

June 26, 1951

F. L. CORY ET AL
AUGER ROCK DRILL BIT
Filed March 11, 1949

2,558,341

Fig. 1.

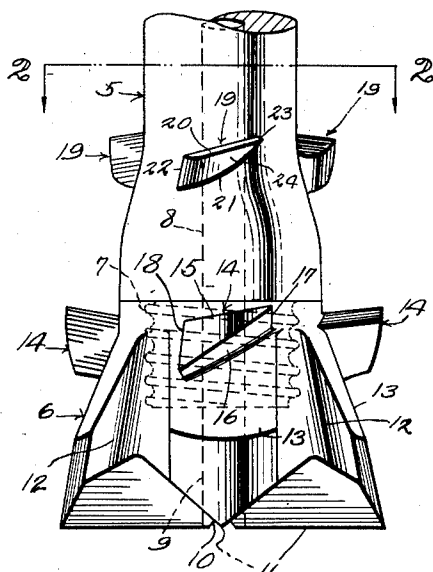
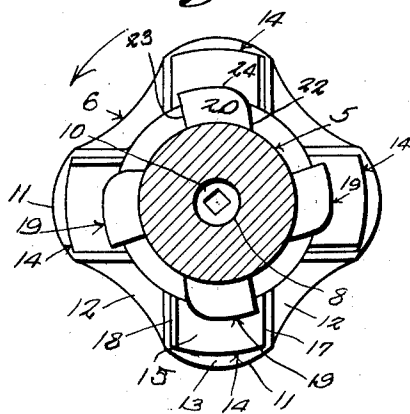


Fig. 2.



F. L. Cory

E. A. Hayden

INVENTORS

BY *C. A. Snow & Co.*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,558,341

AUGER ROCK DRILL BIT

Frank Lawrence Cory, Central Valley, and Ernest
Albert Hayden, Callahan, Calif.

Application March 11, 1949, Serial No. 80,952

5 Claims. (Cl. 255-64)

1

This invention relates to rock drill bit construction. More particularly, the invention has reference to an improved bit, novelly designed to permit easy and speedy withdrawal from the drill hole.

By way of background, it may be noted that in rock drilling operations, holes must often be drilled to considerable depth. In the course of such drilling, all sorts of conditions may be encountered. For example, as the drilling proceeds one may encounter clay strata, mud, paving or gravelly rock, and water in varied amounts.

One or a combination of these conditions may complicate and make difficult the drilling operations. For example, in damp clay ground, the drilling dust tends to form around the drill stem, making a collar. Or, in caving ground small rocks will fall behind the drill bit forming an obstruction when an attempt is made to withdraw the drilling steel. Thus, many hours of time may be lost in drilling a single hole, and very often long lengths of drill steel cannot be removed. In such cases, it may be necessary to drill another hole nearby in order to achieve the results desired, and subsequent blasting operations in most cases will damage the unre-
moved drill still beyond possible reuse.

The purpose of the present invention, accordingly, is to save valuable time and material, and to permit drilling in types of earth and rock heretofore avoided, thus to make earth excavation cheaper and many projects possible that have heretofore not been feasible, using the usual drilling methods.

To this end, we provide a rock drill bit which in basic essentials is conventionally formed, so far as actual drilling of the hole is concerned; and special cutters or augers formed on the drill shank or side surfaces of the drill bit, or at any other point back of the cutting face of the bit, said augers being specially designed so as, in effect, to cause the rock drill to auger its way back out of the drill hole, where it is desired to remove the drill.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts, hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

Referring to the drawings

Fig. 1 is a side elevational view of a rock drill bit and adjacent portion of a drill shank, showing one form of the invention applied thereto.

Fig. 2 is a section on line 2-2 of Fig. 1.

Referring to the drawings in detail, 5 designates generally a drill shank to which is attached

2

a drill bit 6 having a threaded socket receiving threaded stud 7 formed on the shank 5. When considered together, the bit 6 and the illustrated portion of the shank 5 constitute the head portion of a rock drill. Shank 5 has an axial bore 8 communicating with bore 9 of the bit, bore 9 opening at 10 on the cutting face of the bit.

The bit in the present instance is formed with radial cutters 11 defining between them depressions 12. Additionally, shoulders 13 are defined back of the respective cutters 11, said shoulders alternating with the depressions 12, as readily seen from Fig. 2.

All the above is conventional rock drill bit construction and does not per se constitute the present invention.

At this point, and for a better understanding of the invention, it is appropriate to discuss the manner of use and operating characteristics of a conventional rock drill bit as described above. As the drilling proceeds, a blast of air or air and water is sent through the bores 8, 9 and is blown out the opening 10. This is for the purpose of carrying the drillings and small stones out of the drill hole.

It will be readily seen by reference to Fig. 2 that when this blast moves backwardly around the drill bit for the purpose stated above, it will pass through the spaced apart grooved or depressed portions 12 of the bit. This, of course, is because the outer side walls of the cutters 11 will be in engagement with the side wall of the drill hole so that the air blast is forced rearwardly through the clearance spaces or depressions 12 between the respective cutters.

The result is that there is what amounts to a "dead air space" immediately behind each cutter 11 between each shoulder 13 and the side wall of the drill hole. Small hard stones, drillings, mud, and other material tends to lodge in this dead air space. Accordingly, when an attempt is made to remove the drill, the drill sticks in the drill hole.

In accordance with the invention, a plurality of spaced cutter members are provided as projections from the side walls of the drill shank and drill bit, said cutter members on the drill bit being best termed cutting augers and being generally designated by the reference numeral 14. We believe the number of these augers 14 can vary depending on the characteristics of the earth or rock being drilled, the particular formation of the rock drill bit to which the augers are applied, or on other factors. In the illustration of the invention, four augers 14 are illustrated purely for the sake of example in showing one form of the invention which has worked well.

In this form, an auger 14 is formed as a lateral projection on each of the several shoulders 13.

As a result, each auger 14 partially fills the dead air space mentioned, so that falling rock or cuttings tend to stay above the cutting augers 14 as viewed in Fig. 1, so that on withdrawal of the drill, they will be chewed up by the augers allowing free removal of the drill.

Each auger 14 in its preferred form is pitched away from the cutting face of the bit, this being for the purpose of causing the drill to auger its way backwardly out of the drill hole while still rotating in the same direction as it was rotating while moving forwardly and drilling the hole. Each auger, in this connection, is provided with a top face 15 disposed in a plane that is at a slight angle from a plane perpendicular to the axis of the drill. Each auger, additionally, has a bottom face 16 which is at a greater angle to said perpendicular plane, said top and bottom faces converging to meet at the front cutting edge 17 of the auger. Thus, each cutting auger 14 is of approximately triangular shape, having a rear face 18. It has been found that, in average drilling conditions, the pitch of the bottom of the auger should be about 35 degrees, and the top pitch about 8 degrees, to the horizontal.

We also provide another annular row of spaced augers, or more than one other row. These are disposed more remote from the cutting face of the drill bit, and for example they can comprise a row of cutting augers 19 located on the drill shank 5. Or, an annular row of cutting augers could be provided on a washer which can be interposed between the drill shank and drill bit in some bit constructions.

In any event, if one or more rows of augers 19 are provided, they are of roughly the same formation and characteristics as the augers 14. In the present instance, the augers 19 have top faces 20 pitched like the top faces 15, and bottom faces 21, rear faces 22, and cutting edges 23. These in the present instance do not extend laterally as far as the cutting augers 14, as readily seen from Fig. 1 and Fig. 2. Rather, the first row of augers 19 can operate to chew into those cuttings which might otherwise bind against the enlarged lower end of the drill shank, whereupon as the drill augers its way back out of the drill hole, the larger augers 14 can act upon those cuttings which have already been chewed up by the augers 19, and can also act upon other cuttings which are outside the reach of the augers 19.

In any event, when the drill is to be withdrawn, the operator continues rotating the drill in its original direction, shown by the arrow in Fig. 2. As the drill is withdrawn, it will drill its way back through the cuttings, in the manner described above, causing easy and speedy withdrawal of the drill. In tests continuing over a long period of time, the augers have been found to act exactly as stated above.

What is claimed is:

1. A rock drill bit comprising radial wings, radial cutting edges on the lower end of said wings, a plurality of radially extending ledge members integral with the upper portion of the bit, the outermost surfaces of the ledge members extending outwardly from the bit axis a distance no greater than the cutting edges of the bit, said ledge members being inclined upwards and having relatively sharp leading edges, the leading

edges of said ledge members projecting further outward from said upper portion than the trailing edges thereof.

2. A rock drill bit as in claim 1 having in combination therewith a shank, said bit being mounted at the lower end of said shank, an enlarged bell-shaped bit receiving portion on the lower extremity of said shank, a plurality of radially extending secondary ledge members integral with said shank and positioned on said bell-shaped portion, the outermost surfaces of said secondary ledges extending outwardly from the bit axis a distance no greater than the greatest diameter of the shank, said secondary ledge members being inclined upwards and having relatively sharp leading edges, the leading edges of said secondary ledge members projecting further outward from said shank than the trailing edges thereof, said first named ledge members extending further outward from the longitudinal axis of the bit than said secondary ledge members.

3. In a drill a head portion including means at one end for drilling a hole, and a plurality of radially extending ledge members rigid with the side surface of said head portion, said ledge members having sharp leading edges and being inclined out of perpendicularity to the bit axis, the outermost surfaces of the ledge members extending outwardly from the bit axis a distance no greater than said hole drilling means.

4. In a drill a head portion, means at one end thereof adapted for drilling a hole, and a plurality of radially extending ledge members rigid with the side surface of the head portion, the outermost surfaces of the ledge members extending outwardly from the bit axis a distance no greater than the cutting edges of the bit, said ledge members being inclined out of the perpendicularity to the bit axis and having relatively sharp leading edges, the leading edges of said ledge members projecting further outward from said side surface than the trailing edges thereof.

5. In a drill a head portion, means at one end thereof adapted for drilling a hole, and a plurality of radially extending ledge members integral with the side surface of said head portion, the outermost surfaces of the ledge members extending outwardly from the bit axis a distance no greater than said hole drilling means, said ledge members being disposed transversely of said head portion and being inclined slightly and having relatively sharp leading edges, the leading edges of said ledge members extending transversely of the path of rotation of said ledge members.

FRANK LAWRENCE CORY.
ERNEST ALBERT HAYDEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
65 658,060	Dudley	Sept. 18, 1900
1,292,608	Hughes	Jan. 28, 1919
1,370,492	Smith et al.	Mar. 1, 1921
1,547,459	Stafford et al.	July 28, 1925
1,734,469	Journeay	Nov. 5, 1929
70 1,868,074	Reese	July 19, 1932
2,194,267	Brock et al.	Mar. 19, 1940
2,464,781	Baker	Mar. 22, 1949