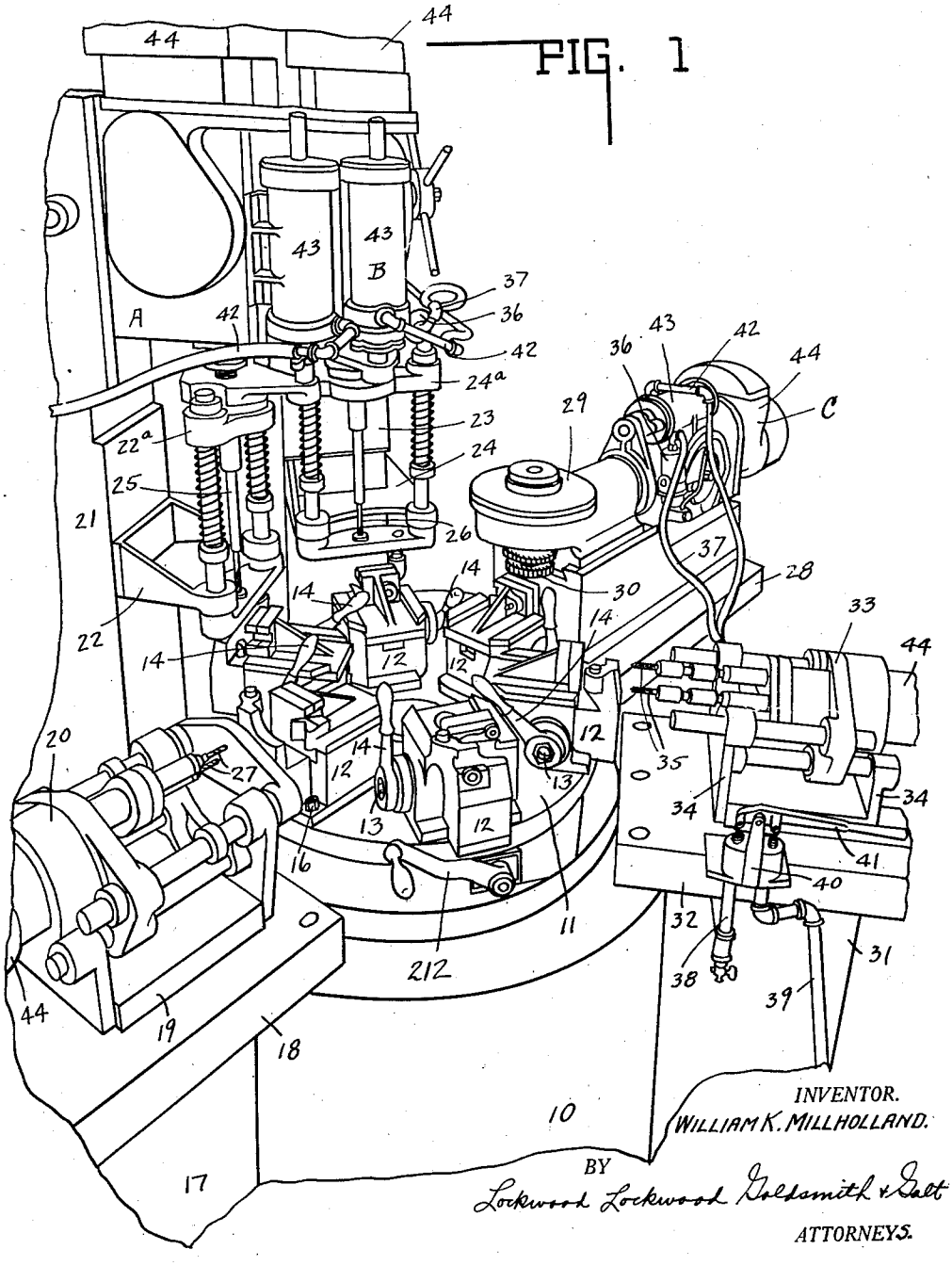
March 15, 1932. W. K. MILLHOLLAND 1,849,683

MULTIPLE UNIT TURRET TYPE MACHINE TOOL

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FIG. 1



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MULTIPLE UNIT TURRET TYPE MACHINE TOOL

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FIG. 3

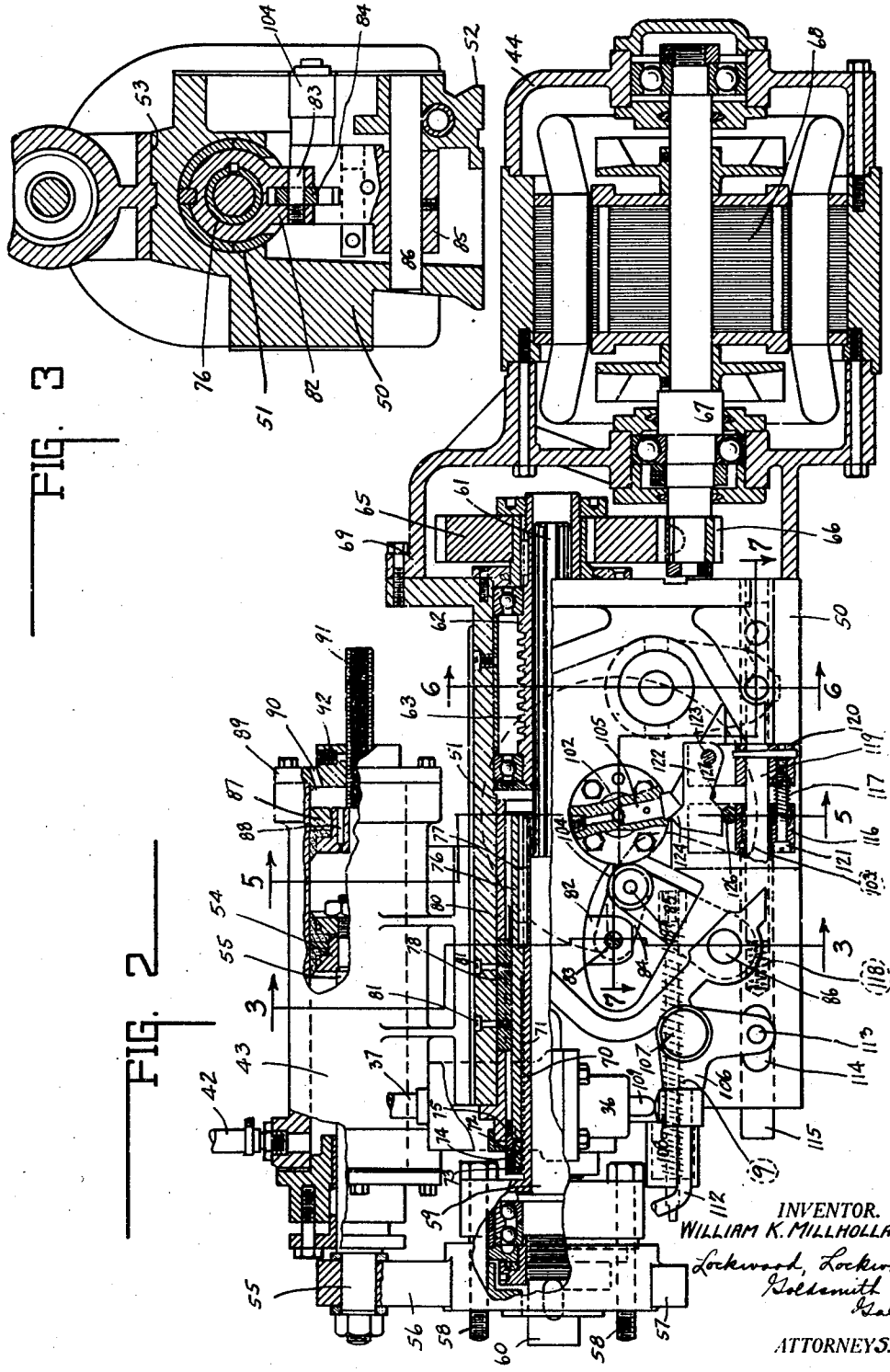


FIG. 2

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MULTIPLE UNIT TURRET TYPE MACHINE TOOL

Filed Feb. 1, 1930 3 Sheets-Sheet 3

FIG. 4

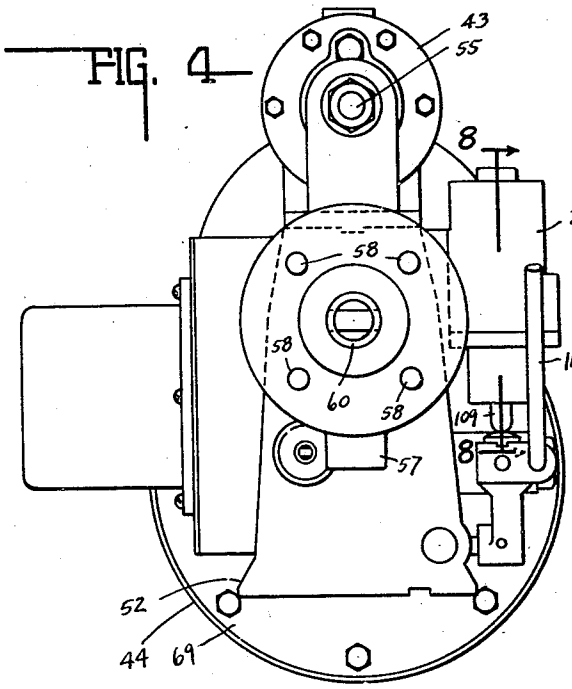


FIG. 6

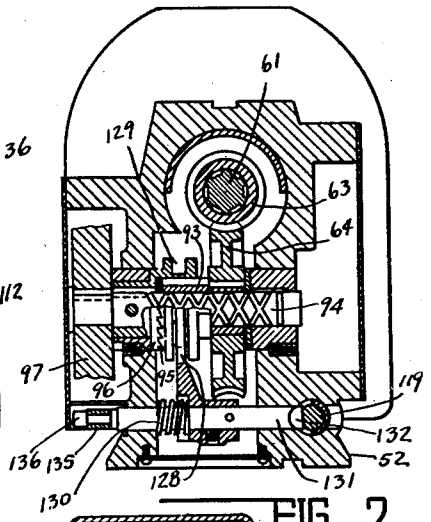


FIG. 7

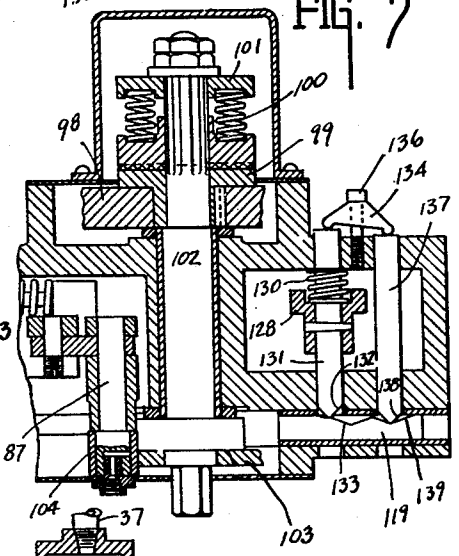


FIG. 5

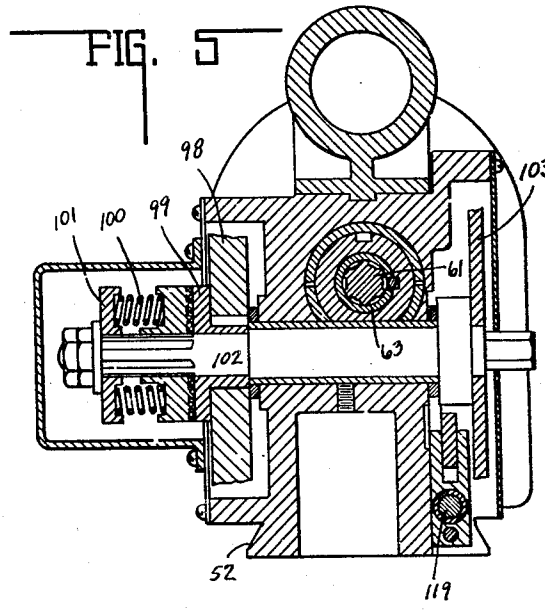
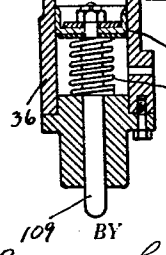


FIG. 8



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Patented Mar. 15, 1932

1,849,683

UNITED STATES PATENT OFFICE

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MULTIPLE UNIT TURRET TYPE MACHINE TOOL

Application filed February 1, 1930. Serial No. 425,141.

This invention relates to a semi-automatic machine embodying a plurality of substantially independent power operable units arranged to successively operate upon pieces of work presented in succession thereto.

One object of the invention is to permit a single operator to manually control a machine of the character indicated so that the machine can be loaded and unloaded and started as desired.

Another object of the invention is to insure substantially simultaneous initiation of all of the units of the machine through a single remote control apparatus.

Another object of the invention is to improve a machine unit of the character set forth in the co-pending application Serial No. 172,148 of which this application is a continuation in part.

This application is an extension of the before mentioned application in that the type of feed is positive; the type of control is of a remote character and the cam and lock associated therewith is positive.

The full nature of the invention will be understood by the accompanying drawings and the following description and claims:

In the drawings Fig. 1 is a perspective view of the major portion of the machine showing a plurality of units arranged in different positions and at different stations, the forepart of the figure representing the loading and unloading and control station. Fig. 2 is an elevational view of a horizontal unit illustrated in Fig. 1 parts being broken away and shown in section to show the details of the unit. Fig. 3 is a transverse sectional view taken on line 3—3 of Fig. 2. Fig. 4 is an end view of the unit looking toward the tool end of the same. Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 3 and in the direction of the arrows. Fig. 6 is a transverse sectional view taken on line 6—6 of Fig. 2 and in the direction of the arrows. Fig. 7 is a horizontal sectional view taken on line 7—7 of Fig. 2 and in the direction of the arrows. Fig. 8 is a vertical sectional view taken on line 8—8 of Fig. 4 and in the direction of the arrows.

In Fig. 1 of the drawings 10 indicates the base of a machine, 11 a rotatable table, the rotation of which may be controlled by or even actuated by the lever 212 so that the table may be indexed a predetermined angular distance at each operation of the lever. The table 11 is provided with a plurality of work holding chucks 12 each of which is controlled by a shaft 13 mounting a manually controlled lever 14. The work operated upon is manually positioned in the work holders and similarly removed therefrom and at the same station. Each of the work holders is detachably mounted as at 16 upon the table and herein six work holders are provided and are arranged to hold and grip the work so that different operations may be performed thereon while mounted in the holder.

Extending laterally of the base 10 is a supporting portion 17 upon which is mounted the bed 18 and said bed detachably supports a base plate 19 of a multiple drill unit indicated generally by the numeral 20. A support 21 at station No. 3 detachably supports a rest and guide 22 and also a unit indicated generally by the letter A. Adjacent thereto is another supporting portion 23 that also supports a guide 24 associated with a unit B. Unit A includes a drill 25 while unit B mounts a reamer 26. These operate upon the horizontal top face of the work while the drill 27 of the unit at the foreground, the head 20 of which only is illustrated, is adapted to operate upon the vertical face of the work.

A supporting portion 28 supports the unit C which in the present invention includes an extension head 29 that terminates in a milling cutter 30 for milling the top of the work. The portion 31 of the main frame supports the base 32 which supports the multiple head 33 of the last unit and said head is guided by the guide portion 34 and terminates in the tapping portions 35 for tapping certain of the openings in the vertical face of the work. Each of the units mounts an air cylinder 36 which is connected by the conduit 37 to the common line 38, see the lower right hand portion of Fig. 1. Said line 38 is connected to the pressure supply line 39 by a valve construction 40 controlled by lever 41. In cer-

tain instances additional air pressure is constantly supplied by the lines 42 to power return and stop anchoring cylinders 43 see units B and C.

The operation in general of the machine is as follows: In the foreground the work holder is opened by operating lever 14 and the finished work is removed and a work blank is inserted. Lever 14 is then tilted to lock the work in the holder. Handle 212 is then operated for indexing the work to the first station where it is drilled by drill 27. Simultaneously with the operation of drill 27, drill 25, reamer 26, milling cutter 30 and taps 35 are caused to approach the work and operate thereon. Each unit is arranged to rotate the tool and also to feed the tool toward the work. The power is supplied to each unit through an electric motor indicated generally by the numeral 44 in the several figures. These motors continuously rotate the tools associated therewith. When the master control lever 41 is actuated pressure is supplied to the several starting cylinders 36 controlling the respective units and thereupon the clutch mechanisms simultaneously connect all of the feeding or tool advancing mechanisms to the source of power so that all of the tools are simultaneously moved into work engagement for working and while rotating.

The time cycle of indexing of course is determinable by the operation that requires the longest interval. The time cycle of each unit as set forth in the co-pending application before mentioned is determinable by the control cam so that the forward feeding of the respective tools is automatically disconnected from the power and the tool is retracted. This retraction may be by spring or counter weight action or may be by pneumatic action, or may be by spring or counter weight action and pneumatic action or may be by either and its extreme retracted travel is cushioned by pneumatic action or spring action or both, and further travel of the tool thereupon ceases until the forward feeding mechanism is again actuated by remote control obtained through actuation of lever 41.

When the unit whose time cycle is the longest completes its cycle the operator again actuates lever 41 to again and simultaneously initiate all of the time cycles. During the operation of all of the units the operator opens the chuck of the work holder at the loading and unloading station, removes the completed work and inserts the blank to be operated upon.

The advantage of having manual indexing is that the rate of indexing is determined by the speed of the operator in changing blanks or work. Likewise manual indexing permits the operator to stop all the units in order to replace any broken tool should that unfortunately occur. The co-pending application machine as pointed out and the same applies to the present disclosure discloses that breakage in tools is reduced to a minimum because the feeding of the tool is determinable by the cam in each unit so that the feeding of the tool toward and into the work is at the most economical rate of operation consistent with tool consumption and power consumption and excellence of workmanship or machining.

Fig. 1, therefore, illustrates but one form of a multiple unit machine all of the units being simultaneously controlled for the simultaneous operation of the units upon successive pieces of work and as illustrated the units need not necessarily be confined to operate upon the work in the same general relationship but may be positioned radially of or parallel to the axis of work rotation. Likewise the units may operate transverse to a plane intermediate a horizontal plane or a vertical plane. In other words, machines have been built in which the base portions supporting the units have been inclined at an angle to the work table and this angularity may be in a radial plane or in a plane between that and a tangent plane.

It will be observed from Fig. 1 that practically all of the units disclosed therein are associated with a supporting base portion of the machine which detachably supports a guide construction in turn slidably supporting an operating head that mounts the tool and interposed between the same are separating springs. It will likewise be observed from this figure that each of the units is detachably mounted upon ways formed in the supporting portions of the machine and it will be furthermore observed that some of the units are provided with ways upon the upper face parallel to the supporting base portions that are mounted in and upon the ways of the machine supporting portions referred to. Since all of the units except for a change of head construction to accommodate different types of tools are substantially identical a brief description of the particular unit illustrated in Figs. 2 to 8 inclusive will it is believed suffice for an understanding of all of the units illustrated and the various modifications thereof that are possible and within the scope of this invention.

In Figs. 2 to 8 inclusive there is illustrated in detail one form of one of the units. 50 indicates the base of the machine having a central bore 51 therein parallel to a lower way construction 52 and a parallel upper way construction 53. The lower way construction 52 is arranged for mounting upon the bed of the machine or an extension thereof. The upper way construction 53 is arranged for mounting an auxiliary attachment that may be in the nature of a boring bar or auxiliary head support, or as shown herein in the nature of a power and cushioning device. The same constitutes the cylinder 43 constantly supplied

with air pressure by line 42. Mounted therein is the piston construction 54 which is supported by stem 55, said stem extending forwardly and having a portion 56 connecting with an auxiliary head 57. The latter is provided with mounting members in the form of cap screws 58 or the like by which the several auxiliary heads indicated at 20, 22*a*, 24*a* and 33 are supported, and these in turn as illustrated in Fig. 1 are slidably supported upon parallel bars or rods mounted in the auxiliary frameworks 19, 22, 24 and 34 respectively.

Mounted in the bore 51 is a rotatable and reciprocable spindle 59 which terminates in its forward end in a portion 60 to which or by which the tool is attached. The spindle 59 has a multiple splined connection 61 with a sleeve 62 and said sleeve is associated with the rear end and splined end of said spindle and includes upon its exterior periphery a worm formation 63 for meshing with a worm wheel 64, the same being shown in Fig. 6 and constituting a source of power for power projection or forward feeding of said spindle through mechanism hereinafter set forth.

The frame 50 rotatably supports the worm forming sleeve 63 and upon the outer projecting end thereof, see Fig. 2, is keyed a gear 65 which meshes with a pinion 66 carried by a motor shaft 67 of a motor indicated generally by the numeral 68 and shown in Fig. 2, said motor frame being suitably secured to the unit frame 50 as at 69. Any desired gear change set may be substituted for that illustrated, and in place of a pair of gears a multiple gear train may be employed if desired.

To axially adjust the throw of the spindle 59 the head 57 includes a sleeve extension 70 that rotatably supports said spindle. The sleeve extension 70 is exteriorly threaded as at 71 to receive an adjusting collar 72 near the forward end of the extension. A lock collar 73 is secured thereto as at 74 and is secured as at 75 to a sleeve 76, said sleeves having telescopic and splined connection as indicated at 77. Sleeve 76 is likewise splined or has a keyed connection 78 with a sleeve 80, the same forming the bearing within the bore 51 for the spindle construction, said bearing being secured therein by the screws 81 which also lock the bearing against axial or rotative movement and also serve to anchor the key 78 that forms the splined connection between said bearing and the outer adjusting sleeve 76.

The sleeve 76 includes two depending spaced ears 82 which mount pin 83, see Figs. 2 and 3, in turn mounting therebetween the link 84. Said link 84 is supported at its opposite end by lever 85 pivotally supported by the shaft 86, see Figs. 2 and 3. The pivotal support 87 between the link and the lever includes a roller or cam follower 104, the same being adapted to engage cam 103, see Figs. 2 and 5. Cam 103, in the rotation thereof through means hereinafter specified, serves to project the spindle construction forwardly toward the left from the unit in opposition to the several springs interposed between the forward auxiliary guide and the head construction, see Fig. 1 in opposition to the pneumatic pressure in the cylinder 43, see Figs. 1 and 2. Upon the cam reaching its extreme position corresponding to the extreme forwardly fed position of the spindle the springs if employed, or the air pressure in cylinder 43 if provided, or both, or a counter-weight if utilized therewith or substituted therefor, serves to automatically return the spindle to the retracted or non-working position. Spring 9 may be associated with lever 85 to return the work holder upon proper positioning of the cam permitting such movement.

It will of course be understood that this retractive movement at the end may be cushioned by a cushion spring or by a dash pot construction and the same is herein illustrated in the upper portion of Fig. 2. The air cylinder 43 includes a closure 87 which has a port 88 therethrough and the cap 89 includes a port 90 therein. Closure 87 forms one end of the dash pot. Piston 54 forms the piston therefor. A threaded stem 91 is provided by which the position of piston 87 is adjusted so that the desired dash pot action is obtained and the adjustment is fixed by set screw 92 or the like.

The power supplied to the worm wheel 64, see Fig. 6, is transmitted through a splined connection to a clutch collar 93 slidably supported on a shaft 94. Said collar is axially shiftable on shaft 94 and has the clutch toothed facing 95 for engagement with the clutch 96 rigid with said shaft 94 which in turn mounts the gear 97. Gear 97 meshes with gear 98 and the latter is keyed to a sleeve-like collar 99, see Figs. 5 and 7, which through the spring clutch construction 100 is associated with collar 101 carried by shaft 102. Mounted on shaft 102 is the cam 103 which engages the follower 104.

Concentric with said cam and mounted on said shaft is an automatic control in the form of a dog 105, see Fig. 2. The power supplied through the clutch 95—96 causes reciprocation of the tool through the cam and follower connection 103—104. Should an obstruction be encountered or should the rate of feeding be excessive, to prevent breakage of the device, the relief clutch 99—100—101 is provided and the collars will have relative rotative movement in that event, and thus forward feeding of the spindle will not occur beyond a predetermined pressure.

Movement of the clutch into power transmitting position and automatic disengagement thereof is obtained through mechanism illustrated most clearly in Figs. 2, 6 and 7. Means for initiating or starting the machine

is shown in Figs. 1, 2, 4 and 8. The two are interrelated and will be so treated.

A bell crank lever 106 is pivotally supported at 107 upon the side of the unit and an abutment 108 is adapted to be engaged by plunger 109 extending through and projecting beyond cylinder 36. Plunger 109 mounts a piston 110 within the cylinder and a spring 111 normally retains the plunger and piston in the retracted or elevated position. When pressure is supplied to line 37 and therefore cylinder 36, and the same is supplied to all of the cylinders simultaneously by depressing lever 41 of the valve construction 40, see Fig. 1, the plunger is depressed in opposition to spring 111 and the lever is tilted counter-clockwise. Lever 106 mounts an extension 112 which permits manual tilting of said lever. Said lever terminates in a pin 113 which rides in a slot 114 of a reciprocating bar or rod 115. Counter clockwise movement of the lever 106 serves to project, see Fig. 2, the block 116 toward the right in opposition to spring 117 and a spring 118 interposed between said rod and a stem 119 telescopically mounted at one end within the latter.

Rod 119 mounts block 120 which supports a bolt 121 concentric with which is the spring 117. Block 120 pivotally supports the latch or pawl 122 at 123 and the toothed portion 124 thereof is engaged by the exposed end of dog 105 so that in rotation of said dog the block 122 is moved toward the left in opposition to springs 117 and 118 for moving the rod 119 to the left for the purpose of disconnecting the power to the forward feeding mechanism, in other words for disengaging the clutch. In this forward movement of the block 120 the pawl 122 rides upon the pin 126. The pawl 122 thus is maintained in the elevated position by the pin or bearing surface 126 carried by block 116.

Counter clockwise tilting of lever 106 moves the block 116, and the rod 119 by abutting contact, and to the right and in this movement the pawl 122 moves relative to the lockout surface 126 so that the groove 127 permits the pawl to drop which releases the dog 105 from the abutment 124 of said pawl permitting the dog 105 and the supporting shaft 102 to rotate when the shaft and the cam rotates for reciprocating the spindle construction. Shaft 102 starts to rotate as soon as power is supplied to the same.

The power is supplied to the shaft 102 as before described when the clutch shifting yoke 128 riding in groove 129 of clutch collar 95 is shifted toward the gear 97 in opposition to spring 130 concentric with the transverse shaft or clutch lever support 131. Clutch lever support 131 terminates in a cam face 132 which is engaged by the cam portion 133 of the actuating rod 119, see Figs. 6 and 7. When the rod is projected toward the right the support 131 is projected transversely thereof and into clutch engaging position. A rocker 134 is suitably supported upon a pivot support 136 and when support 131 is moved into the position shown in Figs. 6 and 7 an auxiliary support 137 is moved oppositely and the tapered end 138 thereof engages in another cam portion or groove 139 of rod 119. Rod 119 is thus maintained in the position shown in Fig. 7 even after pressure is removed from lever 106, see Fig. 2. The support member 131 is then held in the clutch engaging position and the plunger 137 is seated in groove 139 to lock the rod 119 in said clutch engaging position.

In this way positive engagement of the clutch is maintained since there is no force other than spring 130 normally tending to return the support 131 or locking plunger 137 or anything tending to move rod 119 to the left. In fact the coil spring 118, see Fig. 2, tends to maintain the rod 119 in clutch engaging position. The rotating dog, however, constitutes the opposition.

After the power has been supplied to the cam and shaft 102 supporting the same a sufficient length of time the dog 105 again approaches the pawl 122 and engages the toothed portion 124 thereof. Continued rotation of shaft 102 and therefore dog 105 moves block 120 with the rod 119 rigid therewith to the left in opposition to springs 117 and 118 and such movement automatically cams the locking plunger 137 out of groove seating engagement and this movement likewise tilts the rocker 134. Rocker 134 assisted by spring 130 thereupon moves the clutch lever support 131 into the groove 133 which has by this time moved into registration with said support and the spring 130 then maintains the end of support 131 in seated relation in the groove or cam portion 133. This movement of the support member 131 automatically shifts the clutch to non-engaging position and the power to the shaft 102 is immediately disconnected until lever 106 is again actuated to shift the clutch in a reverse direction which actuation of the lever 106 as before described automatically releases the lock construction 105—122 and 126 permitting rotation of the cam 103 when power is supplied after the clutch has been shifted into clutch position by the actuation of lever 106 likewise previously described.

The invention claimed is:

1. In a semi-automatic machine, in combination with a bed, a table rotatable thereon, a plurality of tools arranged in spaced relation for successively operating upon a piece of work, means for holding a piece of work on said table, independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the work, each power operable means being ar-

ranged for but single cycle operation, and a manually controlled reciprocation movement starting control for each tool.

2. In a semi-automatic machine in combination with a bed, a table rotatable thereon, and a plurality of tools arranged in spaced relation for successive operation upon a piece of work and positioned adjacent thereto, a plurality of work holders arranged in spaced relation upon said table and similarly spaced for simultaneously presenting a plurality of like pieces of work to said tools for simultaneous operation upon separate pieces of work and successive operation upon the same piece of work, an independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the pieces of work, each power operable means being arranged for single cycle automatic operation, and a manually controlled reciprocating movement starting control for each tool.

3. In a semi-automatic machine in combination with a bed, a table rotatable thereon, and a plurality of tools arranged in spaced relation for successive operation upon a piece of work and positioned adjacent thereto, a plurality of work holders arranged in spaced relation upon said table and similarly spaced for simultaneously presenting a plurality of like pieces of work to said tools for simultaneous operation upon separate pieces of work and successive operation upon the same piece of work, independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the pieces of work, each power operable means being arranged for single cycle automatic operation, and a single means for simultaneously initiating the reciprocation of each of said tools.

4. In a semi-automatic machine in combination with a bed, a table rotatable thereon, and a plurality of tools arranged in spaced relation for successive operation upon a piece of work and positioned adjacent thereto, a plurality of work holders arranged in spaced relation upon said table and similarly spaced for simultaneously presenting a plurality of like pieces of work to said tools for simultaneous operation upon separate pieces of work and successive operation upon the same piece of work, independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the pieces of work, each power operable means being arranged for single cycle automatic operation, a reciprocation movement starting control, and means remotely operable and operatively associated with each starting control for simultaneously and remotely initiating the reciprocation of each of said tools.

5. In a semi-automatic machine in combination with a bed, a table rotatable thereon, and a plurality of tools arranged in spaced relation for successive operation upon a piece of work and positioned adjacent thereto, a plurality of work holders arranged in spaced relation upon said table and similarly spaced for simultaneously presenting a plurality of like pieces of work to said tools for simultaneous operation upon separate pieces of work and successive operation upon the same piece of work, independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the pieces of work, each power operable means being arranged for single cycle automatic operation, and a single means for simultaneously initiating the reciprocation movement of each of said tools, said single means including a manually operable control member adjacent the loading and unloading station of said machine.

6. In a semi-automatic machine in combination with a bed, a table rotatable therein, and a plurality of tools arranged in spaced relation for successive operation upon a piece of work and positioned adjacent thereto, a plurality of work holders arranged in spaced relation upon said table and similarly spaced for simultaneously presenting a plurality of like pieces of work to said tools for simultaneous operation upon separate pieces of work and successive operation upon the same piece of work, independent power operable means for each tool for continuously rotating the same and intermittently reciprocating the same toward and away from the pieces of work, each power operable means being arranged for single cycle automatic operation, each power operable means including a starting control, and means remotely operable and operatively associated with each starting control for simultaneously and remotely initiating the reciprocation of each of said tools, said single means including a manually operable control member adjacent the loading and unloading station of said machine.

7. In combination a tool holder capable of rotation and reciprocation, a single source of power therefor, means for rotating the holder and permanently connected to the source of power for continuous rotation, means for moving said holder in one direction for power feeding the same toward work, a clutch operatively connecting said moving means to said source of power, a control for said clutch, means automatically operable by the moving means for disengaging the clutch when predetermined movement of the holder has occurred, and manually controlled means for actuating said clutch control to engage the clutch.

8. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-

working position and in opposition to which said moving means operates said holder.

9. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a pneumatic construction.

10. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a yielding construction.

11. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a pneumatic and yielding construction.

12. A device as defined by calim 7 characterized by the addition of a dash pot construction for cushioning the return movement of the work holder.

13. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, and the addition of a dash pot construction for normally cushioning the return movement of said work holder.

14. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a pneumatic construction, and the addition of a dash pot construction for normally cushioning the return movement of said work holder.

15. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a yielding construction, and the addition of a dash pot construction for normally cushioning the return movement of said work holder.

16. A device as defined by claim 7 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, said opposing moving means including a pneumatic and yielding construction, and the addition of a dash pot construction for normally cushioning the return movement of said work holder.

17. In combination a tool holder capable of rotation and reciprocation, a single source of power therefor, means for rotating the holder and permanently connected to the source of power for continuous rotation, means for moving said holder in one direction for power feeding the same toward the work, a clutch operatively connecting said moving means to said source of power, a control for said clutch, means automatically operable by the moving means for disengaging the clutch when predetermined movement of the holder has occurred, manually controlled means for actuating said clutch control to engage the clutch, and a yielding clutch interposed between said source of power and the manually controlled clutch for automatically disconnecting the source of power from the work holder moving means while the manually controlled clutch is engaged and upon predetermined loading of the tool.

18. A device as defined by claim 17 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder.

19. A device as defined by claim 17 characterized by the addition of a dash pot construction for cushioning the return movement of the work holder.

20. A device as defined by claim 17 characterized by the addition of other means normally tending to return the holder to non-working position and in opposition to which said moving means operates said holder, and the addition of a dash pot construction for normally cushioning the return movement of said work holder.

21. In combination a tool holder capable of rotation and reciprocation, a single source of power therefor, means for rotating the holder and permanently connected to the source of power for continuous rotation, means for moving said holder in one direction for power feeding the same toward work, a clutch operatively connecting said moving means to said source of power, a control for said clutch, means automatically operable by the moving means for disengaging the clutch when predetermined movement of the holder has occured, manually controlled means for actuating said clutch control to engage the clutch, and pneumatically operable means arranged to actuate said clutch control.

22. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, and means operable by said cam upon completing a single cycle of rotation for disengaging the clutch.

23. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder

in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, and means for locking said clutch in the disengaged position by said cam means.

24. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, and a brake automatically operable by said cam for locking said cam at the end of the cycle movement.

25. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, means operable by said cam upon completing a single cycle of rotation for disengaging the clutch, means for locking said clutch in the disengaged position by said cam means, and a brake automatically operable by said cam for locking said cam at the end of the cycle movement.

26. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, means for locking said clutch in the disengaged position by said cam means, and a manually operable member for releasing the cam operable clutch lock.

27. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, a brake automatically operable by said cam for locking said cam at the end of the cycle movement, and a manually operable member for releasing the cam operable brake.

28. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, means operable by said cam upon completing a single cycle of rotation for disengaging the clutch, means for locking said clutch in the disengaged position by said cam means, a brake automatically operable by said cam for locking said cam at the end of the cycle movement, and a manually operable member for releasing the cam operable clutch lock and cam operable brake.

29. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, including a shiftable support, a member for shifting said support in one direction, yielding means arranged to shift said clutch in the opposite direction, and means associated with said shifting member for locking said clutch in the clutch engaged position in opposition to said yielding means.

30. In combination a tool holder arranged for reciprocatory movement, a rotational source of power therefor, cam means operable thereby for causing movement of the holder in one direction, a clutch interposed between said source of power and said cam means, a control for said clutch, including a shiftable support, a member for shifting said support in one direction, yielding means arranged to shift said clutch in the opposite direction, means associated with said shifting member for locking said clutch in the clutch engaged position in opposition to said yielding means, and means for moving said shifting member to permit said opposing yielding means to shift said clutch, said shifting member and said locking means being arranged to permit said movement and the latter being arranged upon the shifting of said shifting member for clutch release to positively assist in the shifting of the clutch to the released position.

In witness whereof, I have hereunto affixed my signature.

WILLIAM K. MILLHOLLAND.

DISCLAIMER

1,849,683.—*William K. Millholland*, Indianapolis, Ind. MULTIPLE UNIT TURRET TYPE MACHINE TOOL. Patent dated March 15, 1932. Disclaimer filed June 10, 1933, by the patentee.

Hereby disclaims from Letters Patent No. 1,849,683, claims 1 to 6, inclusive, thereof.

[*Official Gazette July 11, 1933.*]