-pin 54, whereby the roller 79 is swung into proper position to engage the cam-block 81 on the next back traverse movement of the turret-slide. As above stated, if there are one or more empty faces in the turret-head, the pins 60 pertaining to such faces are screwed upwardly sufficiently so that they will not engage the pin 56, and the turret is thus rotated continuously past such empty face or faces.

It will be observed that the described mechanism is such as to cause the turret to rotate counter clock-wise (in the machine shown); that is, so that the forward half of the turret is always turning toward the front of the machine where the operator stands when chucking the work. This is a great advantage when the turret is fitted with long boring bars or tools extending out from the faces of the turret-head, since they push the operator away from the center of the lathe instead of pulling him into the machine.

I am aware that automatic mechanism for rotating a turret-head through a predetermined distance, for automatically locking the same at the completion of the rotary movement, and for automatically releasing such locking means prior to the next rotary movement is broadly old; but, so far as I am aware, the mechanism herein described for controlling the clutch through which the turret-head is rotated is new.

It will be evident to those skilled in the art that the particular mechanism herein presented as one practical embodiment of the invention, may be considerably varied in detail without departing from the operative principles involved, or sacrificing any of the benefits and advantages secured thereby. Hence, the invention is not limited to the exact construction shown and described except to the extent clearly indicated in specific claims.

I claim—

1. The combination with a turret-slide and a head rotatably mounted thereon, of mechanism for turning said head including a clutch having a continuously rotating member and a normally idle member in driv-

ing relation to said head, spring means urging said clutch members into engagement with each other, means normally holding said clutch members separated, cooperating parts carried by the turret slide and machine bed, respectively, for throwing out of action said clutch-separating means during the backward traverse of the turret-slide, and means controlled by the turret in its turning movement for throwing into action said clutch-separating means, substantially as described.

2. The combination with a turret-slide and a head rotatably mounted thereon, of mechanism for turning said head including a clutch having a continuously rotating member and a normally idle member in driving relation to said head, spring means urging said clutch members into engagement with each other, means normally holding said clutch-members separated, cooperating parts carried by the turret-slide and the machine bed, respectively, for throwing out of action said clutch-separating means during the backward traverse of the turret-slide, spring-actuated means for throwing into action said clutch-separating means, a detent for said last named means, and a detent releasing mechanism carried by the turret and operating during the turning movement of the latter, substantially as described.

3. The combination with a turret-slide and a head rotatably mounted thereon, of mechanism for turning said head including a clutch mounted on the slide and having a continuously rotating member and a normally idle member in driving relation to said head, spring means urging said idle clutch member into engagement with said continuously rotating member, a lever normally holding said idle clutch member out of engagement with said continuously rotating member, a spring acting upon said lever in a direction to retract it from said idle clutch member, a spring-actuated device normally acting to force said lever into holding engagement with said idle clutch member, and cooperating parts carried by the turret-slide and machine bed, respectively, for retracting said spring-actuated device from said clutch-engaging lever during the backward traverse of the turret-slide, substantially as described.

4. The combination with a turret-slide and a head rotatably mounted thereon, of mechanism for turning said head including a clutch mounted on the slide and having a continuously rotating member and a normally idle member in driving relation to said head, spring means urging said idle clutch-member into engagement with said continuously rotating member, a lever normally holding said idle clutch-member out of engagement with said continuously rotating member, a spring acting upon said

lever in a direction to retract it from said idle clutch member, spring-actuated mechanism normally acting to force said lever into holding engagement with said idle clutch-member, cooperating parts carried by the turret-slide and machine bed, respectively, for retracting said spring-actuated mechanism from said clutch-engaging lever during the backward traverse of the turret slide, detent mechanism for holding said spring-actuated mechanism in retracted position, and detent-releasing means carried by the turret head and spring during the turning movement of the latter, substantially as described.

5. The combination with a turret slide and a head rotatably mounted thereon, of mechanism for turning said head including a clutch mounted on the slide and having a continuously rotating member and a normally idle member in driving relation to said head, spring means urging said idle clutch-member into engagement with said continuously rotating member, a lever normally holding said idle clutch-member out of engagement with said continuously rotating member, a spring acting upon said lever in a direction to retract it from said idle clutch member, a pivoted cam member engaging said lever in opposition to said spring, a cam-actuating spring normally urging said cam member into operative engagement with said clutch-engaging lever, an operating arm fast on the pivot shaft of said cam member, a fixed cam on the machine bed engaging said arm during the backward traverse of the turret slide, thereby moving said cam member out of engagement with said clutch-engaging lever and simultaneously tensioning said cam-actuating spring, detent mechanism for holding said cam-actuating spring under tension, and detent releasing means carried by the turret head and operating during the turning movement of the latter, substantially as described.

6. The combination with a turret-slide, and a head rotatably mounted thereon, of mechanism for turning said head including a clutch mounted on the slide and having a continuously rotating member and a normally idle member in driving relation to said head, spring means urging said idle clutch member into engagement with said continuously rotating member, a lever normally holding said idle clutch-member out of engagement with said continuously rotating member, a spring acting upon said lever in a direction to retract it from said idle clutch-member, a pivoted cam-member engaging said lever in opposition to said spring, a spring-actuated rod connected to said cam-member and urging the latter into operative engagement with said clutch-engaging lever, an operating arm connected to said pivoted cam-member, and a cam mount-

ed on the machine bed and engaging said arm during the backward traverse of the turret-slide whereby to retract said spring-actuated rod and simultaneously move said
5 cam-member out of engagement with said clutch-engaging lever, a detent for said rod, and detent-releasing means carried by the turret-head and operating during the turning movement of the latter, substantially as described.

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