

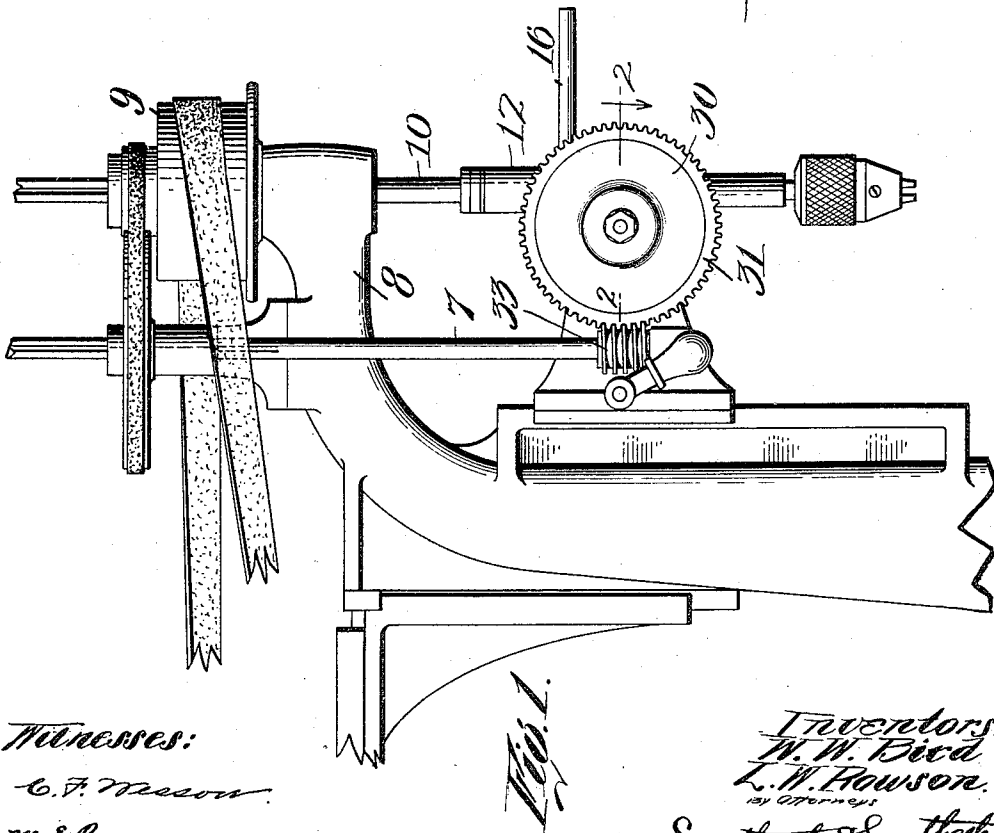
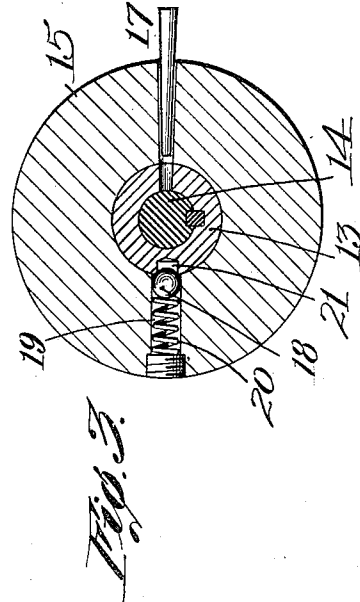
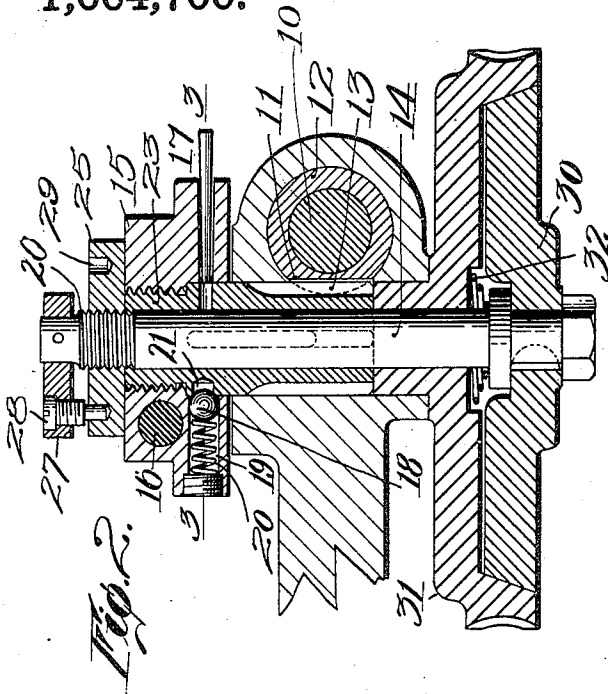
W. W. BIRD & L. W. RAWSON.

FEED DEVICE.

APPLICATION FILED AUG. 8, 1912.

1,064,700.

Patented June 17, 1913.



Witnesses:

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FEED DEVICE.

1,064,700.

Specification of Letters Patent. Patented June 17, 1913.

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To all whom it may concern:

Be it known that we, WILLIAM W. BIRD and LOUIS W. RAWSON, citizens of the United States, both residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Feed Device, of which the following is a specification.

This invention relates to a feeding device capable of general use but especially adapted for drills of the upright type.

The principal objects of the invention are to provide a simple and inexpensive construction by which the operation of a feed lever for the purpose of sensitive feeding and throwing in the power feed is materially simplified; to provide a construction in which the motion of the feed lever for the purpose of bringing the tool, which it is adapted to feed, into the position in which it is to commence its operation can be continued without change of direction for the purpose of disconnecting the feed lever from the tool and connecting the tool with a power feed; also to provide means of this character adapted especially for use on drills of the upright type.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which,

Figure 1 is a side elevation of a portion of an upright drill with a preferred embodiment of this invention applied thereto; Fig. 2 is an enlarged sectional view of the same on the line 2—2 of Fig. 1, and Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2.

The invention is shown as applied to an upright drill having a main frame 8 for supporting a pulley 9 by which the power is transmitted to a reciprocable drill spindle 10. This spindle is rotated in any of the ordinary ways from a feed shaft 7 and for the purpose of reciprocation is provided as usual with a longitudinal rack 11 on the quill 12. This rack is designed to be operated by a pinion 13 fixed on a shaft 14 as is well understood in this art. For the purpose of rotating this shaft by hand and feeding the drill or other tool forward, the pinion may be connected with a hub 15 rotatable on the shaft and provided with a feed

lever 16 for operating it. When it is designed to operate the device in the manner of a sensitive drill without power feed the hub and pinion are connected positively, as for example, by means of a pin 17 securing them together. But in other cases this pin is not used and the connection is secured by means of a ball 18 mounted in a chamber 19 in the hub and pressed by a spring 20 into a shallow depression or socket 21 in the circumference of an extending hub of the pinion. It will be obvious that when this ball is in the socket 21 the feed lever 16 can be operated to control positively the drill or other tool in the manner of a sensitive drill. For the purpose of operating the drill by power, however, the following mechanism is provided. On the shaft 14, either integrally or otherwise, is a shaft 23 having external threads thereon. These threads engage with internal threads on the hub 15. At the end on the shaft 14 is a plate 25 against which the hub 15 is adapted to engage and which it is adapted to press outwardly when unscrewed along the screw-threads. For the purpose of adjustment to take up wear, this plate is shown as mounted on a screw-thread 26 and having an arm 27 on the shaft provided with a pin 28 adapted to enter any one of a series of sockets 29 in the plate. The other end of the shaft 14 is provided with a clutch member 30 fixed thereto and adapted to engage a second clutch member 31 freely rotatable on the shaft. The shaft and the clutch member 30 normally are pressed away from the clutch member 31 by a spring 32. The second clutch member is provided with an external worm and constitutes a worm wheel adapted to be driven by a worm 33 connected with the feed shaft 7 and designed to be positively and constantly driven.

The operation is very simple. The worm wheel or clutch member 31 normally rotates idly. At the same time the feed lever 16 is normally in absolute control of the reciprocation of the drill spindle 10 because the ball 18 is normally in the socket 21 so all motions of the feed lever are communicated directly and positively to the quill and spindle. Now in operation, when the operator turns the feed lever to bring the drill spindle down toward the work, he retains abso-

lute control of the reciprocation of the spindle so long as the latter meets with no resistance, but when it comes against the work the continued forward motion of the feed lever in the same direction, and preferably with added force, will cause the ball 18 to be forced out of the socket 21 against the resistance of the spring 20 and permit the hub 15 to turn a small part of a revolution on its own axis. This screws it out along the screw threads on the shaft 23 against the plate 25. This plate being positively fixed to the shaft 14, it will be seen that this motion of the feed lever forces the shaft 14 back as shown in Fig. 2 and brings the clutch member 30 into cooperation with the second clutch member 31 against the resistance of the spring 32. This not only causes the rotary motion of the second clutch member to be positively communicated to the shaft 14 and consequently to the pinion 13 which is keyed thereon, but it will be observed that the control of the feed lever over the pinion 13 is simultaneously lost on account of the ball 18 riding up on the cylindrical surface of the end of the pinion. Therefore, by this continued motion of the feed lever in its forward direction after the drill meets a resistance, the hand feed is automatically disengaged and the power feed connected with the drill spindle. This is an important result as it does not necessitate changing the direction of motion of the feed lever, letting go of it, or using the left hand in making the desired change. At the same time the motion that the operator does make to cause this change is a natural one; that is, the exertion of a little more force in the direction in which he is already moving the feed lever when the feed lever meets with a resistance against the motion which it has been taking. In this way it will be seen that a green hand can be taught the operation of a machine with little trouble, as almost no explanation need be given him as to the motions to make when he desires to change from hand feed to power feed. It will be understood, of course, that during this period the feed lever continues to move in the same direction, and that although operatively disconnected temporarily, yet the control by the feed lever can be regained almost instantaneously by a slight backward motion of the feed lever. When the operation has been completed, as for example, when the hole to be drilled has reached the proper depth, the operator simply turns the feed lever back which will first result in screwing the hub up on the screw-threads and loosening the clutch members, thus permitting the spring 32 to separate them. The next result will be the entrance of the ball 18 into the socket 21 and the restoring of the whole control of the spindle to the feed

lever. Any desired device may be applied for the purpose of stopping the feed at any desired point.

Although we have illustrated and described the invention especially as applied to upright drills and although we have found it particularly applicable thereto, we are aware of the fact that the invention is capable of broader application and we do not wish to be limited to that particular type of machine. We are also aware of the fact that the invention can be carried out in other forms than that shown without departing from the scope of the invention as expressed in the claims. Therefore, we do not wish to be limited in these respects, but

What we do claim is:—

1. In a device of the character described, the combination with a constantly rotating feed shaft, a spindle, and a feed lever, of means connected with the feed lever for feeding said spindle forward as the feed lever is moved, and means whereby when the spindle meets a resistance and the advance of the feed lever is continued positively in the same direction, the spindle will be disconnected from the feed lever and connected with said feed shaft.

2. In a device of the character described, the combination with a reciprocable spindle, a feed lever rotatable about an axis, means connected with the feed lever for feeding said spindle forward as the feed lever is turned in one direction, and means whereby when the spindle meets a resistance and the feed lever is advanced positively in the same direction, the spindle will be automatically disconnected from the feed lever.

3. In a device of the character described, the combination with a feed shaft, a reciprocable spindle, and a feed lever, of means connected with the feed lever for feeding said spindle forward as the feed lever is moved, a rack connected with said spindle, a pinion for operating the rack, means for connecting the feed lever with said pinion to transmit the motion of the feed lever directly to the pinion and disconnecting it from the feed lever when the feed lever is advanced in the same direction after the spindle meets an obstruction, and means whereby the pinion will be connected with the feed shaft when the feed lever is disconnected from the pinion.

4. In a device of the character described, the combination with a feed shaft, a reciprocable spindle, and a feed lever, of means connected with the feed lever for feeding said spindle forward as the feed lever is moved, a rack connected with said spindle, a pinion for operating the rack, means for connecting the feed lever with said pinion to transmit the motion of the feed lever directly to the pinion, said means being capable of yielding, and of being dis-

connected from the pinion when the feed lever is turned positively forward after the spindle meets a resistance, and means whereby when this motion takes place the pinion will be connected with the feed shaft.

5. In a device of the character described, the combination of a shaft, a clutch member fixed thereon, a second clutch member rotatably mounted on the shaft, means for normally forcing said clutch members apart, a rack, a pinion fixed to said shaft and meshing with the rack, a feed lever, a yielding connection between the feed lever and the pinion whereby normally the feed lever will rotate the pinion and shaft, and feed the rack, and means whereby when the connection between the feed lever and pinion is broken, the further motion of the feed lever in the direction for feeding the rack will cause the shaft to be moved longitudinally and the clutch members to be operatively engaged.

6. In a device of the character described, the combination of a shaft, a clutch member fixed thereon, a second clutch member rotatably mounted on the shaft, means for constantly rotating the second clutch member, means for normally forcing said clutch members apart, a spindle having a rack, a pinion fixed to said shaft and meshing with the rack, a hub on said shaft, a feed lever connected with the hub, a yielding connection between the hub and the pinion whereby normally the feed lever will positively rotate the pinion and shaft, and feed the spindle, and means whereby when the connection between the hub and pinion is broken, the further motion of the hub in the direction for feeding the spindle will cause the shaft to be moved longitudinally and the clutch members to be operatively engaged.

7. In a device of the character described, the combination of a shaft, a clutch member fixed thereon, a second clutch member rotatably mounted on the shaft, means for constantly rotating the second clutch member, means for normally forcing said clutch members apart, a spindle having a rack, a pinion fixed to said shaft and meshing with the rack, a hub screw-threaded on said shaft, a yielding connection between the hub and the pinion whereby normally the hub will rotate the pinion and shaft and feed the spindle forward, and a member fixed on the shaft for receiving the thrust of said hub when it is turned along the screw-threads,

whereby when the connection between the hub and pinion is broken, the further motion of the hub in the direction for feeding the spindle will cause the shaft to be moved longitudinally and the clutch members to be operatively engaged.

8. In a device of the character described, the combination of a shaft having a screw thread, a hub on said screw thread, a member fixed on the shaft and having a circular part provided with a socket, a spring pressed ball in the hub adapted to engage in the socket and connect said hub with the shaft, a power-operated member and means, whereby upon a relative rotary movement of the hub with reference to the shaft, said power-operated member will be connected with the shaft.

9. In a device of the character described, the combination of a shaft having a screw thread, a hub on said screw thread, a member fixed on the shaft and provided with a socket, a spring pressed ball in the hub adapted to engage in the socket and connect said hub with the shaft, a clutch member fixed on the shaft, a second clutch member rotatable on the shaft, a plate or stop on the shaft beyond the screw thread to receive the hub when unscrewed and transmit the motion of the hub to the shaft and first clutch member.

10. In a device of the character described, the combination of a shaft having a screw thread, a hub on said screw thread, a member fixed on the shaft and having a circular part provided with a socket, a spring pressed ball in the hub adapted to engage in the socket and connect said hub with the shaft, a clutch member fixed on the shaft, a second clutch member rotatable on the shaft, yielding means for normally moving the shaft to keep the clutch members out of contact, a plate or stop on the shaft beyond the screw thread to receive the hub when unscrewed and transmit the motion of the hub to the shaft and first clutch member.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

WILLIAM W. BIRD.
LOUIS W. RAWSON.

Witnesses:

LOUIS W. SOUTHGALO,
C. FOREST WESSON.