C. S. COX & R. B. BUTLER.

ROTARY ROCK DRILL.

APPLICATION FILED JULY 16, 1907.

924,743.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

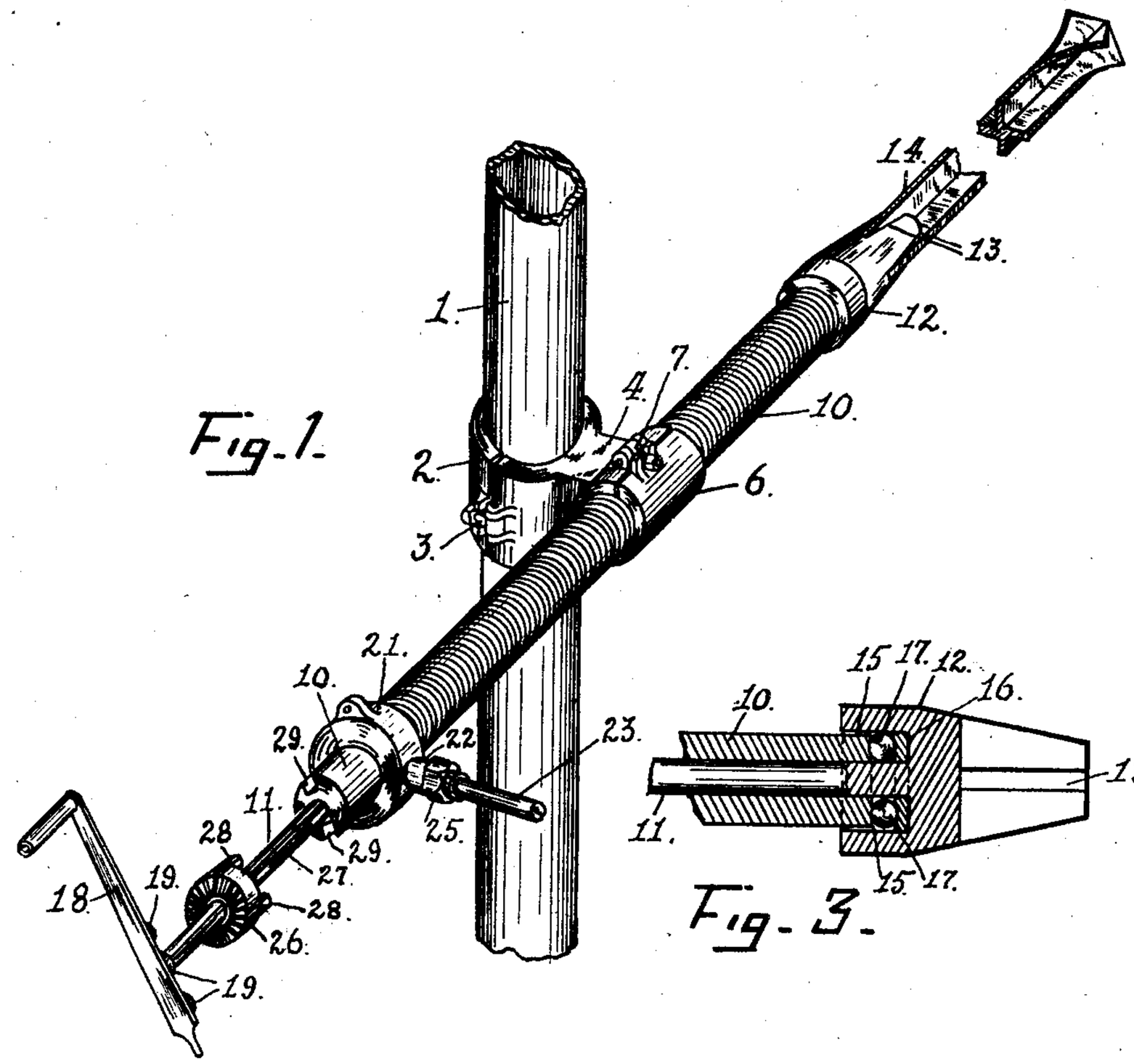


Fig. 3.

Fig. 2.

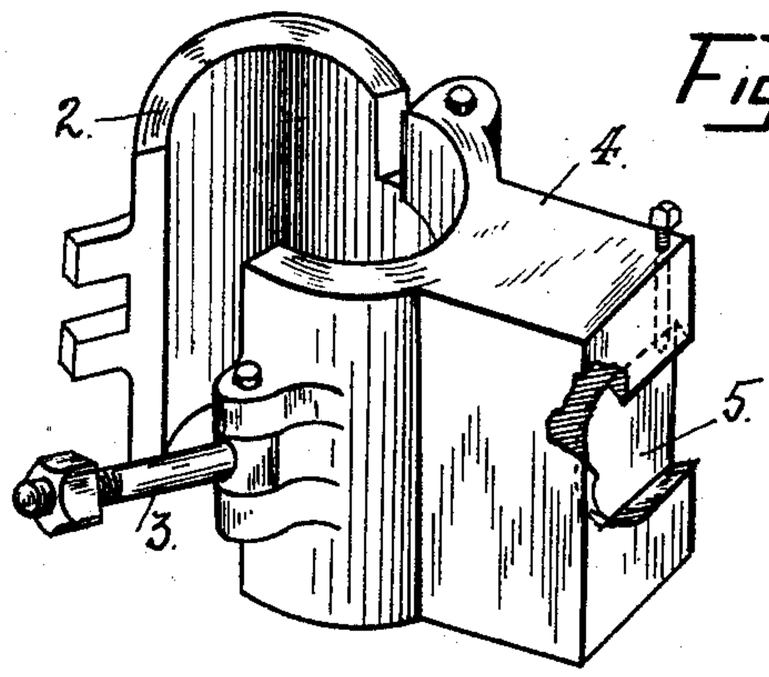
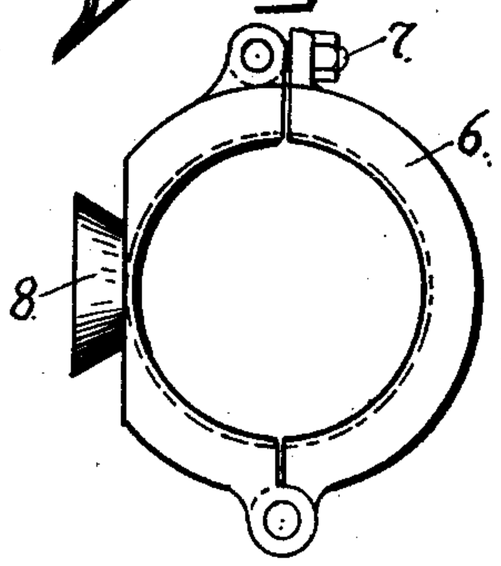


Fig. 5.

Fig. 4.



WITNESSES.

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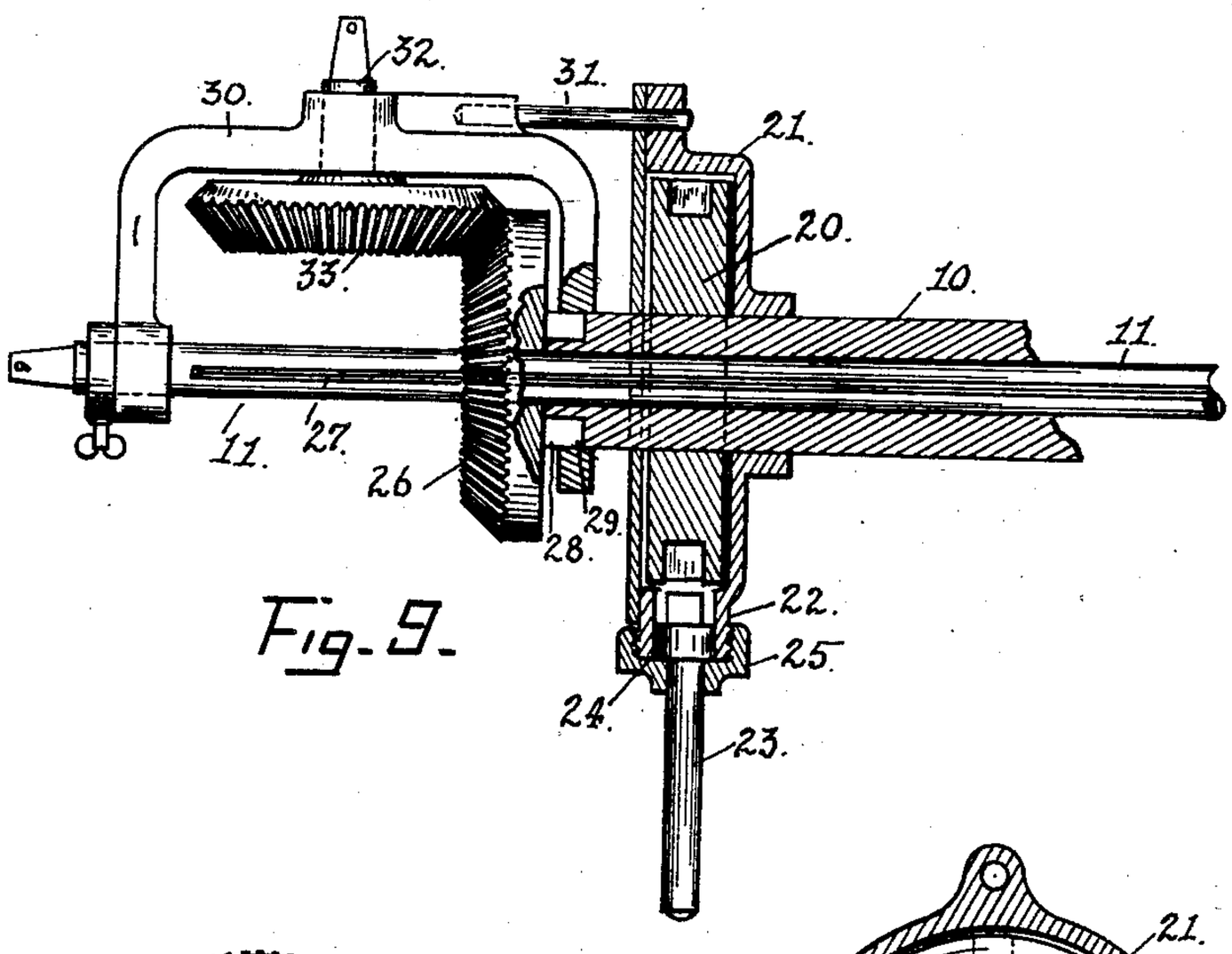

Fig. 9.

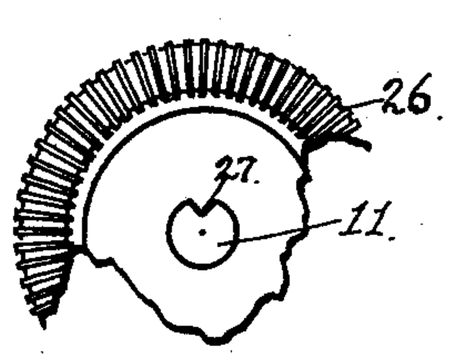

Fig. 7.

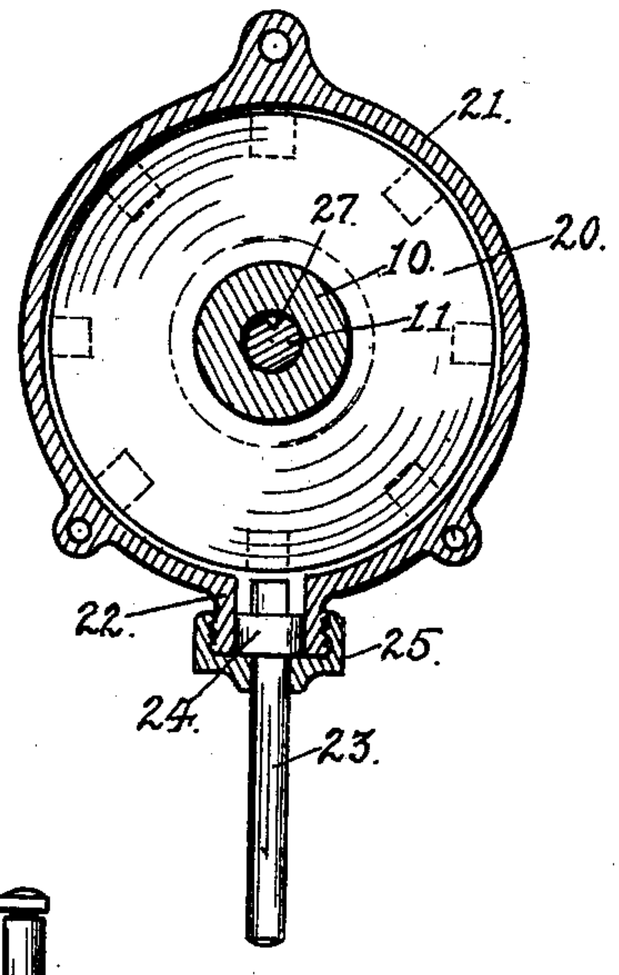

Fig. 8.

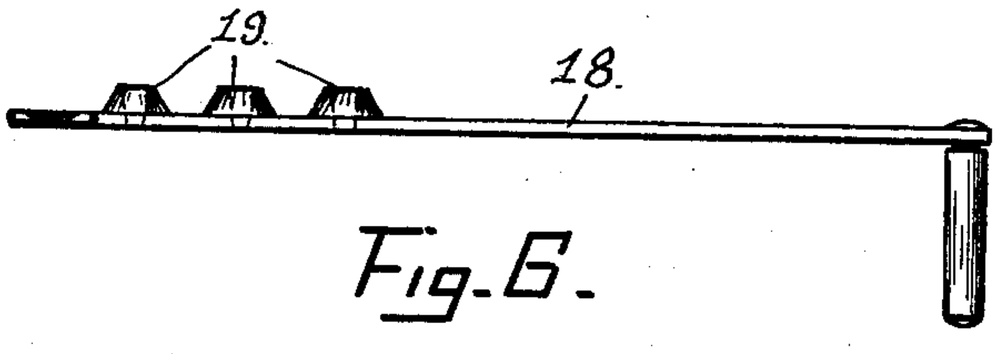

Fig. 6.

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UNITED STATES PATENT OFFICE.

CARY S. COX AND RICHARD B. BUTLER, OF SAN FRANCISCO, CALIFORNIA.

ROTARY ROCK-DRILL.

No. 924,743. Specification of Letters Patent. Patented June 15, 1909.

Application filed July 16, 1907. Serial No. 384,109.

To all whom it may concern:

Be it known that we, CARY S. COX and RICHARD B. BUTLER, citizens of the United States, residing at the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Rotary Rock-Drills, of which the following is a specification.

Our invention relates to the class of rotary rock-drills, and while capable of use as a power drill, is especially intended by reason of its simplicity, compactness, power, and ease of operation, to be used as a hand boring-machine.

Our invention consists in the novel construction, arrangement, and combination of parts, which, together with the objects of the invention, will be, hereinafter, fully described, by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of our rotary rock-drill. Fig. 2 is an enlarged perspective view of the column clamp 2. Fig. 3 is a sectional detail showing the anti-friction bearing between the forward end of the feed-screw and the back of the chuck-head of the boring bar. Fig. 4 is an elevation of the feed-nut 6. Fig. 5 is a view of the filling piece 9, to complete the pivotal support of the feed-nut in the column clamp. Fig. 6 is an enlarged elevation of the crank handle 18. Fig. 7 is a broken, face elevation of the gear 26. Fig. 8 is a vertical, sectional elevation of the ratchet mechanism for feeding the screw 10. Fig. 9 is an enlarged sectional elevation of the right-angle connection.

1 is a column, which, in the usual manner, is to be fixed and tightened in place to support the drill. Upon the column is fitted a clamp 2, which is made of hinged sections, fastened together by a swing bolt 3, whereby the clamp may be removed, replaced and may be set at any desired position on the column. The clamp is formed with a projecting lug 4, in the face of which is made a dove-tail seat 5, opening out through one edge of the lug.

6 is the feed nut. It is made in hinged sections, fastened together by a swing bolt 7. The back of the nut is formed with a circular dove-tail bearing 8, which enters the dove-tail seat 5 of the clamp and forms therein a pivotal connection for the feed nut, so that it may rock on the clamp. A filling piece 9 is fitted in the open end of the seat 5, behind the bearing 8, and completes the journal of said bearing.

10 is the feed-screw. It is hollow throughout its length, its bore being smooth. The screw 10 is seated in and feeds through the nut 6.

11 is the boring or drill-carrying bar. It is seated rotatably in the hollow feed-screw 10, and extends through the same. The forward end 12 of the boring bar is the chuck to receive and hold the drill. This chuck is an enlarged head with cross-slots 13, so made to receive the rear end 14 of a drill which is made from cross steel, its forward end being suitably twisted for its boring function, while its rear end, shown at 14, is left as made, of cross steel, said rear end being adapted to fit simply and securely and without other fastening into the cross slotted chuck head 12 of the boring bar.

The boring bar 11, in the back of the chuck-head is formed with a deep annular groove 15. In the base of this groove is fitted a race-way collar 16 for the series of balls 17. The forward end of the feed screw 10 enters the annular groove 15 of the boring-bar head, and its extremity is concaved, as shown, to form the other race-way for the balls 17. This construction forms a concealed and well protected anti-friction bearing between the feed-screw and boring bar.

The rear end of the boring bar projects well beyond the feed-screw and is squared to receive a crank handle 18 which is best provided with a plurality of engaging sockets 19, whereby its leverage may be varied as found expedient.

Upon the rear end of the feed-screw is fixed a ratchet 20, in the form of a notched disk. Rotatably fitted upon this ratchet is a casing 21 which has a neck 22 through which plays a ratchet-lever 23 adapted to engage and release the ratchet. The lever 23 is held in place by a shoulder 24 upon it, and a cap nut 25 screwed on the neck 22.

The operation of the drill, as far as described, is as follows. The operator, taking hold of the ratchet lever 23 with one hand, pushes it in to engage the ratchet 20, and he then, by means of said lever, turns the screw 10, which, feeding forward through the nut 6, and its forward end pressing, through the ball-bearing 17, on the head of the boring-bar, forces said bar forward and carries its drill to and against the face of the rock.

With his other hand, the operator, by means of the crank 18, now rotates the boring-bar 11 and its drill. Then, by intermittent feeding of the screw 10 and continuous rotation of the boring-bar 11, the drilling is effected.

If desired, the feed may be rendered automatic by being made dependent upon and simultaneous with the rotation of the boring-bar. For this purpose it is only necessary to directly connect the feed-screw and boring-bar, so that they will rotate together. A good means for doing this, and one which serves a further purpose, as we shall presently explain, is the sleeve 26, made as a gear, as shown, which gear, by a feather 27 is slidably mounted on the rear end of the boring bar 11. The back of the gear has lugs 28, which when the gear is slid upon the boring bar engage notches 29 in the rear end of the feed-screw 10, whereby the bar and screw are locked together. Then, when the crank 18 is turned, both bar and screw rotate together by one operation and the feed is thus automatic. During such operation the ratchet lever 23 hangs by gravity out of engagement with the ratchet 20, and presents no impediment to rotation. The machine as thus fitted is suitable for drilling in any position in the face of the drift, either horizontal or at an angle up or down, for the parts swing with the pivotal feed-nut 6 and the crank 18 is in position for convenient operation. But, for up or down drilling, the crank 18 would be in an awkward position for operation. To provide for this, we fit to the device a right-angle connection, as follows:—30 is a bracket fitted upon the rear end of the boring-bar and slidably connected by a pin at 31 to the ratchet casing 21. In this bracket is journaled a short shaft 32 which carries on its inner end a gear 33 meshing with the gear 26, heretofore described. The outer end of the shaft 32 is squared to receive the crank 18, and as said shaft is at right angles to the boring-bar, it follows that the position of the crank applied to said shaft will be a convenient one when the machine is disposed for up or down drilling: and all the operations heretofore described, can be carried out with this right-angle connection.

From the foregoing description, the following advantages will be understood. The relative arrangement of the drill feed and rotation, the former by means of the screw 10, and the latter by means of the boring-bar 11 seated in and rotatable within the hollow screw, is a simple, compact and economical arrangement and construction, admitting both independent and automatic feed, according to the character of the rock.

The adjustable column clamp permits the height of the drill to be readily adjusted, and its hinged character enables the drill to be easily applied to and removed from the column.

The pivotally supported feed-nut permits the necessary angle adjustment of the drill; and its sectional hinged character permits the ready insertion and removal of the feed-screw with its accompanying parts, without having to run the screw through the nut its entire length.

As with very hard rock, the feed and rotation of the drill will be independent, the former essentially intermittent, and the latter continuous, it becomes necessary that the bearing between the feed-screw and the boring-bar shall be of a highly anti-friction character, and one readily reached and protected thoroughly. All these essentials are found in the ball-bearing here shown, which is simple in its nature, easy of access, easy of construction and well protected. Any necessary amount of pressure may be applied to the feed-screw, and yet permit the boring-bar to be rotated with available hand power, thus rendering the machine especially adapted for operation by hand.

Drills made from cross steel are particularly serviceable, but heretofore it has been the custom to specially prepare their rear ends, either by collars applied to them or by forging them down to solid octagonal or other shapes, to fit the existing chucks. Our improvement is to leave their rear ends as made, of cross steel, and to make a corresponding cross slotted chuck to receive them, whereby we avoid any special preparation, and at the same time secure a particularly strong and simple fitting without the necessity of any fastening devices whatever. Finally, the ratchet feed and rotating means, both direct and right-angle connection, are simple and effective devices for operating the drill.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is,

1. In a rotary rock drill, the combination of a feed screw, a boring or drill carrying bar passing through the feed screw, means for rotating the feed screw to advance the drill carrying bar, said means comprising a ratchet mounted on and fast to the feed screw, a rotatable casing about the ratchet and an actuating lever for the ratchet mounted in said casing for sliding movement to permit said lever to be engaged with and disengaged from said ratchet, said casing being adapted to assume a position whereby said lever will be normally held by gravity out of engagement with said ratchet; and means independent of said first mentioned means to rotate the drill carrying bar and feed screw.

2. In a rotary rock drill, the combination of a hollow feed screw, a boring or drill carrying bar passing through said feed screw, means for rotating the feed screw to advance the drill carrying bar, means independent of

the last mentioned means to rotate the drill carrying bar and a member mounted on the drill carrying bar for rotation therewith and for longitudinal movement thereon, said member being adapted to be adjusted along the drill carrying bar and means on said member to engage and lock the feed screw to the drill carrying bar.

3. In a rotary rock drill, the combination of a rotatable hollow feed screw, a rotatable drill carrying bar passing through said screw, means at the rear end of the bar for rotating it, a ratchet mechanism including a casing for rotating the feed screw, a gear member mounted on the drill carrying bar for rotation therewith and for movement longitudinally thereof, said gear member being constructed and adapted to be adjusted longitudinally of the drill carrying bar to engage and lock the feed screw thereto, a bracket provided with a pin to engage the ratchet casing, a shaft in said bracket at right angles to the drill carrying bar, a gear on said shaft, said bracket being mounted on the drill carrying bar for adjustment longitudinally thereof to engage said gear with the gear member and the pin with the ratchet casing.

4. In a rotary rock drill, the combination of a rotatable hollow feed screw, a rotatable drill carrying bar passing through said feed screw, a ratchet mechanism for rotating the feed screw, said ratchet mechanism including a ratchet mounted fast on the feed screw, a rotatable casing about the ratchet, and an actuating lever mounted in said casing to permit the lever to be engaged with and disengaged from the ratchet, and means for rotating the drill carrying bar, said means including a gear member mounted on the drill carrying bar, a bracket adapted to interlock with the ratchet casing and a gear mounted in said bracket, said bracket being mounted on the drill carrying bar for adjustment longitudinally thereof to permit said bracket to be engaged and interlocked with the ratchet casing.

5. In a rotary rock-drill, the combination of a feed-nut; a rotatable hollow feed-screw seated in the nut and having slots at one end thereof; a rotatable, boring or drill-carrying bar passing through said screw; and the means for locking the screw and bar together consisting of a sliding sleeve feathered on the bar and having lugs to engage slots in the end of the screw.

6. In a rotary rock-drill, the combination of a feed-nut; a rotatable hollow feed-screw seated in the nut; a rotatable boring or drill-carrying bar passing through said screw; a gear feathered on the bar and provided with means to lock the bar and screw together; a bracket mounted on the bar; a shaft in said bracket at right angles to the bar; and a gear on said shaft to engage the feathered gear.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CARY S. COX.
RICHARD B. BUTLER.

Witnesses:
N. A. ACKER,
D. B. RICHARDS.