No. 775,139. PATENTED NOV. 15, 1904.

J. F. HANNIGAN.

RATCHET DRILL.

APPLICATION FILED DEC. 9, 1903.

NO MODEL.

Fig. 1.

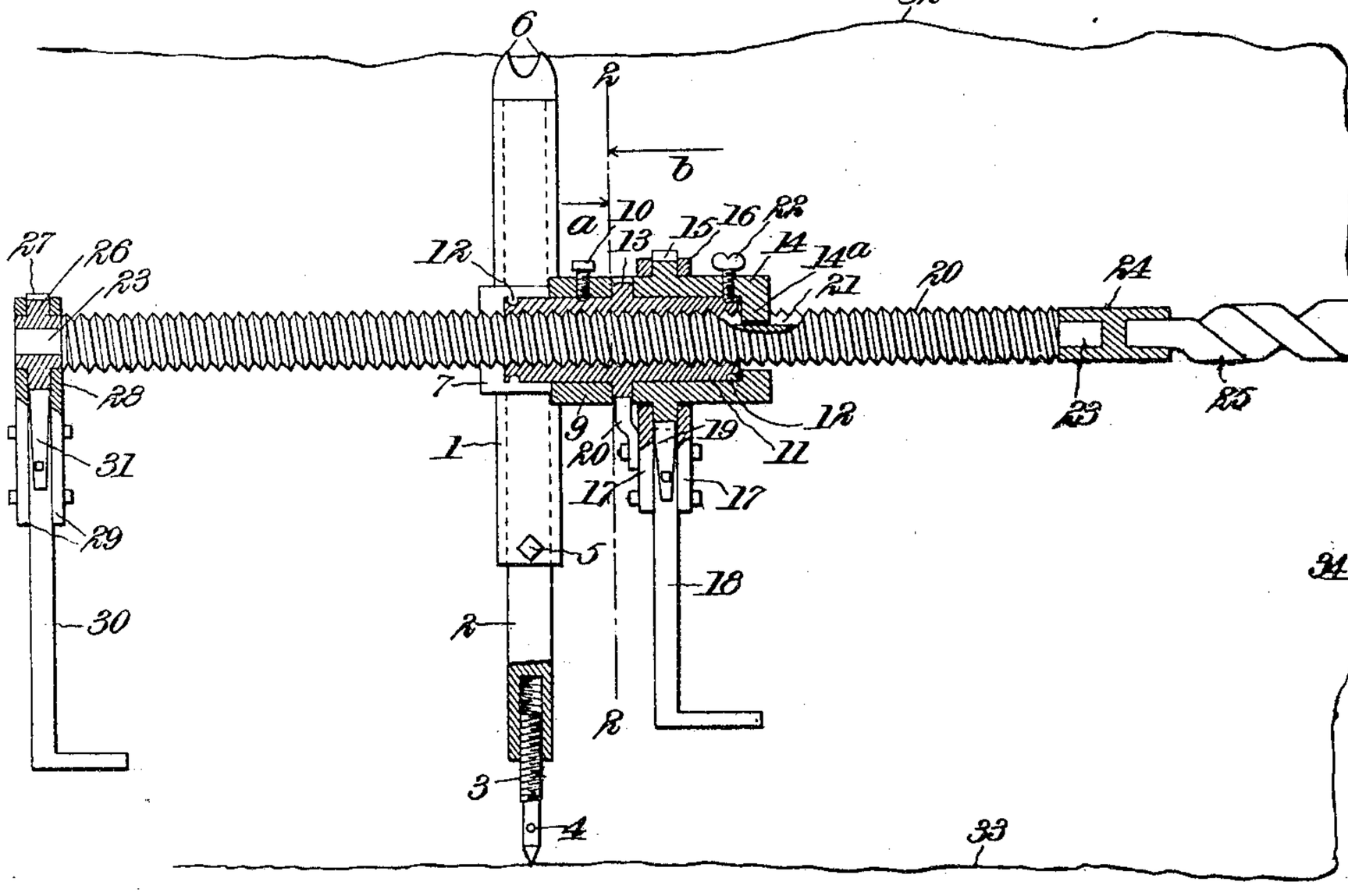


Fig. 3.

Fig. 2.

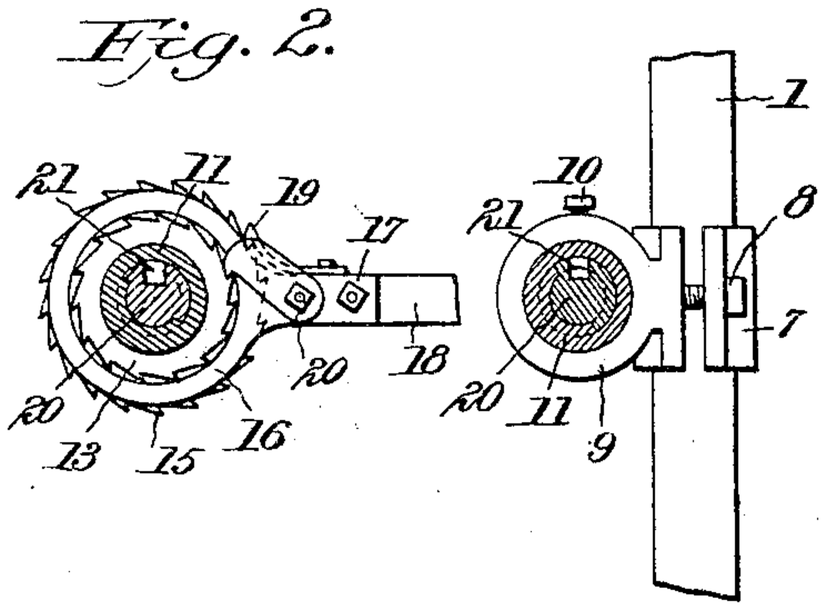


Fig. 4.

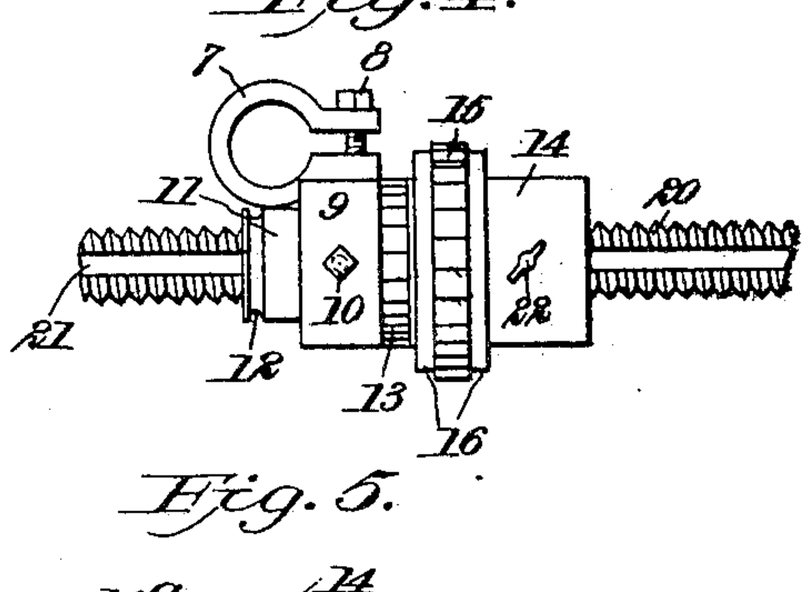
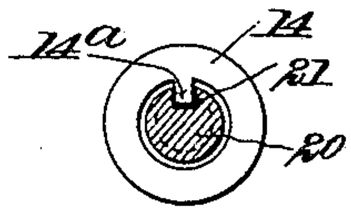


Fig. 5.



WITNESSES:

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No. 775,139. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

JAMES F. HANNIGAN, OF PRATT CITY, ALABAMA.

RATCHET-DRILL.

SPECIFICATION forming part of Letters Patent No. 775,139, dated November 15, 1904.

Application filed December 9, 1903. Serial No. 184,480. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. HANNIGAN, a citizen of the United States, and a resident of Pratt City, county of Jefferson, State of Alabama, have invented certain new and useful Improvements in Ratchet-Drills, of which the following is a specification.

My invention relates to ratchet rock-drills or similar drills, and more especially to such drills as are adapted for use in mines where the space for the operator is limited.

My object is to provide a drill of this character which will be effective in operation and durable in use and which will be, moreover, susceptible of manipulation by two operators working at the same time, thereby securing not only increased power, but continuous rotation of the drill and such a drill as will also be reversible, so as not to necessitate the return of the feed-screw through the feed-nut whenever the drill has been advanced to its extreme limit. In drills of this character in common use the supporting-post is usually placed about four or five feet from the rock upon which the drill is operating in order to provide sufficient room for the movement of the ratchet mechanism, which advances as the drill penetrates the material. Under such conditions, the drill being supported on the side of the post, the structure tends to and does wabble more or less, thereby causing the drill to depart from a straight line and otherwise interfering with the proper operation of the device. By my invention I am enabled to place the support within two feet of the material upon which the drill operates and effectually prevent wabbling of the structure during operation. I also provide for the reversal of the screw-threaded spindle or stem which carries the drill without necessitating the return of said stem through the feed-nut, as is required in drills heretofore in common use.

With these objects in view my invention consists in the novel construction of drill and details thereof as hereinafter described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the drawings, Figure 1 is a side elevation, partly in section, with the operating-handles in distorted position for better illustration of the parts and showing the application of my drill in a mine. Fig. 2 is a transverse vertical section on the line 2 2 of Fig. 1 looking in the direction of the arrow *a*. Fig. 3 is a similar view on the same line looking in the direction of the arrow *b*. Fig. 4 is a top plan view of the feed-nut and coöperating parts, and Fig. 5 is an end elevation of the ratchet-hub and screw-threaded spindle or stem.

Referring to the drawings, in which the same reference characters indicate the same or corresponding parts in all the views, 1 indicates a supporting-post, which is preferably made in telescopic form, comprising a tubular section 1, a cylindrical section 2 slidably mounted in the former and held in fixed relation thereto in any adjusted position by means of a set-screw 5. This post-section is further provided with a screw-threaded socket at its lower end, to which is adapted a screw-threaded bearing-point 3, provided with a hole 4 for the insertion of a suitable rod or tool to turn the point for adjusting the post into position between opposite walls of the mine, as the roof 32 and the bottom or the floor 33 of the mine. The upper end of the post is preferably provided with two bearing-points 6, which are adapted to enter the wall or roof and hold the post securely in position against lateral or turning movement as the drill is penetrating the wall of rock or other material 34. Upon this supporting-post is secured a clamp 7, provided with a clamping-screw 8, projecting laterally from a bearing-hub 9, which is adapted to support the feed-nut 11. This feed-nut 11 is normally held against rotation in its bearing-hub 9 by a suitable binding or set screw 10 and is confined in fixed relation to the supporting-post 1. Rotatably mounted upon the periphery of the feed-nut 11 is a ratchet-hub 14, which is confined against longitudinal movement with respect to said nut by means of an adjustable screw 22, passing through the ratchet-hub 14 and engaging a groove 12, extending around the periphery of said feed-nut. A similar groove 12 is provided at each end of the feed-nut, so that when the latter is reversed, as it

may be, the screw 22 may be in proper operative relation therewith. Projecting inwardly from the ratchet-hub 14, preferably at its end, is a lug 14^a, shown in the present instance as integral with said hub and engaging a groove 21, extending longitudinally throughout the length of the screw-threaded stem or spindle 20 of the drill, thus slidably connecting the ratchet-hub and the spindle, so that as rotary movement is imparted to said ratchet-hub, as hereinafter described, the stem of the drill is caused to rotate, and as the screw-threads of said stem engage the screw-threaded bore of the feed-nut 11 such rotary movement will, it is evident, cause the drill to advance.

In order to impart the necessary rotary movement to the drill, I provide a ratchet 15, preferably consisting of ratchet-teeth integral with and extending from the outer periphery of the ratchet-hub 14. Mounted to turn upon said hub are suitable bearing-rings 16 on each side of the ratchet 15 and having handle-supporting extensions 17, to which a suitable handle 18 is secured. This handle, therefore, is rotatably supported upon the outer periphery of the hub 14 and is provided with a suitable pawl 19, preferably spring-actuated, which is adapted to engage the ratchet-teeth 15 as the handle is moved back and forth by the operator, upward movement of the handle releasing the pawl and reverse movement causing said pawl to engage the ratchet 15, and thereby turn the hub 14, which through the medium of its lug 14^a imparts a similar movement to the drill-spindle 20. The handle in normal position for convenience of operation extends in substantially horizontal direction from the post; but it is shown distorted in this position for better illustration in Fig. 1.

It sometimes happens that rock or other material operated upon is unusually hard, and in drills heretofore used for this purpose, especially in mines where the space is contracted, it has been difficult, if not impossible, for one operator or even two operators to apply sufficient power to properly accomplish the work because the parts become jammed by reason of the fact that the feed of the drill when the pitch of the feed-nut is normal is more rapid than it can cut such material, and even to attempt to operate the drill under sufficient power would result in breakage of the parts. To relieve the strains so created and prevent such breakage, I provide a supplemental ratchet 13 on the feed-nut 11, which is adapted to be operated by a pawl 20 carried by the handle 17. When the drill strikes such unusually hard material and the parts become so tight after a limited cut, it is only necessary to release the frictional hold of the binding-screw 10 upon the feed-nut and throw the pawl 20 into engagement with its ratchet. Further operation of the drill will cause the feed-nut 11 to turn in the same direction as the drill, and thus check further advance movement thereof until the hole is cleared and the strain upon the parts becomes relieved, thereby loosening them. The parts may be clamped again in their positions with the feed-nut fixed against rotation in its supporting-bearing, the pawl 20 being thrown out of engagement with its ratchet 13. These operations may be repeated until the very hard material is gradually penetrated. The ratchet 13, it will be noted, is formed on a projecting rim of the nut and acts as a thrust-bearing against the hub 9.

It will be observed that the drill-chuck ends 23 at the extremities of the drill stem or spindle are squared so as to receive the drill-chuck 24, in the latter of which the bits 25 are fixed in the usual manner, and when it is desired to reverse the drill-stem the chuck will fit either end. To accomplish this reversal and in order to prevent the necessity of returning the screw-threaded drill-stem through the feed-nut after it is advanced to the extreme position through said nut, the chuck 24 having been removed and the binding-screw 22 being released, the ratchet-hub 14 can be readily slipped from the drill and the feed-nut bearing the drill removed from the bearing-hub 9 upon release of the screw 10 and turned end for end and the parts then assembled in position for operation again. The screw 22 now engages the groove 12 at the opposite end of the feed-nut 11.

The operation of the drill may be facilitated by providing an auxiliary ratchet mechanism to be operated by a second operator, and I have shown such auxiliary ratchet 26, adapted to be mounted upon the squared end 23 of the drill-stem and provided with ratchet-teeth 27, operated by a suitable spring-actuated pawl 31 similar to the pawl 19 and carried by the handle 30, supported upon the extensions 29 on bearing-rings 28, rotatably mounted upon the hub of the ratchet 26. By this means a second operator, it will be readily understood, may operate the handle 30, one operator taking hold for an operative movement of the drill while the other is releasing for a new hold, and thus a practically continuous rotary movement of the drill may be obtained. As the drill-bits usually employed in mines are of two, four, and six feet, respectively, in length, it will be seen that as soon as the shortest drill has advanced as far as possible the next greater length can be readily applied, the drill-stem being returned just sufficient to release the chuck 24, and while the bit is being withdrawn from the hole the reversal of the drill can be affected and a new bit applied at the same time.

I claim as my invention—

1. In a ratchet-drill, the combination with a support, of a feed-nut supported in fixed relation to said support and held against turn-

ing, a screw-threaded drill spindle or stem mounted therein, a ratchet-hub rotatably mounted on said feed-nut, a detachable connection between the hub and feed-nut adapted to prevent longitudinal movement of the hub with respect to the nut, and connection between said ratchet-hub and spindle for imparting a rotary movement to the spindle as the ratchet is operated, substantially as described.

2. In a ratchet-drill, the combination with a support, of a feed-nut supported in fixed relation to the support and held against turning, a screw-threaded drill spindle or stem provided with a longitudinal groove mounted in said feed-nut, a ratchet-hub rotatably mounted on the feed-nut and having a lug engaging said groove, a detachable connection between the hub and feed-nut adapted to prevent longitudinal movement of the hub with respect to the nut, and a pawl for operating the ratchet, substantially as described.

3. In a ratchet-drill, the combination with a supporting-post provided with two bearing-points adapted to engage the wall of a mine and an adjustable bearing-point to engage an opposite wall thereof, of a feed-nut fixedly held on said post, a screw-threaded drill-spindle mounted in said nut, a ratchet mechanism rotatably mounted on the nut and slidably connected with the drill-spindle, a detachable connection between the hub and feed-nut adapted to prevent longitudinal movement of the hub with respect to the nut, whereby rotary motion of the ratchet will impart rotary motion to the drill-spindle, substantially as described.

4. In a ratchet-drill, the combination with a support, of a bearing-hub carried thereby, a feed-nut, a screw-threaded drill-spindle mounted therein, means for clamping said nut to the hub and adapted to be released therefrom to permit the nut to turn in said hub, ratchet-and-pawl mechanisms adapted to rotate the spindle and the feed-nut in the same direction, substantially as described.

5. In a ratchet-drill, the combination with a support, of a bearing-hub carried thereby, a feed-nut normally fixed to but capable of movement in said hub, a screw-threaded spindle mounted therein, a ratchet-hub rotatably mounted on the feed-nut and slidably connected therewith, a pawl and an operating-handle for imparting rotary movement to the ratchet, an auxiliary ratchet on the feed-nut adapted to impart a motion to the feed-nut in the same direction with the spindle, and a pawl carried by the operating-handle adapted to be put into engagement with the auxiliary ratchet, substantially as described.

6. In a ratchet-drill, the combination with a support and a bearing-hub clamped thereto, of a reversible feed-nut carried by the said hub and held against rotation and in fixed relation to the support, a ratchet-hub mounted upon the feed-nut, a screw-threaded drill-spindle having drill-chuck ends at each extremity, and a pawl-handle for operating the ratchet, substantially as described.

7. In a ratchet-drill, the combination with a support and a bearing-hub clamped thereto, a feed-nut carried by said hub, a screw-threaded drill-spindle mounted in and rotatable relatively to said nut, a ratchet-hub slidably connected with the spindle, a ratchet-driving mechanism for rotating the said ratchet-hub, and a supplemental ratchet-driving mechanism mounted on the end of the spindle, whereby continuous rotation may be imparted to the spindle, substantially as described.

8. In a ratchet-drill, the combination with a support and a bearing-hub clamped thereto, a feed-nut removably held in fixed relation to the support and the hub, and provided with peripheral grooves at each end, a screw-threaded drill-spindle mounted in the nut, a ratchet-hub rotatably mounted thereon and slidably connected to the spindle, a set-screw carried by the ratchet-hub and adapted to engage one of the grooves in the said hub, and a pawl mechanism for operating the ratchet, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. HANNIGAN.

Witnesses:
W. W. KICKER,
E. M. COLLINS.