R. MILNE.

GEARING.

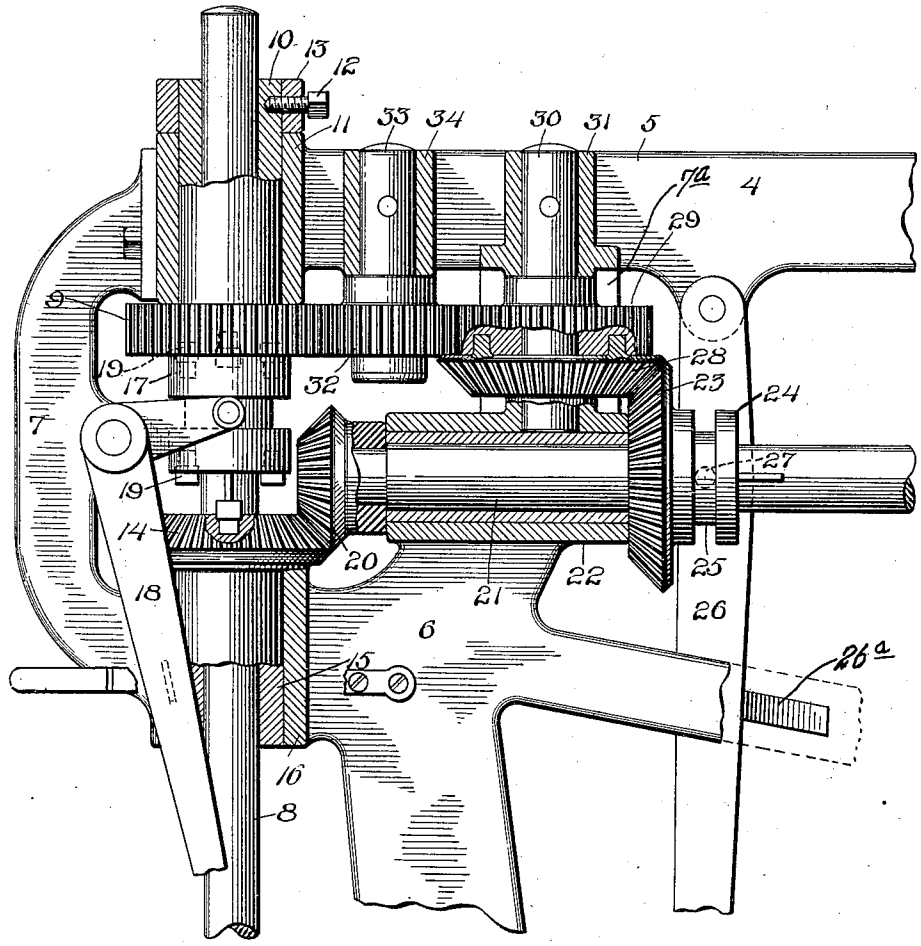
APPLICATION FILED JAN. 3, 1911.

1,017,441.

Patented Feb. 13, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



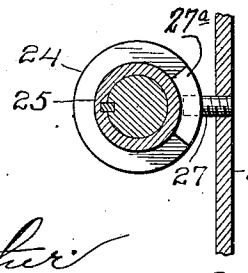


Fig. 3.

WITNESSES

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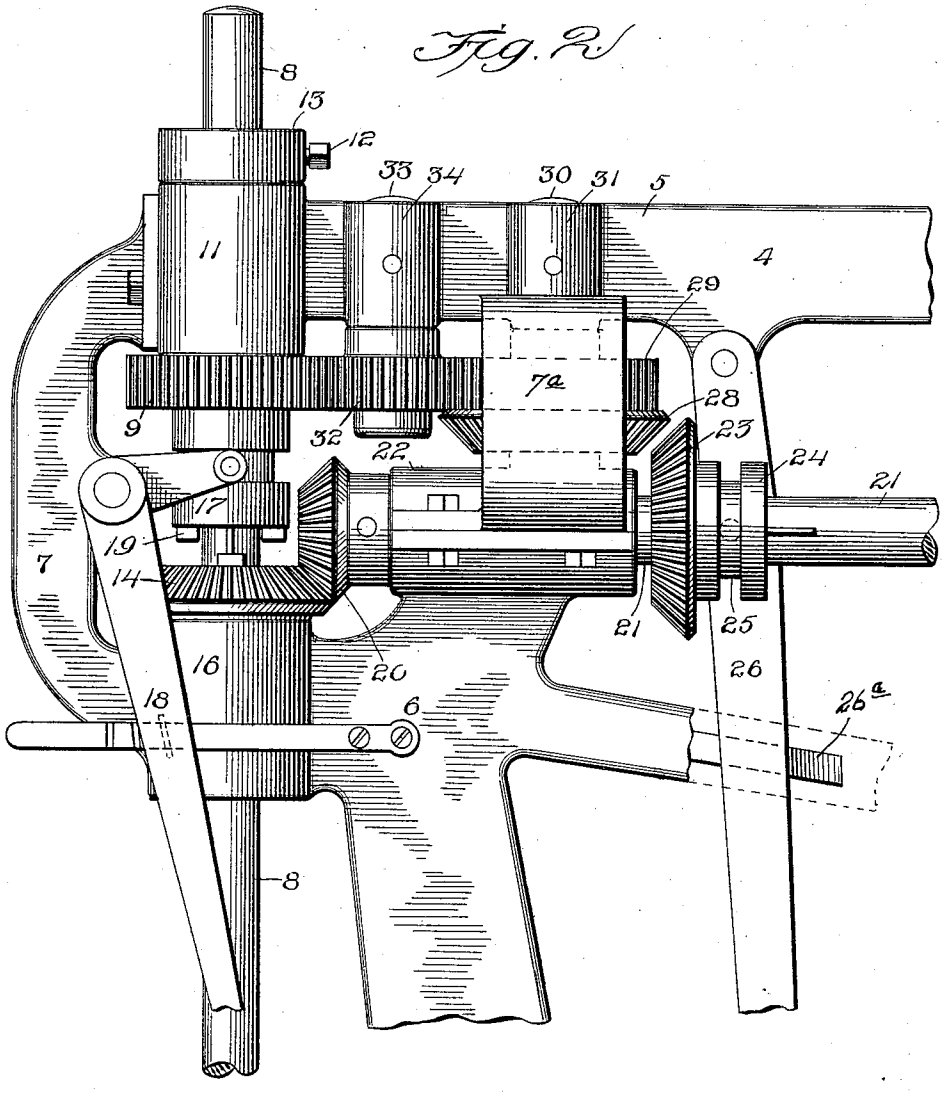
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

ROBERT MILNE, OF ROCKFORD, ILLINOIS, ASSIGNOR TO ROCKFORD DRILLING MACHINE COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

GEARING.

1,017,441. Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed January 3, 1911. Serial No. 600,552.

To all whom it may concern:

Be it known that I, ROBERT MILNE, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

The present invention relates to a mechanism for controlling the rotative advance and reverse movements of a drill spindle.

The objects of the present invention are, to provide a main driving shaft upon which will be mounted a driving gear for advancing the spindle and a driving gear for reversing the spindle; to provide a train of gearing connecting the driving gear for the reversing gear with the reversing gear; and to provide means for sliding the driving gear for the reversing gear longitudinally upon the main driving shaft, whereby reverse rotation of the spindle can be stopped without checking the movement of the main driving shaft.

A further object of the invention is to provide a series of levers which will be within handy reach of the operators, and which levers will control all of the mechanism controlling the advance or reverse movements of the drill spindle.

The invention further consists in the features of construction and the combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a view showing the mechanism of the present invention with the parts in position for reversing the direction of rotation of the drill spindle, and showing a portion of the device in section; Fig. 2, an elevation showing the parts comprising the present invention in the position they assume when the gear upon the main drive shaft for driving the reverse gearing is thrown out of mesh; and Fig. 3, a detail showing the swinging lever and the pin thereon for moving the driving gear of the reverse gearing along the drive shaft.

During the operation of drill presses, it frequently becomes necessary to reverse the direction of rotation of the drill spindle. It has been found to be a matter of difficulty to provide a reversing mechanism for retracting a tapping tool from the work which will be accurate and easy of manipulation, and which will serve to check the reversing or advancing rotation of the spindle when desired.

It is the object of the present invention to provide a means for accurately and quickly stopping the reverse rotation of the spindle, which stopping will be independent of the movement of the clutch mechanism and can be brought about without the stopping of the rotation of the main driving shaft for the spindle.

The device, as shown, is applied to the upper portion 4 of an ordinary drill press frame. Said upper portion, as shown, consists of a separate upper rail 5, which is attached to the body portion 6 of the drill press frame, and is supported by a webbed casting 7 and by a lug 7^a, best shown in Fig. 1, although, of course, the details of construction of this framework are not deemed to have any bearing upon the present invention.

Extending longitudinally of the drill press frame is a drill spindle 8 of the ordinary and well known type. Loosely mounted upon the upper end of the drill press spindle is a gear 9, which is carried by a sleeve or bushing 10, mounted within a journal or bearing 11 carried by the upper rail 5; and the sleeve or bushing 10 has secured thereto, by pins 12, or other suitable fastening means, a collar 13. The collar prevents movement of the gear 9 longitudinally of the spindle in one direction; and movement in the opposite direction is prevented by the face of the gear contacting the lower face of the journal 11.

Loosely mounted upon the spindle 8 and lying below and spaced away from the gear 9 is a gear 14, which has secured thereto a sleeve or bearing 15 mounted within a journal 16 carried by the main frame 6. The gear 14 is for the purpose of rotating the drill spindle in a direction to cause the tool to perform the drilling or other operation upon the work; and the gear 9 is for the purpose of reversing the direction of rotation of the drill spindle, which reversal is necessary in order to retract the tool from the work. The desirability of these movements is well known in the drill press art and need not be discussed further in connection with the present invention. Also the mechanism for moving the drill longitudinally of the machine to bring the acting end into and out of the work is old and well known in the art and is not shown in conjunction with the present invention, it being

understood that any suitable means may be utilized for performing this portion of the work.

In order to expedite the description of the present invention, the gear 9 will be referred to as the reversing gear, and the gear 14 as the advancing gear. As heretofore stated, both of these gears are loosely mounted upon the drill spindle 8 and are spaced away from one another upon the drill spindle. Interposed between these two gears is a clutch member 17, which is keyed to the spindle 8 to permit of its movement longitudinally upon said spindle, and to cause it to rotate simultaneously with said spindle. The clutch mechanism is actuated by a bell crank lever 18 and is provided with oppositely extending clutch surfaces 19. This portion of the device, however, is old and well known in the art and is not claimed as a part of the present invention.

The operation of the portion of the device just described is as follows: By moving the bell crank lever 18, the clutch mechanism may be thrown into the position shown in Fig. 1, at which time it has thrown the reversing gear into clutch with the drill spindle; or it may be moved into position to bring the lower face into engagement with the gear 14, at which time said gear will be thrown into clutch with the drill spindle.

Meshing with the gear 14 is a pinion 20 mounted upon a main driving shaft 21, which is journaled, as shown, within a suitable hub 22 secured to the drill press frame. As shown in the drawings, the pinion 20 is fixedly secured to one end of the shaft 21 and lies upon one side of the hub 22. Lying upon the opposite side of said hub and splined to the shaft 21 is a gear 23, which is provided with a collar 24, in which is formed a circumferential groove 25; and pivotally attached to the upper rail 5 is a lever 26 carrying a stud 27, carrying a yoke 27^a, which rests within the groove 25. As the lever 26 is swung, the yoke 27^a will, through its engagement with the groove 25, serve to move the gear 23 longitudinally of the shaft 21.

Meshing with the gear 23 is a gear 28, which is attached to a gear 29 loosely mounted upon a stub shaft 30, and said stub shaft is fixedly mounted within a bearing 31 upon the upper rail 5; and the lower end of the stub shaft, as shown, rests within the hub 22. Meshing with the gear 29 is a gear 32, which is loosely mounted upon a stub shaft 33 that is fixedly mounted within a journal 34 on the upper rail 5; and this gear 32 in turn meshes with the reversing gear 9. The gears 9, 32 and 29 extend in practical alinement with one another and parallel to the main driving shaft 21; and these gears, together with the gear 28, remain at all times in fixed relation to one another, to constitute what is termed the train of gearing from the reversing gear. The bell crank lever 18 actuating the clutch mechanism, and the lever 26 for moving the gear 23, terminate adjacent to one another, so that the movements of these two parts are easily controlled by the operator.

The operation is as follows: With the parts in the position shown in Fig. 1, where the clutch 17 is in engagement with the gear 9, and where the gear 23 is in mesh with the gear 28, reverse movement is being imparted to the drill spindle from the main driving shaft 21 through the medium of the gears 23, 28, 29, 32 and 9. When it is desired to check this reverse movement, the lever 26 is swung to bring the gear 23 out of mesh with the gear 28, as shown in Fig. 2, at which time the connection between the power shaft and the train of reversing gears will be broken. Of course, with the parts in this position, the clutch will not be engaged with the advancing gear, hence, the rotation of the drive shaft will continue without imparting movement to either the advancing or reversing gears, and the drill spindle will remain at rest. It will thus be seen that the main drive shaft may continually operate at all times and that the advance and retraction of the drill spindle is entirely controlled by means operating independently of the drive shaft, and that the clutch mechanism need only be thrown into position to throw the advancing gear into clutch with the shaft, and the reversing gear into clutch with the shaft, and that it need not be necessarily moved to a neutral position unless desired, since the stopping of the rotation of the spindle can be accomplished by the movements of the gear 23. A suitable stop block 26^a is provided, which is made of spring material and serves to hold the lever 26 locked when the gears 23 and 28 are in mesh.

I claim:

1. In a device of the class described, the combination of a driving shaft, a drill spindle, an advancing gear, and a reversing gear, loosely mounted on said spindle, a gear fixed on the driving shaft meshing with the advancing gear, clutch mechanism for connecting the advancing and reversing gears with the spindle, a train of gearing extending from the reversing gear and lying to one side and longitudinally of said driving shaft, and a gear sliding on the main driving shaft and meshing with one gear of the train of gears, substantially as described.

2. In a device of the class described, the combination of a driving shaft, a drill spindle, an advancing gear and a reversing gear, loosely mounted on said spindle, a gear fixed on the driving shaft meshing with

the advancing gear, clutch mechanism for connecting the advancing and reversing gears with the spindle, a train of gearing extending from the reversing gear and lying to one side and longitudinally of said driving shaft, a gear sliding on the main driving shaft meshing with one gear of said train of gears, and a swinging lever secured to the drill press frame for shifting said slidable gear, substantially as described.

3. In a device of the class described, the combination of a frame, a main driving shaft, a drill spindle, an advancing gear and a reversing gear loosely mounted on said spindle, clutch mechanism for connecting the advancing and reversing gears with the spindle, a gear fixed on the main driving shaft meshing with the advancing gear, a train of gearing extending from the reversing gear and lying to one side and longitudinally of said driving shaft, a gear on the main driving shaft meshing with one of said gears of the train of gears, and having a grooved collar thereon, a rail secured to the frame, a lever pivoted to the rail, and a pin on the lever entering into the groove of the collar, substantially as described.

4. In a device of the class described, the combination of a frame, a main driving shaft, a drill spindle, an advancing gear loosely mounted on the spindle, a reversing gear on the spindle, clutch mechanism for connecting the advancing gear and the reversing gear with the drill spindle, a rail attached to the frame lying to one side and longitudinally of said driving shaft, a plurality of stub shafts fixedly mounted on said rail, a spur gear mounted on one of said stub shafts and meshing with the reversing gear, a spur gear on another of said stub shafts meshing with the first mentioned spur gear, a bevel gear secured to the second mentioned spur gear, and a bevel gear splined to the main driving shaft and meshing with said bevel gear on the spur gear, substantially as described.

5. In a device of the class described, the combination of a main driving shaft, a drill spindle, an advancing gear loosely mounted on the spindle, a reversing gear loosely mounted on the spindle, clutch mechanism for connecting the advancing gear and the reversing gear with the drill spindle, a rail attached to the body of the frame lying to one side of and parallel to said driving shaft, a plurality of stub shafts fixedly mounted on said rail, a spur gear mounted on one of said stub shafts and meshing with said reversing gear, a spur gear on another of said stub shafts meshing with the first mentioned spur gear, a bevel gear connected to the second mentioned spur gear, a bevel gear splined to the main driving shaft and meshing with the bevel gear attached to said spur gear, and a lever pivoted to said rail for shifting said splined bevel gear on the driving shaft, substantially as described.

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Witnesses:
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MARY R. FROST.