G. W. NIXON.

MINING DRILL.

APPLICATION FILED APR. 26, 1909.

953,969.

Patented Apr. 5, 1910.

2 SHEETS—SHEET 1.

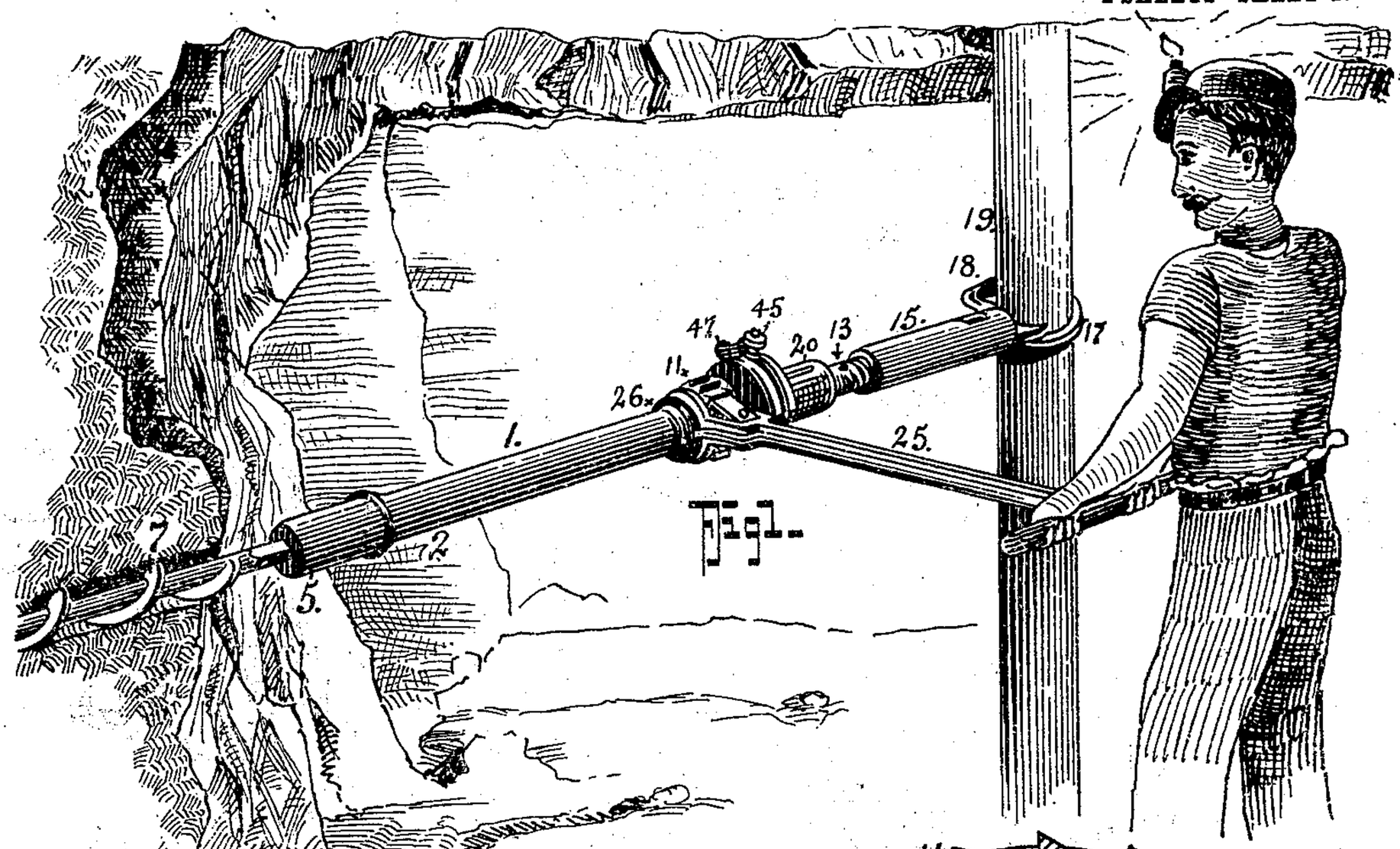

Fig. 1.

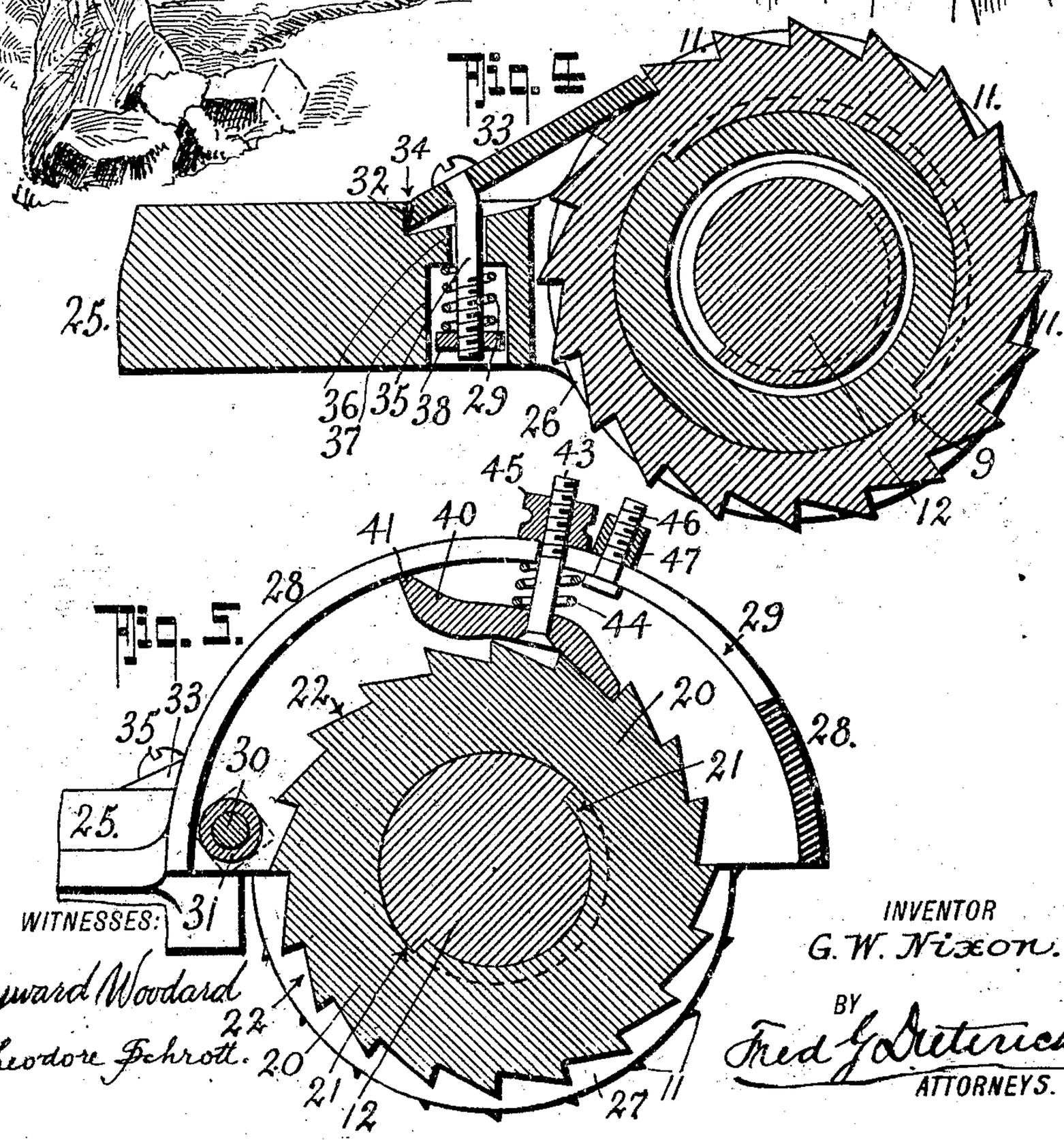

Fig. 2.

Fig. 5.

WITNESSES:

Hayward Woodard

J. Theodore Fehrott.

INVENTOR

G. W. Nixon.

BY

Fred G. Dieterich & Co

ATTORNEYS.

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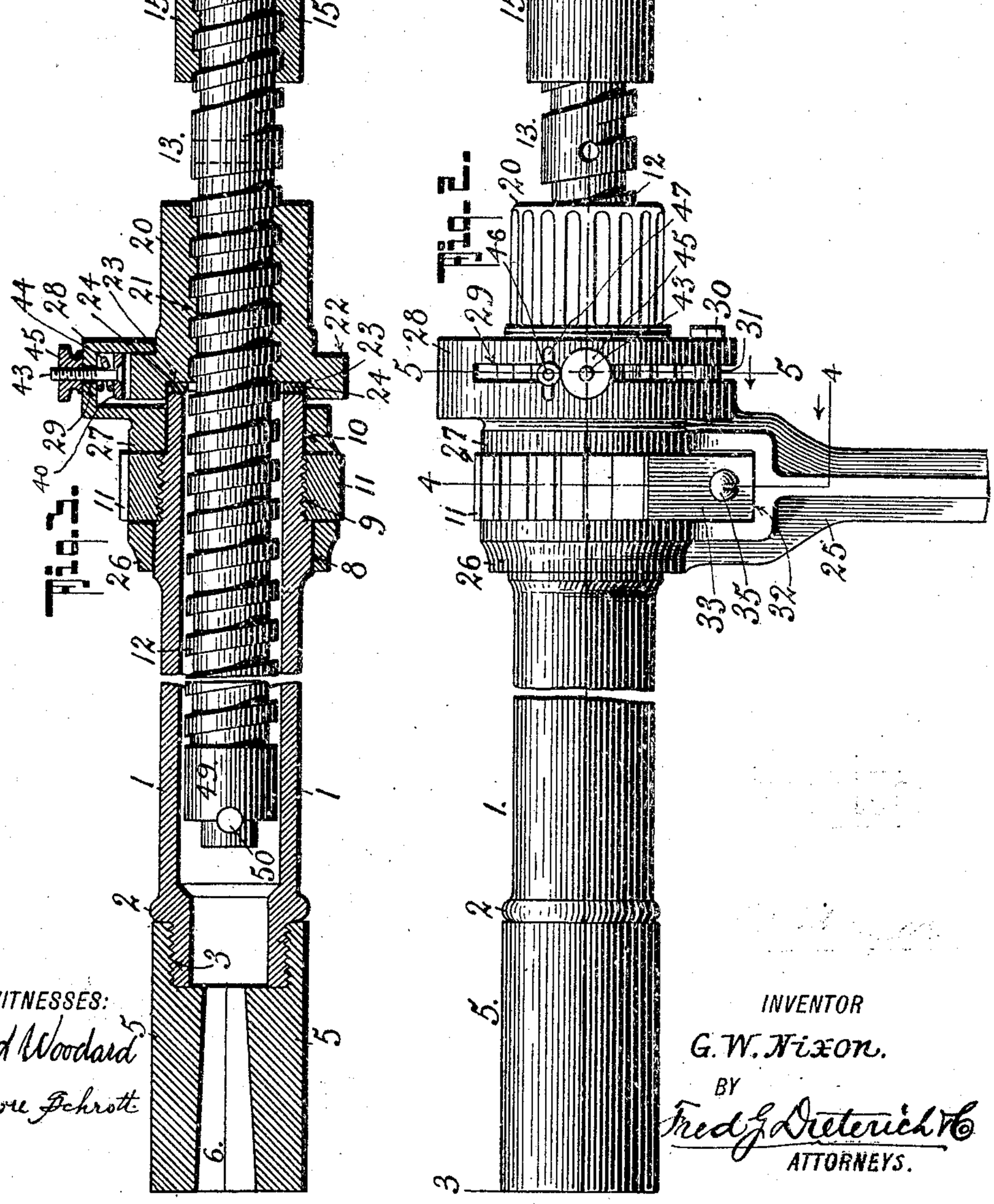

Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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

MINING-DRILL.

953,969. Specification of Letters Patent. **Patented Apr. 5, 1910.**

Application filed April 26, 1909. Serial No. 492,244.

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 is an improved ratchet drill of the type embodying a ratchet and pawl mechanism for feeding the drill longitudinally to the work, and means for turning the drill on its axis.

Heretofore it has been the common practice in the art to provide separate mechanisms for feeding the drill and for effecting its rotation.

My present invention has for its object to combine the feeding and turning mechanism into one so as to be operative by a single actuating lever in such manner that any desired feed may be given by the operator while rotating the drill to cause it to perform its cutting function.

A further object of my invention is to provide means whereby the drill may be released should it become jammed in place which would occur did the operator permit the drill to feed forwardly too fast.

My invention also resides in those novel details of construction, combination and arrangement of parts, all of which will be first described in detail, then be specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1, is a perspective view illustrating the application of my invention. Fig. 2, is a plan view of the drill, parts being broken away. Fig. 3, is a longitudinal section on the line 3—3 of Fig. 2, the screw bar being in elevation. Fig. 4, is a detail section on the line 4—4 of Fig. 2. Fig. 5, is a detail cross section on the line 5—5 of Fig. 2.

Referring now to the accompanying drawings, in which like numerals of reference indicate like parts in all of the figures, 1 represents the drill barrel, whose forward end has a shoulder 2 and terminates in a threaded portion 3 to receive the drill chuck or socket 5. The chuck 5 has a square bore 6 to receive the squared end 7 of a twist mining drill of the ordinary type. At its other, or inner end, the barrel 1 has bearings 8 and 10 with an intermediate threaded section 9, as shown. The main ratchet 11 is screwed onto the threaded section 9 and is held between the bearing sections 26 and 27 of a forked operating lever or handle 25. The lever 25 has a semi-circular housing 28 for a purpose hereinafter described.

12 designates the main screw bar which has a rearward extension 14 separated from the main part 12 by a wrench receiving portion 13, both parts 12 and 14 of the screw bar are threaded, those threads of the section 14 being of greater pitch than those of the section 12 for a purpose hereinafter made clear. The rear extension 14 enters a threaded socket dog 15 having a center knife-like bearing 16 to engage a column or support 19 and rests on a brace ring 17, as shown in Figs. 2 and 3. The socket dog 15 has a handle 18 by means of which it may be screwed on or off the threaded parts 14 of the screw bar in setting up the machine. A nut 20 is threaded at 21 on the main screw bar 12. The nut 20 has a ratchet part 22 having a socketed base 23 to receive the rear end of the barrel 1, a washer 24 of hard fiber, or other suitable material being interposed to receive the ends of the barrel. The housing 28 has a slot 29 opening at one end, a bolt 30 being passed through the walls of the housing and carrying a sleeve 31, disposed within the housing, as shown in the drawings.

The handle lever 25 is socketed at 32 to receive the main ratchet pawl 33. The pawl 33 has a beveled end 34 to engage the socket seat 32 while its other end engages the main ratchet 11. The lever 25 is bored as at 36, and countersunk as at 37 to receive the bolt 35 and nut 38 that holds the pawl 33 in place, a spring 29 being held around the bolt 35 within the countersunk portion 37 of the handle 25 to retain the pawl 33 in engagement with the ratchet 11.

The feed pawl 40 is held within the housing 28 by a bolt 43 that projects through the slot 28 and is held by a milled nut 45 while the spring 44 on the bolt 43 within the housing 28 serves to press the pawl 40 into engagement with the ratchet 22 of the feed nut 20, the pawl 40 having a heel 41 to engage the housing 28 so that by tightening up on the nut 45 the pawl 40 may be raised out of engagement with the ratchet 22, for a purpose hereinafter more clearly explained.

46 is an adjustable stop in the nature of a bolt, having its head within the housing 28 and having its shank projecting through the slot 29 to be secured by a winged thumb nut 47, at any desired position along the housing 28.

A chilled ferrule 49 is held by a pin 50 on the forward end of the screw bar 12 to protect the same.

Operation: The main ratchet 11 rotates the bit 7, the cutting edge of the bit resting against the material being bored. Pulling the handle 25 rotates the bit the full stroke given. This is usually about 60 degrees, or one-sixth of a full revolution. The ratchet feed nut 20, when rotated, forces the bit forward against the substance being bored. The problem of feeding the drill forward slower than the speed at which the bit is revolved is solved by the mechanism disclosed in the drawings hereinbefore described, imparting to the feed nut ratchet 22 only such movement as may be desired. This is accomplished by the slot 29 and stop bolt 46 in the housing. While the back stroke of the lever carries the ratchet pawl 33 all the way back, the stop bolt 46 may be set so as to carry the feed nut ratchet pawl 40 back only as far as desired. The pawl 40 is moved forwardly by the back part of the housing at the cap screw 31. Thus, while the barrel 1 and bit 7 are rotated a full stroke, the ratchet nut 22 is rotated only such number of teeth as the operator may desire. With 20 teeth in each ratchet 11 and 22 and the stroke being one-fifth, or four teeth on the main ratchet 11, the stop 46 being set to move the ratchet 22 one notch, it is plain that the feed nut 20 will revolve one-fourth as fast as the bit. If the pitch of the main thread bar 12 is 2–1/2 threads per inch, (this having been demonstrated by use to be the best adapted to the purpose) it will be seen that the cutting edge of the bit is being fed forward one-fourth of 2–1/2 threads per inch, or 1/50 inch per stroke, since five strokes make one revolution of the bit the feed would be 5/50 inch per revolution, or equal to a screw bar of ten threads per inch. Should the operator only move the feed ratchet one tooth on every other stroke, the feed would then be 1/20 inch, or equal to a screw bar of 20 threads per inch. It will soon become a matter of mechanical instinct with the miner to move the feed ratchet a notch when the lever is pulling too easy, or not to move it when the lever is pulling too hard.

By the use of my improved drill the operator can give the bit such feed as he can pull. By setting the stop bolt 46 so as to give a regular stroke of four teeth to the main ratchet 11 without moving the feed nut ratchet 22, then there would be no forward feed at all, but should the operator make a stroke of five teeth on the main ratchet, then the feed nut ratchet 22 would be fed forward one notch. Should the operator make four four-tooth strokes and one five-tooth stroke, the feed nut 22 would have made one stroke. In this case the forward feed would have been, there being 20 teeth in the ratchet 1/20 of 2–1/2 threads per inch, or 1/120 revolution equaling 2/105 of an inch, while the bit has made 21/20 revolutions, which correspond to a thread bar of 52–1/2 threads per inch. This construction produces a drill that will feed forward as at low a rate as may be desired, or up to as fast as the full 2–1/2 revolutions to one inch when both ratchets are given full strokes. The socket dog 15 has a center bearing against the support as before described, and the curve fits the outside of the support so that it cannot move sidewise. The brace ring 17 prevents the socket dog 15 from moving along the support. The socket dog 15 chambers about 8 inches of the section 14 of the screw bar 14 which allows for variation of at least 6 inches in the "set up" of the support. Should the drill become jammed the same may be released by inserting a wrench in the wrench receiving portion 13 and then turning the screw. By turning the crank handle the socket dog can be backed off to connect with the support, should conditions of top, bottom or sides require the setting to be even as much as 7 inches farther back than is possible with other drills of this general type now in common use.

While I have herein stated certain definite proportions of parts I consider desirable I do not wish to limit myself to such proportions as it may be found convenient in practice to construct the drill of various sizes and proportions as may suit the conditions of the trade.

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

What I claim is:

1. A barrel, a drill holding chuck carried thereby, a screw bar projectable into the barrel, a feed nut on the screw bar in engagement with one end of the barrel, a main ratchet on the barrel, a second ratchet on the feed nut, a pawl coöperating with the main ratchet, a free pawl coöperating with the feed nut ratchet, a single lever on which said pawls are mounted for actuating both ratchets, and means for adjusting the throw of the free pawl to vary the action thereof without changing the action of the main ratchet pawl.

2. A barrel, a drill holding chuck car-

ried thereby, a screw bar projectable into the barrel, a feed nut on the screw bar in engagement with one end of the barrel, a main ratchet on the barrel, a second ratchet on the feed nut, a pawl coöperating with the main ratchet, a free or floating pawl coöperating with the feed nut ratchet, a single lever on which said pawls are mounted for actuating both ratchets, and a threaded socket dog to receive said screw bar and engage a support to prevent longitudinal movement of the screw bar.

3. A barrel, a drill holding chuck carried thereby, a screw bar projectable into the barrel, a feed nut on the screw bar in engagement with one end of the barrel, a main ratchet on the barrel, a second ratchet on the feed nut, a pawl coöperating with the main ratchet, a free or floating pawl cooperating with the feed nut ratchet, a single lever on which said pawls are mounted for actuating both ratchets, means for adjusting the throw of the free pawl to vary the action thereof without changing the action of the main ratchet pawl, and a threaded socket dog to receive said screw bar and engage a support to prevent longitudinal movement of the screw bar.

4. In a mining drill, a barrel, a drill holding chuck carried at one end of said barrel, a ratchet on the other end of said barrel, a screw bar projecting into the barrel, a feed nut on the screw bar and having a ratchet portion, said feed nut engaging one end of said barrel, a lever having forked bearing members to receive the barrel and straddle the main ratchet on the barrel, a pawl carried by said lever to engage said main ratchet, said lever having a housing for said feed nut ratchet, a floating or free pawl within the housing and in engagement therewith and with the feed nut ratchet, and means carried by the housing for limiting the floating or free movement of said floating pawl.

5. In a mining drill, a barrel, a drill holding chuck carried at one end of said barrel, a ratchet on the other end of said barrel, a screw bar projecting into the barrel, a feed nut on the screw bar and having a ratchet portion, said feed nut engaging one end of said barrel, a lever having forked bearing members to receive the barrel and straddle the main ratchet on the barrel, a pawl carried by said lever to engage said main ratchet, said lever having a housing for said feed nut ratchet, a floating or free pawl within the housing and in engagement therewith and with the feed nut ratchet, means carried by the housing for limiting the floating or free movement of said floating pawl, and adjustable means on the housing for varying the free or floating movement of said floating pawl.

6. In a mining drill, a barrel, a drill holding chuck carried at one end of said barrel, a ratchet on the other end of said barrel, a screw bar projecting into the barrel, a feed nut on the screw bar and having a ratchet portion, said feed nut engaging one end of said barrel, a lever having forked bearing members to receive the barrel and straddle the main ratchet on the barrel, a pawl carried by said lever to engage said main ratchet, said lever having a housing for said feed nut ratchet, a floating or free pawl within the housing and in engagement therewith and with the feed nut ratchet, means carried by the housing for limiting the floating or free movement of said floating pawl, and means coöperating with said floating pawl in virtue of which the pawl may be disengaged from the feed nut ratchet.

7. In a mining drill, a barrel, a drill holding chuck carried at one end of said barrel, a ratchet on the other end of said barrel, a screw bar projecting into the barrel, a feed nut on the screw bar and having a ratchet portion, said feed nut engaging one end of said barrel, a lever having forked bearing members to receive the barrel and straddle the main ratchet on the barrel, a pawl carried by said lever to engage said main ratchet, said lever having a housing for said feed nut ratchet, a floating or free pawl within the housing and in engagement therewith and with the feed nut ratchet, means carried by the housing for limiting the floating or free movement of said floating pawl, means coöperating with said floating pawl in virtue of which the pawl may be disengaged from the feed nut ratchet, said last named means comprising a bolt carried by the pawl and projecting through a slot in the housing and a nut on the bolt for drawing the pawl out of engagement with the ratchet.

8. A mining drill comprising a barrel, a drill holding chuck at one end, bearing portions on the other end, a threaded section supporting said bearing portions of the drill, a lever having forked bearings to engage said bearing portions and straddle said threaded portion of the barrel, a main ratchet threaded onto the threaded portion of the barrel, a screw bar projected into said barrel, a feed nut on said screw bar and having a socket portion to receive one end of said barrel, said feed nut having a ratchet portion, said lever having a housing to receive said feed nut ratchet portion, said housing having a pawl carried by the lever in engagement with said main ratchet, a free or floating pawl held within said housing in engagement with the feed nut ratchet, a bolt secured to said last named pawl and projecting through the slot of the housing and an adjusting nut carried by the bolt, said last named pawl having free or floating movement within the housing, means carried by the housing for engaging the pawl to move it in one direction to impart rota-

tion to the feed nut and other means carried by the housing for imparting movement to the free pawl in an opposite direction.

9. A mining drill, comprising a barrel, a drill holding chuck at one end, bearing portions on the other end, a threaded section supporting said bearing portions of the barrel, a lever having forked bearings to engage said bearing portions and straddle said threaded portion of the barrel, a main ratchet threaded onto the threaded portion of the barrel, a screw bar projected into said barrel, a feed nut on said screw bar and having a socket portion to receive one end of said barrel, said feed nut having a ratchet portion, said lever having a housing to receive said feed nut ratchet portion, said housing having a slot, a pawl carried by the lever in engagement with said main ratchet, a free or floating pawl held within said housing in engagement with the feed nut ratchet, a bolt secured to said last named pawl and projecting through the slot of the housing, an adjusting nut carried by the bolt, said last named pawl having free or floating movement within the housing, means carried by the housing for engaging the pawl to move it in one direction to impart rotation to the feed nut, other means carried by the housing for imparting movement to the free pawl in an opposite direction, and means for varying the distance between both of said movement imparting means.

10. In a mining drill, a barrel, a drill holding chuck carried thereby, a screw bar having a main and a supplemental thread section of different pitches, a feed nut on the main section in engagement with said barrel, combined with a single lever actuated means for turning the barrel on its axis and simultaneously turning the feed nut to move the barrel longitudinally, and a threaded socket dog to receive the supplemental thread section of the screw bar, and means in virtue of which said screw bar may be turned independent of the feed nut to release the barrel when jammed.

GEORGE W. NIXON.

Witnesses:
W. POLLARD,
W. A. KELLY.