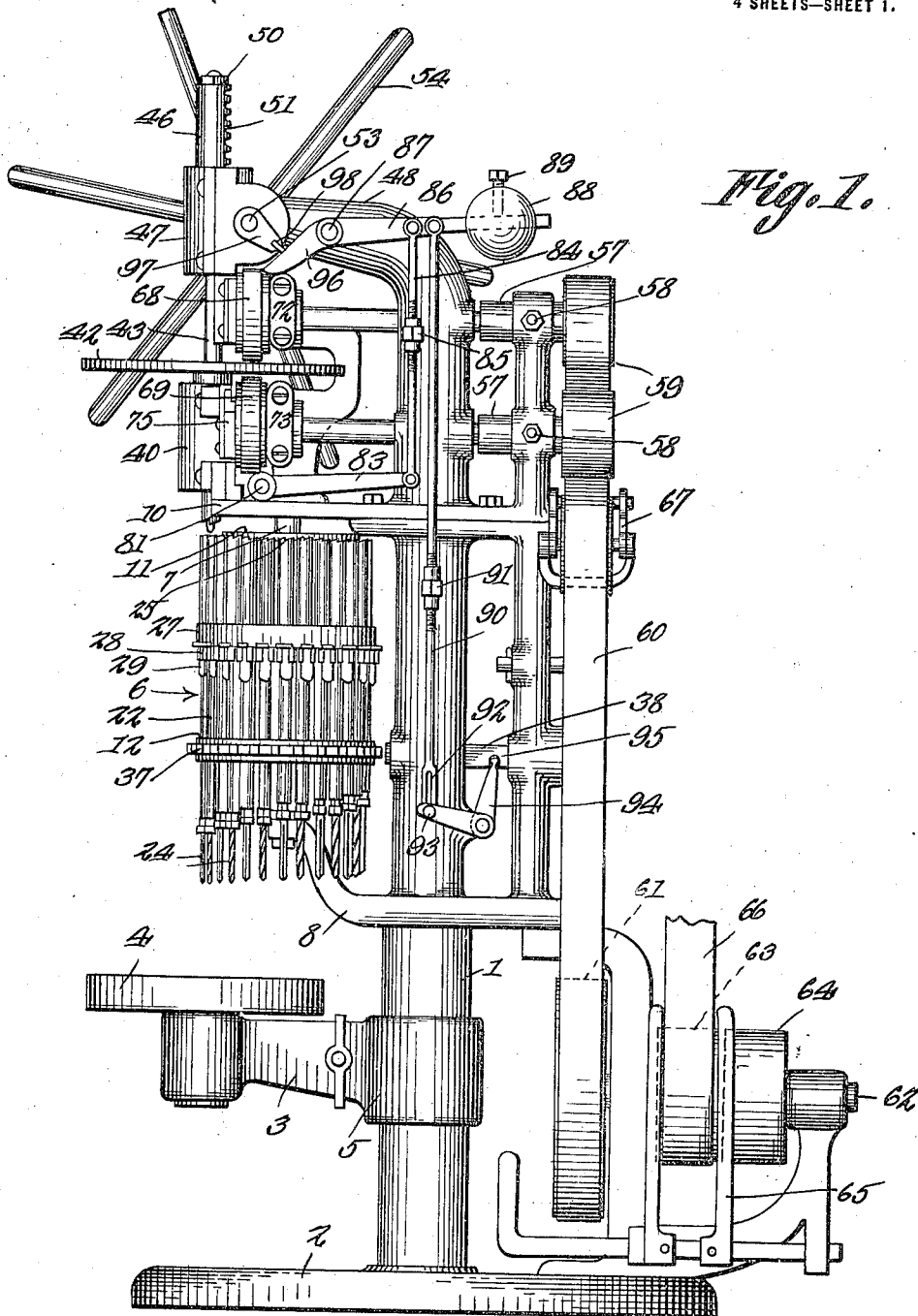


1,320,152,

A. KLAY.
MULTIPLE MAGAZINE DRILL PRESS.
APPLICATION FILED SEPT. 12, 1917.

Patented Oct. 28, 1919.
4 SHEETS—SHEET 1.



Witnesses

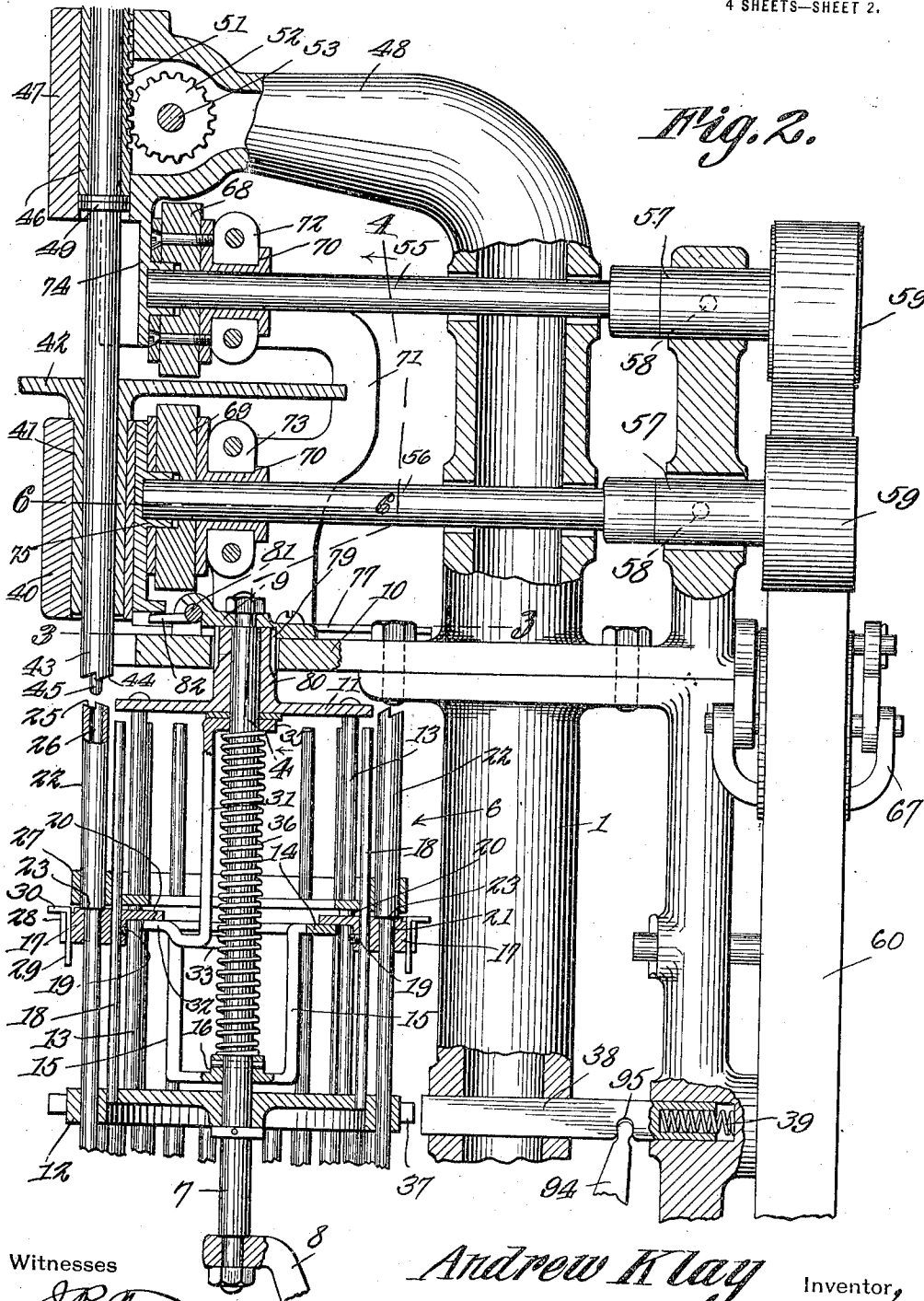
J. R. Limer
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Witnesses

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4 SHEETS—SHEET 3.

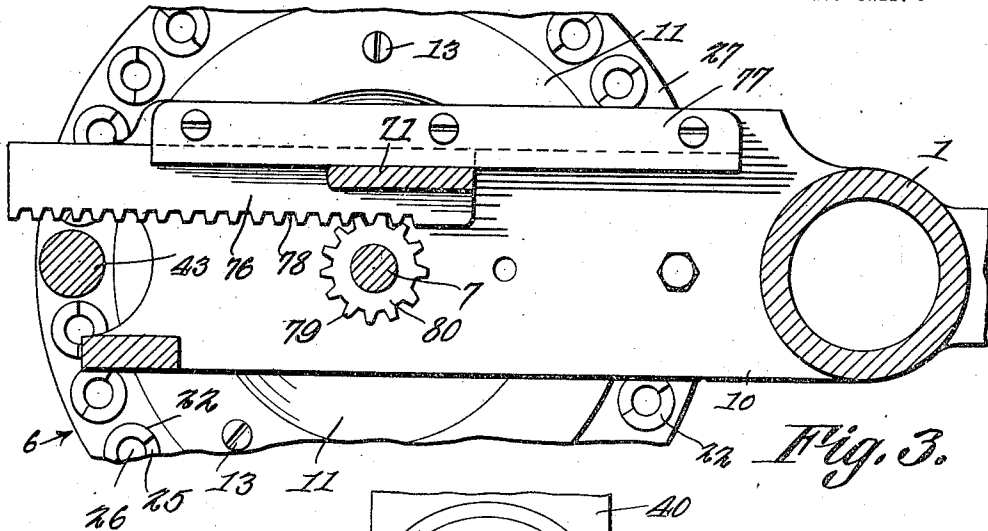


Fig. 3.

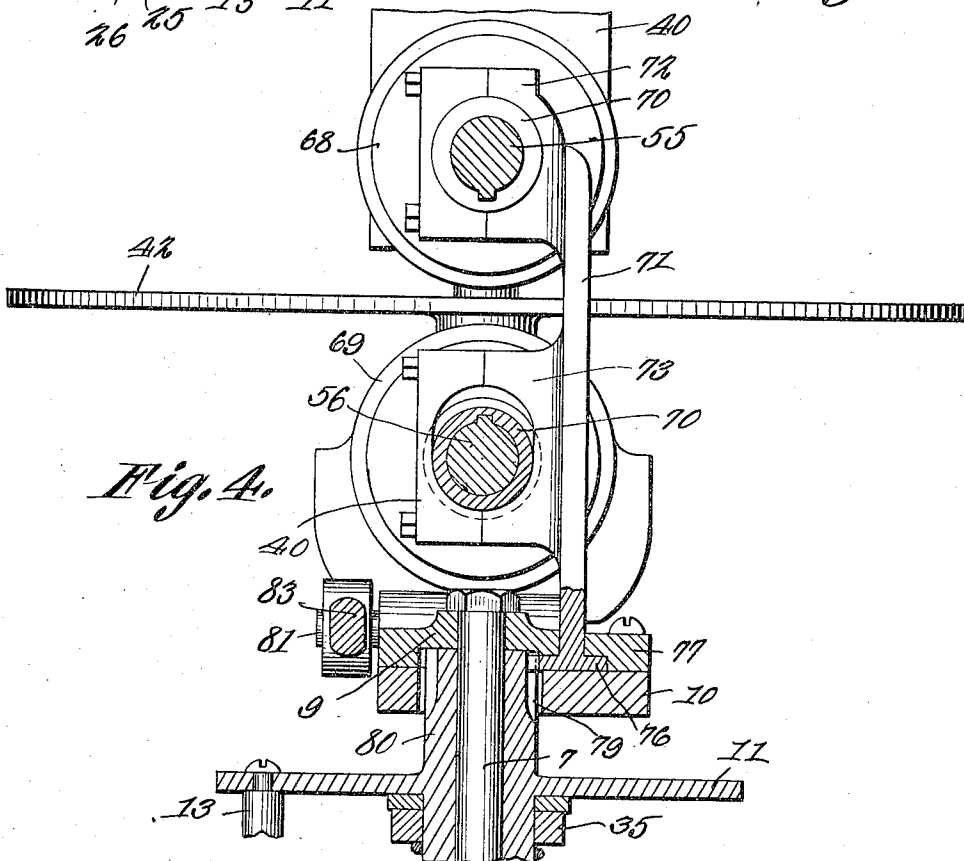


Fig. 4.

Witnesses

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4 SHEETS—SHEET 4.

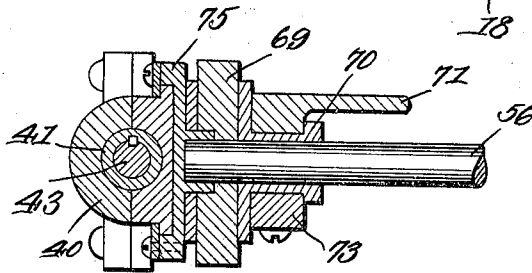
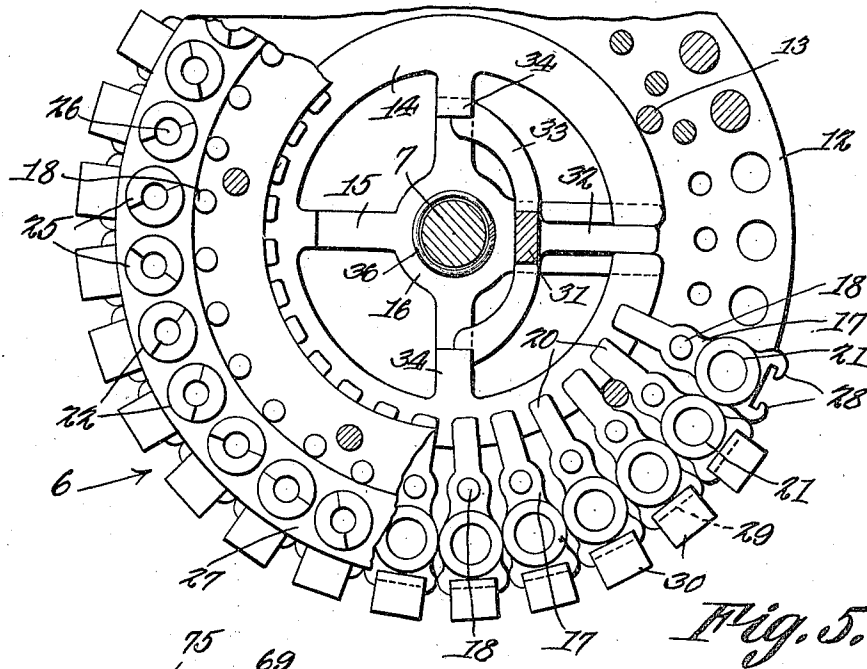


Fig. 6.

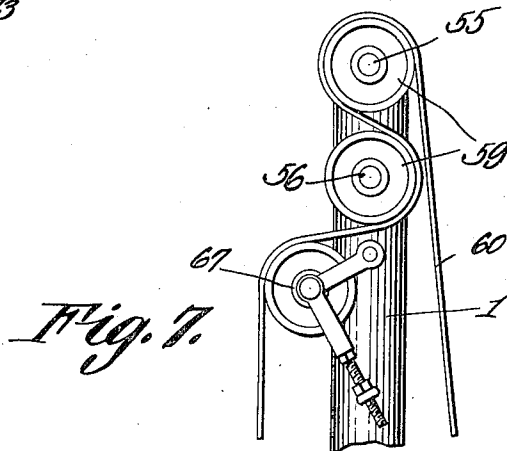


Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

ANDREW KLAY, OF LIMA, OHIO, ASSIGNOR OF ONE-THIRD TO THADDEUS TROUT, OF LIMA, OHIO.

MULTIPLE-MAGAZINE DRILL-PRESS.

1,320,152.

Specification of Letters Patent.

Patented Oct. 28, 1919.

Application filed September 12, 1917. Serial No. 190,981.

To all whom it may concern:

Be it known that I, ANDREW KLAY, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented a new and useful Multiple-Magazine Drill-Press, of which the following is a specification.

The present invention appertains to drill presses, and aims to provide a novel and improved machine of that character for holding a number of drill bits and enable any selected bit to be brought into play.

A further object of the invention is the provision of a drill press embodying a turret for holding drill bits of different sizes, and means whereby when the drill bits are moved selectively to operative position, they will be capable of movement to and from the work or stock, means being provided for rotating the drill bit when it is in operative position.

Another object of the invention is the provision of a multiple magazine drill press wherein the bits are supported against movement toward the work excepting when brought to operative position, in which position the drill bit is yieldably supported for movement to and from the work, and is also arranged to be engaged by the actuating means for both rotating and reciprocating the drill bit.

A still further object of the invention is the provision in a drill press of the nature indicated, of novel actuating means or gearing for moving the selected drill bit to the work and rotating it, connection with the selected bit being made before the bit is rotated, and the power being automatically connected to and disconnected from the drill bit as the bit is started to move toward the work and returned to normal position, respectively.

The invention has for another object, the provision of novel means for automatically changing the speed according to the diameter of drill bits used, whereby the drill bits of different diameters will be rotated with substantially the same peripheral speed, which is highly desirable, especially when there is considerable difference in the diameters of the bits.

A further object of the invention is the provision of novel means for locking the turret in any one position, and controlled automatically by the feeding means, so that

the turret can only be released when the feeding means is returned to disconnect the actuating means from the selected drill bit.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of the improved drill press.

Fig. 2 is an enlarged fragmental side elevation thereof, portions being shown in section.

Fig. 3 is an enlarged sectional detail on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 2, the friction disk 42 and the shifter 71 being shown in elevation.

Fig. 5 is a fragmental plan view of the turret, portions being broken away.

Fig. 6 is a sectional detail on the line 6—6 of Fig. 2.

Fig. 7 is a rear view showing the pulley wheels and belt tightener.

The machine embodies a suitable stand or frame 1 mounted on a base 2, and an adjustable work support is carried by the stand, the same embodying a bracket 3 carrying a table 4 to support the work or stock. The bracket has a clamp 5 embracing the stand for vertical and rotary adjustment, in order that the table can be adjusted to the desired position.

The turret is designated generally by the numeral 6, and is rotatable about a vertical rod 7 which has its lower end secured to the upturned end of a bracket 8 carried by the stand 1, while the upper end of said rod is secured to a bearing plate 9 secured on a bracket 10 carried by the stand above the bracket 8. The turret embodies a drum rotatable between the brackets 8 and 10 and comprising the upper and lower plates or disks 11 and 12, respectively, connected by the vertical tie rods 13. The plates 11 and 12 are rotatable on the rod 7 and are supported thereby.

An annular set of drill carriers 17 is disposed above the lower plate 12, and said carriers are engaged to vertical guide rods 18 between their ends and are secured thereto by means of set screws 19 or otherwise, said rods sliding through the lower plate 12 to guide the carriers 17 for vertical movement. The carriers 17 have inwardly projecting fingers 20 seating slidably upon an arcuate supporting rail 14 extending almost through a complete circle, and having its ends spaced apart a distance slightly wider than one of the fingers 20, so that when one carrier is moved adjacent to the opening between the ends of the rail 14, the respective finger 20 can move downwardly through said opening. In this position, the carrier is in operative or active position. The rail 14 is supported by a dropped spider 15 having a lower hub 16 secured upon the rod 7 above the plate 12. Each carrier 17 is provided outside of the rod 18 with a vertical aperture 21 for receiving a drill spindle 22 which can be readily inserted or dropped downwardly through the aperture 21, the spindles 22 having downwardly facing shoulders 23 to seat on the carriers 17, to support the spindles from said carriers. The drill bits 24 are attached to the lower ends of the spindles 22 in any suitable or well known manner, and these drill bits can be readily lifted from the turret with the spindles 22, in case that sharpening, replacement or repairs are necessary. The drill bits are arranged in an annular series with the spindles 22, and are of graduated sizes arranged in succession from one point around the turret. The upper ends of the spindles 22 have clutch teeth 25 and recesses 26 for the connection of the actuating and feeding means, as will hereinafter more fully appear, and a guide ring 27 is disposed slidably on the spindles 22 and guide rods 18 to rest on the carriers 17. Thus, when one carrier is moved downwardly together with its rod 18 and spindle 22, said rod and spindle will be guided for vertical movement in an effective manner. The spindles 22 as well as the rods 18 are slidable through the lower plate 12 and the guide ring 27, and said guide ring will be supported by those carriers 17 which are not moved downwardly. The drill spindles 22 can be readily lifted from the ring 27, carriers 17, and guide plate 12, and dropped back in place at either side of the machine, and the drill spindles are all supported by the carriers which are in turn supported by the rail 14. The turret thus provides a drill rack, to store all of the drill bits which are not in use, and prevent the misplacement or loss thereof.

In order to yieldably support that carrier 17 which is in operative position, there is provided a vertically movable elevator or member 31 for raising or returning the car-

rier, and said elevator is provided at its lower end with an outstanding arm 32 normally raised between the ends of the rail 14, so that the fingers 20 will slide over the arm 33 in moving from one end of the rail 14 to the other. The finger 20 which is moved over the arm 32 must necessarily push the arm 32 downwardly in moving the respective carrier 17 downwardly to feed the drill bit toward the table 4. The elevator 31 is guided for vertical movement by arms 33 extending therefrom and having notched ends engaging vertical guides 34 carried by the spider 15, and the upper end of the elevator 31 has an ear 35 fitting slidably on the rod 7 near the plate 11. Due to the dropping of the spider 15 and the upward offsetting of the ear 35, this provides sufficient room for the coiled expansion spring 36 surrounding the rod 7 within the drum of the turret, the lower end of the spring seating on the hub 16 and its upper end bearing upwardly against the ear 35, whereby to yieldably raise the elevator 31 and normally move the arm 32 between the ends of the rail 14. Thus, when the selected carrier 17 is moved downwardly, its finger 20 will move the elevator downwardly against the tension of the spring 36 which will immediately raise the elevator and carrier as soon as free to do so.

In order that the carriers can be readily selected for use, the carriers 17 are provided at their outer ends with hook-shaped or grooved guides 28 forming receptacles for tags 29 inserted downwardly therein and having finger pieces 30 extending outwardly at an angle from their upper ends, to seat on said guides. These tags 29 may have printed or stamped thereon the sizes of the respective drill bits. It is also possible to have the drill bits arranged in pairs for hard and soft metals, respectively, and the corresponding tags 29 of each pair of bits can be of different colors or metals. Thus, the tags of the drill bits for hard metals can be of steel, while the tags for the drill bits for softer metal can be of brass, indicating at a glance the drill bits for steel, iron and harder metals than those for brass and softer metals. These tags can be readily lifted out of their receptacles to be changed as the drill bits are changed.

Means is provided for locking the turret in any one position. Thus, a latch 38 is slidable in the stand 1 to engage lugs or notches 37 with which the periphery of the plate 12 is provided, a spring 39 tending to move the latch into engagement with said plate of the drum to hold the drum of the magazine against rotation about its vertical axis. Said latch is automatically retracted by the feeding means, as will hereinafter appear.

The bracket 10 carries a vertical bearing in which is journaled for rotation the

downwardly extending hub 41 of a horizontal friction disk 42, and a vertical drill shaft of spindle 43 is feathered through the hub 41 to rotate with the disk 42 and slide vertically. The shaft 43 is provided at its lower end with clutch teeth 44 to match the clutch teeth 25 of the spindles 22, and said shaft 42 has at its lower end, a centering pin 45 to enter the recess 26 of the spindle 22 which is in operative position, thus assuring of the alinement of the spindle 22 with the shaft 43 before the clutch teeth come into engagement. A rack sleeve 46 is swiveled or fitted rotatably upon the shaft 43 above the friction disk 42, and is slidable vertically in a bearing or guide 47 carried by an upper bracket 48 with which the stand 1 is provided, the shaft 43 having a collar 49 underneath and a retaining nut or member 50 above the sleeve 46 whereby the shaft 43 and sleeve 46 will slide longitudinally with one another, while the shaft can rotate within said sleeve. The sleeve 46 is provided with rack teeth 51 meshing with a pinion 52 secured on a feeder shaft 43 journaled through the bracket 48, and a feeder wheel 54 is secured to said shaft to be rotated by hand for feeding the shaft 43 downwardly, thus bringing its clutch teeth 44 into engagement with the clutch teeth 25 of the drill spindle 22 below said shaft, so that said drill spindle will then be moved downwardly with the shaft 43 and rotated thereby. This constitutes means for feeding the drill bit downwardly, and when the wheel 54 is released, the spring 36 will raise the drill spindle back to normal position, thereby also raising the shaft 43 and sleeve 46.

The actuating means includes, in addition to the friction disk 42 feathered on the shaft 43, substantially horizontal vertically spaced shafts 55 and 56 journaled in bearings 57 carried by the stand 1 and preferably pivoted thereto, as at 58, so that they can swing about a transverse axis, to permit the forward ends of the shafts to move upwardly and downwardly, although the upper shaft 55 normally has no such movement, excepting should adjustments be made. Pulleys 59 are secured to the rear ends of the shafts 55 and 56 and a belt 60 is trained around said pulleys, as seen in Fig. 7, and around a pulley wheel 61 carried by a drive shaft 62. This drive shaft 62 has a pair of pulley wheels 63 and 64 thereon, one of which is loose and the other fastened to the shaft. A belt shifter 65 is used for shifting a drive belt 66 from one pulley wheel to the other, whereby to bring the belt 60 into and out of operation. A suitable belt tightener 67 is carried by the stand 1 for tightening the belt 60.

Upper and lower friction wheels 68 and 69 have grooved hubs 70 centered upon the

respective shafts 55 and 56 above and below the friction disk 42, whereby said friction wheels can shift radially of the disk to change the speed. A shifter 71 is provided with a portion 72 engaging the grooved hub 70 of the friction wheel 68, and has a vertically slotted portion 73 engaging the grooved hub 70 of the friction wheel 69, whereby the lower friction wheel can be raised and lowered with the forward end of the shaft 56. The slight swinging movement of the shaft 56 does not interfere with the movement of the belt 60 over the pulleys 59, since the relative movement of said pulleys is slight and practically negligible. The slotted portion 73 permits the friction wheel 69 to move up and down, and both friction wheels will be slid on their shafts when the shifter 71 is slid toward and away from the shaft 43, the shifter 71 being of U-shape to move astride the disk 42 without interference therewith. The forward end of the shaft 55 is journaled in a bearing 74 suspended from the bearing 47, and the forward end of the shaft 56 is journaled in a vertically slidable bearing 75 carried by the bearing 40. The arrangement is such, that when the shaft 56 is moved downwardly, the disk 42 moves slightly away from the friction wheel 68, as seen in Fig. 2, the disk 42 then being supported by the bearing 40, and the friction wheel 69 then moves away from the under surface of the friction disk, whereby both friction wheels are spaced from the friction disk to disconnect the shafts 55 and 56 from the shaft 43, thus breaking the connection. The shifter 71 is provided with a base or slide 76 movable on the bracket 10 and guided by the bearing plate 9 and guide bar 77 fastened on said bracket, and the slide 76 is provided with rack teeth 78 meshing with a pinion 79 with which the upstanding hub 80 of the plate or disk 11 of the turret drum is provided. This provides an operative connection between the variable speed actuating mechanism and the turret, in order that when the turret is rotated to select different drill bits, the shifter 71 is moved in one direction or the other—carrying the friction wheels 58 and 59 with it—to change the speed in inverse proportion to the diameters of the drill bits. In other words, as the turret is rotated in one direction to bring the drill bits of increasing diameters under the shaft 43, the pinion 79 will move the shifter 71 away from the shaft 43, thus moving the friction wheels 68 and 69 farther from the center of the disk 42. Consequently, the more the turret is turned to bring drill bits of larger diameters under the shaft 43, the farther will the friction wheels 68 and 69 be moved from the center of the friction disk 42, thereby changing the ratio of rotation between the friction wheels and disks,

and decreasing the angular velocity of the shaft 43. When the turret is turned in the opposite direction to bring drill bits of smaller diameters underneath the shaft 43, the friction wheels 68 and 69 are moved proportionately closer toward the shaft 43, to increase the angular velocity of the shaft 43. Consequently, the velocity of the shaft 43 with respect to the actuating mechanism is varied in inverse proportion to the diameters of the drill bits, whereby the peripheral velocity of the various drill bits will be substantially the same. The movement of the shifter 71 is limited, in order that the turret can only be turned through one complete revolution, whereby it is impossible to turn the turret an excessive amount. This will prevent the movement of the turret to prevent the drill bit of smallest diameter following the drill bit of the largest diameter under the shaft 43, or vice versa, as would disturb the automatic adjustment of the speed as above described. In other words, when the turret is turned the limit in one direction to bring the drill bit of larger diameter under the shaft 43, the turret can turn no farther to bring the drill bit of smallest diameter under the shaft 43, and when the turret is turned in the other direction to bring the drill bit of smallest diameter under said shaft, the turret cannot turn farther, to bring the drill bit of largest diameter thereunder.

Automatic means is provided for making the connection between the shaft 43 and actuating means when said shaft is started in its downward feeding movement. Thus, a rock shaft 81 is journaled within the bearing plate 9 on the bracket 10, and has an arm 82 projecting underneath the bearing 75 to raise said bearing against gravity when the arm 82 is raised. The rock shaft 81 has a second arm 83 connected by a link 84, having a turnbuckle 85 therein for purpose of adjustment, with a lever 86 fulcrumed, as at 87, to the bracket 48. A weight 88 is carried by the lever 86 and is slidable thereon for purpose of adjustment, being held in adjusted position by means of a set screw 89 or its equivalent. Thus, when the lever 86 is free to gravitate under the influence of the weight 88, this will force the link 84 downwardly, and swing the arm 83 likewise, thereby raising the arm 82 and bearing 75, which will raise the friction disk 69 against the lower surface of the friction disk 82. This upward movement of the friction wheel 69 will also raise the friction disk into contact with the upper friction wheel 68, causing the friction disk to be clamped with the desired pressure between friction wheels, whereby the shaft 43 will be rotated with enough hold between the friction wheels and disk to do good

work, but to prevent too hard a grip between the friction wheels and disk as would prevent slipping should the power applied be greater than the drill will stand. By adjusting the weight 88, the desired pressure between the friction wheels and disk can be obtained, permitting slipping when the power is too great or the resistance of the drill bit excessive.

The movement of the lever 86 is also used for automatically operating the latch 38. Thus, a link 90 is connected at one end to the lever 86 and has a turnbuckle 91 therein for purpose of adjustment, and the lower end of said link has a longitudinal slot 92 engaging a pin or rivet 93 carried by one arm of a bell crank lever 94 fulcrumed to the stand 1, thus providing for a limited movement of the link 90 with respect to the bell crank lever. The other arm of the bell crank lever engages a notch 95 in the latch 38. When the lever 86 swings downwardly to throw in the connection between the shaft 43 and actuating means, the link 90 is lowered, thereby permitting the bell crank lever 94 to swing, so that the spring 39 will move the latch 38 into engagement with the plate 12 to hold the turret in its set position, and the lever 86 can have a limited vertical movement to make and break the connection without retracting the latch 38, but when the lever 86 is raised beyond a certain amount, the link 90 will swing the bell crank lever 34 to retract the latch 38, thus releasing the turret so that it can be turned to change bits—that is, to bring different bits under the shaft 43, to operate on the work.

The lever 86 is controlled by the feeding means, and for this purpose, the lever has an arm 96 providing a cam, and a wiper arm 97 is secured to the feeder shaft 53 and has a wiper 98 of fiber or other suitable material 99 to move along the arm 96 after the wheel 54 has been turned sufficiently to raise the shaft 43 out of engagement with the drill spindle 22, as seen in Fig. 2, and then raise slightly farther which brings the wiper arm 97 into position to swing the arm 96 of the lever 86 and raise the links 84 and 90. Consequently, when the selected drill spindle 22 is raised by the elevating spring 36, the feeder wheel 54 can be rotated farther by hand, thereby removing the shaft 43 from the drill spindle, and causing the arm 97 to swing the arm 96 of the lever 86 to raise said lever against the influence of the weight 88. The link 84 in being raised will lower the arm 82 thereof, thereby permitting the lower friction wheel 69 to gravitate away from the disk 42, and said disk will gravitate away from the friction wheel 69, thus breaking the connection between the shaft 43 and actuating means. This upward

movement of the lever 86 also raises the link 90, whereby to retract the latch 38 and permit the turret to be turned.

In operation, supposing that the machine is in the position as just described and shown in Fig. 1, after the work or stock is placed on the table 4, the turret can be readily turned to bring the desired drill bit into operative position underneath the shaft 43. Then, when the feeder wheel 54 is rotated in the proper direction (counter clockwise as seen in Fig. 1), the arm 98 being moved away from the arm 96 permits the lever 86 to gravitate, and the latch 38 will then move into engagement with the plate 12, to lock the turret against rotary movement after it has been set, and before the shaft 43 is moved into engagement with the selected drill spindle. Such movement of the lever 36 also results in the friction wheel 69 being raised, as above described, to clamp the friction disk between the two friction wheels, thus making the connection between the driven and driving members, but before this connection is made, the shaft 43 is lowered sufficiently to bring the clutch teeth 44 thereof into engagement with the clutch teeth 25 of the drill spindle. This prevents the stripping of or injury to the clutch teeth, since they are brought into engagement before the power is applied. Then, as the downward movement of the shaft 43 is continued, due to the rotation of the pinion 52 with the hand or feeder wheel 54, the selected drill spindle is moved downwardly and will be rotated at the proper speed with the shaft 43, it being noted that the rotation of the turret serves to automatically change the speed. The carrier 17 of the selected drill bit has its finger 20 moved onto the arm 32 of the elevator 31, as above described, permitting the carrier and drill spindle to move downwardly with the shaft 43, against the tension of the spring 36, which is compressed as said parts are moved downwardly. Thus, as the drill bit is rotated, the operator, by advancing the wheel 54, can feed the drill bit downwardly at the desired speed, and by releasing the wheel 54, the spring 36 in recoiling or expanding will raise the elevator 31, carrier 17, drill spindle 32 and shaft 43, but the latch 38 will not be retracted unless the wheel 54 is rotated backward far enough by hand for this purpose. This permits the turret to remain locked, for using one bit repeatedly. The elevator 31 raises the carrier 17 back into the plane of the other carriers 17, so that if the magazine is released and turned, the carrier 17 can move off of the arm 32 onto the supporting rail 14. The only parts of the machine requiring manual operation are the feeder wheel 54 and turret, the turret only being manipulated

when it is desired to change drills, while the movement of the feeder wheel or manually controlling member 54 is employed for feeding the selected drill downwardly and breaking the connection of the friction drive or actuating means and releasing the turret, the elevation or return of the drill being accomplished automatically by the spring 36.

Having thus described the invention, what is claimed as new is:

1. A machine of the character described embodying a rotatable turret carrying revoluble tools adapted to be moved longitudinally when in operative position, a projecting portion carried by each tool, an arcuate rail for engaging said projecting portions to support the tools against movement except when in operative position, there being an opening in the rail at said operative position to permit the movement of the tool, and means for yieldingly supporting the tool when in operative position.

2. A machine of the character described, a rotatable turret carrying revoluble tools adapted to be moved longitudinally, a projecting portion carried by each tool, an arcuate rail for engaging said projecting portions and preventing the movement of said tools except when in operative position, said rail having an opening to permit the movement of the tools when in operative position, and yieldable means normally moved into said opening to return a tool when moved in operative position.

3. A machine of the character described embodying a rotatable turret having longitudinally movable, revoluble tools, an arcuate rail having spaced ends, means for preventing the longitudinal movement of said tools except when opposite the space between the ends of the rail, and means for yieldingly returning said tools to their initial positions after being moved at said point.

4. A machine of the character described embodying a rotatable turret having longitudinally movable tools, an arcuate rail for supporting said tools except when brought to one point, and yieldable means for supporting the tools at said point.

5. A machine of the character described embodying a rotatable turret having longitudinally movable tools, an arcuate rail for supporting said tools except when at one point, and a spring pressed elevator having a portion extending between the ends of the rail for yieldably supporting the tools when at said point.

6. A machine of the character described embodying a rotatable turret having longitudinally movable tool carriers, an arcuate rail within the magazine on which said carriers seat except when between the ends of said rail, and a spring pressed elevator with-

in the turret having a portion normally between the ends of said rail for yieldably supporting the carriers when in operative position.

5 7. A machine of the character described embodying a turret comprising a rod, a drum rotatable on said rod, tool carriers mounted to move longitudinally on the drum and arranged in an annular series, an
10 arcuate rail within the drum carried by said rod for supporting the carriers except when between the ends of the rail, an elevator guided within the drum and having a portion to move between the ends of the rail for
15 supporting the carriers in operative position, and spring means for normally moving the elevator to bring said portion into said position.

8. A machine of the character described
20 embodying a turret including a vertical rod, a drum rotatable about said rod, an annular set of vertically movable carriers carried by the drum, vertical drill spindles inserted downwardly in and supported by
25 the carriers, the drum having means for guiding the carriers and spindles for vertical movement, stationary means within the drum for supporting the carriers except when at one position, and a yieldable elevator within the drum for supporting the carriers when at said position.

9. A machine of the character described embodying a shaft mounted for rotary and sliding movements, a movable turret having
35 rotatable and slidable spindles movable into alinement with said shaft, an arcuate rail, means movable with the spindles for engaging the rail to hold the spindles against sliding movement, said shaft and spindles having clutch teeth at their adjacent ends,
40 means for feeding the shaft to engage and feed the alining spindle opposite the space between the ends of the rail, actuating means for rotating the shaft, and means for automatically making and breaking the connection between the shaft and actuating means when the feeding means is advanced and returned respectively.

10. A machine of the character described
50 embodying a shaft mounted for rotary and sliding movements, a movable turret having rotatable and slidable spindles to be brought into alinement with said shaft, an arcuate rail, means movable with the spindles for
55 engaging the rail to hold the spindles against sliding movement, said shaft and spindles having interengageable clutch teeth, means for feeding the shaft to engage and feed the alining spindle opposite the space
60 between the ends of the rail, a friction drive actuating mechanism connected to said shaft, and means controlled by the sliding movement of said shaft into and out of engagement with the alining spindle for bringing

the friction elements of said mechanism into and out of engagement, respectively.

11. A machine of the character described embodying a shaft mounted for rotary and sliding movements, a movable turret having
70 rotatable and slidable spindles to move into alinement with said shaft, an arcuate rail, means movable with the spindles for engaging the rail to hold the spindles against sliding movement, said shaft and spindles having interengageable clutch teeth, means
75 for feeding said shaft longitudinally to engage and feed the alining spindle opposite the space between the ends of the rail, actuating means for rotating said shaft, means tending to connect the actuating means with
80 said shaft, and means for disconnecting the actuating means from the shaft when the shaft is returned to disconnect it from the spindle.

12. A machine of the character described
85 embodying a shaft mounted for rotary and sliding movements, the movable turret having rotatable and slidable spindles to move into alinement with said shaft, an arcuate rail, means movable with the spindles for engaging the rail to hold the spindles against
90 sliding movement, said shaft and spindles having interengageable clutch teeth, means for feeding the shaft to engage and feed the alining spindle opposite the space between
95 the ends of the rail, a friction drive actuating mechanism for said shaft, means tending to bring the friction elements of said mechanism into engagement with a predetermined pressure, and means for separating
100 the friction elements when said shaft is returned to disconnect it from the spindle.

13. A machine of the character described embodying a friction disk, a shaft slidable therethrough and rotated thereby, a turret
105 having rotatable and slidable spindles to move into alinement with said shaft, said shaft and spindles having interengageable clutch teeth, means for feeding the shaft to engage and feed the alining spindle, actuating means having friction wheels at opposite sides of said disk one of said wheels being movable toward and away from the other wheel, means for moving the shiftable friction wheel to clamp the disk between it and
115 the other wheel with a predetermined pressure, and means for separating said wheels when the shaft is returned to disengage it from the spindle.

14. A machine of the character described
120 embodying a rotatable turret having revoluble spindles for drills of different diameters, speed change actuating means for revolving the spindles, the turret being rotatable for the connection of either spindle with the actuating means, and means for changing the speed controlled by the rotation of the turret.

15. A machine of the character described embodying a rotatable turret having revoluble drill spindles for drill bits of different diameters, and speed change actuating means for connection with the spindles in succession when the turret is rotated and controlled by the rotation of the turret to change the speed for the various spindles.

16. A machine of the character described embodying a rotatable turret having revoluble and slidable spindles for drill bits of different diameters, friction drive actuating means to engage the spindles in succession by the rotation of the turret and including a shiftable member for changing speed, and an operative connection between said member and turret.

17. A machine of the character described embodying a rotatable turret having a series of revoluble spindles for drill bits of different diameters, actuating means including a friction disk and a shiftable friction wheel engageable therewith to drive it, means operated by the disk for operating a selected spindle moved to operative position, and an operative connection between said friction wheel and turret to shift the wheel according to the position of the turret.

18. A machine of the character described embodying a rotatable turret having slidable and revoluble spindles for drill bits of different diameters, a shaft mounted for sliding and rotary movements, said shaft and spindles having interengageable clutch teeth, means for feeding the shaft to engage and feed a spindle alining therewith, speed change actuating means connected to said shaft and controlled by the rotation of the turret to change the speed.

19. A machine including the combination specified in claim 18 and further including means for disconnecting the actuating means and shaft when the shaft is returned to disconnect it from the spindle.

20. A machine of the character described embodying a shaft mounted for sliding and rotary movements, a rotatable turret having an annular series of spindles for drill bits

of different diameters to move into alignment with said shaft, said shaft and spindles having interengageable clutch teeth, means for locking the turret against movement, a friction disk feathered on said shaft, a shiftable friction wheel to engage said disk and change the speed, means for feeding the shaft to engage and feed the alining spindle, means for bringing the friction wheel and disk into contact with a predetermined pressure, and means operated by the feeding means for separating the friction disk and wheel and unlocking the turret when the shaft is returned to disengage it from the spindle.

21. A machine of the character described embodying a shaft mounted for rotary and vertical sliding movements, a turret mounted for rotation about a vertical axis below said shaft and having revoluble and vertically slidable spindles for drill bits of different diameters to move under said shaft, the lower end of the shaft and upper ends of the spindles having interengageable clutch teeth, a friction disk feathered on said shaft, actuating means including a pair of shiftable friction wheels above and below said disk, a shifter for shifting said wheels and geared to the turret to adjust the friction wheels according to the position of the turret, means for moving one of the friction wheels toward the other wheel to clamp the friction disk therebetween at a predetermined pressure, a latch for holding the turret, feeding means operable manually for moving the shaft downwardly to engage and lower the spindle therebelow, and means operated by the feeding means, when the shaft is raised to disconnect it from the spindle, for separating the friction wheels and retracting the latch.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ANDREW KLAY.

Witnesses:

F. M. RAMSDELL,
T. TROUT.