

Oct. 27, 1931.

L. A. PRESTEK

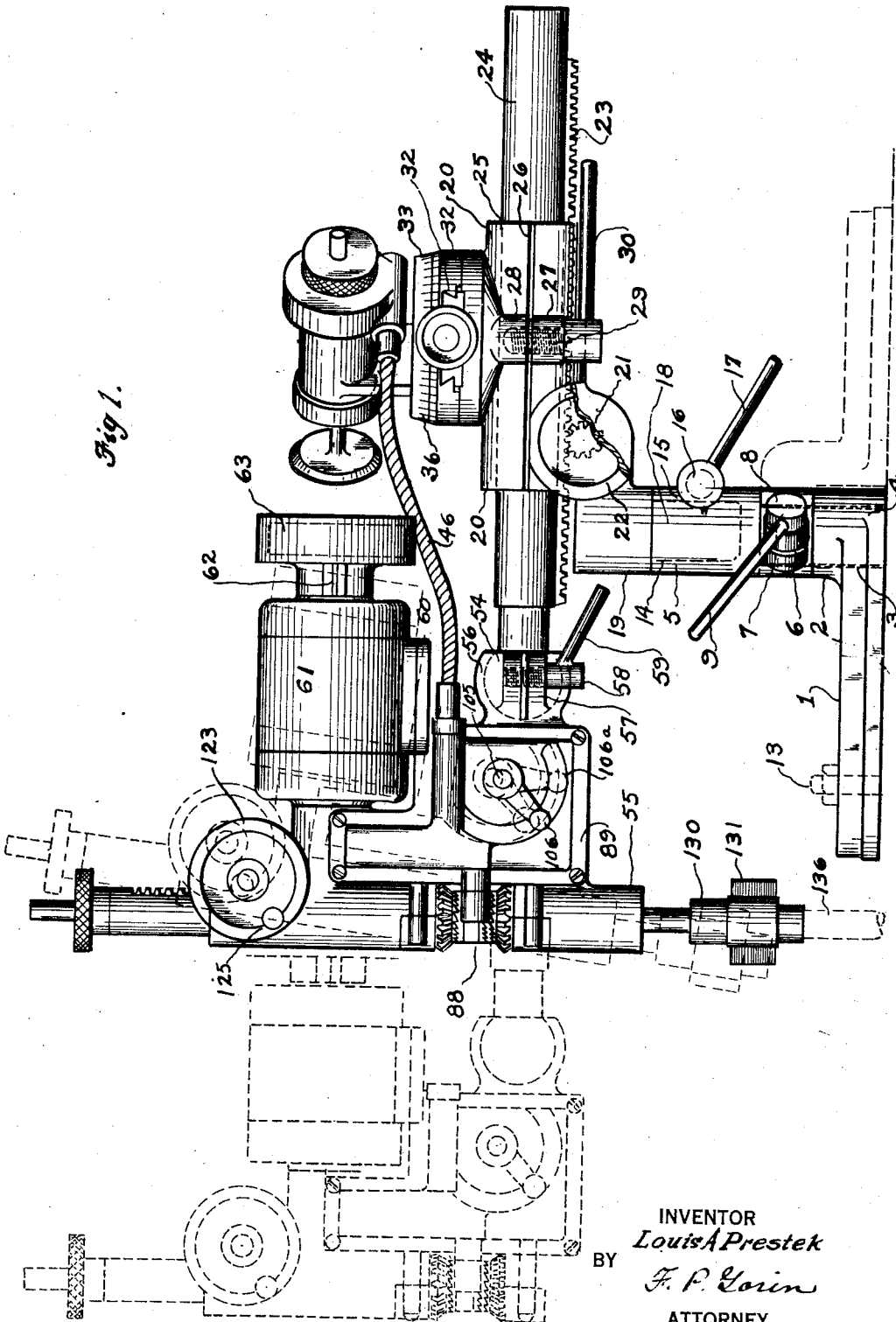
1,829,059

VALVE GRINDING REFACING AND RESEATING DEVICE

Filed June 24, 1930

5 Sheets-Sheet 1

Fig 1.



INVENTOR  
*Louis A Prestek*  
BY  
*F. P. Coiro*  
ATTORNEY

Oct. 27, 1931.

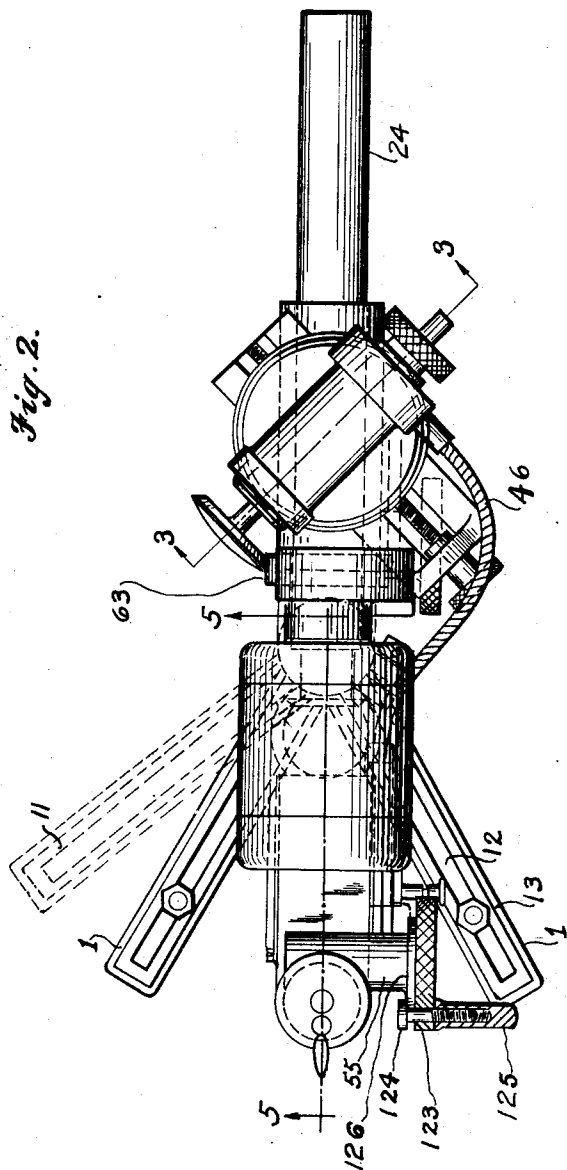
L. A. PRESTEK

1,829,059

VALVE GRINDING REFACING AND RESEATING DEVICE

Filed June 24, 1930

5 Sheets—Sheet 2



INVENTOR  
*Louis Prestek*  
BY  
*F. P. Lozin*  
ATTORNEY

Oct. 27, 1931.

L. A. PRESTEK

1,829,059

VALVE GRINDING REFACING AND RESEATING DEVICE

Filed June 24, 1930

5 Sheets-Sheet 3

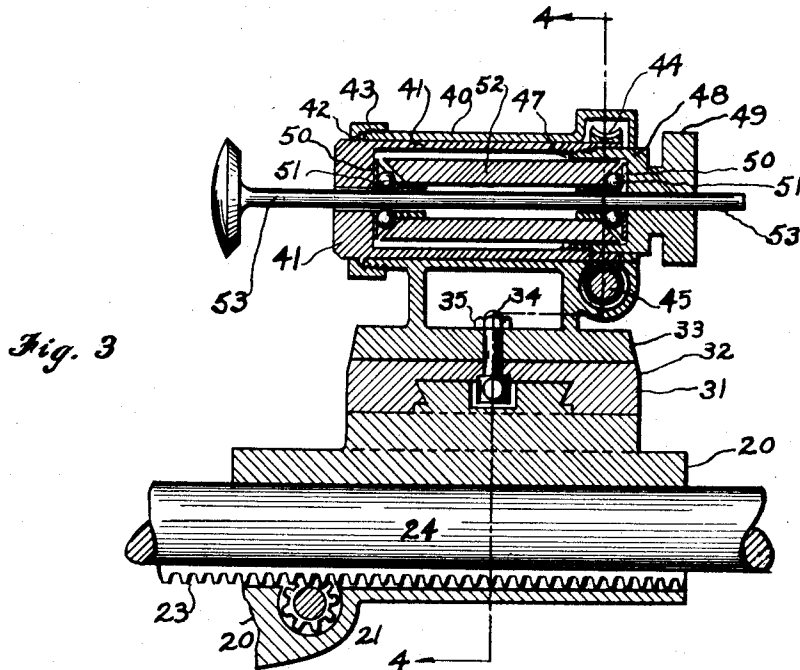


Fig. 3

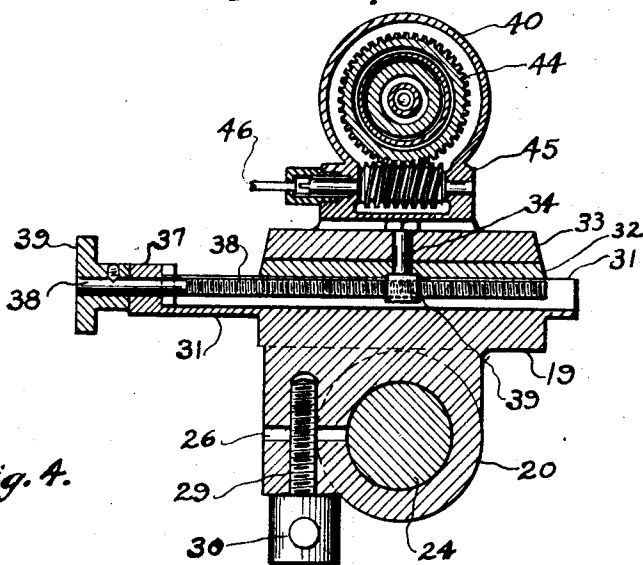


Fig. 4.

INVENTOR  
*Louis Prestek*  
BY *F. P. Goin*  
ATTORNEY

Oct. 27, 1931.

L. A. PRESTEK

1,829,059

VALVE GRINDING REFACING AND RESEATING DEVICE

Filed June 24, 1930

5 Sheets-Sheet 4

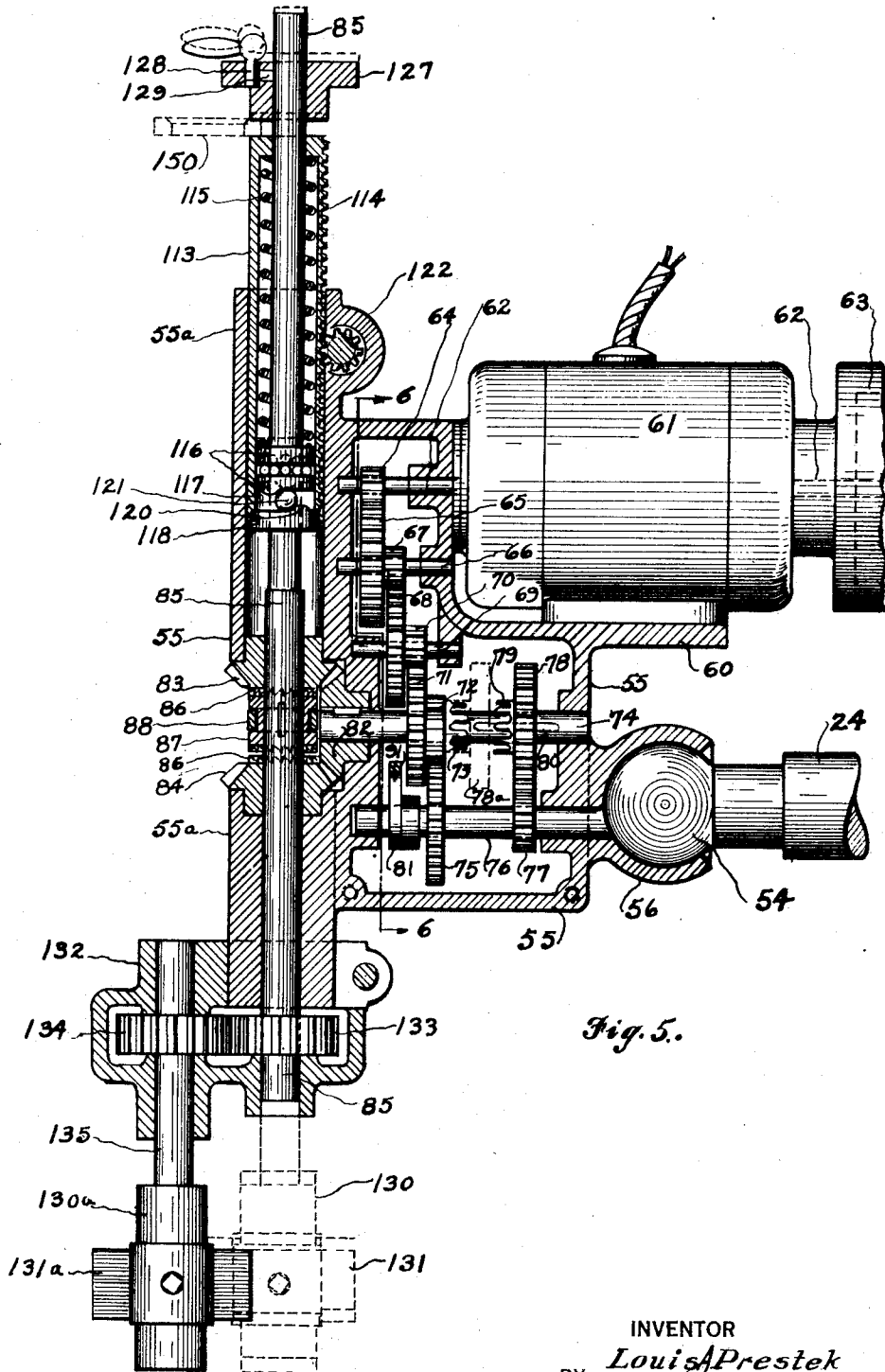


Fig. 5.

INVENTOR  
*Louis A. Prestek*  
BY *F. P. Lorin*  
ATTORNEY

Oct. 27, 1931.

L. A. PRESTEK

1,829,059

VALVE GRINDING REFACING AND RESEATING DEVICE

Filed June 24, 1930

5 Sheets-Sheet 5

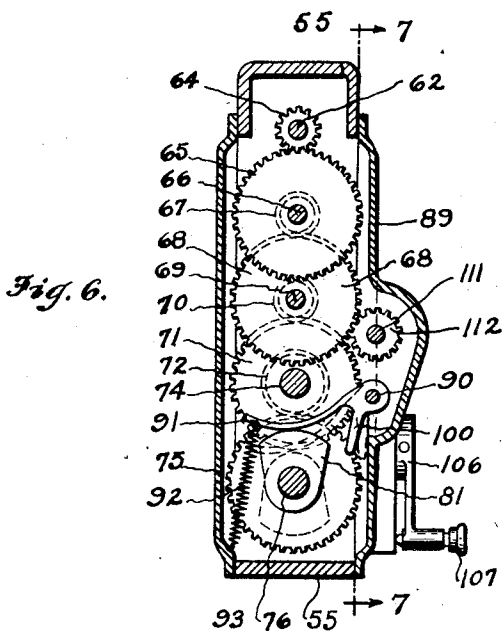


Fig. 6.

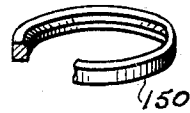


Fig. 10.

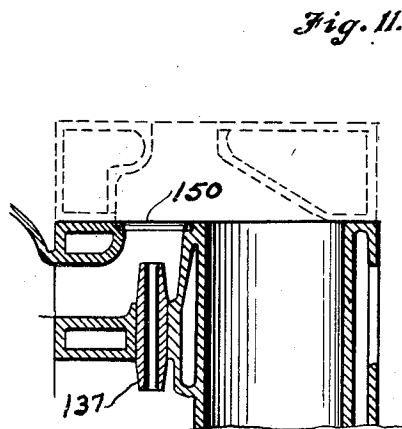


Fig. 11.

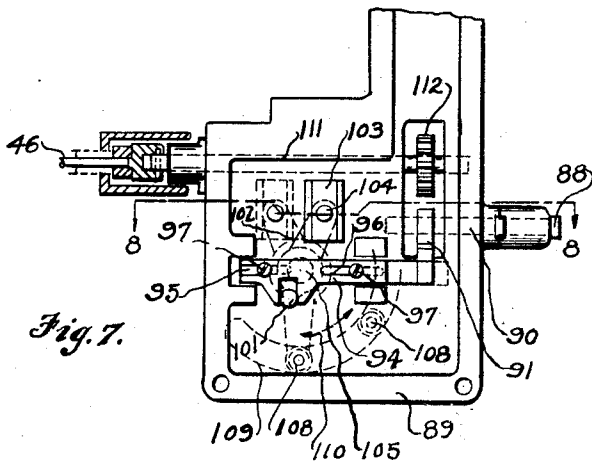


Fig. 7.

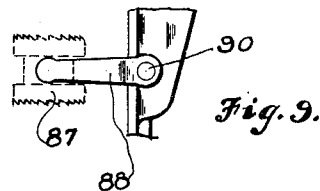


Fig. 9.

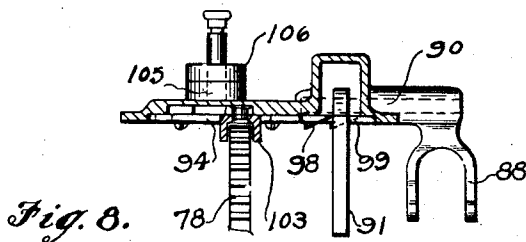


Fig. 8.

INVENTOR  
*Louis Prestek*  
 BY *F. P. Cain*  
 ATTORNEY

# UNITED STATES PATENT OFFICE

LOUIS A. PRESTEK, OF SEATTLE, WASHINGTON

VALVE GRINDING REFACING AND RESEATING DEVICE

Application filed June 24, 1930. Serial No. 463,508.

This invention is directed to a machine designed for use in connection with valves and valve seats of internal combustion or like engines, and in the use of which the valve seat  
5 may be reground, the metal of the head adjacent the valve seat counterbored to accurately receive a ring in which a new valve seat may be formed, and to resurface the valve proper for cooperation with the seat.

10 In a conventional seat regrinding operation, experience has demonstrated that the most effective work is performed when the regrinding tool is alternately reciprocated on the surface to be ground and periodically  
15 elevated to insure thereby the delivery to such surface of a portion at least of the grinding compound which has worked out from beneath the tool during the grinding operation.

20 The primary object of the present invention, therefore, is the provision of a machine in which the grinding elements may be set at any appropriate angle to insure accurate and effective cooperation with the seat to be  
25 ground and the grinding elements in operation being alternately reciprocated in a rotary direction and periodically raised from grinding contact with the valve seat for the introduction of fresh or displaced grinding  
30 compound.

Where a valve seat is so badly worn or so distorted that a regrinding operation would be without avail to restore the seat, it is customary to counterbore the material of the  
35 head to receive a ring in which a new valve seat may be subsequently ground or cut. It is of essential importance in a counterbore apparatus of this type that the counterbore be accurate as to diameter and depth to receive the ring under a driving fit to permit  
40 the new valve seat to be not only accurately placed but formed entirely in the ring.

Therefore, a further object of the present  
45 invention is the provision of a machine adapted for a counterbore operation, wherein the cutting depth of the tool is accurately gauged and determined by parts manually set in a predetermined position, the gauge of  
50 these parts being specifically determined by

the ring itself which is to be inserted in the counterbore.

A further object of the present invention is the provision of means whereby the tool arbor may operate under practically any pre-  
55 selected operating pressure, the pressure adjustment being simply and manually controlled to insure the most effective result, the machine thus providing for the comparatively light, though appreciably a constant  
60 pressure, when the machine is in use for regrinding purposes and the increased comparatively heavy constant pressure when the machine is in use for counterbore purposes.

A still further object is the provision of  
65 means whereby the tool arbor and associated parts may be set in practically any position to properly cooperate with the valve seat, the predetermined position of the arbor being controlled by the cooperation of an arbor ex-  
70 tension and the particular valve guide of the engine.

Another object of the invention is the provision of means arranged for simple, manual control, by which the alternate reciprocatory movement of the tool arbor may be  
75 converted to a single uni-directional rotary movement, as is necessary in converting the machine from a regrinding machine to a counterbore machine.

80 Still another object of the invention is the provision of means to be selectively operated at will whereby the valve proper may be resurfaced when necessary or desirable.

The invention is illustrated in the accompanying drawings, wherein:—

85 Figure 1 is a view in elevation of the improved machine, various adjustments of the machine parts being indicated in dotted outline.

90 Figure 2 is a plan view of the machine.

Figure 3 is an enlarged section on the line 3—3 of Figure 2.

95 Figure 4 is a section on the line 4—4 of Fig. 3.

Figure 5 is a vertical sectional view, partly in elevation, showing the machine parts for use in regrinding and counterboring.

100 Figure 6 is a section on the line 6—6 of Fig. 5.

Figure 7 is a section on the line 7—7 of Fig. 6.

Figure 8 is a section on the line 8—8 of Fig. 7.

5 Figure 9 is a detail in elevation showing the means for operating the movable clutch member controlling the rotary reciprocatory movement of the tool arbor.

10 Figure 10 is a view of the block inserted in the counterbore formed by the machine when used for this purpose.

Figure 11 is a view in vertical section showing the ring of Figure 10 in applied position.

15 The machine of this invention is designed to be motor driven, and ordinarily for a rotary reciprocatory movement and an intermittent lifting movement of the tool arbor when used for regrinding valve seats or a constant uni-directional movement of the arbor when used for counterboring, the conversion of the machine to either the regrinding or counterboring function being through a simple mechanical control and avoiding the necessity for changing, removing or replacing any parts; a simple, variable pressure means being capable of being mechanically set to insure that the operating tool will have the proper pressure both in the regrinding and counterboring operations, the cutting depth of the tool, when in counterboring operation, being selectively limited automatically through means gauged and set as determined by the thickness or height of the ring to be inserted in the counterbore.

20 The preferred details of construction of the present machine are clearly illustrated in the accompanying drawings. The machine is supported by means of elongated base brackets 1 having hubs 2 axially bored at 3 for the reception of a pilot 4 depending from a hollow casting 5. The hubs 2 are split at 6, with offset ears 7 to receive a clamping screw 8 whereby either bracket, one or both, may be rigidly secured to the pilot 4.

45 It is to be understood that the brackets are capable of any relative angular relation in order that the longitudinally ranging slots 12 therein may be positioned to cooperate with any appropriate engine bolts 13 to rigidly secure the machine to the engine block. For example, the bolts rising from the block and utilized for securing the removable head in place when the engine is of this type may be utilized for rigidly securing the brackets in place. The clamping screw 8 may, if desired, be provided with an operating handle 9 to insure effective clamping operation.

60 The casting 5 is hollow in that portion above the hubs 2, as at 14, the hollow portion being longitudinally split, with offset ears 15 to receive a clamping screw 16 operated by a handle 17 for clamping this portion of the casting onto a pilot 18 depending from a casting 19. The casting 19 is thus obviously capa-

ble of any rotary, angular relation with respect to the casting 5 and may be clamped in such position.

70 The casting 19 includes an elongated sleeve 20 longitudinally slotted at 26 and provided on opposite sides of the slot with ears 27 and 28 with which a set screw 29 cooperates for clamping the sleeve on a bar 24 slidably guided within the sleeve and held in any position of adjustment by the clamping action on the sleeve. The bar 24 is provided with a rack 23, through which cooperates a pinion 21 mounted in the casting 19 below the sleeve 20 and operative through a slot in the sleeve by a hand wheel 22 for longitudinally adjusting the bar 24 for a purpose which will later appear.

75 The upper portion of the sleeve 20 is thickened for a part of the length of the sleeve and supports an undercut trackway 31, preferably disposed at an angle to the axis of the sleeve. On this trackway slides a block 32 formed in its under surface to cooperate with the trackway and on the block 32 is rotatably supported a base 33, through the medium of a pin 34 and nut 35. The peripheral surfaces of the block 32 and base 33 are graduated to permit the base to be arranged in any angular adjustment with respect to the block, as is necessary in setting the parts for resurfacing the operative faces of a valve, as will later appear.

80 The track 31 is longitudinally recessed, the track at one end of the recess forming an abutment 37 in which is mounted for rotative movement a rod 38 operative through a hand wheel 39 secured on the rod beyond the end of the track. The rod 38 is threaded and passes through a threaded opening in the pivot bolt 34 for the base 33. Obviously, the block 32 and base 33 may be thus adjusted longitudinally of the track at will.

85 With particular reference to Figures 3 and 4, it will be seen that the base 33 supports a sleeve 40 in which is rotatively mounted a barrel 41 having a head formed with an opening to permit the passage therethrough of the stem 53 of an ordinary poppet valve. The barrel is rotatively held in the sleeve by an annular flange 42 overlying the end of the sleeve and held between the ends of the sleeve and a hollow nut 43 slidably embracing the head 41 and having threaded connection with the sleeve 40. The end of the barrel remote from the head is provided with an offset worm wheel 44 which is designed to be engaged by a worm gear 45 supported upon one end of a shaft mounted in the casting and extended as a flexible shaft 46 for driving by a motor to be later referred to.

90 The hollow plug 48 is arranged for threaded connection within the open end of the barrel opposite the head 41, the plug being operable by an integral hand wheel 49. The head 41 of the barrel and the plug 48 are

provided with cases 50 receiving and supporting balls 51, and within the barrel is a longitudinally cored sleeve 52 having conically depressed ends to receive and cause the balls under endwise adjustment of the plug to bear upon and grip the stem 53 of the valve. Under rotation of the flexible shaft, the worm gear 45 operating through the worm wheel drives the barrel and with it the valve stem and valve through the gripping means described.

The rod 24, which, as previously described, is mounted for longitudinal adjustment in and with respect to the sleeve 20 of the casting 19 is terminally provided with a spherical end 54, with which cooperates a partly spherical socket 56 carried by and forming part of a main housing 55. The socket is split, with the split portions formed with lugs 57 engaged by a clamping screw 58 operable by means of a handle 59 to permit the main housing to be arranged in any desired angular adjustment with respect to the rod 24 and the parts locked in such adjusted position.

The housing 55 carries a bracket 60 supporting the motor 61 driven from any appropriate source of energy. The motor shaft 62 is provided at one end with an emery or like abrading wheel 63, and on the opposite end with a pinion 64 (see Figure 6). The pinion 64 meshes with and drives a gear 65 rotatably mounted on a stub shaft 66, there being secured to the gear 65 a pinion 67 which meshes with and drives a gear 68 supported on the stub shaft 69 and having a fixed pinion 70 arranged to mesh with and drive a gear 71, which is in turn provided with a relatively fixed pinion 72. The gear 71 and pinion 72 are mounted for free rotation on a shaft 74 supported in the housing 55, the pinion 72 having one element 73 of a conventional or preferred form of clutch. The pinion 72 meshes with a gear 75 which is fixed on a shaft 76 mounted in the housing 55 below the shaft 74. A pinion 77 is also secured to the shaft 76 and is arranged for selective cooperation with the gear 78 slidably mounted on the shaft 74 and provided with a clutch element 79 adapted for selective cooperation with the clutch element 73. The gear 78 is held against independent rotation with respect to the shaft 74 by a key 80.

The housing 55 includes an upright, cylindrical or sleeve-section 55a circumferentially interrupted in line with the shaft 24 and housing a tool arbor shaft 85. On this shaft 85 are mounted opposing beveled gears 83 and 84, the gears operating in the interrupted portion of the sleeve and in opposed mesh with a beveled gear 82 secured upon the end of the shaft 74. The proximate faces of the gears 83 and 84 are formed to provide clutch elements 86, and an intermediate double clutch member 87 is slidably mounted upon and keyed with respect to the arbor shaft 85 so

that on appropriate movement of the clutch member 87, either gear 83 or 84 may be fixed with relation to the arbor shaft 85 and the latter driven in the appropriate direction in the operation of the shaft 74, as will be apparent.

It is, of course, understood that the tool arbor shaft 85 is the element by which the valve grinding tools or seat cutting tool is operated. In the use of this shaft or arbor for valve grinding, it is important that the shaft be given a rotary reciprocatory movement to be thus driven first in one direction and then in the opposite direction, and that means be provided for lifting the shaft at periodic intervals in order to insure the drawing into the seat of the valve the grinding compound forced therefrom during the grinding operation, an operation well understood in valve grinding.

If the clutch member 87 is reciprocated periodically, it is, of course, apparent that the arbor shaft 85 will be operated alternately in opposite directions accordingly as gear 83 or gear 84 provides the driving power for the shaft. However, in the use of this tool arbor shaft for counterboring, in order to insert a ring into the block for the formation of a new valve seat, it is apparent that the tool arbor shaft must be driven continuously in one direction and that under these circumstances the clutch member 87 must be held in one position to cause but one of the gears 83 or 84 to provide the driving means for the arbor shaft 85.

In order to facilitate this operation and provide a practical machine, the conversion of the mechanism from a rotary reciprocatory movement of the arbor shaft 85 to a uni-directional movement thereof must be simply and easily controlled. The mechanism for accomplishing this result is illustrated more particularly in Figures 6, 7 and 8, in which it will be seen that that portion of the main housing 55 which encloses the gears and pinions heretofore referred to is provided with a cover plate 89.

In this cover plate, and particularly in an off-set portion thereof is mounted a shaft 90 on which is fixed a lever including an extended arm 91 and a depending portion or lug 100. The lever arm 91 is of curved form and is arranged in the path of movement of the cam 81 fixed on shaft 76. The cam is of such shape as to elevate the lever arm 91 in the rotation of the cam, thus turning the shaft 90, the opposite movement of the lever arm 91 being compelled by a spring 92 connected to such lever arm and to an appropriate part of the main housing 55, as shown more particularly in Figure 6.

The shaft 90 extends toward the double clutch member 87 and is terminally provided with a yoke 88, the arms of which seat in an annular channel in such double clutch mem-

ber so that under the operation of the parts the double clutch member is, through the described movement of the lever arm 91, operated to alternately fix the gears 83 and 84 with respect to the arbor shaft 85, thus causing said arbor shaft to be alternately rotated in opposite directions. 70

In order to insure that the arbor shaft 85 may at will be continuously driven in one direction, it is necessary to lock out the cooperation of the lever arm 91 with the cam 81 and hold the double clutch member 87 in cooperation with but one of the beveled gears 83 or 84. To secure this result, there is arranged within the housing 55 a latch bar 94 slidably limited by slots 95 and 96 engaging fixed pins 97. The operative end of this latch bar is formed with a beveled nose 98 positioned in a plane between the lug 100 of the lever fixed on shaft 90 and the wall of the cover, so that when the latch bar has been moved to the positions indicated in dotted lines at 99 in Figure 8, the lug 100 will be forced away from the proximate wall of the cover 89 and the lever arm 91 raised from the operative plane of movement of the cam 81. 75

The consequent movement of the yoke 88 moves the double clutch member 87 into clutching cooperation with the beveled gear 83 so that in the subsequent operations the tool arbor shaft 85 is driven continuously in one direction. The position of the latch bar, and thereby the control of the machine from a rotary reciprocatory to the uni-directional movement, is controlled through a lever 102 fixed on a stub shaft 105 mounted in the cover 89, which lever is provided with a projection 101 fitted between depending lugs on the slide 94, so that as the lever is rocked the slide is moved to and from an operative position, as will be plain from Figure 7 of the drawings. 80

The shaft 105 extends through the cover and is provided with a handle 106 having a spring-pressed pin 107 adapted to engage in either of two notches 108 in a segment 109, whereby the slide may be locked against casual displacement in either the operative or inoperative position. The lever 102 extends above the shaft 105 and is there provided with a yoke 103 which loosely embraces the gear 78, which gear has been heretofore described as having a keyed sliding mounting on shaft 74 and having a clutch face 79 to cooperate with the clutch face 73 on the combined gear and pinion 71 and 72 loosely mounted on shaft 74. Thus when handle 106 is moved in the direction of the arrow 110 from position 106 indicated in Figure 1 to position 106a in said figure, the latch 94 is withdrawn from operative position and the gear 78 has been shifted to the position 78a in Figure 5 in the clutching cooperation with the pinion 72 and the shaft 74 is driven directly by the gear 71. In the opposite position of the handle 106, the latch is in operative position, the double clutch element 87 provided for reverse positioning through the cooperation of the lever arm 91 and cam 81, the gear 78 has been moved into mesh with the pinion 77 on shaft 76, and the shaft 74 is therefore driven from shaft 76 through gears 71, pinion 72, gear 75, pinion 77, and gear 78. 85

In connection with the rotary reciprocation of the tool arbor shaft 85 when using the machine for grinding a valve seat, it is advisable to periodically lift the grinding tool from the surface being operated upon in order to permit the grinding compound which has been expressed from between the surfaces in the operation of the tool to be drawn back onto the surfaces being operated on. Furthermore, in the uni-directional operation of the tool arbor shaft 85, as when counterboring, it is desirable to place endwise pressure on said shaft to insure the desired depth cutting and further important to limit that depth cutting in more or less exact accordance with the thickness of the ring to be seated in the counterbore. 90

In providing for these functions, there is mounted in the upper end of the sleeve section 55a of the housing 55 a barrel 113 provided on one side of a rack 114 designed to be engaged and operated by a pinion 122 mounted in the sleeve section 55a of the housing 55. The pinion 122 is manually operated by hand wheel 123 (see Figure 1) to provide for vertical adjustment of the barrel 113. The lower end of the barrel is provided with a thrust collar 118 having an upstanding projection 120. A ball bearing thrust collar 116 is fixed to the tool arbor shaft 85, and between this thrust collar and the upper end of the barrel is arranged a spring 115, preferably in the form of a spring coiled about the tool arbor shaft 85. 95

The thrust collar is provided with a depending projection 117 corresponding to the projection 120, and a ball 121 is arranged in the path between these projections, with the obvious result of causing a lifting movement of the shaft 85 as the projections ride over and under the ball 121. 100

It is, of course, to be understood that the thrust collar 116 is made up of two parts, with interposed ball bearings, one of which is fixed to the tool arbor shaft and the other of which receives bearing contact with the lower end of the spring 115 so that the spring may remain stationary during the rotation of the tool arbor shaft and yet exert downward pressure on said shaft. 105

In the uni-directional movement of the shaft, that is, in the use of the machine for counterboring, it is apparent that any desired longitudinal pressure, that is, feeding pressure, may be applied to the tool arbor 110

115

120

125

130

shaft by obvious manipulation of the pinion 122 and consequent downward movement of the barrel 113 through engagement of the pinion with the rack 114. This movement of the barrel forces the upper end of the spring downwardly, and as the lower end is held with respect to the shaft 85 by the thrust collar 116, the downward pressure on the shaft will, of course, be increased as the spring is adjusted.

It is important that the cutting depth of the counterbore substantially equal the thickness of the ring to be inserted, and means are provided to limit the counterbore depth of the tool accordingly. For this purpose, there is slidably mounted upon the upper end of the counterbore shaft above the barrel 113 a collar 127 including a conventional locking element 129 controlled by a handle 128 for fixing the collar at any desired position longitudinally of the projecting portion of the shaft 85. The lower surface of the collar and the upper surface of the barrel form square abutting surfaces, and it will be apparent that when the shaft, under the downward feeding pressure of the spring 115, has moved to a limit permitted by contact of the collar 127 with the upper end of the barrel 115, further cutting depth of the counterbore tool is prevented.

In order to accurately determine this cutting depth, the ring to be introduced in the counterbore and in which the new valve seat is to be formed and shown at 150 in Figure 10, is introduced, as indicated by dotted lines in Figure 5, between the upper end of the barrel 113 and the lower surface of the collar 127, the collar being vertically adjusted into contact with the interposed ring and locked to the shaft. The ring is then removed, and it will be apparent that the cutting depth of the tool arbor shaft in the counterbore operation is limited to the thickness of the ring.

The lower end of the tool arbor shaft 135 is provided with a chuck 130, to which may be attached a fly cutter 131 or a grinding tool in accordance with the desired operation. The lower end of the housing 55 may be provided with a casting 132, in which are arranged spur gears 133 and 134. Gear 133 is rigidly secured to the tool arbor shaft 85 and gear 134 is secured to a shaft 135 arranged in an offset plane to the shaft 85. When the casting 132 is used, the lower end of the shaft 135 will be provided with a chuck 130a, to which a fly cutter 131a or a grinding tool (not shown) may be connected.

The flexible shaft 46, through which the barrel for carrying the poppet valves proper during the grinding operation is driven, extends to the housing 55 and is terminally connected to a pinion shaft 111 on which is mounted a pinion 112 in mesh with and driven by gear 68. Thus the power of the

motor 61 is utilized to rapidly rotate the poppet valve held in the clamp previously described and, after the various adjustments have been made, to position the valve seat faces of this valve at the proper angle and in proper contacting relation with the emery wheel 63. It is apparent that the valve may be readily and conveniently provided with a new face through the obvious grinding operation.

With the parts constructed and arranged as described, and assuming that a regrinding operation is contemplated, the machine is clamped on the engine block and the housing 55 adjusted so that the grinding tool fits properly over the valve seat. If desired, and as contemplated, a pilot extension 136 of the tool arbor shaft 85 may be guided into the usual valve stem guide 137 shown in Figure 11. Of course, the various adjustments described in connection with the housing 55, that is, longitudinal adjustment of the bar 24 and the universal adjustment on the spherical head 54 of said bar, permit the housing to be arranged conveniently in proper relation to the valve seat to be ground.

The lever 106 is turned to the lower position, indicated at dotted lines 106a in Figure 1, and the gear 78 will be in the dotted position 78a and clutched to the pinion 72. In this position of the parts, the latch will be in inoperative position and the double clutch member 87 free to be reciprocated by the cam action described. The motor 61 is energized and, through the train of gears, the shaft 74 will be driven at the same speed as the gear 71 and the tool arbor shaft incident to the drive including the beveled pinions 82, 83 and 84 and the control of the double clutch member 87 will compel a rotary reciprocatory movement of the tool arbor shaft 85.

In this connection it is to be noted that the cam 81 occupies but a small portion of the peripheral area included in the operative plane of that cam. Hence the lever arm 91 will be in lowered position a greater length of time than in the upper position. Thus the shaft 85 will be rotated in one direction for a greater number of revolutions than in the opposite direction.

During the rotation of the tool arbor shaft 85, the ball 121 in cooperation with the projections described causes a momentary vertical movement of the shaft to withdraw the grinding tool from the surface being operated upon for the restoring of the grinding compound thereto, as is well understood.

If it is desired to replace a worn valve seat by new material in which a new valve seat may be formed, the material surrounding the valve seat is counterbored for the reception of the ring 150, the appropriate edge of which is initially beveled to start the formation of the valve seat before the ring is inserted. Under these circumstances, the latch 74 is re-

versed, locking the lever arm 91 beyond the influence of the cam 81 and moving the gear 78 out of clutching cooperation with the pinion 72 and driving the shaft 74 through the shaft 76 at a materially reduced speed. As the shaft 90 is now held in a fixed position, the yoke 88 holds the double clutch 87 in cooperation with one of the beveled gears, as 83, and the drive of the shaft 85 is a uni-directional one.

The barrel 113 has been adjusted through the pinion 122 to increase the feeding tension on the shaft by compressing the spring 115, and the operative depth of the reboring tool is controlled by limiting the downward movement of the shaft through the adjustment of the collar 127 in the manner described. After counterboring to the predetermined depth, the ring 150 is inserted in the counterbore, being intended to be a driving fit, and the machine re-set and the new valve seat ground in place.

If the valves are to be resurfaced, as is generally desirable in a job of this character, the valves are successively placed in the mechanism described and illustrated more particularly in Figures 3 and 4, the parts adjusted to present the faces of the valve at the appropriate angle to the emery wheel 63 and in contact therewith, and the operation of the motor will compel a rotation of the valve and the appropriate refacing. It is quite apparent that the valve seat grinding operations or the counterbore operations may be carried out simultaneously with the refacing of the valves.

The mechanism is entirely portable and, of course, is intended to be adjusted with respect to the particular valve seats being operated upon and for each independent operation. The complete adjustment of the parts provides for cooperation of the machine with any known type of valve seat or valve so that the machine is universal in its application for the purpose for which it is designed.

I claim:—

1. In an apparatus of the class described, a tool arbor shaft adapted for the reception of different tools, mechanism for imparting rotary reciprocatory movement to the shaft, means whereby the shaft is momentarily elevated during such rotary reciprocatory movement, and means whereby the rotary reciprocatory movement may be converted into a uni-directional drive for the shaft.

2. In an apparatus of the class described, a tool arbor shaft adapted for the reception of different tools, mechanism for imparting rotary reciprocatory movement to the shaft, means whereby the shaft is momentarily elevated during such rotary reciprocatory movement, means whereby the rotary reciprocatory movement may be converted into a uni-directional drive for the shaft, and means whereby the shaft may be placed under ad-

justable feeding pressure during such uni-directional drive.

3. In a machine of the type described, a main housing, a base casting with which the main housing is adjustably connected, a tool arbor shaft operative in the main housing, a motor, gearing intermediate the motor and shaft for operating the shaft, manually operable means whereby said gearing may be caused to operate the shaft in a rotary reciprocatory movement or in a uni-directional movement at will, a spring for exerting a feeding pressure on the shaft during the uni-directional movement, and adjustable means for limiting the feeding movement of the shaft under such pressure.

4. In a machine of the type described, a main housing, a base casting to which the main housing is universally connected, means for securing the main housing in any adjusted position relative to the base casting, a tool arbor shaft mounted on the main housing, a drive shaft mounted on the main housing, a beveled gear on the drive shaft, beveled gears freely rotatable on the tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch keyed to the tool arbor shaft and designed for clutch cooperation with either of the beveled gears on said shaft, a prime mover, gearing intermediate the prime mover and drive shaft, and means operated by the gearing for reciprocating the clutch on the tool arbor shaft to alternately connect the beveled gears thereon with and as a driving means for said shaft.

5. In a machine of the type described, a main housing, a base casting to which the main housing is universally connected, means for securing the main housing in any adjusted position relative to the base casting, a tool arbor shaft mounted on the main housing, a drive shaft mounted on the main housing, a beveled gear on the drive shaft, beveled gears freely rotatable on the tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch keyed to the tool arbor shaft and designed for clutching cooperation with either of the beveled gears on said shaft, a prime mover, gearing intermediate the prime mover and drive shaft, and means operated by the gearing for reciprocating the clutch on the tool arbor shaft to alternately connect the beveled gears thereon with and as a driving means for said shaft, said means varying the periods of cooperation between the clutch and the respective beveled gears on the tool arbor shaft.

6. In a machine of the class described, a base casting, a main housing adjustably connected to the base casting, a prime mover carried by the main housing, a drive shaft mounted in the main housing and carrying a beveled gear, an auxiliary shaft arranged be-

low the drive shaft, gearing between the prime mover and drive shaft to operate the latter through the auxiliary shaft, a tool arbor shaft mounted for rotation in the main housing, spaced beveled gears loose on said tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch member on the tool arbor shaft whereby either of said beveled gears thereon may be connected with the shaft, a yoke for operating the clutch to engage either of the beveled gears, an arm for controlling the movement of the yoke, and a cam on the auxiliary shaft for operating the arm to compel a reciprocation of the clutch.

7. In a machine of the class described, a base casting, a main housing adjustably connected to the base casting, a prime mover carried by the main housing, a drive shaft mounted in the main housing and carrying a beveled gear, an auxiliary shaft arranged below the drive shaft, gearing between the prime mover and drive shaft to operate the latter through the auxiliary shaft, said gearing including an element movable to insure a direct drive of the drive shaft independently of the auxiliary shaft, a tool arbor shaft mounted for rotation in the main housing, spaced beveled gears loose on said tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch member on the tool arbor shaft whereby either of said beveled gears thereon may be connected with the shaft, a yoke for operating the clutch to engage either of the beveled gears, an arm for controlling the movement of the yoke, and a cam on the auxiliary shaft for operating the arm to compel a reciprocation of the clutch.

8. In a machine of the class described, a base casting, a main housing adjustably connected to the base casting, a prime mover carried by the main housing, a drive shaft mounted in the main housing and carrying a beveled gear, an auxiliary shaft arranged below the drive shaft, gearing between the prime mover and drive shaft to operate the latter through the auxiliary shaft, said gearing including an element movable to insure a direct drive of the drive shaft independently of the auxiliary shaft, a tool arbor shaft mounted for rotation in the main housing, spaced beveled gears loose on said tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch member on the tool arbor shaft whereby either of said beveled gears thereon may be connected with the shaft, a yoke for operating the clutch to engage either of the beveled gears, an arm for controlling the movement of the yoke, a cam on the auxiliary shaft for operating the arm to compel a reciprocation of the clutch, and means for locking out the arm against the influence of the cam, said means adjusting

the element to directly drive the drive shaft independently of the auxiliary shaft.

9. In a machine of the class described, a base casting, a main housing adjustably connected to the base casting, a prime mover carried by the main housing, a drive shaft mounted in the main housing and carrying a beveled gear, an auxiliary shaft arranged below the drive shaft, gearing between the prime mover and drive shaft to operate the latter through the auxiliary shaft, said gearing including an element movable to insure a direct drive of the drive shaft independently of the auxiliary shaft, a tool arbor shaft mounted for rotation in the main housing, spaced beveled gears loose on said tool arbor shaft and cooperating with the beveled gear of the drive shaft at diametrically opposite points, a clutch member on the tool arbor shaft whereby either of said beveled gears thereon may be connected with the shaft, a yoke for operating the clutch to engage either of the beveled gears, an arm for controlling the movement of the yoke, a cam on the auxiliary shaft for operating the arm to compel a reciprocation of the clutch, and means for locking out the arm against the influence of the cam, said means adjusting the element to directly drive the drive shaft independently of the auxiliary shaft, the speed of the drive shaft when driven directly varying from the speed of such shaft when driven through the auxiliary shaft.

10. In a machine of the class described, a main housing, a tool arbor shaft mounted therein, a prime mover, gearing between the prime mover and tool arbor shaft, a clutch interposed in said gearing, manually operable means for controlling the clutch to cause the gearing to compel a rotary reciprocatory movement of the tool arbor shaft or a unidirectional movement thereof, a barrel encircling the tool arbor shaft, a projection formed on the lower end of the barrel, a thrust collar secured to the shaft above the lower end of the barrel and formed with a projection, a ball between said projection to compel a momentary endwise movement of the shaft during its rotation, a spring bearing between the barrel and thrust collar, and manually operable means for adjusting the tension of the spring.

11. In a machine of the class described, a main housing, a tool arbor shaft mounted therein, a prime mover, gearing between the prime mover and tool arbor shaft, a clutch interposed in said gearing, manually operable means for controlling the clutch to cause the gearing to compel a rotary reciprocatory movement of the tool arbor shaft or a unidirectional movement thereof, a barrel encircling the tool arbor shaft, a projection formed on the lower end of the barrel, a thrust collar secured to the shaft above the lower end of the barrel and formed with a

- projection, a ball between said projection to compel a momentary endwise movement of the shaft during its rotation, a spring bearing between the barrel and thrust collar, manually operable means for adjusting the tension of the spring, a collar on the shaft beyond the barrel, and means for adjusting the collar to limit the feeding movement of the tool arbor shaft under the influence of the spring.
12. In a machine of the class described, a tool arbor shaft adapted for the reception of a counterboring or grinding tool, a main housing in which the shaft is mounted for rotation and longitudinal movement, a prime mover carried by the housing, gearing intermediate the prime mover and shaft including spaced beveled gears loose on the shaft, and an intermediate clutch member slidably mounted on and otherwise fixed with relation to the shaft, means whereby the clutch member may be operated in the movement of the prime mover to alternately engage said beveled gears whereby the shaft is given a rotary reciprocating movement for grinding purposes, said means being manually controllable to fix the clutch in cooperation with one of the beveled gears to impart a uni-directional movement to the shaft for counterboring purposes.
13. In a machine of the class described, a tool arbor shaft adapted for the reception of a counterboring or grinding tool, a main housing in which the shaft is mounted for rotation and longitudinal movement, a prime mover carried by the housing, gearing intermediate the prime mover and shaft including spaced beveled gears loose on the shaft, an intermediate clutch member slidably mounted on and otherwise fixed with relation to the shaft, means whereby the clutch member may be operated in the movement of the prime mover to alternately engage said beveled gears whereby the shaft is given a rotary reciprocating movement for grinding purposes, said means being manually controllable to fix the clutch in cooperation with one of the beveled gears to impart a uni-directional movement to the shaft for counterboring purposes, and means whereby the driving influence of the gear mechanism on the tool arbor shaft may be varied in speed in the respective movements of said shaft.
14. In a machine of the class described, a tool arbor shaft adapted for the reception of a counterboring or grinding tool, a main housing in which the shaft is mounted for rotation and longitudinal movement, a prime mover carried by the housing, gearing intermediate the prime mover and shaft including spaced beveled gears loose on the shaft, an intermediate clutch member slidably mounted on and otherwise fixed with relation to the shaft, means whereby the clutch member may be operated in the movement of the
- prime mover to alternately engage said beveled gears whereby the shaft is given a rotary reciprocating movement for grinding purposes, said means being manually controllable to fix the clutch in cooperation with one of the beveled gears to impart a uni-directional movement to the shaft for counterboring purposes, and means for varying the feeding pressure of the tool arbor shaft when in uni-directional movement.
- In testimony whereof I affix my signature.  
LOUIS A. PRESTEK.

70

75

80

85

90

95

100

105

110

115

120

125

130