(No Model.) 3 Sheets—Sheet 1.

G. W. PICKETT.

ROCK DRILL.

No. 519,202. Patented May 1, 1894.

Fig. 1.

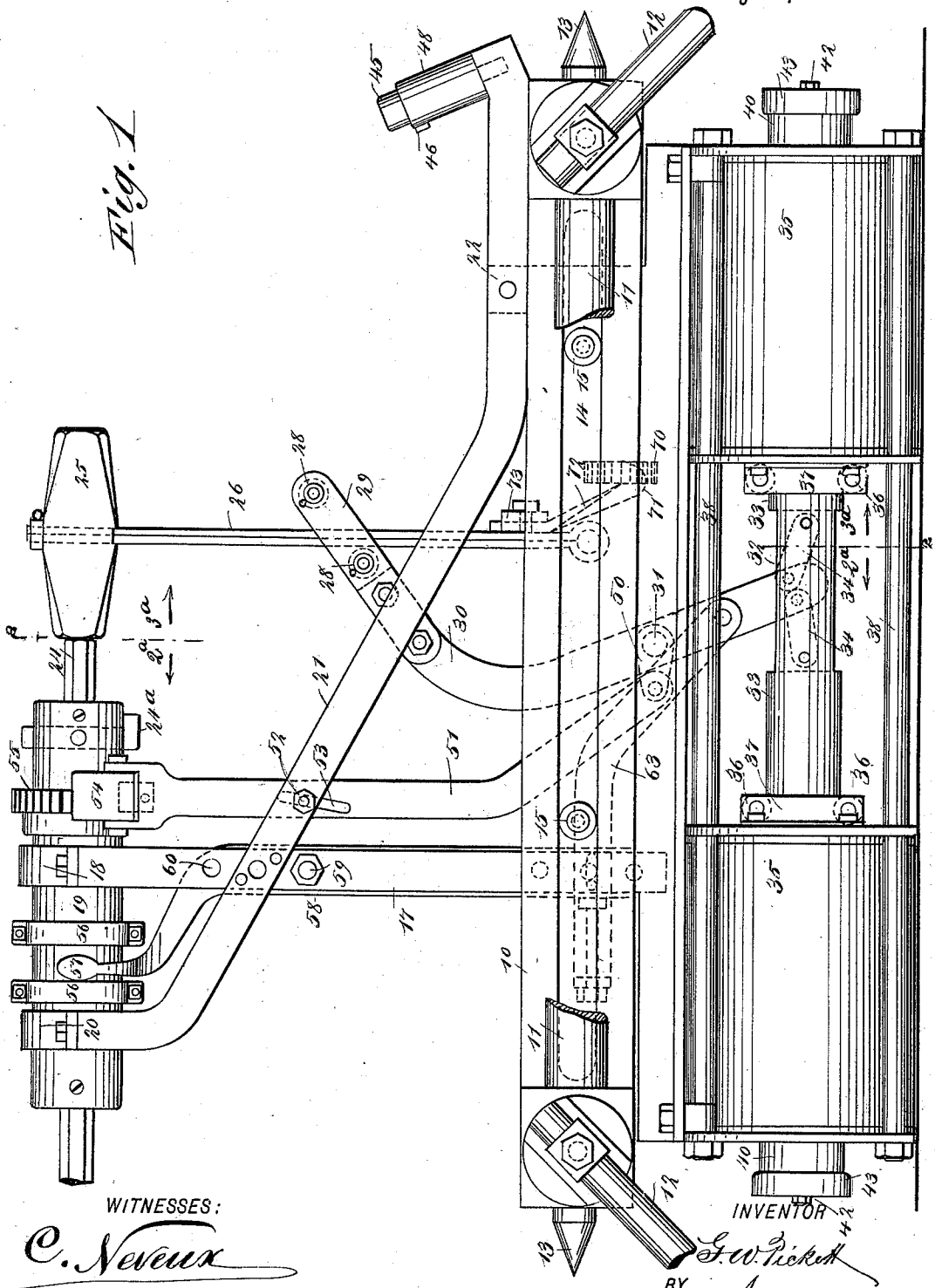

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Fig. 2

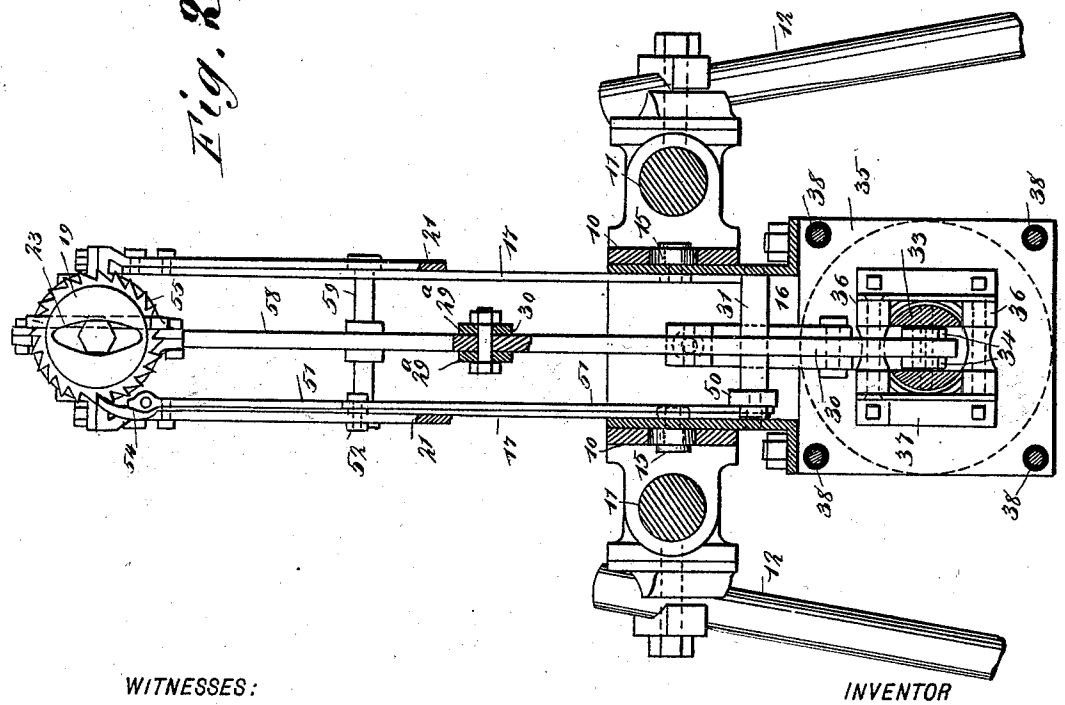
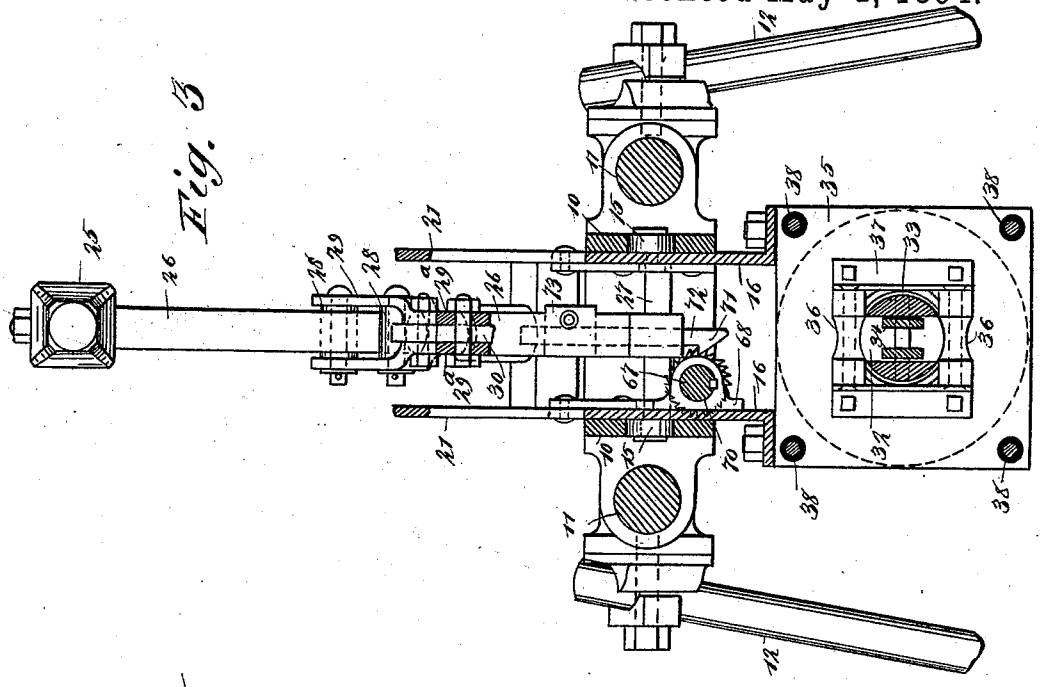


Fig. 3



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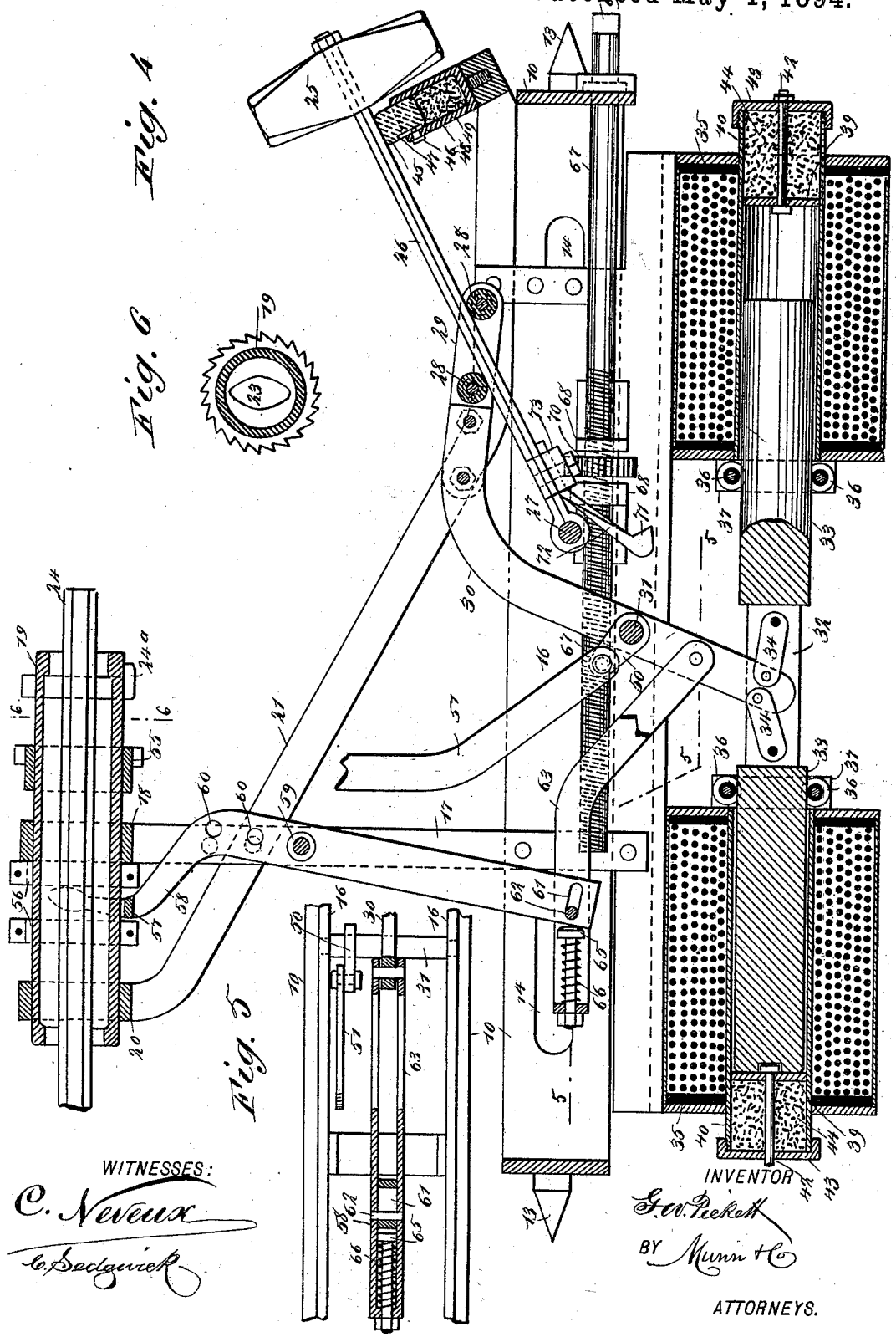

Fig. 4

Fig. 6

Fig. 5

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UNITED STATES PATENT OFFICE.

GEORGE W. PICKETT, OF DENVER, COLORADO, ASSIGNOR OF NINE-SIXTEENTHS TO SAMUEL LESEM, OF SAME PLACE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 519,202, dated May 1, 1894.

Application filed June 13, 1893. Serial No. 477,432. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. PICKETT, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and Improved Rock-Drill, of which the following is a full, clear, and exact description.

My invention relates to improvements in rock drills; and the object of my invention is to produce a very simple, substantial, and durable drill which is provided with a reciprocating plunger operated by solenoids, which is provided with a movable drill holder adapted to hold a drill in close contact with a rock to be drilled, which has a swinging hammer adapted to strike repeated blows upon the end of the drill, which is arranged to turn the drill after each blow of the hammer so as to bring it into proper position for drilling, which has means for withdrawing the drill slightly after each blow of the hammer so as to provide for clearance, which is provided with a screw mechanism adapted to move the drill holder and drill forward, and which has all its mechanism connected in a simple and operative manner with the reciprocating plunger so as to operate by the movement of said plunger.

My invention, as illustrated in the accompanying drawings, is similar to that shown in another application filed simultaneously herewith, Serial No. 477,431, the mechanism in this case being chiefly the connections between the drilling mechanism and the solenoid operated plunger, but the drill holder, the frame and various other parts of the machine are like the corresponding parts in the application referred to.

To the ends specified my invention consists in certain features of construction and combinations of parts, as will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken side elevation of the drill embodying my invention, showing the hammer in contact with the drill. Fig. 2 is a vertical cross section on the line 2—2 in Fig. 1, looking in the direction of the arrow 2^a. Fig. 3 is a similar section, looking in the direction of the arrow 3^a. Fig. 4 is a broken longitudinal section of the machine with the hammer thrown back and supported on its cushion. Fig. 5 is a detail sectional plan on the line 5—5 in Fig. 4; and Fig. 6 is a cross section through the drill holder on the line 6—6 in Fig. 4.

The machine is provided with a rectangular frame 10, which is supported upon legs 12 adjustably secured thereto, and which has extensible rods 11 extending longitudinally of it and provided with pointed ends 13 to engage the rock or to assist in supporting the machine when it is placed on end, the machine being adapted to be placed in any desired position and yet operate successfully. The frame 10 is longitudinally slotted, as shown at 14, and the trucks 15 of the sliding frame 16 are held to run in this slot, and the sliding frame carries the operating portion of the drill, all as hereinafter described.

The construction above referred to, is not described or illustrated in great detail, because it is like that shown in my other application referred to above.

Extending upward from the sliding frame 16 are supports 17, which at their upper ends merge in a collar 18 in which the drill holder 19 is carried, and this drill holder lies parallel with the frame and is also supported on another collar 20 which is carried on braces 21, these being secured to lugs 22 of the sliding frame, as shown by dotted lines in Fig. 1. The drill holder is in tubular form and is substantially like that in my other application before referred to, the holder having elliptical end openings 23 through which the drill 24 extends, and this drill is slotted in the same way as the drill referred to in my other application and is held in the holder by a key 24^a.

The drill may be of any desired form. The drill is struck by a swinging hammer 25, the shank 26 of which is pivoted in the sliding frame, as shown at 27, in Fig. 4, and the shank of the hammer is carried between rollers 28 in the forked end 29 of the hammer lever 30, which lever is curved, as shown in the drawings, and the two sides 29^a of the fork 29 are bolted securely to the upper end of the lever. The lower end of the lever is secured to a bolt or pin 31 which is journaled in the slid-

ing frame 16 and which turns with the swinging of the hammer shank. The hammer lever 30 projects downward beneath the fulcrum pin 31, and its lower end enters a recess 32 in the center of the reciprocating plunger 33, with which plunger the lever is connected by means of links 34, these being pivoted to the lever and also to the plunger so as to give the necessary freedom of movement to the lever and permit the same to swing while the plunger reciprocates. The plunger 33 is arranged to reciprocate in the solenoids 35, which are of the usual kind, and are supported on the sliding frame 16. I have not shown any means for applying the current to the solenoids alternately, but it will be seen that any usual shifting mechanism may be employed for this purpose.

The plunger 33 lies between grooved rollers 36 which are journaled in frames 37 at the inner ends of the solenoids, and these rollers guide the plunger and prevent it from contacting with the central tubes 40 of the solenoid. The two solenoids are preferably bolted together by long bolts 38, but they may be held rigidly in place in any convenient way.

The plunger 33 is cushioned so that there will be no excessive shock at the ends of its stroke, and to this end abutment plates 39 are arranged loosely in the tubes 40 of the solenoids, and the plates are held in place by bolts 42 which are secured to the plates and also to the caps 43 on the outer ends of the tubes 40. The spaces between the caps 43 and the plates 39 are filled with wool, as shown at 44, and the wool serves as a cushion for the plates and absorbs the shock of the plunger striking against the plate.

It will be seen that when the plunger 33 reciprocates the hammer lever 30 will be tilted, and the hammer shank 26 operated so as to swing the hammer 25 backward and forward, and in the forward and up stroke of the hammer it is made to strike upon the drill 24, as shown in Fig. 1. When the hammer moves back it is prevented from creating any great shock and vibration by a cushion block 45, which is held, by a set screw 46 entering a slot 47 in the block, see Fig. 4, to a socket 48 on the rear end of the braces 21 or on any suitable support, and in the socket is a cushion of wool 49 which forms a yielding support for the block 45.

The drill is turned, after each stroke of the hammer, by the following mechanism:—On the pin 31 is a crank 50 which connects with an upwardly-extending connecting rod 51 which is steadied by a bolt 52 extending through a slot 53 in the connecting rod and through one of the braces 21, and at the upper end of the connecting rod is pivoted a pawl 54 which engages a ratchet wheel 55 secured to the drill holder 19. It will thus be seen that every time the hammer swings backward, the crank 50 will tip up, thus lifting the rod 51; and the pawl 54 turns the ratchet wheel and drill holder, this motion being repeated at every stroke of the hammer so that after each blow on the drill, the drill will be turned so as to bring it into a proper position to receive another blow. After each blow of the hammer, the drill holder and drill are also moved back slightly to prevent the drill from being choked and also to permit it to be turned easily, by a lever 58 which is fulcrumed on the supports 17, as shown at 59, and which has a forked upper end 57 held between collars 56 on the drill holder. The lever 58 is provided with several holes 60 which may receive fulcrum bolts 59, and by means of these the throw of the lever and the consequent movement of the drill holder may be regulated. The lower end of the lever 58 is provided with a transverse slot 61 through which extends a pin 62 which connects the lever with a connecting rod 63 and permits a certain amount of independent movement of the lever and rod, so as to provide for a certain amount of lost motion in case the drill meets solid obstruction during the stroke of the plunger 33. The rod 63 is split so that the lever 58 may enter it, and in the front end of the connecting rod is a spring bolt 65, the head of which engages the front edge of the lever, and the bolt is pressed normally into engagement with the lever by a spring 66, as shown in Fig. 4. The lower or rear end of the rod 63 is pivoted to the hammer lever 30 and consequently when the hammer swings back after striking a blow upon the drill, the lower end of the lever 30 moves forward and the connecting rod 63 is also pushed forward, thus tilting the lever 58 and pushing back the drill holder 19. It will be seen that if, during this movement, the drill should meet a serious obstruction, the slot 61 and spring 66 will permit the rod 63 to move independently of the lever 58, so that no injury will be done to the machine and some such provision as this is necessary as the plunger 33 has a positive stroke and does not stop during its movement. The continued forward movement of the drill holder and the drill mechanism is produced by a screw 67 and the mechanism connected therewith, this screw being held to turn in one end of the frame 10 to which it is attached and also in lugs 68 which are secured to the sliding frame and which are threaded to fit the screw, so that when the screw is turned, the lugs and sliding frame will be caused to move longitudinally on the screw. The screw 67 has a squared end 69 to enable it to be turned by a wrench, if necessary, but it is turned automatically by means of the swinging hammer and the nut 70, which is mounted on the screw between the lugs 68. This nut 70 has ratchet teeth upon its periphery, as shown clearly in Fig. 3, and is engaged by a pawl 71 which has an upwardly-extending shank 72 which is secured to the hammer shank 26 by means of a suitable clamping piece 73. It will be seen then that when the hammer 25 is thrown back, as in Fig. 4, the pawl 71 is out of engagement with the nut 70,

but when the hammer swings forward and strikes the drill, the pawl swings into engagement with the nut and thus turns the nut and advances the screw 67 and sliding frame 16 so as to, at all times, hold the drill up to its work.

It will be seen from the above description that when the solenoids 35 are alternately energized, the plunger 33 is reciprocated, the hammer lever 30 tilted on its fulcrum, the hammer 25 swung into repeated contact with the drill 24, the sliding frame advanced by the screw mechanism described so as to hold the drill to its work, the drill drawn back and turned after every blow of the hammer, and consequently a hole will be very quickly drilled.

It will be observed that the construction described is of great simplicity and that there is very little about the mechanism to get out of repair.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A rock drill, comprising a drill holder, a swinging hammer arranged to strike a drill in the holder, a reciprocating electrically operated plunger, and an operative connection between the plunger and the hammer, whereby the hammer is swung by the movement of the plunger, substantially as described.

2. A rock drill, comprising a drill holder, a swinging hammer to strike a drill in the holder, a reciprocating plunger, oppositely arranged solenoids to work the plunger, and a lever connection between the plunger and the swinging hammer, substantially as described.

3. A rock drill, comprising a supporting main frame, a sliding frame therein, a drill holder supported on the sliding frame, a swinging hammer mounted on the sliding frame, a reciprocating plunger mounted on the sliding frame, solenoids to work the plunger, a lever connection between the plunger and the hammer, and mechanism actuated by the plunger for revolving and sliding the drill holder, substantially as described.

4. A rock drill, comprising a main frame, a sliding frame therein, a drill holder supported on the sliding frame, a swinging hammer mounted on the sliding frame and adapted to swing against a drill in the holder, a reciprocating plunger, solenoids supported on the sliding frame and adapted to work the plunger, a tilting lever connecting the plunger with the hammer shank, and a lever mechanism actuated by the hammer lever and adapted to slide and turn the drill holder, substantially as described.

5. The combination, of the reciprocating plunger, the movable drill holder, the hammer lever connected with the plunger, the swinging hammer operated by the hammer lever, the tilting forked lever to move the drill holder longitudinally, and the connecting rod pivoted to the hammer lever and having a flexible connection with the forked lever, substantially as described.

6. In a rock drill, the combination with a movable drill holder, of a swinging hammer operating lever, a pivoted lever having its upper end forked and engaging the tool holder and its lower end transversely slotted, a rod having one end pivoted to the hammer lever and its other end slotted to receive the lower end of the forked lever, a pin passing through the rod and the slot of the forked lever, and a spring bolt in the front end of the said rod, substantially as described.

7. In a rock drill the combination with a movable drill holder provided with a ratchet wheel, of a pivoted hammer operating lever, a crank on the fulcrum pin of the said lever, a pivoted lever having a forked upper end engaging the tool holder, a rod pivoted to the hammer operating lever, and loosely connected with the lower end of the forked lever, and a rod pivoted to the said crank and provided at its upper end with a pawl engaging the said ratchet wheel, substantially as described.

8. In a rock drill, the combination, of the drill holder, the swinging hammer adapted to strike the holder, the reciprocating plunger, the oppositely arranged solenoids for working the plunger, and the tilting lever pivoted to the plunger between the solenoids and slidably connected with the hammer shank, substantially as described.

9. In a rock drill, the combination with the main frame, and a sliding frame thereon, of solenoids, a reciprocating plunger therein, a pivoted hammer shank, a swinging lever pivotally connected to the plunger, and having a slidable connection with the hammer shank, a screw, a ratchet nut on the screw, and a pawl secured to the hammer shank and adapted to engage the ratchet nut, substantially as described.

GEORGE W. PICKETT.

Witnesses:
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