No. 852,346. PATENTED APR. 30, 1907.

W. PORTEOUS.

MILLING MACHINE.

APPLICATION FILED SEPT. 11, 1905.

5 SHEETS—SHEET 1.

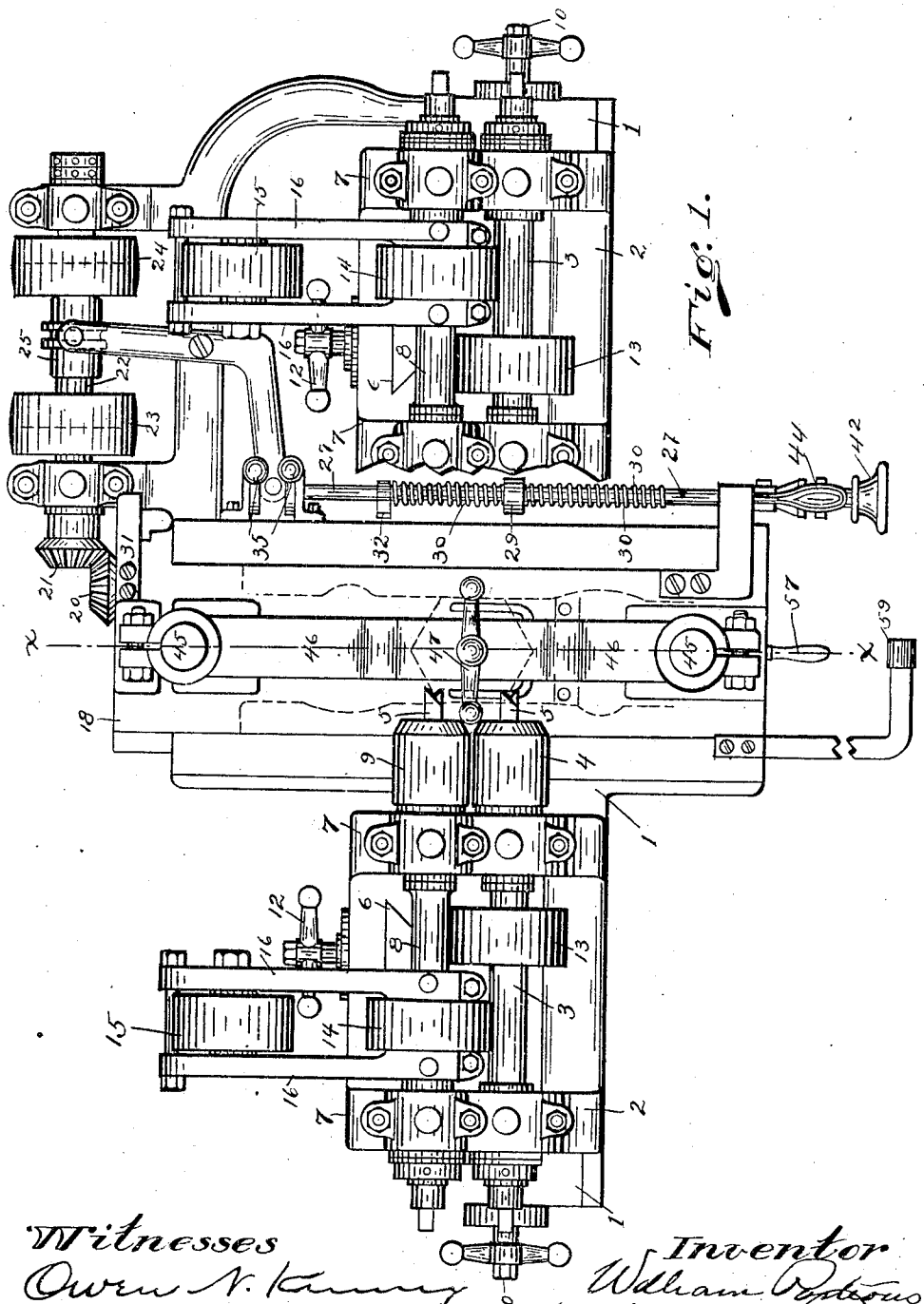


Fig. 1.

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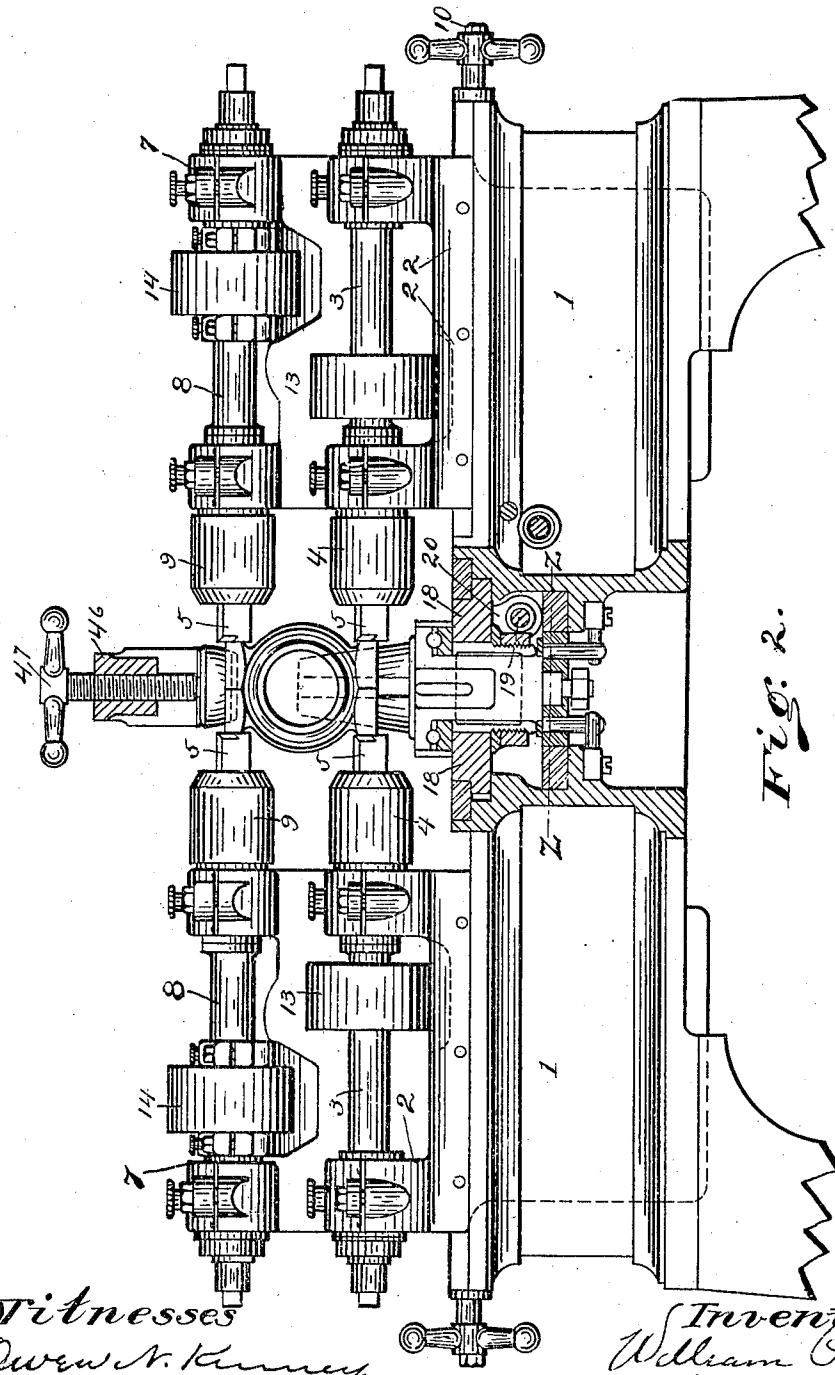


Fig. 2.

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5 SHEETS—SHEET 3.

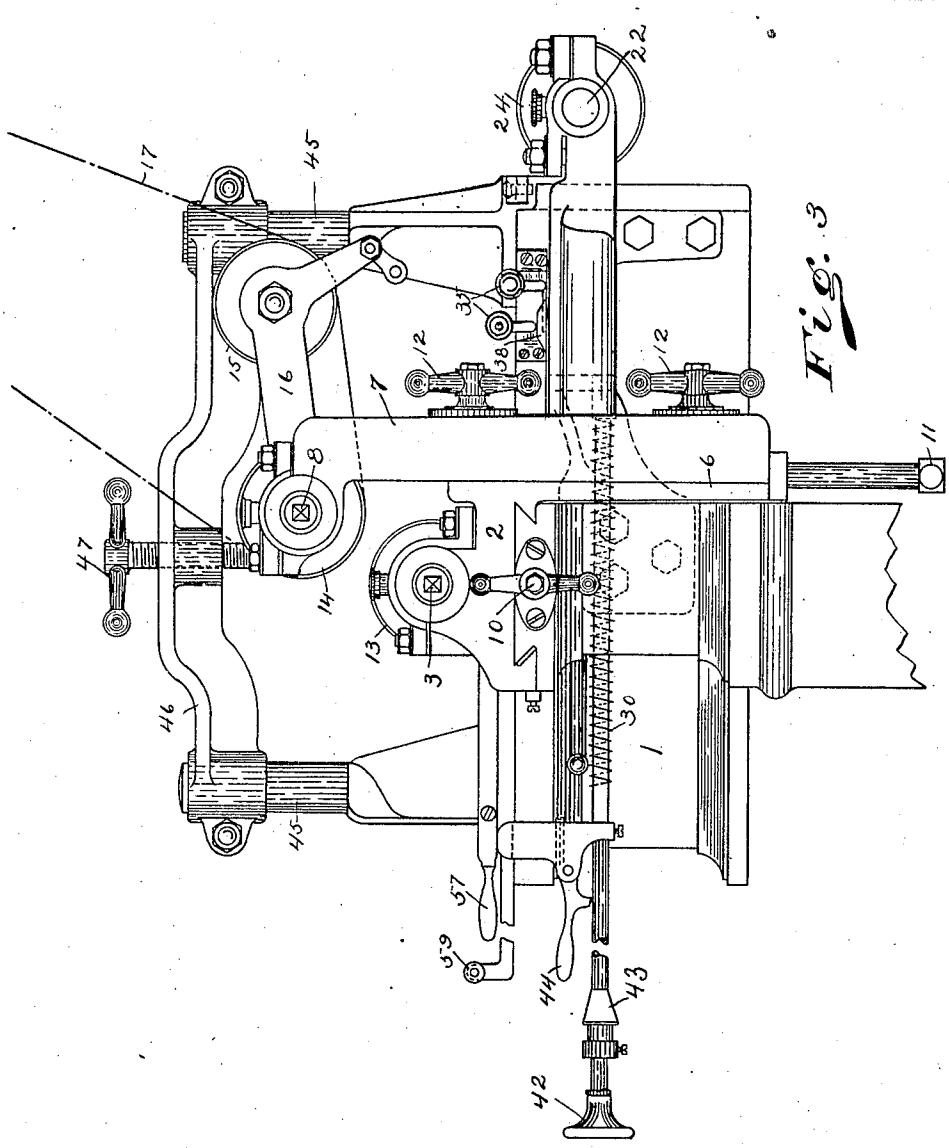


Fig. 3

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5 SHEETS—SHEET 4.

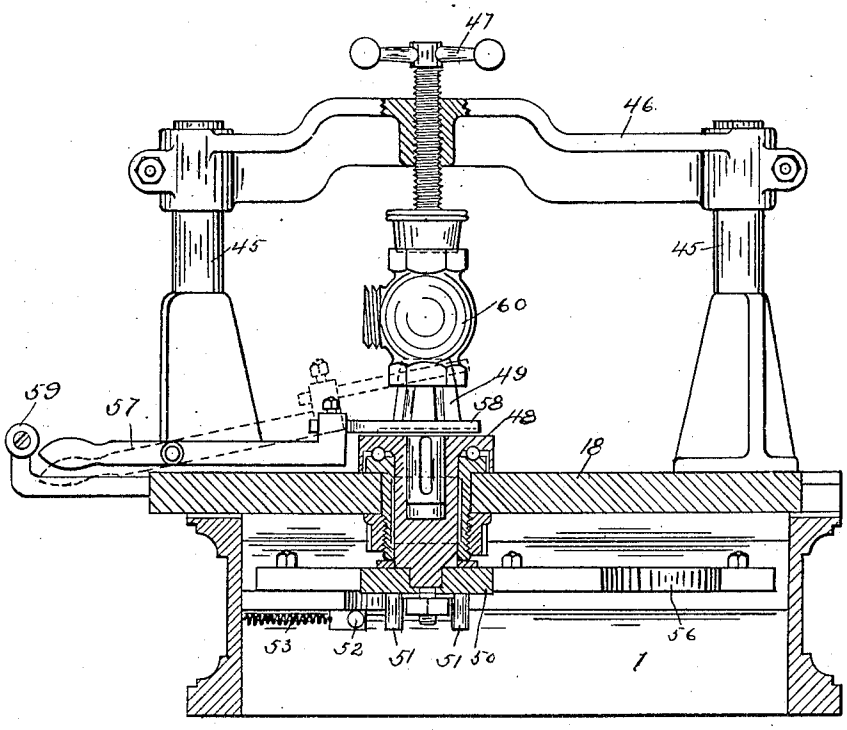


Fig. 4.

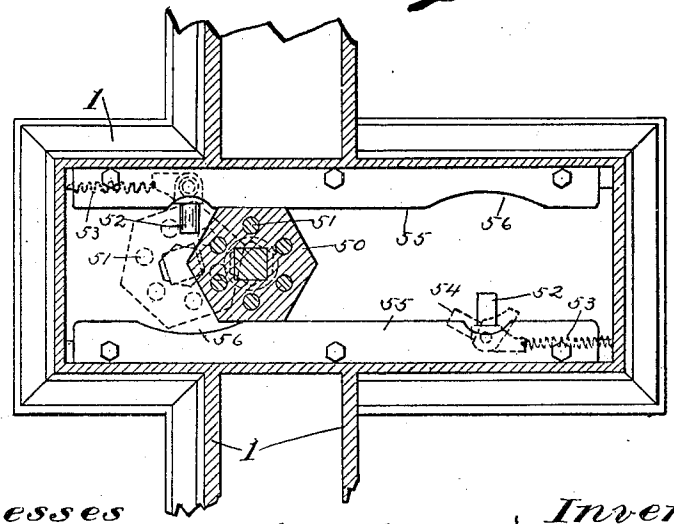


Fig. 5.

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5 SHEETS—SHEET 5.

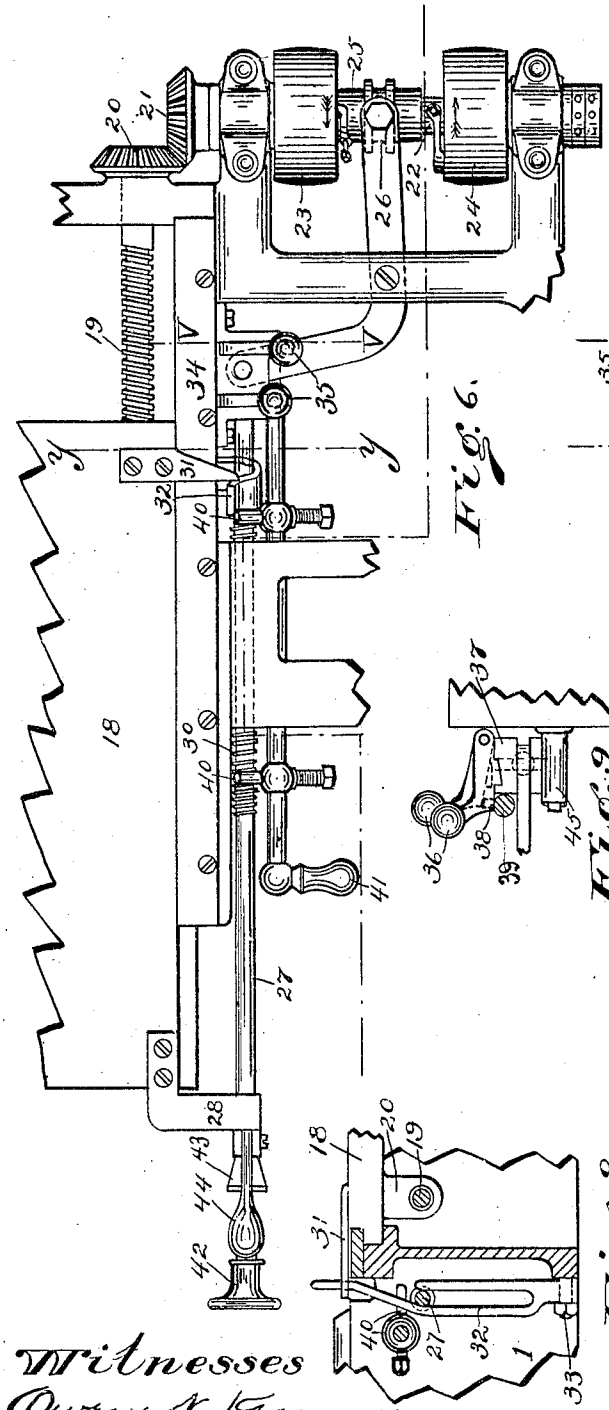


Fig. 6.

Fig. 9.

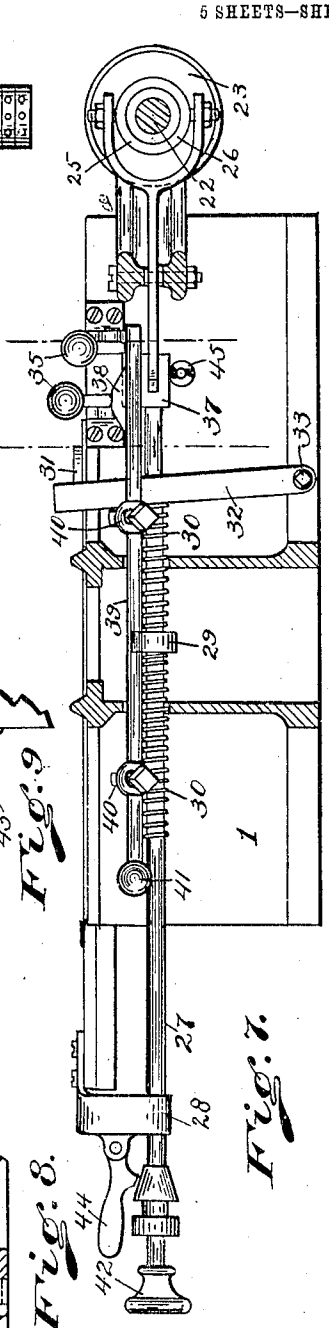


Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM PORTEOUS, OF COLLEGE HILL, OHIO.

MILLING-MACHINE.

No. 852,346. Specification of Letters Patent. Patented April 30, 1907.

Application filed September 11, 1905. Serial No. 278,016.

To all whom it may concern:

Be it known that I, WILLIAM PORTEOUS, a citizen of the United States, residing at College Hill, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Milling-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of milling machines especially designed for milling or dressing the nut faces of brass valve bodies and fittings of the like character, and it has for its object the production of a machine which can simultaneously mill or dress two pairs of faces, one pair of which is at one end of the fitting and the other pair at the other end thereof, and which is simple and efficient in its action and automatic in its operation in causing the work carrying table to travel back and forth between the cutters and to turn the work to present new faces to be cut.

The novelty of my invention consists in the construction and combination of the parts, all as will be hereinafter more fully set forth and specifically pointed out in the claims.

In the accompanying drawings:—Figure 1, Sheet 1 is a plan view of the machine embodying my invention. Fig. 2, Sheet 2 is a front elevation with the table in section. Fig. 3, Sheet 3 is an end elevation of the machine, looking from the left. Fig. 4, Sheet 4 is a sectional end elevation on dotted line *x*—*x* of Fig. 1 looking to the left. Fig. 5, Sheet 4 is a sectional plan view on the dotted line *z*—*z* of Fig. 2. Fig. 6, Sheet 5 is a plan view of the reversing mechanism. Fig. 7, Sheet 5 is a side elevation of the reversing mechanism. Fig. 8, Sheet 5 is a section on dotted line *y*—*y* of Fig. 6. Fig. 9, Sheet 5 is a section on the dotted line *v*—*v* of Fig. 6.

The same numerals of reference are used to indicate identical parts in all the figures.

Suitably mounted upon ways on a cross-shaped bed plate 1 are two opposing head stocks 2, carrying live spindles 3, provided with chucks 4, adapted to receive suitable cutters 5. The head stocks 2 are provided on their rear faces with vertical ways 6 (Figs. 1 and 3) upon which are gibbed vertically adjustable head stocks 7 carrying live spindles 8 similar to the spindles 3 of the head stocks 2, and carrying chucks 9 similar to the chucks 4.

Lead screws 10 are provided for adjusting the head stocks 2 and 7 toward and from the work and lead screws 11, for vertically adjusting the head stocks 7 (Fig. 3), clamps 12 being provided to retain head stocks 7 in their adjusted positions. Suitable driving mechanism is employed to drive the live spindles 3 and 8, consisting of belt pulleys 13 on the spindles 3 and belt pulleys 14 on the spindles 8 and to compensate for the loosening and tightening of the driving belts, when the head stocks 7 are raised or lowered, I have provided floating idlers 15, carried on links 16, by head stocks 7, for the purpose of maintaining constant tension on the driving belt 17 (Fig. 3) as will be readily understood.

Transversely gibbed on the bed plate 1 is the work carrying table 18 (Figs. 1, 2, 4 and 6) which is driven forward and backward between the cutters 5 by a lead screw 19 (Figs. 2 and 6) which is suitably journaled in the bed plate 1. A nut 20, embracing the lead screw 19, is secured to the table 18 (Fig. 2) to drive the same forward or backward according to the direction of rotation of the lead screw 19, which is driven by miter gears 20 and 21, gear 20 being mounted on the lead screw 19 and driven by gear 21 mounted on a counter shaft 22, which carries right and left driving pulleys 23 and 24, shown particularly in Fig. 6, and these pulleys 23 and 24 are adapted to be connected to or disconnected from the counter shaft 22, by means of a clutch 25, which is shifted by the forward and backward movement of the table 18 by means of a bell crank 26, which is operated by a rod 27, sliding through a bracket 28, secured to the table 18. A collar 29 (Fig. 7) is secured to the rod 27 and forms the abutment for a pair of coiled springs 30, which when compressed supply the power for shifting the clutch 25. A trigger 31 carried by the table 18 is provided to strike a lever 32 (Figs. 6, 7 and 8) which is fulcrumed at 33 to the bed 1 and serves to move the lever 32 toward the collar 29 on the rod 27 and thereby compress the spring 30 as will be readily understood. Suitably journaled upon the bed plate 1 as by brackets 34 (Figs. 6 and 7) are a pair of latches 35 provided with weights 36 and these latches engage a block 37 which is secured to the rod 27 and forms the connection between said rod and the bell crank 26, these latches 35 being so arranged and spaced that only one thereof may engage the block 37 at

one time, and a lifter 38 (Fig. 7 and dotted lines Fig. 9) carried by rod 39, is provided to alternately raise the latches 35 out of engagement with the block 37.

The rod 39 is provided with adjustable shifting pins 40 which lie in the path of travel of the lever 32 and the bracket 28 and is also provided with a handle 41 for moving the same by hand. The operation of this shifting mechanism is as follows, reference being had more particularly to Figs. 6, 7, 8 and 9, wherein the parts are shown in their proper positions with the work carrying table 18 at the forward end of its stroke and ready to start backward. Assuming that the machine is running, the lead screw 19 will draw the work carrying table 18 backward to bring the bracket 28 against the spring 30 thereby compressing the same against the collar 29, carried on the rod 27, which compression of the spring 30 will tend to shift the rod 27 and consequently the shifter 26 and clutch 25, this shifting however will be resisted by one of the latches 35 engaging the block 37 until, when the bracket 28 strikes the pin 40 on the rod 39 and thereby shifts the lifter 38, the latch 35 is released and permits the spring pressure on the collar 29 to become effective and cause the instantaneous shifting of the clutch 25, whereupon the other latch 35 will drop behind the block 37 thereby locking the same in place. At the time of shifting of the clutch 25 the direction of revolution of the lead screw 19 will be reversed and the work carrying table 18 will travel forward until the trigger 31 comes against the lever 32 and compresses the spring 30 against the collar 29, the latch 35 resisting this pressure until it is raised by the lifter 38 being pulled thereunder through the medium of the lever 32 striking the pin 40 and shifting the rod 38, whereupon the block 37 will be again released and the spring pressure become effective to shift the parts to the positions shown in Figs. 6, 7, 8 and 9, as will be readily understood.

Upon the free end of the rod 27 is secured a handle 42 and adjacent thereto is secured a latch piece 43 adapted to be engaged by a latch 44 (Figs. 3 and 6) and the position of the parts is such that, when the latch 44 engages the groove in the latch piece 43, the shifting mechanism will be in a neutral position and the table 18 will remain stationary. To accomplish this, it is necessary that both the latches 35 be raised out of engagement with the block 37 by means of the handle 41 on the rod 39, whereupon the table may be stopped and the latch 44 engaged as will be readily understood. Any suitable roller bearing 45 (Figs. 7 and 9) may be employed to maintain the position of the block 37 with relation to the latches 35.

Suitably mounted upon the work carrying table 18 and approximately at each end thereof, are vertical standards 45, upon which is adjustably mounted a bridge 46 carrying a work-clamping screw 47 having a swivel head or plug to engage the work, directly beneath which and journaled through the work carrying table is a work revolving chuck 48, provided with spring jaws 49 adapted to engage and hold the work thereon. Removably secured to this work revolving chuck 48 and below the table 18 is a plate 50 having as many flat sides as there are sides to be milled on the work carried by the table, Fig. 5 showing a hexagonal plate used for milling a hexagonal nut. The plate 50 is provided with turning pins 51, one for each flat side, which project downward and engage trips 52 which are pivoted to the bed plate 1 in such manner that they are free to move in one direction only and this movement is resisted by a coiled spring 53 (Figs. 4 and 5), the dotted lines at 54 (Fig. 5) showing this movement. Guides 55, suitably mounted within the bed 1 and lying adjacent to the plate 50 and parallel to the travel thereof, are provided to prevent the plate 50 from turning during the cutting operation, and these guides are cut out at 56 to permit the plate 50 to turn when the dogs 52 come in contact with the pins 51.

Carried by the work carrying table 18 and at the front end thereof, is a movable guide carrier 57, carrying a guide bar 58 and an elevating roller 59, which is carried by the bed 1 lies in the path of travel of the guide carrier 57 in such manner that, when the table 18 moves to its forward position, the roller 59 striking and riding upon the carrier 57, depresses the forward and elevates the rear end thereof, to bring the guide 58 to a position shown by the dotted lines in Fig. 4, adjacent to one of the faces to be milled, for the purpose of assisting the operator to square up his work on the work carrying table, before clamping the same down by means of the clamp screw 47. The operation of this part of the machine is as follows:— Assuming the parts to be in the positions shown in Figs. 4 and 5 and that a globe valve body 60 has been inserted for the purpose of having the faces of the nuts thereon, milled, and that the machine has been started, the table 18 travels forward until one of the turning pins 51 comes in contact with the dog 52 and the plate 50 being opposite the cut-out 56 in the guide bar 55 and being free to turn, is revolved by the pin 51 and dog 52, (dotted lines Fig. 5) a sufficient distance to bring the next flat surface of the plate 50 against the guides 55, at which time the reversing mechanism shown in Figs. 6, 7, 8 and 9 is actuated by the travel of the table 18, as before explained, and reverses the travel of table 18, which, carrying the plate 50, causes one of the pins 51 to again strike the dog 52, but on the opposite side thereof, which causes the tripping of the dog 52 and permits the

plate 50 to pass thereby without causing any further revolution of the plate, and as the table 18 proceeds rearward past the cutters, the fitting carried upon the table, is milled off and at the rearward end of the movement of the table 18, one of the pins 51, striking the dog 52 at the rear end of the guides 55, causes another partial revolution of the plate 50 and consequently of the work 60, at which time the table driving mechanism is again reversed to move the table 28 forward, thereby again passing the work 60 between the cutters which operate thereon, and this series of operations of the revolving mechanism and the table driving mechanism continues until all of the operations to be performed upon the piece 60 have been completed, whereupon the machine is stopped, the clamp screw 47 unscrewed, the work 60 removed from the table, a new piece inserted and clamped thereon and the machine again started.

It is to be observed that the live spindles and the cutters of the upper and lower sets do not occupy a vertical plane in their axes, but the axes of the upper and lower live spindles are in a plane oblique to the work carrying table, so that the work of the one set of cutters, say the upper set for instance, is done before the work of the other or lower set of cutters comes into play. This is illustrated in Fig. 1 and is an important feature in that it largely relieves the strain on the machine and in fact throws no more strain upon it than upon a machine having a single pair of opposing cutters, as will be readily understood.

Having thus fully described my invention, I claim:—

1. In a milling machine of the character described, the combination of a supporting and guiding bed, a transversely movable work carrying table carried thereby, means for securing work to said table, opposing cutters for operating on the lower part of the work carried on said table, and opposing cutters for operating on the upper part of said work, said opposing pairs of cutters having their axes occupying a plane oblique to the table so as to act on the work successively at its lower and upper parts, substantially as described.

2. In a milling machine of the character described, the combination of an automatically operated work carrying table having a path of travel in a straight line back and forth, clamping mechanism for the work upon said table, live spindles in pairs journaled on each side of said work carrying table, each pair journaled obliquely above the other and carrying facing tools, the upper pair to face off opposite sides of a nut of a fitting carried by said work carrying table and the lower pair to face off opposite sides of a nut on said fitting, said pairs of cutters operating on the work successively, and mechanism to arrest the travel of the table after it has passed the cutters, substantially as described.

3. In a milling machine of the character described, the combination of a bed carrying a transversely movable work carrying table, an intermittingly revolving work carrying chuck carried thereon, means for securing work to said table, adjustable opposing cutters for operating on the lower part of the work carried on said table, and adjustable opposing cutters for operating on the upper part of said work, the axes of said cutters being in a plane oblique to the table, substantially as described.

4. In a milling machine of the character described, the combination of a bed carrying a transversely movable work carrying table, an intermittingly revolving work carrying chuck carried thereon, mechanism for intermittingly revolving said chuck automatically, means for securing work to said table, adjustable opposing cutters for operating on the lower part of the work carried on said table, and adjustable opposing cutters for operating on the upper part of said work, the axes of said cutters being in a plane oblique to the table, substantially as described.

5. In a milling machine of the character described, the combination of a bed carrying a transversely movable work carrying table, an intermittingly revolving work carrying chuck carried thereon, means for securing work to said chuck, adjustable opposing revolving cutters for operating on the lower part of the work carried on said chuck automatically, adjustable opposing revolving cutters for operating on the upper part of said work, the axes of said cutters being in a plane oblique to the table, and mechanism for revolving said cutters, substantially as described.

6. In a milling machine of the character described, the combination of a bed carrying a transversely movable work carrying table, an intermittingly revolving work carrying chuck carried thereon, mechanism for automatically and intermittingly revolving said chuck, means for securing work to said chuck, adjustable opposing revolving cutters for operating on the lower part of the work carried on said chuck, adjustable opposing revolving cutters for operating on the upper part of said work, the axes of said cutters being in a plane oblique to the table, and mechanism for revolving said cutters, substantially as described.

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