

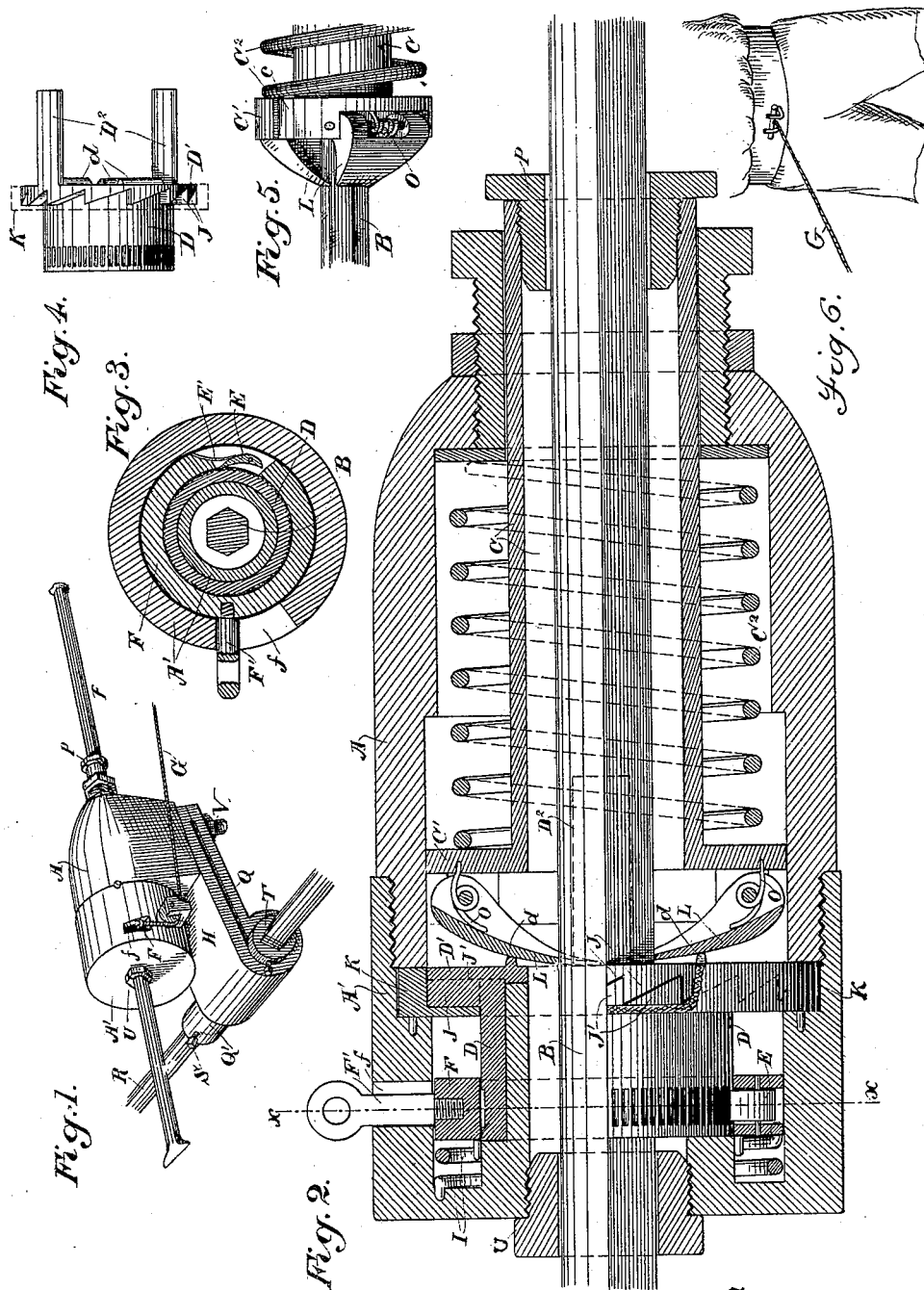
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R. AVERY.
ROCK DRILL.

(Application filed Sept. 26, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 646,343, dated March 27, 1900.

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To all whom it may concern:

Be it known that I, RUSSELL AVERY, a citizen of the United States, residing at Sausalito, county of Marin, State of California, have invented an Improvement in Rock-Drills; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in apparatus for drilling rock and the like; and it consists in a means for maintaining the drill at any desired angle and providing for means of moving the drill transversely and returning it without disturbing the angle, means for connecting with the striker whereby the movements of striking the drill serve to rotate and raise it intermediate of each stroke, and actuating mechanism and details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a general view of the drill. Fig. 2 is a horizontal section through the machine. Fig. 3 is a lateral section on the line *xx*. Fig. 4 is a detail view of the ratchet-sleeve. Fig. 5 is a detail view of the sleeve with the clamp. Fig. 6 is a detail showing the belt of the hammer-wielder and the free end of the connection *G* attached to it.

A is an outer hollow casing screw-threaded near one end and adapted to screw into the cylindrical head *A'*, with which it forms when put together a single structure, which is adapted to contain the operative parts of the drill. The drill-shank *B* passes longitudinally through a central sleeve *C* at the rear of the casing, and at the front, or in the direction of the stroke, it passes through a hub formed with the cylinder *A'*, the former being surrounded by a ratchet-sleeve *D*, having its periphery formed with teeth, which are engaged by a pawl *E* for the purpose of rotating the drill, as will be hereinafter described.

Formed with the cylindrical ratchet portion *D* is an outer portion *D'*, having lugs *D²* engaging with corresponding slots *c* in the flange of the sleeve *C*, so that the part *D D'* is slidable with relation to the sleeve *C*, as will be hereinafter described.

In order to turn the drill after each stroke, a ring or collar *F* incloses the part of the cylindrical ratchet portion *D* and is slotted at

one side to receive the pawl *E*, which projects through the slot, and its point is pressed into engagement with the teeth of the ratchet by a spring, as shown at *E'*. From the ring *F* an arm *F'* projects through a slot in the outer casing *A'*, having an eye or other suitable exterior head, to which is connected a rope or cord *G*, and this cord leads over a direction-pulley *H* and has sufficient length so that the opposite end may be attached to the belt of the man who swings the hammer by means of loops or hooks of any suitable description. When there is room for two strikers, two cords may be connected with the arm *E'*, one being connected with each man's belt, so that each one in swinging back for a blow will turn the drill for the other one's stroke. The object of this is to enable the hammer-wielder to turn the drill without the assistance of a second man, as is usual in hand-drilling, and by this connection each backward swing of the body in raising the hammer will pull upon the cord *G* and through the arm *F'* will turn the ring *F* and the pawl *E* a distance equal to the length of the slot made in the side of the casing and through which the arm *F'* projects, and which is equal to the length of a tooth *J J'*. A coiled spring has one end fixed in the end of the casing and the other connecting with the ring *F*, so that as the swing of the body relieves the cord of the strain upon it the spring will return the ring and pawl to engage a new point on the ratchet-cylinder *D*. By this construction the striker is enabled to strike and turn the drill.

In order to allow the drill to retract slightly after each stroke for the purpose of turning and to prevent its binding in the hole, I have shown a series of teeth *J* made upon the end of the part *D'* where it is of larger diameter than the part *D* and a corresponding series of teeth *J'* made upon the ring *K*, which is fixed in the casing *A'* and interposed between the ring *F* and the teeth *J* of the part *D'*, so that when the drill is being turned by the action of the ring *F*, as previously described, these teeth *J J'*, engaging each other, will push the part *D D'* backwardly, and the drill being constantly gripped will be retracted slightly also to allow it to be turned freely by the movement of the operator previously de-

scribed. As soon as the parts are released by the swing of the operator a spring C², which has a tendency to hold these parts in close connection, acts to bring them back to their former position, carrying also the drill by means of its grip, to be hereinafter described.

The sleeve C, through which the drill-shank B passes, has a flange C' at the forward end, and the chamber around the sleeve C is large enough to receive a spiral spring C², which presses against the collar C', and thus closes the teeth J J' together, as previously stated, when they are relieved of the turning-pressure which has caused the teeth to ride up on each other and temporarily separate the parts. Fulcrumed to the sleeve C C' are the gripping-jaws L, which are pressed upon by light springs O, by which the jaws are separated or forced away from the drill-shank B, when the sleeve is pulled back, by taking hold of the bushing P at the end of the sleeve C; but when released the spring C² will force the grip to take hold of the drill again. This result is better effected by the formation of ribs or projections d upon the face-contacting portion of D', which serve as fulcrums, and the jaws being pressed against these ribs by the pressure of spring C² will insure their closing upon the drill-shank.

Whenever it is desired to remove the drill, it can be done by pulling the sleeve C backward sufficiently to overcome the tension of the spring C². This is readily effected, as previously mentioned, by means of a split bushing P, which is threaded and screws into the sleeve C, and this bushing has an exterior flange or collar which can be grasped to retract it and its connections, and thus allow the drill to be easily withdrawn through the grips and out of the sleeve, if desired, by having first removed the bushing U in the front of cylinder A' in the sleeve C.

The outer casing carrying the mechanism here described is swiveled to a split clamp Q, the jaws of which bind upon a sleeve Q', and this sleeve has an interior opening to fit a rectangular or polygonal column R. This sleeve is slidable transversely to the line of motion of the drill upon the column R, this being fixed in any suitable or usual manner with relation to the face or part where the holes are being drilled and serving to support the apparatus in position. The casing A is locked to the clamp Q, and the latter is locked to the sleeve Q' after the desired adjustments are made by a bolt and nut, as shown at V in Fig. 1.

The direction of the hole to be drilled having been determined, the device is set up and the sleeve Q' is turned so that the drill is alined in the direction in which the hole is to be drilled. The parts are then fixed by set-screw, as at S, the sleeve Q' abutting against a collar, as shown at T, which determines its position. The hole may then be drilled, and it will be manifest that it will be

drilled in a perfectly-straight line and will not be subjected to the irregularities caused by the turning by hand, as when this hand method is employed.

The drill will not bind in the hole, and if for any reason it is desired to remove the drill before the hole is completed it is only necessary to retract it clear of the hole. Then by loosening the set-screw S the sleeve Q', carrying the casing and drill, can be moved transversely along the support R and the hole thus exposed for cleaning or for other purpose.

When the parts are restored to their normal position, the sleeve Q' being brought up against the collar T and again fixed in place it will have the same alinement that it had before, and the work of drilling can go on with the assurance that the drill will move in the same line in which it had started.

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

1. In a rock-drill and in combination, a casing through which the drill is guided and movable, a plate upon which the casing is turnable transversely and to which it may be clamped, a polygonal supporting-bar fixed transversely to the line of movement of the drill, a sleeve slidable but not turnable upon said bar, and clamping-jaws forming an extension of the drill-casing support, inclosing said sleeve and turnable in a plane at right angles with the axis of the sleeve to change the angle of the casing and line of movement of the drill.

2. In a rock-drill, and in combination, a polygonal supporting-bar, a sleeve fitting and slidable but not turnable upon the bar, a clamp composed of a cylindrical socket fitting a sleeve and having parallel plate extensions from one side thereof, a bolt passing through said plates forming a swivel connection about which the drill-casing and guide are turnable, and a nut by which the casing is locked to the plates, and the plates clamped upon the sleeve.

3. In a rock-drill and in combination, a drill-casing and guide-plates upon which the casing is turnably mounted, said plates having their opposite ends forming a cylindrical clamp, and a bolt and nut whereby said clamp is closed, and the casing is locked to the plates, a cylindrical sleeve upon which the clamp is fitted and around which it is turnable to allow any radial adjustment with relation to the sleeve, a polygonal bar upon which the sleeve is fitted and slidable but not turnable, a collar by which the sliding movement of the sleeve is limited, and set-screws by which the sleeve is locked to the bar.

4. In a manually-operated drill, and in combination, a casing through which the drill is guided and slidable, a ratchet-sleeve turnable within the casing and through which the drill passes, a ring turnable exterior to the ratchet-sleeve having a pawl by which it is engaged with the teeth of the sleeve in one

direction, a slot made in the exterior casing, a pin projecting from the ring through said slot and a cord by which the pin is connected with the belt of the hammer-wielder whereby the ring and sleeve are turned by each backward swing of the body, and a spring contained within the casing and acting upon the ring so as to return it independent of the sleeve when the cord is relieved.

5. In a rock-drill and in combination, a casing through which the drill is axially guided and slidable, a ratchet-sleeve turnable upon a hub within the casing, a ring turnable exterior to the ratchet-sleeve having a pawl by which it is engaged with the teeth of the sleeve in one direction, a pin projecting radially from said ring through a slot in the casing, a cord by which the pin is connected with the belt of the hammer-wielder whereby the ring and sleeve are turned by the backward swing of the body, a return-spring connected with the ring, inclined teeth formed upon the end of the turnable sleeve, a fixed ring having similar teeth with which the first-named teeth engage, whereby the turning of the sleeve alternately retracts the drill and allows it to advance.

6. In a rock-drill and in combination, a casing through which the drill-shank is axially supported, mechanism for retracting and turning the drill and advancing it against the rock-face, a flattened surface on the exterior of the casing, a double plate upon which said flattened surface rests and is turnable in the plane of the plate, a hollow cylindrical clamp formed at the opposite ends of the plates, a cylindrical sleeve about which the clamp is turnable, a bolt and nut by which the clamp is closed and locked upon the sleeve, a polygonal supporting-bar extending axially through a correspondingly-shaped hole in the sleeve whereby the latter is slidable and not turnable upon the support, a collar to limit the movement of the sleeve in one direction, and a screw by which it is locked to the support.

7. In a rock-drill, the combination of a cas-

ing and a support therefor, a drill extending axially through said casing and guided thereby, a mechanism for intermittently turning the drill, and means for operating the mechanism including a flexible connection having one portion attached to said mechanism and another portion adapted for connection with a belt worn by the operator wielding the hammer whereby the drill is raised and turned at each swing of the body of the hammer-wielder in making the stroke.

8. In a rock-drill, the combination of a fixed support, a casing and guide through which the drill is axially movable, a pawl-and-ratchet mechanism whereby the drill is turned, a cord connecting at one end to said mechanism and having its opposite end provided with means for engaging a belt worn by the operator wielding the hammer whereby the swinging movements of the body of the operator in making the hammer-stroke act to raise and turn the drill between each stroke of the hammer.

9. In a rock-drill, a fixed support, a casing carried thereby, a sleeve within the casing through which the drill-shank passes, having a flange at one end with edge slots, a second sleeve in line therewith having arms engaging the slots, and a reduced portion provided with ratchet-teeth, a pawl engaging said teeth, and means for actuating it, teeth formed on the end of the larger part of the ratchet-sleeve, a fixed ring having similar teeth so that the turning of the ratchet-sleeve engages the teeth and moves the ratchet and the flanged sleeve back from the fixed ring, grips carried by the flanged sleeve to move the drill in unison with the sleeve, and a spring by which the parts are returned when the engaging teeth have passed each other.

In witness whereof I have hereunto set my hand.

RUSSELL AVERY.

Witnesses:

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