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1,928,451

ROTARY DRILL BIT

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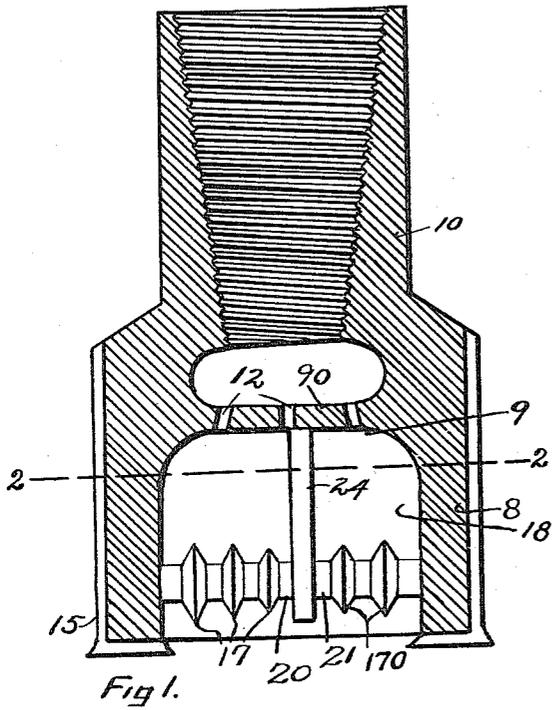


Fig. 1.

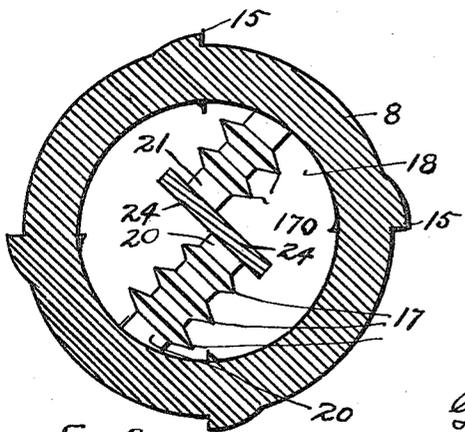


Fig. 2.

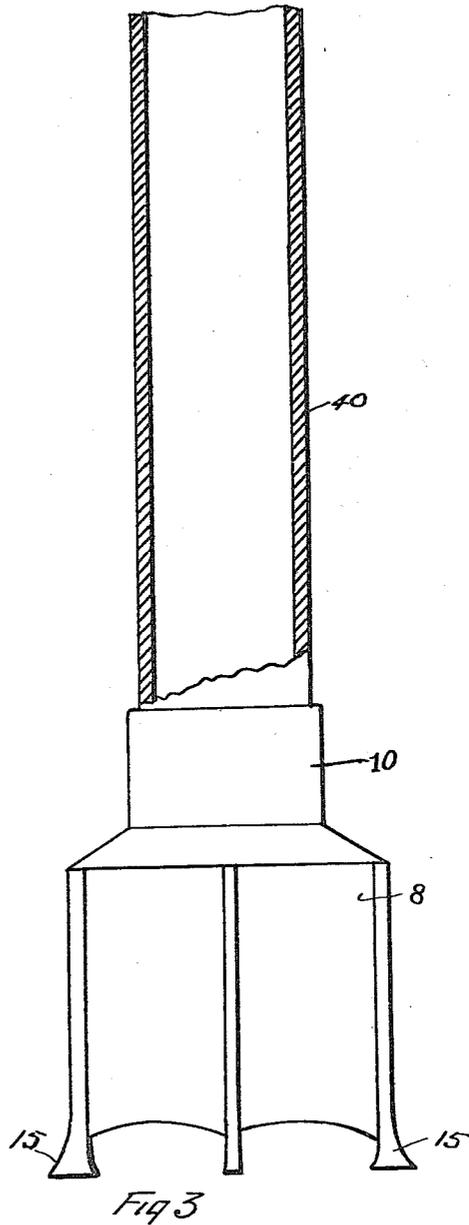


Fig. 3.

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UNITED STATES PATENT OFFICE

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ROTARY DRILL BIT

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3 Claims. (Cl. 255—71)

My invention relates to a rotary drill bit. The object I have accomplished is the production of a drill bit which has a minimum dragging surface and produces a large core compared with the size of the hole being bored, the core being pulverized and removed by means of discs. Another object is the arrangement of the discs within the bit so that one set of discs will offset another set, and the cuttings from the core will be thrown toward the wall of the drill hole.

In the drawing accompanying this specification, Fig. 1 is a longitudinal sectional view of the bit. Fig. 2 is a cross sectional view of the bit along section line 2—2 in Fig. 1. Fig. 3 shows the drill with the drill pipe attached thereto, the drill pipe being in section and showing the leads intended for flushing the hole.

Referring to the drawing, I have formed a drill bit casting in which a portion 8 thereof is in tubular form, one end 9 of the tubular form being closed. Extending beyond the closure and having a common center line with the tubular form is a socket 10 having female threads therein adapted to attach the drill pipe thereto. The drill pipe 40 is hollow for the purpose of conducting fluid mud therethrough and leads 12 through cover 90 are adapted to carry the mud into the core chamber 18 within tubular member 8. The mud pressure carries the mud upward along the outside wall of the bit and drill pipe. Extending along the outside periphery of the tubular portion 8 are a plurality of cutters 15 which are adapted to make an annular cut around the core. These cutters also extend across and below the face of tubular portion 8.

To remove the core thus formed, I cut the core into small particles and then flush it out with the mud circulating through the drill pipe, the core chamber, and along the outside wall of the core and drill pipe.

The pulverizing or cutting of the core is done with a plurality of discs or cutter assemblies 17 and 170 positioned within core chamber 18. A shaft 20 supports cutter assembly 17. One end of shaft 20 is rigidly attached to the wall of tube 8 and the opposite end is supported by a hanger 24 which depends from the closure on the top of tube 8. Discs 170 are supported by shaft 21 which shaft is attached to the wall of tube 8 on the opposite side to the portion of the wall carrying shaft 20. The other end of shaft 21 is supported by hanger 24. Shafts 20 and 21 should be parallel with each other and parallel with a diameter of the core chamber. Thus the two sets of cutters are offset relative to each other

as clearly shown in Fig. 2. In Fig. 2 I have shown 3 discs on shaft 20 and 2 discs on shaft 21. It is noted, however, that more or less discs can be used as may be desirable after testing the character of the core which it is proposed to disintegrate. Cutters 15, it will be noted, extend slightly beyond the under face of tube 8, thus leaving an opening through which the disintegrating core can pass and the flow of the mud when in circulation will not be obstructed.

It is also noted that the discs or cutters are preferably formed with diameters of different lengths, and are arranged on the shafts so that they uniformly increase in size from the center of the core chamber outwardly from said center. These discs are adapted to rotate on the shafts. The object of this construction is for ease in cutting inasmuch as cutting, or breaking up the core with the discs, is more easily accomplished when the face end of the core is approximately conical in shape or a spiral step, than when said face end of the core is a plane surface.

While the arrangement of the discs above described is adapted to cut the top surface of the core in a conical shape, my invention covers likewise the arrangement which is adapted to cut the surface so it is an approximate plane, which could be accomplished if the discs were all of uniform diameter.

The set of the cutters as shown in Fig. 2 provides for moving the cut portions of the core toward the outside periphery of the core as the drill rotates, and the cuttings are forced through the openings under the tubular portion between the cutters where it can be moved away with the flow of the mud.

Having described my invention I claim as new and ask for Letters Patent:

1. In combination with a bit having a core chamber, and adapted to cut an annular hole in the earth, and to leave a core concentric with said annular hole, of means for pulverizing said core consisting of two sets of cutting discs adapted to rotate on two shafts within the core chamber, the two shafts being arranged to extend from opposite sides of the core chamber parallel with each other, and parallel with a diameter of the core chamber.

2. In a cutting bit having a core chamber, and having means for cutting an annular groove and forming a core concentric with said groove, and means for pulverizing the core consisting of the combination of a plurality of cutting discs within said core chamber, said discs being rotatively disposed on two shafts, said shafts extending from

opposite sides of the core chamber parallel with a diameter of the core chamber.

3. In combination with a cutting bit having a core chamber, means for cutting an annular groove and forming a core within said groove, and for rotating said bit, of means for pulverizing said core consisting of a plurality of cutting discs rotatably disposed on two shafts mounted in said core chamber parallel with a diameter

of said core chamber, said discs having varying diameters, said discs being arranged on the shafts so that the disc having the shortest diameter is nearest the center of the core chamber, and the larger discs are arranged so that they increase in diameter in regular order from said center of the core chamber outwardly from said center.

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