G. W. NIXON.

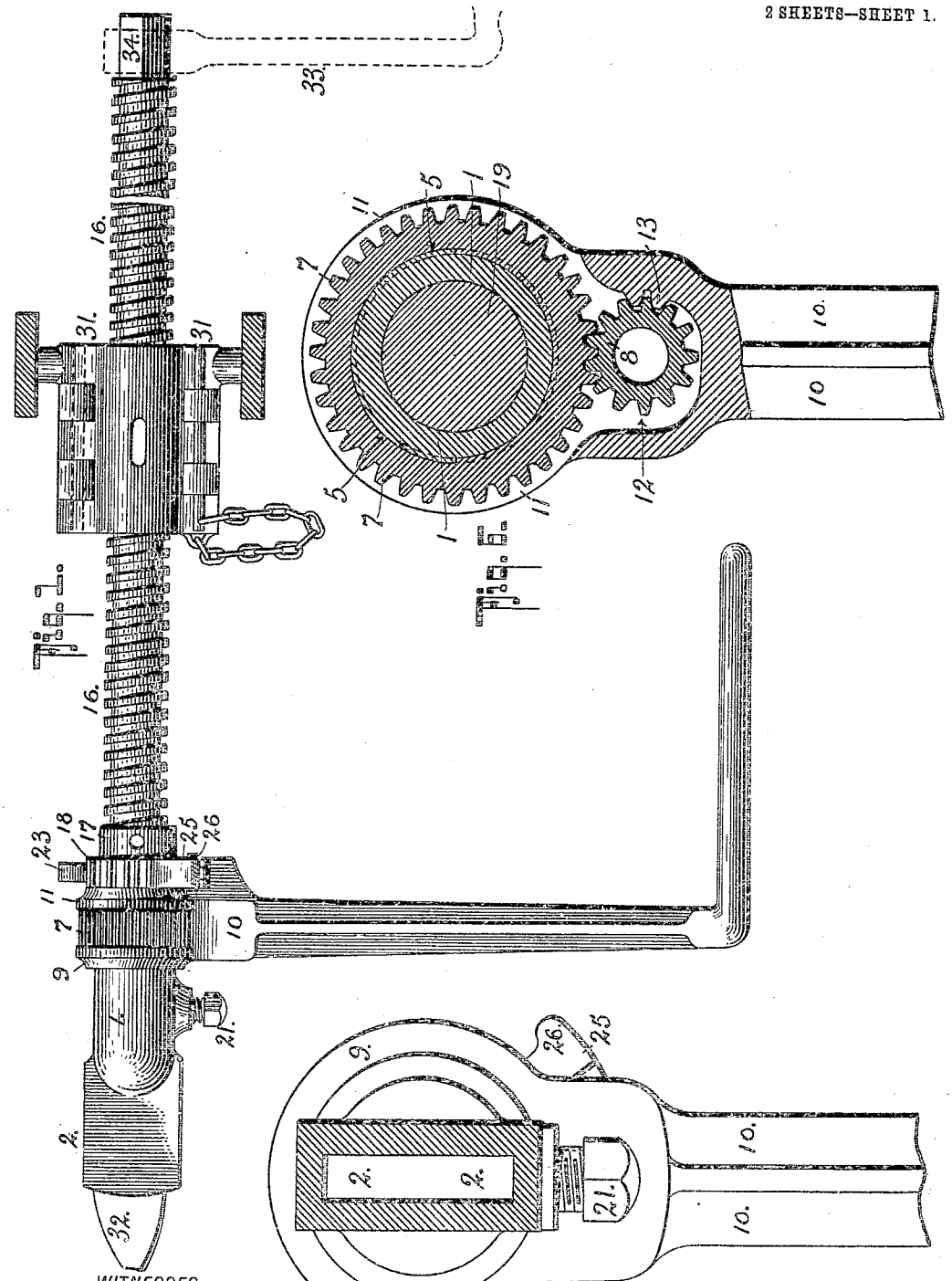
MINING DRILL.

APPLICATION FILED APR. 26, 1909.

953,855.

Patented Apr. 5, 1910.

2 SHEETS—SHEET 1.



WITNESSES:

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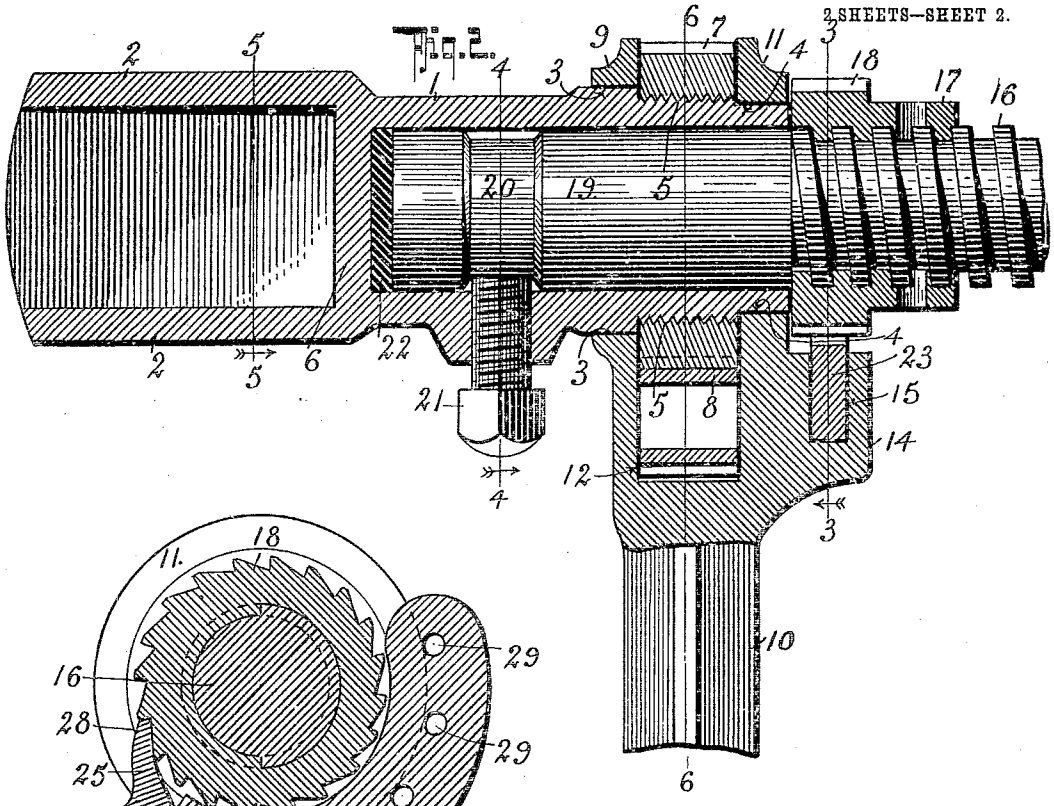
2 SHEETS—SHEET 2.

Fig. 2.



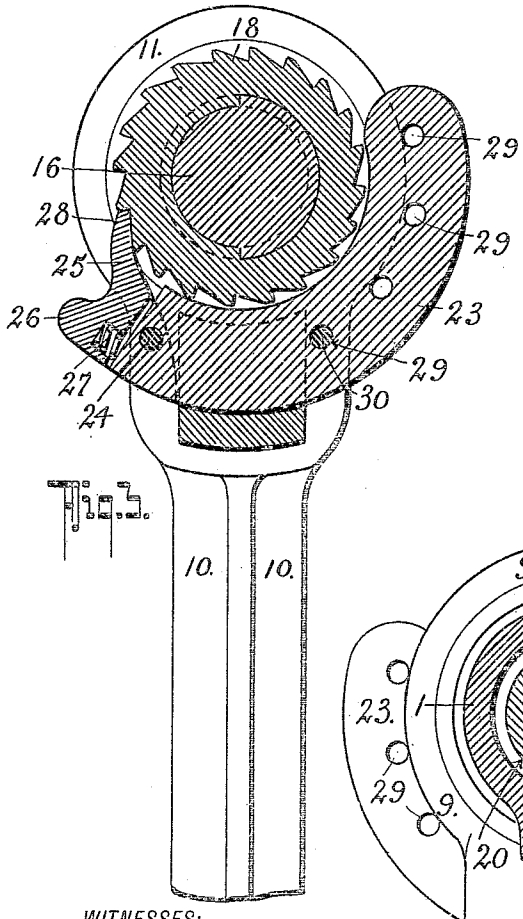
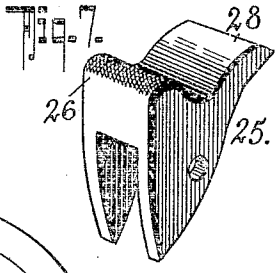


Fig. 7.



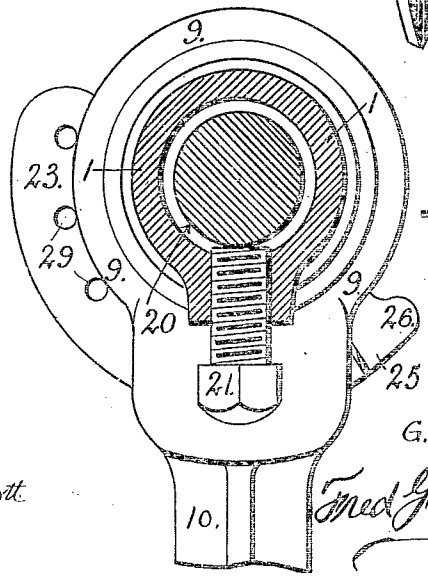


Fig. 6.

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GEORGE W. NIXON, OF CHATTANOOGA, TENNESSEE, ASSIGNOR TO NIXON MINING DRILL CO., INCORPORATED, OF CHATTANOOGA, TENNESSEE.

MINING-DRILL.

953,855. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed April 26, 1909. Serial No. 492,245.

To all whom it may concern:

Be it known that I, GEORGE W. NIXON, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented certain new and useful Improvements in Mining-Drills, of which the following is a specification.

My present invention, which is designed particularly for light mine work where the material to be bored is not of excessive or continued hardness, is a drill of the duplex ratchet type such as is disclosed in my co-pending application filed on even date herewith Serial No. 492,444. In this type of drill, a main ratchet and pawl mechanism turns the bit while another ratchet and pawl mechanism serves to feed the drill to its work.

In the drill of this application as well as that of my co-pending application above referred to, I provide a single lever to actuate the pawls and provide means whereby the feed may be varied to suit the requirements of the material being worked upon, as it is evident that the bit should not be advanced as fast when the material is hard, as when it is soft.

It is the primary object of my present invention to provide a drill embodying a single operating lever for turning and feeding the bit, but of a modified or different construction from that disclosed in my co-pending application above referred to, and one designed for a special use, to wit:—light work.

In carrying out my present invention, I provide a socket piece to fit on the non-threaded end of a screw bar and provide it with a bit shank holding chuck to receive the shank of a bit. The socket piece is turned on the screw bar by a ratchet gear and a gear pawl actuated by the operating handle, while the screw bar is turned in a fixedly held thread box by a ratchet and pawl device also operated by the handle or operating lever.

Those special details of construction and novel arrangement of parts hereinafter described and specifically pointed out in the appended claims also constitute a part of my present invention.

In the drawings, Figure 1, is a plan view of my invention. Fig. 2, is an enlarged central section and part elevation thereof, the bit being omitted and the screw bar being broken away. Fig. 3, is a cross section on the line 3—3 of Fig. 2. Fig. 4, is a section on the line 4—4 of Fig. 2. Fig. 5, is a similar view on the line 5—5 of Fig. 2. Fig. 6, is a similar view on the line 6—6 of Fig. 2. Fig. 7, is a detail perspective view of the feed pawl.

Referring now to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all of the figures, 1 designates the socket piece which is bored to receive the non-threaded end 19 of the screw bar 16, the socket piece 1 having the chuck or bit holding portion 2 to receive the bit. A web or wall 6 separates the bit receiving space of the chuck 2 from the bore of the socket piece. A hard fiber washer 22, or other suitable wear absorbing device is interposed between the web 6 and the non-threaded portion 19 of the screw bar to take up the wear due to end thrust.

The socket piece 1 has bearing surfaces 3 and 4 respectively, to receive the forked bearings 9 and 11 respectively, of the operating lever 10, a threaded surface 5 joining the bearing portions 3 and 4 of the socket piece 1, as shown, to receive the main ratchet gear 7, which is threaded onto the socket piece 1 and held between the forked bearing portions 9 and 11 of the lever 10. The lever 10 is chambered as at 12 to receive the pawl pinion 8, which is adapted to engage with a rack portion 13 on the lever to operatively connect the lever 10 and the main ratchet gear 7 together when the lever is moving in one direction. The lever 10 has an extension 14 which is socketed as at 15 to receive the pawl carrier 23 that carries the pawl 25 which coöperates with the feed ratchet 18 that is formed or carried on the screw bar 16 to turn therewith.

The pawl carrier 23 has a series of apertures 29 to receive stop pins 30, for a purpose hereinafter apparent, and it also has another aperture to receive a pivot pin 24 on which the pawl 25 is pivoted. The pawl 25 has a socket to receive a coil spring 27 to normally hold the finger 28 of the pawl in engagement with the ratchet 18. The pawl 25 is also provided with a thumb piece 26 by means of which the finger 28 of the pawl 25 may be held out of engagement with the ratchet 18 when desired.

The screw bar 16 is threaded into a relatively fixedly held thread box 31, and is also provided with a wrench receiving member

17, by means of which the screw bar 16 may be turned in setting up the drill. The non-threaded portion 19 of the screw bar 16 has an annular groove 20 to receive a stop bolt 21 that threads through an aperture in the wall of the socket piece 1, and prevents longitudinal movement of the socket piece on the screw bar.

Operation: The handle 10 being pulled forwardly, the main ratchet 7, which is screwed rigidly on the socket piece 1, revolves such socket piece 1, together with the bit 32 in the hole. The bit 32 is revolved the full range of the motion given the handle 10. The feed is operated only such proportion of the full stroke as may be desired. To accomplish this result, the cotter set pin 30 is placed in the forward hole 29 (*i. e.* that hole nearest the pawl 25) in the pawl carrier 23, for the fast speed. The cotter set pin 30 is placed in the rear hole 29, (*i. e.* that hole 29 farthest from the pawl 25) for the slowest speed. Thus when the cotter set pin 30 is in the forward hole, the handle 10 will drag the pawl 25 back the same peripheral distance as the main pawl pinion 8 takes on the main ratchet 7, thus feeding the full number of threads per inch, say three threads per inch, or when the cotter set pin 30 is in the last hole 29 it may not be touched on the back stroke of the handle and so give no feed at all to the bit. When the feed ratchet 28, which is rigidly screwed on the screw bar 16, is revolved it carries with it the screw bar. Revolving the screw bar 16 in the thread box 31 feeds the screw bar forward and with it the socket piece 1 and the bit 32 fixed therein. The feed ratchet 18 is made long enough to have a hole in its rear portion 17 large enough to admit the small end of a wrench or rod for use in revolving the screw bar independently.

The scope of this machine covers all work in coal mining, in rooms, and taking slate, top and bottom. For boring holes in coal it will work as rapidly as the regular breast auger. Its most rapid feed is accomplished by tightening the set screw 21 and placing a crank 33 on the squared end 34 of the screw bar 16, when the hole may be bored in at three revolutions per inch (the pitch of the thread being 3 per inch). In this case, the ratchet lever 10 will stand still by its own weight, the ratchet wheel 7 and ratchet 18 turning the pawl pinion 8 and pawl 25. Ordinarily the miner will turn the crank at the rate of twenty-five revolutions per minute. At this rate, he would bore the hole at the rate of $8\frac{1}{3}$ inches per minute, or bore up a two foot bit in less than five minutes. By loosening the set screw 21 and setting the set pin 30 for four notches with the stroke at five notches, the feed would be $\frac{4}{5}$ of four inches or $3\frac{1}{5}$ inches per minute. With the feed ratchet 18 at three notches and the main ratchet 7 at full stroke of five notches, the feed would be $\frac{3}{5}$ of four inches or $2\frac{2}{5}$ inches per minute. Using two notches of the feed ratchet 18 to full stroke of main ratchet 7, the feed would be $\frac{2}{5}$ of 4 or $1\frac{3}{5}$ inches per minute. Likewise with one notch of feed ratchet 18 to five of the main ratchet 7, the feed would be $\frac{1}{5}$ of 4 or $\frac{4}{5}$ of an inch per minute. The latter corresponds to a screw bar of 15 threads per inch, and will enable the operator to bore the hardest slate encountered in coal mining operations. This feed, will in fact, cut many varieties of rock and hard iron ore.

From the foregoing description taken in connection with the accompanying drawings it is thought the complete construction, operation and advantages of my invention will be readily apparent to those skilled in the art to which it appertains.

What I claim is:

1. In a mining drill, a drill carrying socket piece and a member on which said socket piece is rotatably mounted, means for turning said socket piece on said member, said means comprising a gear on said socket piece, a lever rotatably mounted on said socket piece and having a chamber, a pawl pinion inclosed within said chamber, and means fixed to the lever for locking said pawl pinion and lever together when the lever is moved in one direction and to be disengaged by said pawl pinion when the lever is moved in an opposite direction.

2. In a mining drill, a rotatably mounted member having external bearing surfaces and an intermediate gear receiving surface, a gear mounted on said rotatable member at said gear receiving surface to turn with said rotatable member, an operating lever straddling said gear and having bearings for said rotatable member, said operating lever having a chamber and having a toothed portion in said chamber, a pinion loosely mounted in and inclosed by said chamber to engage said toothed portion when the lever is moved in one direction and to disengage said toothed portion when the lever is moved in an opposite direction to produce intermittent rotary motion in said rotatable member by the reciprocating motion of said lever.

GEORGE W. NIXON.

Witnesses:

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W. A. KELLY.