(No Model.) 4 Sheets—Sheet 1.

W. W. TUCKER.

MACHINE FOR TAPER TURNING.

No. 482,210. Patented Sept. 6, 1892.

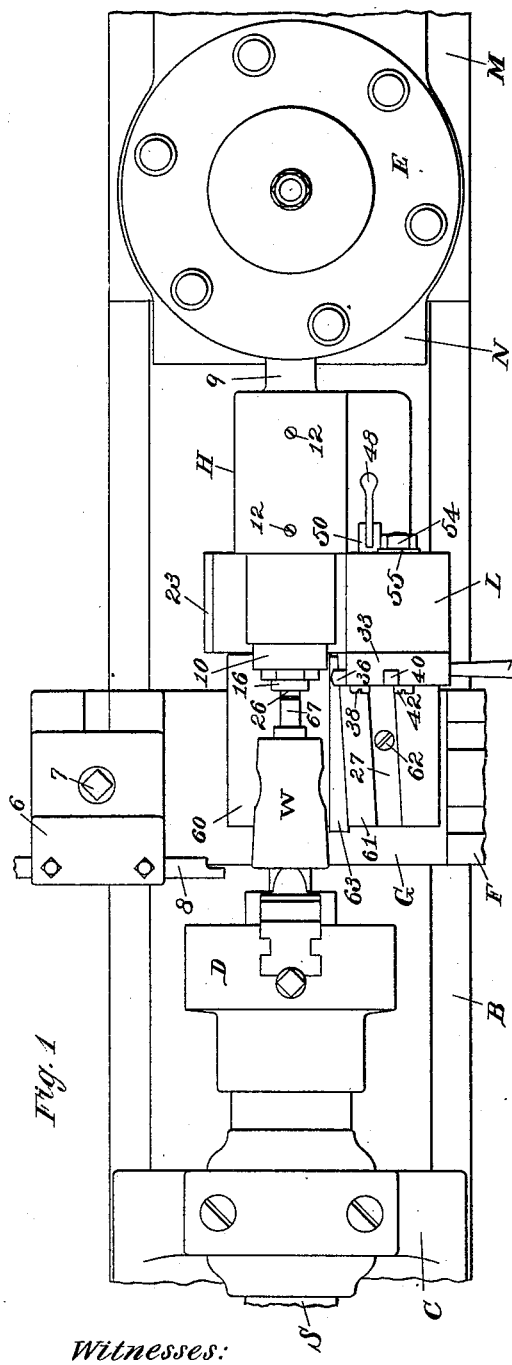

Fig. 1.

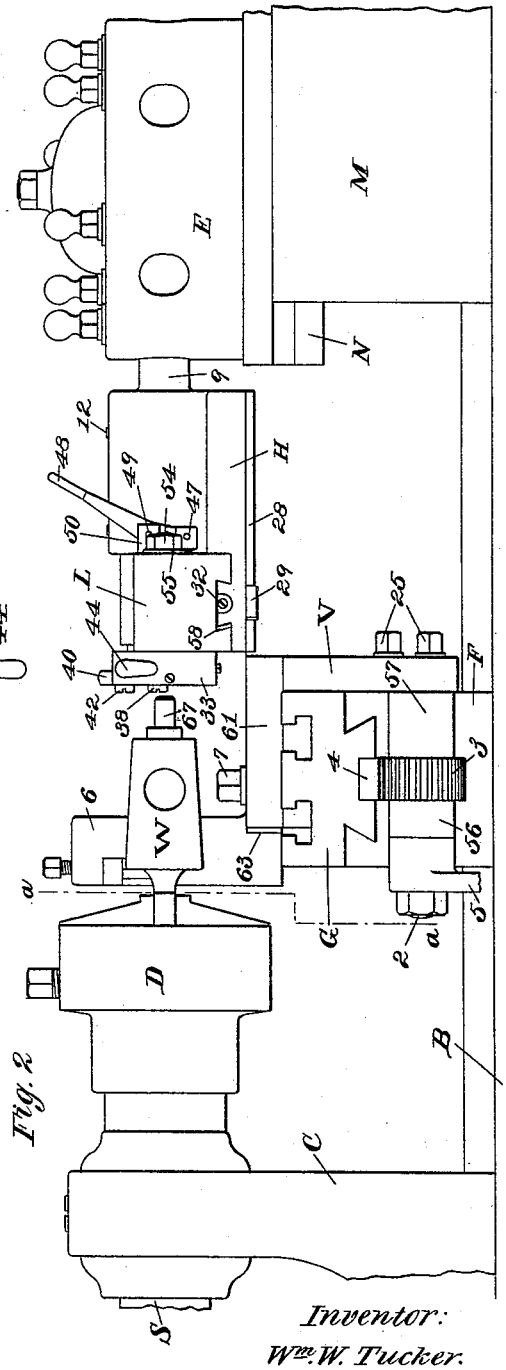

Fig. 2.

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Fig. 5

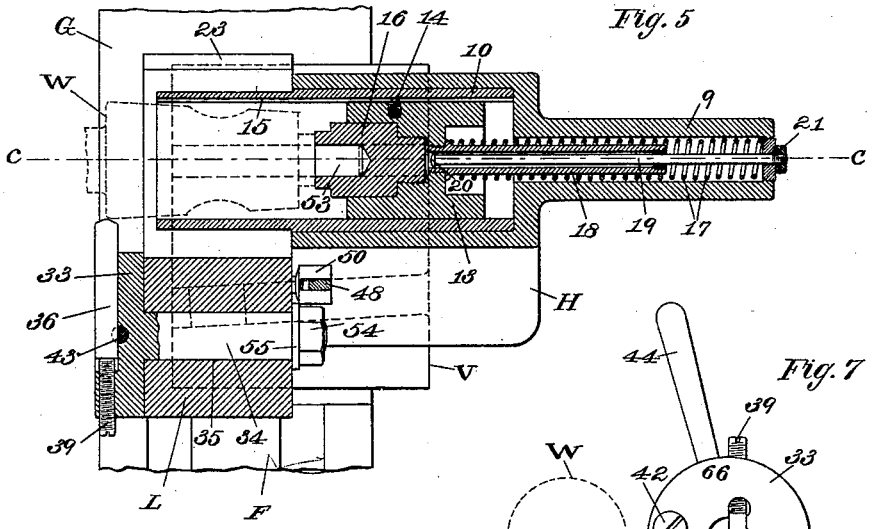

Fig. 7

Fig. 3

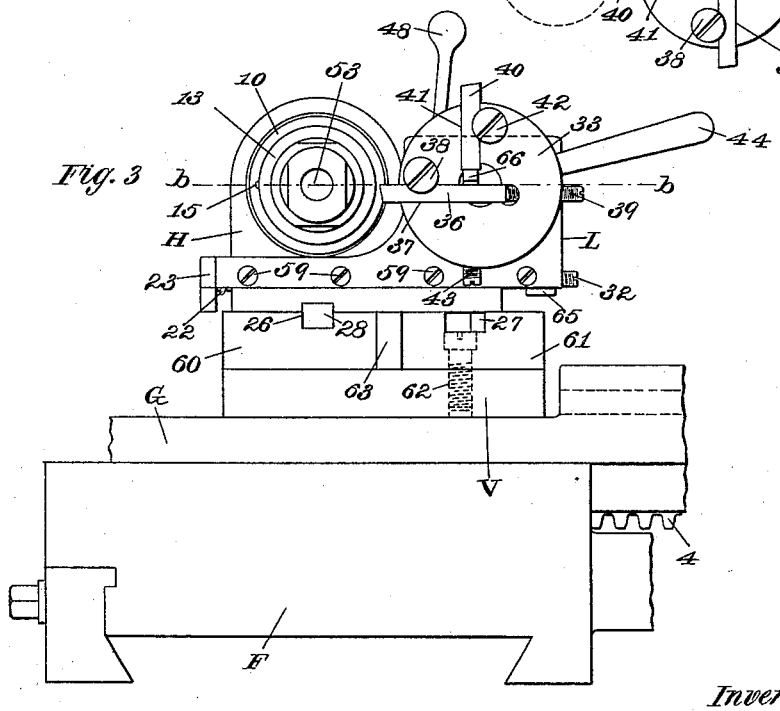

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Fig. 4

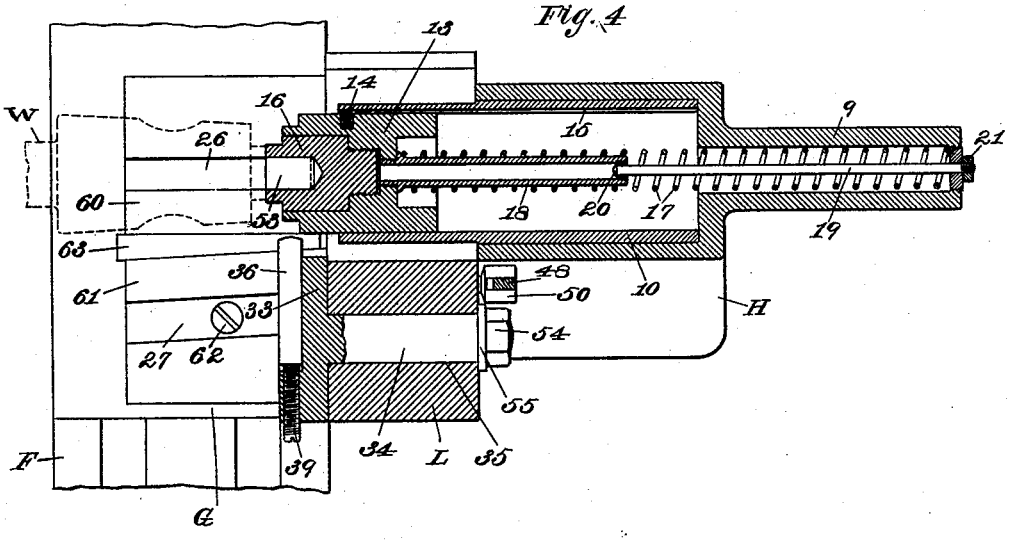

Fig. 6

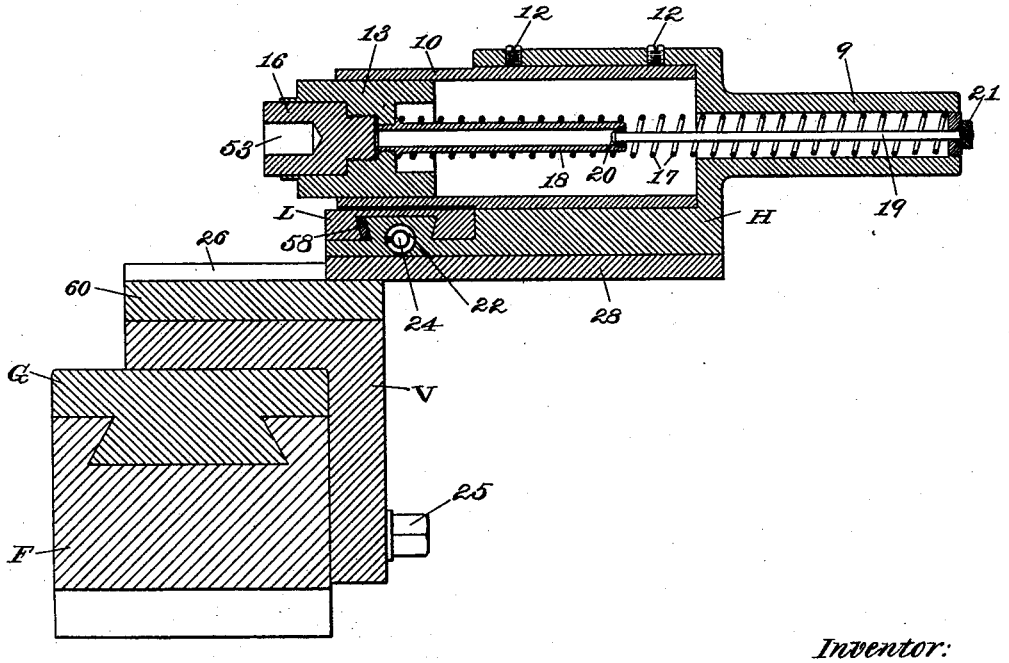

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Fig. 8

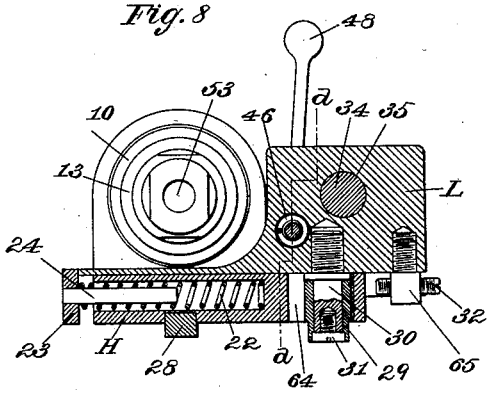


Fig. 9

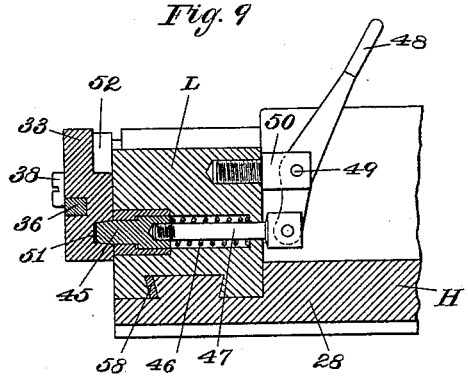


Fig. 10

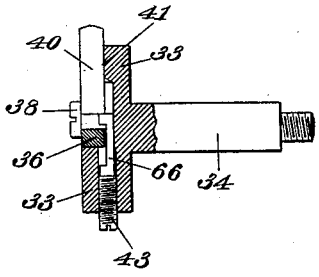


Fig. 11

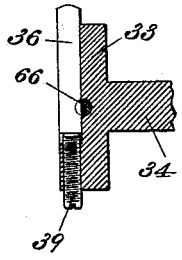
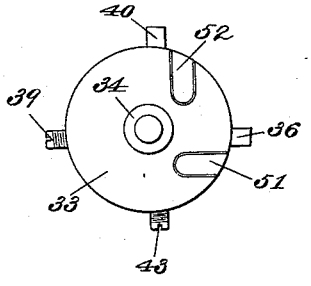


Fig. 12



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UNITED STATES PATENT OFFICE.

WILLIAM W. TUCKER, OF HARTFORD, CONNECTICUT.

MACHINE FOR TAPER-TURNING.

SPECIFICATION forming part of Letters Patent No. 482,210, dated September 6, 1892.

Application filed July 13, 1891. Serial No. 399,432. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. TUCKER, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Mechanism for Taper-Turning, of which the following is a specification.

This invention relates to mechanism for use in turret-lathes for turning tapering pieces, such as the plugs of valves and the like, the object being to furnish a taper-turning tool or mechanism capable of working with unusual precision, and thereby to reduce the amount of grinding afterward required and to reduce the cost of the work.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of a portion of a turret-lathe furnished with my improved taper-turning mechanism. Fig. 2 is a side elevation of the same. Fig. 3 is a left-hand end elevation of the parts shown to the right of the dotted line *a a* in Fig. 2. Fig. 4 is a sectional plan view of the parts below the line *b b* of Fig. 3. Fig. 5 is a view similar to Fig. 4, but showing the parts in a different position. Fig. 6 is a vertical section of the tool in line *c c* of Fig. 5. Fig. 7 is a view similar to a portion of Fig. 3, showing the cutter-holder in a different position. Fig. 8 is a view of the tool as seen from the left-hand in Figs. 1 and 2, the cutter-carrying bracket being shown in cross-section, the better to exhibit the preferred construction thereof. Fig. 9 is a vertical longitudinal section in line *d d*, Fig. 8. Figs. 10, 11, and 12 are detail views of the cutter-holder.

Similar characters designate like parts in all the figures.

The turret-lathe partially shown in the drawings comprises the usual bed or frame B, head-block C, turret-slide block M, turret-slide N, turret E, lathe-spindle S, and a suitable chuck, as D, on said spindle. The lathe is also usually furnished with the "cut-off slide" G, which is fitted to slide in the cut-off block F and carries the cut-off-tool holder 6 for holding the cut-off tool 8. This slide may be actuated by hand in the usual manner by means of the rack 4, fixed to the under side thereof, and the gear 3, meshing with said rack and carried by a shaft 2, mounted in bearings, as 56 and 57, on said block F, said shaft and gear being rotated by some suitable lever, as 5, Fig. 2. The turret E is of the well-known construction and is arranged to be intermittently revolved and locked on the slide N by means of the usual turret-actuating and turret-locking apparatus. (Not herein shown.)

My improved turning mechanism is herein shown especially arranged for turning the tapered plugs of plug-cocks and other like-shaped pieces of work. It comprises a stock or frame carrying a guide-center and a cutter-carrying slide arranged to be fed backward and forward crosswise of said stock during the longitudinal movement thereof.

The fixture stock or frame H for carrying the turning-tool has formed thereon a stem or shank 9, which fits into a corresponding socket in the turret E, wherein it is securely held by clamping in a well-known manner. Said stock is bored to receive the sleeve 10, that is secured therein by set-screws, as 12, and within said sleeve is fitted to slide a spring-actuated plunger or piston 13, which is guided in its movements by means of a key, as 14, fitting in a key-slot 15 in the said sleeve 10, as illustrated in Fig. 4. The plunger or guide-slide 13 carries the removable guide-center 16, which may be replaced by other guide-centers having different internal sizes to accommodate the various pieces of work to be operated upon. Said slide 13 and the center carried thereby are normally held in the position shown in Figs. 4 and 6 by means of the long spiral spring 17. A hollow tube 18 is fixed in the slide 13, the rearward end of this tube being partially closed to engage the head 20 of the stop-rod 19, as indicated in Figs. 4 and 6. Said rod 19 extends rearwardly and passes through the partially-closed end of the hollow shank 9 and has thereon a nut 21 outside said shank end to limit the outward (left-hand) stroke of the slide 13.

During the cutting operation the fixture is moved forward, the center 16 holding one end of the piece of work, as W, and remaining in the position shown in Fig. 4. The spring 17 is compressed, the parts assuming at the end of the cutting operation the positions shown in Fig. 5. It is obvious that should the spring 17 be omitted the center would naturally move back with the stock H when the fixture is re-

tracted, and thus allow the work to drop out; but by means of the arrangement herein described the center is held normally in the proper working position. Should the piece of work be removed when the fixture is in its forward position, (shown in Fig. 5,) the spring 17 will throw forward the center (the rod 19 limiting its forward movement) to the position shown in Fig. 6.

The forwardly-projecting sleeve 10 is used, chiefly, for the purpose of facilitating and improving the construction of the fixture, since said sleeve might obviously be integral with the frame or stock H of the fixture. In this case, however, the projecting portion of the sleeve would make it difficult to fit up the other portions of the mechanism, especially the fitting in place of the tool-carrying slide L. Another reason for making said sleeve 10 separate, as hereinbefore set forth, is that in practice the stock H is made of cast-iron, while it is found important to make the sleeve of hardened steel ground accurately cylindrical, so that the piston 13 (also of hardened steel) shall slide therein with the utmost precision and closeness.

The cutter-carrying slide (designated by L) is fitted to slide on ways formed on the stock H and has a movement crosswise to the movement of the fixture.

The usual mode of gibbing the cutter-slide to the stock of the fixture will be understood from the sectional views, Figs. 6 and 9, and the front view, Fig. 3, the gib 58 for taking up the wear being adjusted by the gib-screws 59, Fig. 3, in a well-known manner. Said cutter-slide carries a shiftable cutter-holder provided with two cutters, one for roughing and one for finishing, as hereinafter more particularly described.

As a means for throwing forward the cutter-slide to move the cutters toward the piece of work W the stock H is bored, as shown in Figs. 6 and 8, to receive the thrust-spring 22, which bears against the cap 23, fixed on the rearward end of said slide L, and is guided by the pin 24 in said cap. The spring thus arranged forces back the cutter-slide as far as this is by the other slide-actuating apparatus permitted to go. This arrangement of the spring and mode of operating the slide also takes up all play or backlash of the parts, so as to produce a very perfect action of the mechanism as a whole.

For effecting the required positive movement of the cutter-carrying slide L on the stock H a parallel guide is provided for said stock and an inclined guide for said slide. For supporting these guides a guide-bracket V is fixed to the cut-off block F by suitable screws, as 25. On this bracket is rigidly fixed the guide-block 60, having therein the guide-groove 26, closely fitting the guide-key 28, which is formed on or fixed to the stock H, as will be understood by comparison of the several figures of drawings, in which these details are respectively shown. By this means when the turret E is swung to bring the fixture into its working position (shown in Figs. 1 and 2) the guide 28 is brought into substantial alignment with the guide-groove 26, so that on the forward movement of the turret said guide will enter said groove, as in Fig. 6, and thereby rigidly control the lateral position of the fixture in the machine.

Forward of the fixed guide-block 60 an adjustable guide-block 61 is pivotally supported on the aforesaid guide-bracket V by means of the pivot-screw 62, and has formed therein the guide-groove 27 for receiving the guide-bearing of the cutter-slide. Said adjustable guide-block stands at a little distance forward of the fixed guide-block, and between the two there is driven a pattern-wedge 63, whose angle corresponds accurately with the taper of the piece W to be turned. By replacing one wedge with another of a different angle a corresponding difference will be produced in the taper of the finished piece W.

For the purpose of operating the cutter-slide during the forward and backward movements of the fixture said slide is furnished with the guide-bearing 29, which is carried on a stud 30, firmly secured into the under side of said cutter-slide, as best shown in Fig. 8, said bearing being retained in place on said stud by means of the screw 31, as there shown. Said guide-bearing and stud extend downwardly through a slot 64, formed in the stock H, as will be understood from said Fig. 8. The lower end of the guide-bearing should be fitted to slide closely in the groove of the aforesaid adjustable guide-block.

For controlling the position of the slide L on the stock H, so that said bearing 29 will enter the groove 27 simultaneously with the entrance of the aforesaid parallel guide 28 into the groove of the fixed guide-block 60, said cutter-slide is provided with a stop-screw 32, carried by a stud 65, fixed to said slide L, as will be understood from Figs. 3 and 8. This stop-screw limits the movement of the slide due to the action of the aforesaid spring 22 when the guides 28 and 29 are withdrawn from their respective guide-blocks.

The cutter-holder in the preferred form herein shown consists of the oscillating holder or turret 33, having a shank or stem 34 formed thereon and fitted to turn freely in a corresponding bore 35 in the slide L, said stem being furnished with a nut 54 and washer 55 for securing said holder in place. The roughing tool or cutter 36 is fitted into a groove 37, formed in the holder 33, and is held therein by a clamp-screw 38, another screw 39 being provided whereby the cutter may be forced outwardly to regulate the cut. The finishing-tool 40 is set in a groove 41, similar to groove 37, and is held therein by means of a screw 42, the depth of cut to be made thereby being regulated by means of the screw 43, acting through the thrust-rod 66, Fig. 10, which passes by the tool 36, as there shown. The tool-holder 33 is furnished with a handle 44, by

means of which the operator may turn said holder in its bearings to bring one or the other of said cutters to the working position.

For locking the cutter-turret 33 in its respective positions there is provided a locking device consisting of a lock-bolt 45, which is carried in the slide L and is normally thrown forward to the position shown in Fig. 9 by means of a spring 46, carried in the slide. A rod or stem 47 is firmly screwed into or otherwise fixed to said bolt 45 and extends rearwardly through the slide L and has pivotally attached thereto one end of a lever 48, which is fulcrumed at 49 in a stud 50, that is screwed into said slide L. Corresponding grooves or notches 51 and 52 are formed in the rearward face of the holder 33 to receive the lock-bolt 45, as illustrated in Fig. 9. The operator by means of the lever 48 is enabled to draw back the lock-bolt 45 out of the notch 51, when by means of the handle 44 he may turn the tool-holder 33 to bring the second tool into position, the lock-bolt being then allowed to engage the notch 52, and thus lock the holder in its second position.

The general operation of the apparatus is as follows: The several parts of the mechanism having been properly assembled on the lathe, as indicated in Figs. 1 and 2, the piece of work W is placed in the chuck D and firmly clamped between the jaws thereof, the stem or reduced end 67 of the piece of work having been previously turned to the required size. The operator next brings forward the turret E and the parts carried thereby, the tongue 28 of the fixture entering the guide-slot 26 of the fixed guide-block 60 and the slide-actuating block 29 entering the inclined slot 27 in the adjustable guide-block 61. At the same time the stem 67 of the piece of work enters the bore 53 of the center or guide-rest 16, thereby securely holding the work ready for the operation. The cutting-tool having been previously set to make the required cut, the operator continues to move forward the turret and parts, thus feeding the cutting-tool to its work. The groove 27 being formed at an angle corresponding to the taper desired and the actuating-block 29 being advanced along said groove, a movement is imparted to the cutter-carrying slide that is crosswise to the line of movement of the fixture H, and as the cutter is advanced it is also retracted or drawn back from the axis of the piece of work W, thus giving to said article the desired taper. A roughing cut having been taken the full length of the piece, as in Fig. 5, the operator by means of the lever 48 draws back the latch 45 from the groove 51 and turns the tool-holder 33 to bring the finishing-tool into working position, as shown by comparison of Figs. 3 and 7. Next the operator allows the lock-bolt 45 to enter the groove 52, thus locking the cutter-holder. The fixture is now slowly returned to place, the finishing cut being preferably made during said return movement. The operator next by means of the lever 5 and the connecting parts hereinbefore described brings forward the cutting-off tool 8 and "squares up" the left-hand end of the piece, which is then removed and another one put in place for turning.

Having thus described my invention, I claim—

1. In a taper-turning mechanism, the combination, with the lathe-spindle and with a fixture-stock arranged to move parallel with the axis of said spindle, of the spring-actuated slide in said stock and fitted to carry one end of the piece to be turned, the cutter-slide mounted on the fixture-stock crosswise to the line of movement thereof, and a guide-block inclined to the line of movement of the fixture and engaging the cutter-slide, whereby the cutter is moved laterally of the fixture during the longitudinal movement thereof, substantially as described.

2. In a taper-turning mechanism, the combination, with the fixed stock having the sleeve 10, of the slide in said sleeve fitted to support the piece to be turned, the spring actuating said slide, and a stop limiting the outward movement of the slide, substantially as described.

3. In a taper-turning mechanism, the combination, with the fixed stock constructed, substantially as described, for carrying the work-supporting slide, of the cutter-carrying slide L, the cutter-holder shiftably supported, substantially as described, on said slide and provided with two cutters, and a holder-lock for locking said holder in successive positions, substantially as described.

4. In a taper-turning mechanism, the combination, with the fixed stock carried by the turret and constructed, substantially as described, to carry the guide-slide, of the guide-slide, the cutter-slide, the spring normally moving said cutter-slide to bring the cutter toward the piece to be turned, a stop limiting said movement, and a guide-bracket having two guide-grooves, one parallel to the longitudinal line of movement of the fixture and engaging the fixed stock and the other inclined to said line of movement and engaging the cutter-slide, substantially as described.

5. In a taper-turning mechanism of the class specified, the combination, with the fixed stock and with the cutter-slide movable crosswise of said stock, of the rotatable cutter-holder mounted on said slide, two cutters mounted in said holder, means for separately adjusting said cutters, a holder-locking bolt carried in the slide and engaging the holder, and means for withdrawing said bolt, substantially as described.

6. The combination, with a cutter-holder, substantially as described, of the cutters 36 and 40, means clamping said cutters in place, means, substantially as described, for adjusting said cutter 36, the screw 43, and the in-

termediate thrust-rod passing to one side of the cutter 36 and engaging the cutter 40 for adjusting the same, substantially as described.

7. In a taper-turning mechanism, the combination, with a fixture, substantially as described, of the fixed guide-block 60, fitted to engage the guide 28 of said fixture, and the adjustable guide-block 61, fitted to engage the cutter-slide of the fixture, and a pattern-wedge controlling the position of the adjustable guide-block, substantially as described.

8. The combination, with the fixed stock H, having the hollow shank 9, of the forwardly-projecting sleeve 10, the slide 13, having the hollow stem 18, the spring 17, outside of said stem and extending within the hollow shank 9, and a rod, substantially as described, limiting the forward movement of the slide and extending into said hollow stem, substantially as described.

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