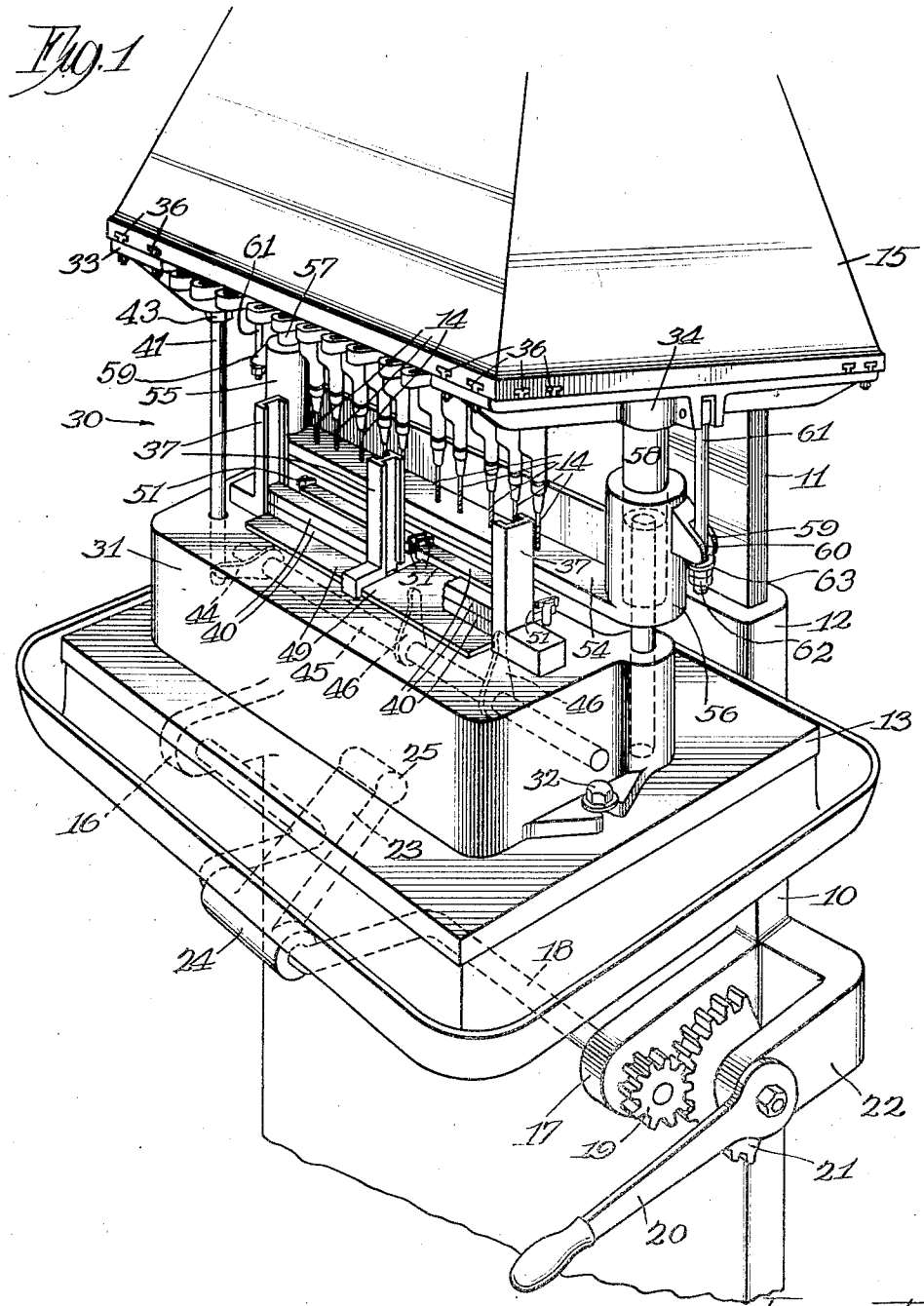
April 1, 1930. J. S. STULL 1,752,468

WORK FEEDING DEVICE FOR DRILLING MACHINES

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Fig. 1



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WORK FEEDING DEVICE FOR DRILLING MACHINES

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Fig. 2

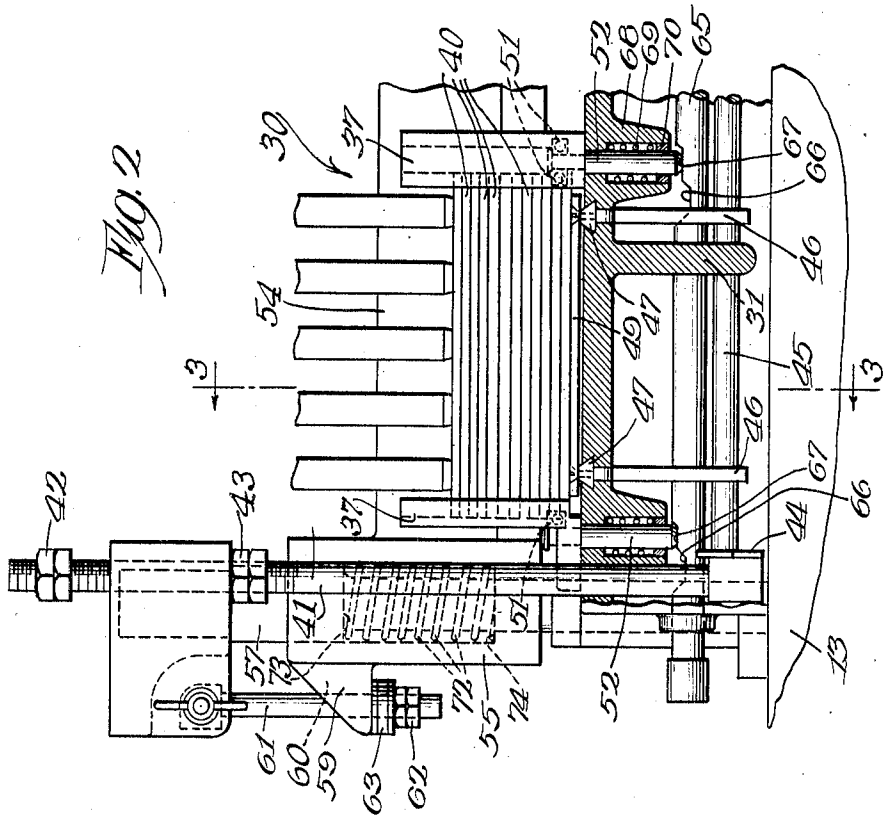
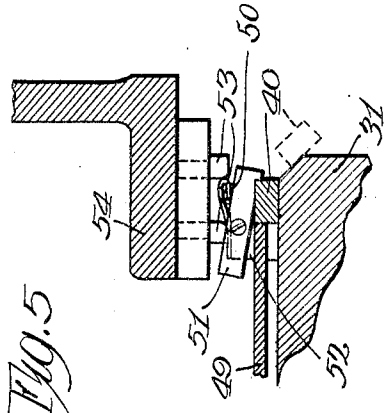


Fig. 5



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Fig. 4

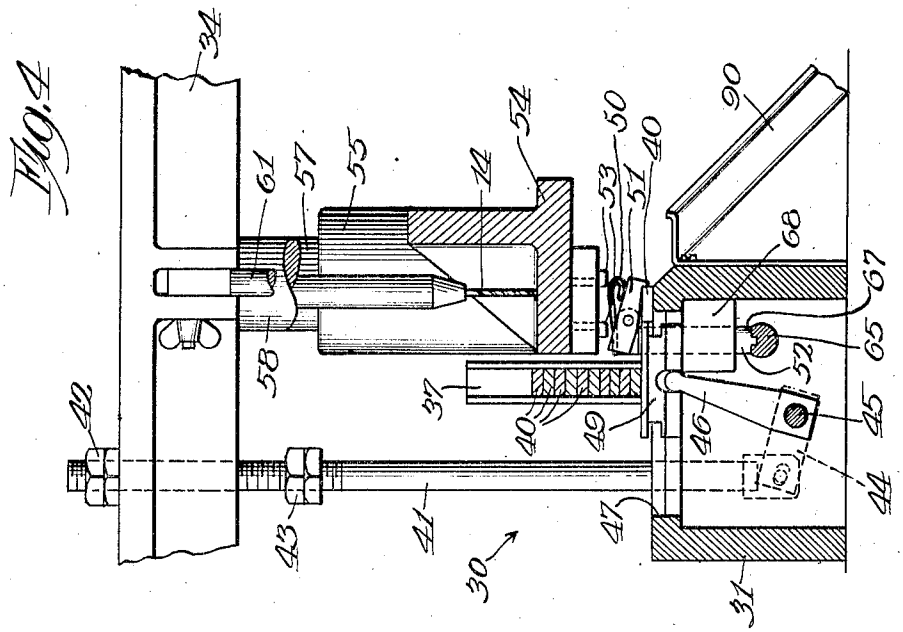
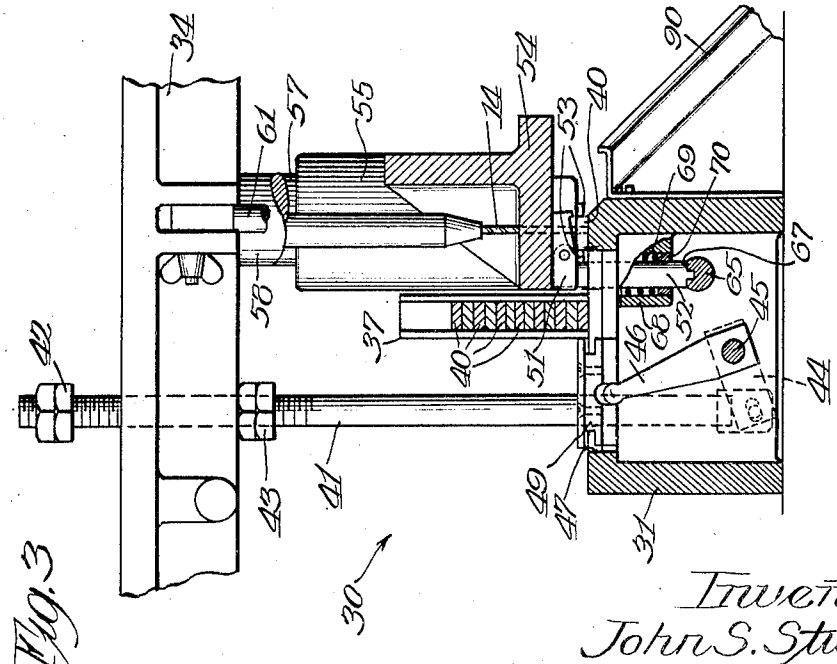


Fig. 3

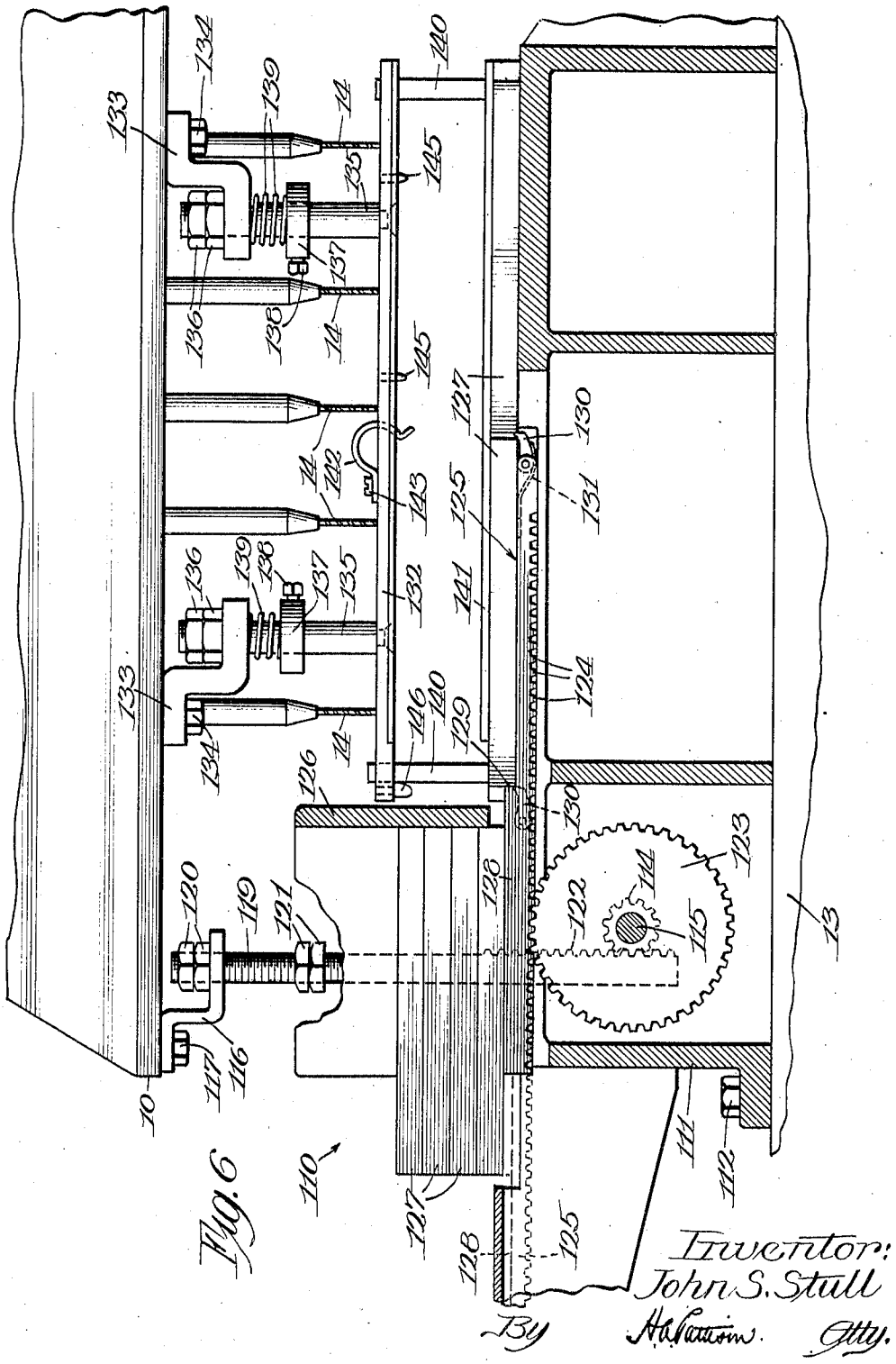


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WORK FEEDING DEVICE FOR DRILLING MACHINES

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Patented Apr. 1, 1930 1,752,468

UNITED STATES PATENT OFFICE

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WORK-FEEDING DEVICE FOR DRILLING MACHINES

Application filed August 22, 1925. Serial No. 51,763.

This invention relates to work feeding devices, and more particularly to work feeding devices for use with drill presses.

An object of the invention is to provide an improved unitary device for operative association with a drill press and responsive to movements of a drilling mechanism for feeding blanks to a drilling position and ejecting the drilled article therefrom.

In accordance with the main features of the invention there is provided in one embodiment thereof a unitary device which is removably attachable to the table of a multiple spindle drill press and which operates simultaneously with the vertical movements of a work supporting table to and from the drills to transfer blanks from a magazine to a drilling position upon the table, the previously drilled blank being ejected by the newly positioned blank and the device being operated by the source of power used to move the table.

Other advantages and features will become apparent in the following detailed description taken in connection with the accompanying drawings, in which

Fig. 1 is a perspective view of one embodiment of the invention shown attached to a multiple spindle drilling fixture, parts being broken away to illustrate certain details more clearly;

Fig. 2 is an elevational view of a part of the fixture, partially in section;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to that shown in Fig. 3 showing the feed plate in an advanced position;

Fig. 5 is an enlarged detail sectional view of one of the holding fingers showing a blank being held therein, and

Fig. 6 is an elevational view of another form of the invention shown partly in section.

In the drawings in which like reference numerals designate like parts throughout the several views, the numeral 10 denotes a frame of a multiple spindle drilling machine having arms 11 formed on the upper end thereof and a cross member 12 slidably mounted thereon. Secured to the cross member 12 is a table 13. The upper end of the frame 10 supports a housing 15 for drilling spindles which drive drills 14. Bearings 16 and 17 formed on the frame 10 support a crank shaft 18 and gear 19 keyed to one end thereof. A hand lever 20 operates a gear segment 21 supported in a bearing 22, said gear segment meshing with the gear 19. A link 23 is connected with the crank shaft 18 by means of a bearing 24 formed on one end of the link and a knuckle 25 formed on the other end of said link engages the underside of the table 13. A downward movement of the hand lever 20 will rotate the crank shaft 18 and raise the table 13, and likewise an upward movement of the handle will lower the table.

An automatic feeding fixture is indicated in general by the numeral 30. A housing 31 of said fixture is fastened to the table 13 by bolts 32. A pair of cross members 33 and 34 are attached to the upper part of the frame 10 by means of tongues and grooves shown at 36. Mounted on the upper surface of the housing 31 are eye-pieces 37 forming magazines for containing the blanks 40 to be drilled. A rod 41 is slidably mounted at its upper end in the cross member 33 by two pairs of lock nuts 42 and 43 (Fig. 2), respectively. The lower end of said rod is slidable in the housing 31. One end of a link 44 is rotatably fastened to the lower end of the rod 41, the other end of the link being keyed to a horizontally disposed shaft 45 rotatably mounted at its ends in the housing 31. A number of fingers 46 are keyed to the shaft 45 and their upper ends reciprocate in grooves 47 cut in the upper surface of the housing 31. The upper ends of these fingers 46 engage feed plates 49.

Spring pressed fingers 51 (Fig. 5) rotatably mounted at the upper ends of a plurality of conveniently spaced pins 52, serve to hold the blanks temporarily in position until they can be more securely clamped by ears 53 formed on the underside of a crosshead 54 which hold the blanks throughout the drilling operation. Leaf springs 50 secured to the upper ends of the pins 52 engage with the fingers 51 and serve to yieldingly retain the

fingers in engaged relation with respect to an associated blank. Shafts 57 and 58 are fixedly mounted at their upper ends in cross members 33 and 34 and their lower ends are slidably mounted in the housing 31. The crosshead 54 is reciprocably mounted on the shafts 57 and 58 by bearings 55 and 56 provided at each end of the crosshead. A projecting portion 59 having a slot 60 therein is formed on the outer surface of each bearing. Bolts 61 pivotally mounted on each of the cross members 33 and 34 hang in direct alignment with and are adapted to enter the slot 60 in the portion 59 (Fig. 2). Washers 63 engage the underside of portion 59 and are held in position by adjustable locknuts 62 threaded on the end of the bolt 61. The crosshead is suspended in this manner, a check being maintained on its downward motion.

A compression spring 72 is interposed between a shoulder 73 formed by an enlarged portion of the shaft 57, and a shoulder 74 formed by the reduced lower end of the bearing 55. A similar arrangement is provided in the bearing 56.

A horizontally disposed shaft 65 is slidably mounted at its ends in the housing 31 (Fig. 2). Pairs of slots 66 and 67 of different depths are cut in the shaft 65. The pins 52 are mounted in the bearings 68 formed in the housing 31 and are pressed against one of the slots 66 or 67 by means of compression springs 69 and washers 70 keyed to the pins 52. The position shown in Fig. 2, that is, with the shallow slot 67 in direct alignment and engagement with one of the pins 52, raises the pin 52 lifting the spring pressed fingers 51 to allow for holding fairly thick blanks. A longitudinal movement of the rod 65 will bring the deeper slot 66 in alignment with the lower surface of one of the pins 52 due to the pressure of the spring 59. Thus the pin 52 will be lowered somewhat also, lowering the fingers 51 to allow for holding blanks of lesser thicknesses.

In the operation of the device a supply of blanks 40 to be drilled are placed in the magazines formed by eye-pieces 37 as shown in Fig. 1. A downward movement on the handle of the hand lever 20 will lift the table 13 as hereinbefore described, raising with it the feeding fixture 30. The rod 41 will be raised therewith until the pair of locknuts 43 engage the under surface of the cross member 33 where they will act as a stop for the rod 41. A continued movement of the hand lever causes the link 44 to rotate turning the shaft 45 therewith. The fingers 46 keyed to the shaft 45 will also rotate and due to the engagement at their upper ends with the feed plates 49 said feed plates will be caused to slide back under the magazines where a blank 40 will drop in front of each feed plate 49. When raising the handle of the hand lever 20 the table 13 will be lowered and with it the rod 41. The engagement of the locknuts 42 with the upper surface of the cross member 33 limits the lowering motion of the rod 41 and a continued lowering of the table 13 will rotate the link 44, the shaft 45 and the fingers 46 in an opposite direction to that in which they were rotated when the table was raised. This moves the feed plate 49 towards the drills and as it advances a blank 40 is carried forward until stopped by the spring pressed finger 51 (Figs. 3, 4, and 5) and held thereby as hereinbefore described.

Repeating the operation just described, again the table 13 will be raised and the feed plates 49 will slide back to receive another one of the blanks 40. When the table is raised high enough for the top surface of the spring pressed fingers 51 to engage the underside of the crosshead 54 the pressure will rotate said finger 51 as shown in Fig. 3 releasing its hold on the blank 40, said blanks then being engaged by the ears 53. A continued upward movement will raise the head 54, which reciprocates on the shafts 57 and 58 compressing the springs 72, thereby exerting pressure on the head 54 and tightly clamping the blank 40. Since the crosshead 54 is forced upwardly relative to the position of the drills 14 the drills will pass through guide holes provided for them in the crosshead 54 and drill the blanks 40.

After the completion of the drilling operation the rod 41 is in a position (Fig. 3) wherein the lower pair of locknuts 43 engage the under surface of the member 34. It will be noted that the rod 41 must be lowered a distance which is adjustably determined by the locknuts 42 at the upper end of the rod before said locknuts will come in contact with the member 34. This lost motion allows the fixture 30 to be lowered far enough for the drills to be removed from the drilled blank without moving the feed plate 49.

This arrangement just described prevents the feed plate from starting forward with a new blank before the crosshead 54 has been lowered past the end of the drills, thus eliminating the chances of breakage of the drills when a new blank is being moved into position. The crosshead 54 is adjusted to continue to lower with the feeding fixture 30 until the locknuts 42 engage the upper surface of cross member 34 and move the feed plate forward far enough to start the displacement of the drilled blank. The downward motion of the crosshead 54 is checked when the portion 59 engages the washer 63 on the bolt 61. As the feeding fixture 30 continues to descend the fingers 51 will be relieved of the pressure exerted by the head 54 and will be free to rotate and engage the oncoming blank (Fig. 5). The feed plate 49 moves the new blank

into position ejecting the drilled one into a slide 90 at the rear of the machine.

The hereinabove detailed description outlines a fixture for automatically feeding blanks from a magazine to a drilling position, holding the blanks while being drilled, and ejecting them after being drilled. Fig. 6 illustrates another feeding fixture indicated in general by the numeral 110. It is shown attached to the same type of multiple spindle drilling machine as is shown in Fig. 1 and is readily attachable to the table 13 by means of bolts 112. This fixture is used for feeding blanks to a drilling position when there are two drilling operations to be performed.

The drilling fixture 110 is provided with a frame 111 having a shaft 115 securely mounted therein. A pinion gear 114 rotatably mounted on the shaft 115 is adapted to engage a rack 122 formed on the lower end of a rod 119. Said rod 119 is reciprocally mounted in the bracket 116 secured to the frame 10 of the machine in a similar manner in which the rod 41 of the previously described fixture 30 is mounted to the cross member 34 thereof. Two pairs of locknuts 120 and 121 are threaded to the upper portions of the rod 119 to aid in supporting the rod and act to adjustably limit the vertical reciprocating motion.

A magazine 126 is provide for containing blanks 127 of material to be drilled. A second gear 123 is fastened integral with the pinion 114 and meshes with a rack 124 formed on the underside of a horizontally disposed slide member 125. A plate 128 is fastened to the upper surface at one end of the slide member 125 forming a projecting edge 129. A finger 130 is rotatably mounted at the other end of the slide member 125. A spring clip 131 also fastened to the slide member tends to keep the finger 130 in a protruding position. Brackets 133 are fastened to the frame 10 by bolts 134. Pins 135 are threaded at their upper ends to receive locknuts 136 and are thereby supported in the brackets 133. A plate 132 serves to guide the ends of the drills 14 and is supported by the lower ends of the pins 135 which are riveted thereto. Collars 137 are adjustably mounted on the pins 135 by set screws 138. Interposed between the collar 137 on the underside of the bracket 133 is a compression spring 139. This spring tends to resist any upward movement of the guide plate 132. The guide plate reciprocates on liner pins 140 mounted on the frame 111, and is adjusted by means of the screws 136 so that it covers and protects the ends of the drills 14.

To operate this fixture the magazine 126 is filled with blanks 127. The table 13 is raised in the same manner described in the other form of the invention, and the pinion 114 rotates upon the rack 122, thereby rotating the gear 123 which meshes with the rack 124 and moves the slide member 125 back towards the magazine. When the slide member 125 is moved back far enough for the projecting edge 129 of the plate 128 to be in alignment with the back ends of the blanks contained in the magazine, the lowest blank will be engaged by the edge 129. When the table 13 is lowered the gear 114 will rotate in an opposite direction, moving the slide member 125 forward towards the drills carrying the blank forward to position it under the drills. As the blank 127 slides forward it is guided and held in position by a pair of guide members 141 fastened to the sides of the frame 111. The table 13 is raised again, moving the slide member 125 back towards the magazine and also moving the frame 111 upward until the blank 127 comes in contact with the under surface of the guide plate 132. A beveled ear 146 is mounted on the underside of the plate 132 and is adapted to engage one end of the blank 127 as the table 13 raises the fixture 110. A spring clip 142 is fastened to the guide plate 132 by a screw 143 and engages the forward end of the blank 127. Thus the blank is prevented from moving longitudinally. Continued upward movement of the table compresses the springs 139 raising the guide plate 132 and holding the blank 127 tightly in position to be drilled. The drills 14 are passed through the guide plate 132 and drill the blanks by virtue of the vertical movement of the guide plate 132 in relation to the stationary vertical position of the drills.

The table 13 is again lowered and the slide member 125 starts to move forwardly. The spring pressed finger 130 thereof engages the edge of the blank just drilled, as shown on the dotted lines, and moves that blank to a second drilling position while at the same time a new blank is being placed in the first drilling position as hereinbefore described. The operation of raising the table 13 is again repeated. A plurality of studs 145 are fastened to the guide plate 132 so as to enter the holes made by the first operation, thereby lining up the blank for the second operation. The two blanks in position are then drilled in the manner hereinbefore described and on the downward movement of the table 13 the second blank is moved to a position wherein the second operation will be performed, thereby ejecting the drilled blank, and a new blank is inserted in position for the first operation. The vertical path of the shaft 119 has a certain amount of lost motion due to the arrangement of the locknuts 120 and 121. Said motion is more fully described in the similar operation of the rod 41 of the other form of the invention. This lost motion allows the table 13 to descend far enough for the drills 14 to be removed from the work before the work is moved on to the next operation or ejected as the case may be.

This form of the invention has the same

features of being removably attached to any ordinary multiple spindle drilling machine as has the first form of the invention and also is operable by the same source of power that is ordinarily used to raise and lower the drilling table.

What is claimed is:

1. The combination with a drill press comprising a drill, operating means for the drill, a work table, means for positioning work on the table, a yielding member for engaging work in the working position, a pin for supporting said member, and a cam member engaging the pin for adjusting the position of the pin to accommodate different sizes of material to be worked.

2. The combination with a drill press comprising a drill, operating means for the drill, a work table, means for positioning work on the table, a plurality of yielding members for engaging the work in the working position, a yieldingly mounted bar having work aligning projections, and means for engaging said bar with the work and disengaging the yielding members.

3. The combination with a drill press comprising a drill, of a fixed support for the drill, a reciprocating work table, a feed member carried by the table and operative to position work in predetermined relation to the drill, and means for operating said feed member including a pivoted member engaging the feed member and a lost-motion connection between the fixed support and the pivoted member.

4. The combination with a drill press comprising a drill, of a fixed support for the drill, a reciprocating work table, a magazine for containing blanks mounted on the table, a feed member carried by the table and operative to successively move blanks from the magazine to a drilling position on the table, and means for operating the feed member including a pivoted member engaging the feed member and a lost-motion connection between the fixed support and the pivoted member.

5. The combination with a drill press comprising a drill, of a fixed support for the drill, a reciprocating work table, a feed member carried by the table and operative to move blanks into drilling position on the table, and means for operating said feed member comprising a pivoted member to actuate the feed member, a rotatable shaft carried by the work table, and a lost-motion connection between the fixed support and the feed member.

6. The combination with a drill press comprising a drill, of a fixed support for the drill, a reciprocating work table, a feed member carried by the table and movable at right angles to the direction of movement of the table, and means for operating said feed member including a lost-motion connection between the fixed support and the feed member.

7. The combination with a drill press comprising a drill, of a work support, a yielding member for retaining the work on the support in drilling position, and means for simultaneously disengaging the yielding member from the work and for retaining the work in drilling position.

8. The combination with a drill press comprising a drill, of a reciprocating work support, a yielding member for retaining the work on the support in position to be operated on by the drill, and means actuated by reciprocation of the work support for simultaneously rendering the yielding member inoperative and for retaining the work in said position.

9. The combination with a drill press comprising a drill, of a fixed support for the drill, a work support reciprocable with respect to the drill, a yielding member for retaining the work on the work support in position to be operated on by the drill, and a member yieldingly carried by the fixed support and operative to simultaneously render the yielding member inoperative and for retaining the work in said position.

In witness whereof, I hereunto subscribe my name this 10th day of August, A. D. 1925.

JOHN STANLEY STULL.