Jan. 3, 1933. R. A. MURDOCK ET AL 1,893,033

ROCK DRILL

Filed Dec. 15, 1931

FIG. 7.

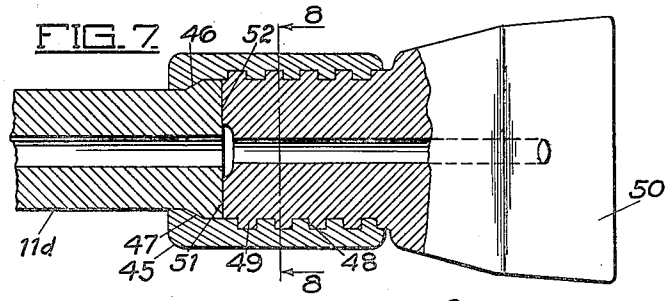


FIG. 8.

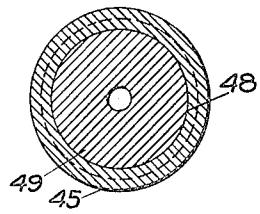


FIG. 5.

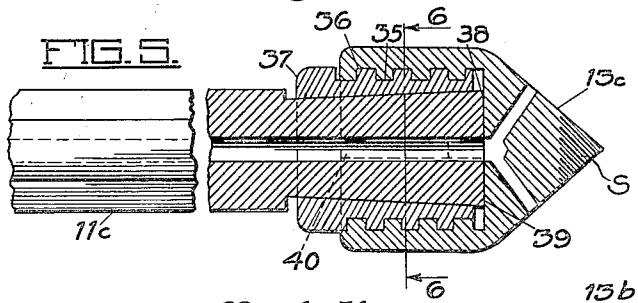


FIG. 6.

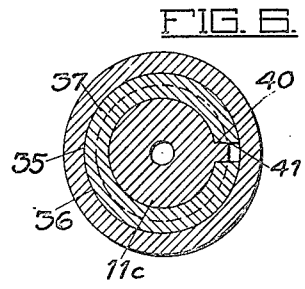


FIG. 3.

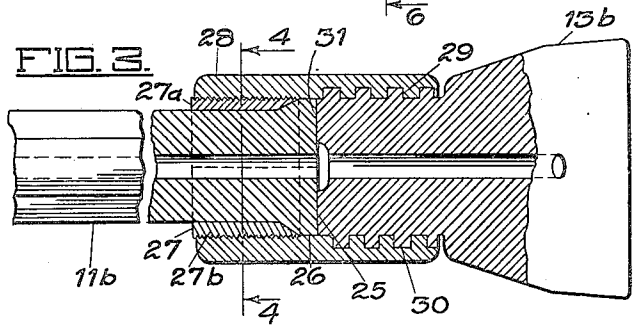


FIG. 4.

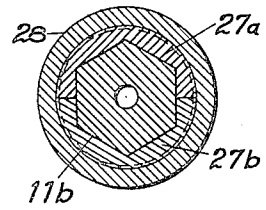


FIG. 2.

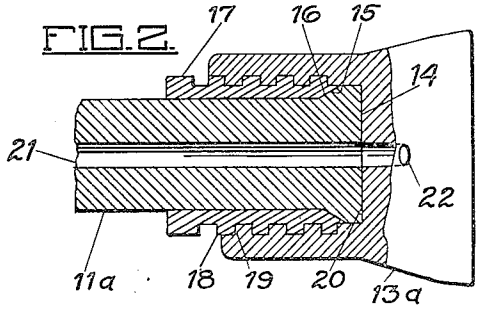
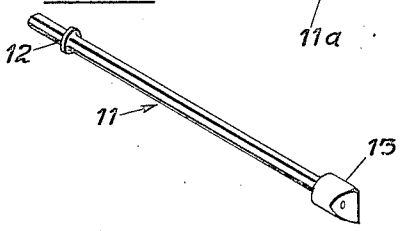


FIG. 1.



INVENTORS
RUSSELL A. MURDOCK
JOHN S. MCKENNA

BY Barnes Lee Graham
ATTORNEY

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UNITED STATES PATENT OFFICE

RUSSELL A. MURDOCK AND JOHN S. McKENNA, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO ELLIOTT CORE DRILLING COMPANY, A CORPORATION OF CALIFORNIA

ROCK DRILL

Application filed December 15, 1931. Serial No. 581,140.

This invention relates in a general way to percussion drilling equipment such as pneumatic rock drilling apparatus which is used in drilling rock formations preparatory to blasting.

It is well known to those familiar with the art that drilling equipment of the type described, consists of a pneumatic piston and cylinder mechanism associated with so-called drill steel and adapted to impart short blows to the steel in extremely rapid succession. The apparatus also includes ratchet means for rotating the drill steel during the operation of the apparatus.

The conventional type of drill steel or drill rod, is made in various shapes usually hexagonal, and is provided with a special type of cutting nose shaped by deforming or upsetting the end of the rod in a forging operation.

In common practice where the hole to be drilled is comparatively deep, the procedure followed is to start operations with a drill of comparatively large diameter and of comparatively short length which is used in drilling a hole of approximately 2 feet in depth. After this hole has been drilled, the first drill rod is replaced by a longer rod having a slightly smaller bit forged on the lower end and so on, until the required depth of the hole is obtained.

Drill rods of this character soon becomes dull and it is necessary to return them to a location at which forging apparatus is located for renewing the cutting points or bits. It becomes necessary therefore to have a reserve supply of drill steel on hand, and in large projects a great deal of expense and labor is involved in transporting the drill steel of various lengths and corresponding sizes to and from the sharpening apparatus.

It therefore becomes a primary object of this invention to produce a drilling tool which functions the same as the ordinary drill steel described above, but has the advantage of providing a structure in which the cutting portion of the steel is detachable. This construction permits the use of a series of bars of fixed diameter and of fixed length with a series of cutting bits of varying diameter, the bits being easily detached and replaced to facilitate sharpening. It will be apparent, therefore, that the device contemplated by this invention reduces, to a very great extent, the quantity of steel which must be kept on hand in connection with each drilling unit and it also reduces the labor involved in transporting and sharpening the drill steel.

The invention also eliminates to a very great extent, the danger involved in handling the drill steel where the work is being done in rugged localities.

As pointed out above, the operation of this type of apparatus depends upon a series of quick sharp blows which follow each other in rapid succession and where the cutting bit is attached to the drill steel or the drill rod by means of a threaded connection, the threads soon become crystallized so that any ordinary type of connection is rendered useless. It is a most important feature of this invention that the bit be attached to the drill bar in a manner such that the impact from the bar is transmitted directly to the bit through abutting faces of the bit and the bar, the bit and the bar being connected in a manner such that none of the impact force is transmitted in shear to the connecting threads.

In order to increase the life of the cutting bit, we propose to face the cutting points or the cutting edges with a hard facing metal such as stellite, and it is to be understood that the cutting edges of the bit may be made in the conventional star shape or may be shaped in the manner shown in the accompanying drawing.

The details in the construction of certain preferred forms of our invention will be best understood from the following description

in the accompanying drawing which are chosen for illustrative purposes only, and in which

Fig. 1 is a perspective view illustrating a drill bar assembly embodying our invention.

Fig. 2 is an elevational view partly in section showing a preferred form of our invention.

Fig. 3 is an elevational view partly in section showing another form of our invention.

Fig. 4 is a sectional view taken in a plane represented by the line 4—4 in Fig. 3.

Fig. 5 is an elevational view partly in section showing another form of our invention.

Fig. 6 is a sectional view taken in a plane represented by the line 6—6 in Fig. 5.

Fig. 7 is an elevational view partly in section showing another form of our invention, and

Fig. 8 is a sectional view taken in a plane represented by the line 8—8 in Fig. 7.

More particularly describing the invention as herein illustrated, reference numeral 11 indicates a drill bar or drill steel which has a shouldered end portion 12 adapted for reception in the socket of any conventional percussion drill tool.

Reference numeral 13 indicates a head or bit member which is detachably mounted upon the bar 11. The details in the construction of the head or bit member 13 may be varied to suit the particular conditions under which the drill is to be operated, but as pointed out above, it is an important feature in bits or heads of the type contemplated by this invention, that the bit be provided with a bearing face which is moved by means of its associated mechanism so as to abut against a corresponding bearing face on the end of the drill bar or drill steel 11.

Referring now to Fig. 2 which shows a preferred form of our invention, reference numeral 11*a* indicates a drill bar which has a substantially flat bearing face 14 formed on its end portion. The end of the bar is upset so as to provide a shoulder 15 against which a seating surface 16 on a sleeve 17 is adapted to seat.

As pointed out in the early part of the specification, the drill bar 11 or 11*a* may be of any preferred shape but is shown as being polygonal or hexagonal and the passage through the sleeve 17 is correspondingly shaped so that there can be no relative rotation between the sleeve and the bar. It will be understood, of course, that the drill steel or drill bar may be cylindrical in which event the end portion thereof may be forged to a polygonal shape, or the end of the bar may be provided with a key to hold the sleeve against movement.

The sleeve 17 is provided with external threads 18 which are adapted to be engaged by threads 19 provided in a recessed portion of the bit 13*a*.

The recessed portion of the bit 13*a* is provided with a bearing face 20 which is adapted to abut against the bearing surface 14 on the bar, being drawn into engagement therewith through the action of interengaged threads 18 and 19.

The bar 11*a* is provided with the conventional air passage 21 which cooperates with air passages 22 in the bit. As pointed out above, the cutting surface of the bit may may take any conventional form. For the purpose of illustration we have shown this bit as being constructed in a chisel shape which is drawn down to a point as shown in Fig. 5. The cutting edge of the bit is preferably faced with a hard metal such as stellite, as indicated at S in Figure 5.

In Figure 3 we show another form of drill tool which is shown as comprising a drill bar 11*b*, having a bearing face 25 and an outwardly extending shoulder 26.

Reference numeral 27 indicates a sleeve which is shown as being made up of segments 27*a* and 27*b*. These two segments cooperate to form a sleeve having a hexagonal passage therethrough adapted to receive the hexagonal bar in the manner indicated in Fig. 4 and having a cylindrical threaded outer surface which is adapted to engage threads in a collar member 28.

The forward end of the collar member projects ahead of the bearing surface 25 and is threaded as indicated at 29 to receive the threaded shank 30 on a bit member 13*b*. In this construction like the construction described in connection with Fig. 1, the collar member is adapted to draw the bearing face 31 on the end of the shank 30 into pressure engagement with the bearing face 25 on the end of the bar.

The form of our invention shown in Fig. 5 is similar to the form shown in and described in connection with Fig. 2 in that the bit 13*c* is provided with an internally threaded recess 35 adapted to engage the threads 36 on a sleeve 37. This construction differs from that described above in that the end portion of the drill bar 11*c* is cut to an elongated frustal conical taper and the interior of the sleeve is correspondingly tapered.

In order to facilitate the assembly of this device, the sleeve 37 is split as is clearly indicated in Fig. 6, and it will be seen that during a relative rotation between the sleeve and the bit that the bit will be drawn rearwardly toward the bar until the bearing face 38 on the bit is in pressure engagement with a corresponding bearing face 39 on the bar.

In order to prevent relative rotation between the sleeve and the bar in this form of our invention, we provide the bar with a key 40 which is adapted to be received in the split 41 in the sleeve.

The form of our invention shown in Fig. 7 is similar to the form shown in Fig. 3, ex-

cept that the sleeve 45 instead of being made up of a collar and a segmental sleeve, is formed in one piece having provided thereon an inwardly extending shoulder 46 adapted to engage a corresponding shoulder 47 on the end portion of the bar 11*d*.

The sleeve 45 is internally threaded as indicated at 48 to receive the threaded shank 49 of the bit 50, and as was pointed out above, it will be observed that relative rotation between the bit and the bar and its associated sleeve will draw the bearing face 51 of the bit into pressure engagement with the bearing face 52 on the end of the bar.

It is the practice in the operation of drill tools of this nature to rotate the bar in a left-hand direction during the drilling action and in order that this rotation may be taken advantage of in maintaining the bit and the bar in pressure engagement, we provide the sleeve with left hand threads so that the rotary movement of the bar will always effect a tightening action upon the threads associated therewith in the sleeve.

It is to be understood that while we have herein described and illustrated certain preferred forms of our invention that the invention is not limited to the precise construction described above, but includes within its scope whatever changes fairly come within the spirit of the appended claims.

We claim as our invention:

1. For use in combination with a percussion drill, a drill tool embodying: a drill bar terminating in a flat bearing face; a bit member having a flat bearing face adapted to abut against the bearing face on said bar; and screw threaded means for drawing the bearing faces on said bit and said bar into full-face pressure engagement, said last mentioned means comprising a sleeve slidably mounted on said bar and provided with threads adapted to engage corresponding threads on said bit.

2. For use in combination with a rotary percussion drill, a drill tool embodying: a drill bar terminating in a flat bearing face; a bit member having a flat bearing surface adapted to abut against the bearing face on said bar; and screw threaded means for drawing the bearing faces on said bit and said bar into full-face pressure engagement, said last mentioned means comprising a sleeve slidably mounted on said bar and provided with a shoulder adapted to engage a corresponding shoulder on said bar, said sleeve also having threads adapted to engage corresponding threads on said bit, said threads being arranged so as to tighten the respective members during rotation of the drill bar.

3. The combination of: a drill bar having a shoulder and a substantially flat bearing face formed on one end thereof; an externally threaded sleeve slidably mounted on said bar with one end adapted to bear against said shoulder; means for holding said sleeve against rotation; and a bit recessed to receive the end of said bar, and having a substantially flat bearing face adapted to have full-face engagement with the bearing face on said bar, the recess in said bit being internally threaded to engage the threads on said sleeve.

4. The combination of: a bit having a threaded shank and a flat bearing surface; a drill bar having a shoulder and a substantially flat bearing face formed on one end thereof; a segmental externally threaded sleeve member slidably mounted on the shouldered end of said bar; a collar having one end portion in threaded engagement with said segmental sleeve and having its other end portion in threaded engagement with said shank for drawing the bearing faces on said shank and said bar into full-face abutting pressure engagement.

5. For use in combination with a percussion drill, a drill tool embodying: a drill bar having a shoulder and a substantially flat bearing face on its end; a bit having a threaded shank and a flat bearing face adapted to abut against the bearing surface on said bar; and a collar mounted on said bar, said collar having a shoulder engageable with the shoulder on said bar and having threads cooperative with the threads on said shank for drawing said bearing surfaces into full-face pressure engagement.

6. For use in combination with a percussion drill, a drill tool embodying: a drill bar polygonal in cross section and terminating in a substantially flat bearing face; a bit having a substantially flat bearing face adapted to abut against the bearing face on said bar; and threaded means for drawing said bearing faces into full-face pressure engagement, said threaded means comprising a sleeve having a polygonal passage in sliding engagement with said bar, means on the end of said bar for preventing the movement of said sleeve over the end of said bar and screw threads on said sleeve adapted to engage corresponding screw threads on said bit.

7. For use in combination with a percussion drill, a drill tool embodying: a drill bar terminating in a substantially flat bearing face which is normal to the axis of said bar; a bit member having a substantially flat bearing face adapted to abut against the bearing face on said bar; screw threaded means for drawing the bearing faces on said bit and said bar into pressure engagement, said last mentioned means comprising a sleeve slidably mounted on said bar and provided with threads adapted to engage corresponding threads on said bit; and means for preventing relative rotation between said drill bar and said sleeve.

8. For use in combination with a percussion drill, a drill tool embodying: a drill bar terminating in a shoulder and a substantially

flat bearing face normal to the axis of said bar; a threaded sleeve slidably and non-rotatably mounted on said bar; a bit member in threaded engagement with said sleeve and rotatable relative thereto, said bit member having a substantially flat bearing face adapted to be drawn into full-face contact with the bearing face on said bar by the advance of said bit in said threads.

In testimony whereof, we have hereunto set our hands at Los Angeles, California, this 8th day of December, 1931.

RUSSELL A. MURDOCK.
JOHN S. McKENNA.