M. J. A. CULMORE.

DRILL BIT.

APPLICATION FILED JULY 30, 1918.

1,306,371.

Patented June 10, 1919

2 SHEETS—SHEET 1.

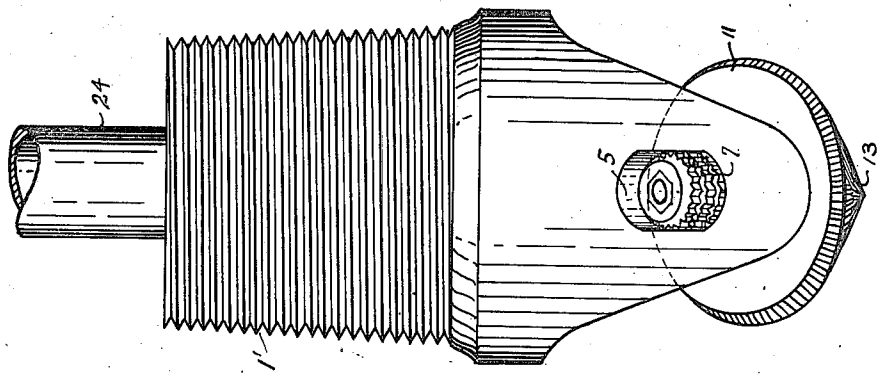


Fig. 1.

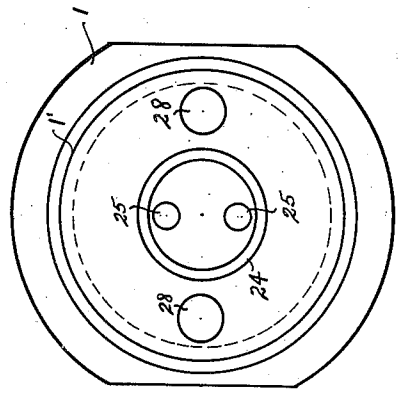


Fig. 2

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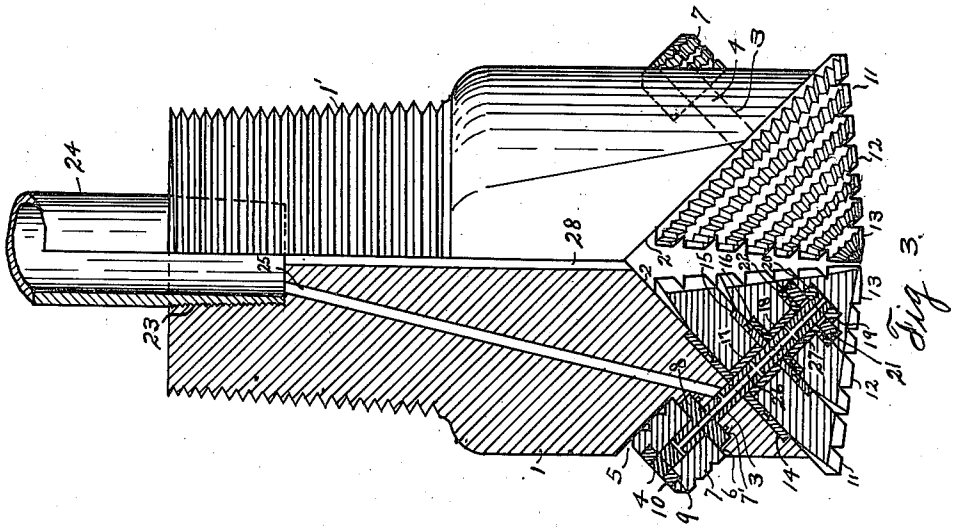


Fig. 3.

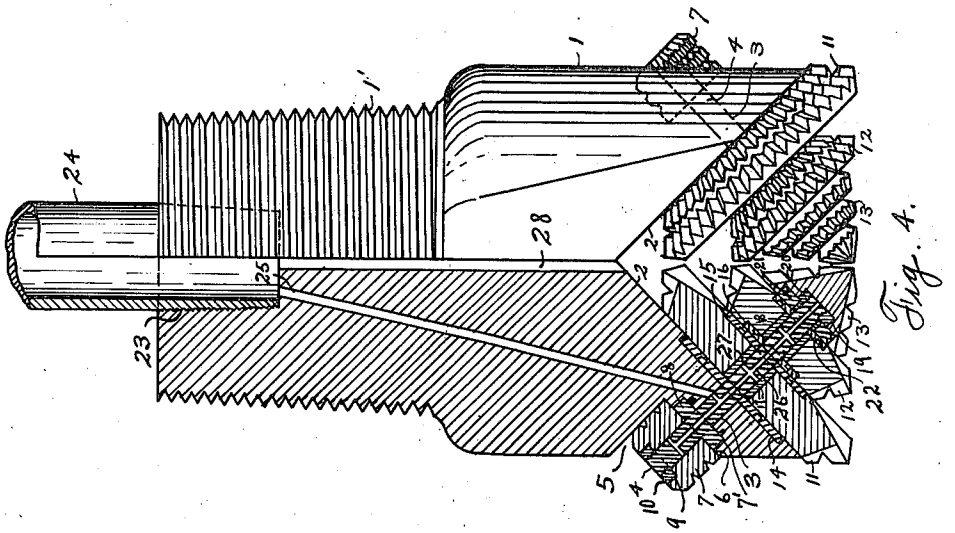


Fig. 4.

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UNITED STATES PATENT OFFICE.

MARCH J. A. CULMORE, OF HOUSTON, TEXAS.

DRILL-BIT.

1,306,371. Specification of Letters Patent. Patented June 10, 1919.

Application filed July 30, 1918. Serial No. 247,450.

To all whom it may concern:

Be it known that I, MARCH J. A. CULMORE, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Drill-Bits, of which the following is a specification.

This invention relates to new and useful improvements in a drill bit.

The object of the invention is to provide a bit of the character described, which has been especially designed for the purpose of drilling through rock, or other hard formations and is also adapted for use in drilling through softer formations, such as shale.

Another object of the invention is to provide a bit of the character described, having rotatable cutters formed in sections, said sections being reversible so as to adapt the bit for drilling, either through rock and hard formations or for drilling through shale, and similar formations.

Another feature of the invention resides in the provision of side reamers which are provided for the purpose of reaming out and enlarging the bore formed by the bit.

A still further feature of the invention resides in the provision of a novel means for lubricating the bearings.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1, is a side view of the bit.

Fig. 2, is a top plan view.

Fig. 3, is a side view of the form of bit especially adapted for drilling through rock, and shown partially in section, and

Fig. 4, is a side view of a modified form which is especially adapted for drilling through shale and shown partially in section.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1, designates the head, which is preferably formed of one piece, and whose shank 1′ is externally threaded to fit a standard pipe coupling, and whose lower end has a transverse V-shaped recess, forming the faces 2, 2, extending at approximately a 90 degree angle to each other, and drilled through the head on each side at approximately right angles to the faces 2, 2, are the holes 3, 3, which are provided to receive bearing spindles 4, 4. The outer ends of the holes 3, 3, are enlarged, forming the recesses 5, 5, and the bearing surfaces 6, 6, forming end bearings for the side reamers 7, 7. The bearing surfaces 6, 6, are counter-bored, as at 7′, to receive the annular bosses 8 of the spindles 4. The outer end of each reamer 7 is counter-bored, at 9, to receive the nuts 10, 10, which are threaded on the outer end of the spindle 4, and seated in said counterbores 9. The reamers 7 have their outer ends frusto-conical shaped in form, and their operative faces are fluted or serrated, forming teeth as shown. The spindles extend inwardly beyond the faces 2, 2, and mounted upon their upper ends are the cutting rollers substantially conical in form, and composed of the sections 11, 12, and 13. The cutting rollers are arranged in pairs, and the section 11, is the largest and fits against the corresponding face 2, and interposed between said section and its face is a hardened washer 14, which rests in a counter-bore in the head. The inner face of this section is counterbored, to receive the hardened washer 15, against which the second section 12, fits, the adjacent end of the last mentioned section being counter-bored to receive the hardened washer 16, and these sections 11 and 12 have bushings 17 and 18, preferably of brass or other similar material which form bearings on the spindles 4. These sections 11 and 12 are milled with teeth, as shown in Figs. 3 and 4, said sections and teeth being beveled each way from a circumferential line, so that they will be reversible. The point of each cutter is formed of the conical shaped section 13, which has a smooth counter-bore 19, to receive the nut 20, which is threaded upon the inner end of the corre-

sponding spindle 4, and a retaining ring 21, is screwed into a corresponding internally threaded counter-bore in the face of said section to retain the same upon the end of the spindle 4. This ring 21 is hardened and operates against the hardened washer 22, which is counter-sunk into the adjacent face of the section 12.

Dowel pins are used to hold the washers, between the sections, in place, and to hold the boss 8 of each spindle 4 in position in the head. The shank of the head has the internally threaded socket 23, to receive the externally threaded lower end of a lubricant retainer 24, and leading from this retainer are the conduits, 25, 25 which terminate in the spindle bearings. The spindles have the respective ducts 26 bored therethrough, from the inner end to near the outer end thereof, and radiating from each duct 26 are the outlets 27, through which the lubricant is conducted to the reamer bearing, and to the bearings of the roller sections, one of said outlets being arranged opposite the discharge end of the conduit 25, through which lubricant is introduced into the duct 26, of the corresponding spindle. All of the bearings are thus continuously lubricated.

Water passageways 28, 28, are bored down through the head outside of the lubricant retainer 24, and terminate in the angle formed between the faces 2, 2. The bit is attached to the lower end of the drill stem in the well known manner, and water is forced down through said stem and through the water passageways 28, 28, and reaches the cutters to carry away the cuttings therefrom.

In drilling through hard rock, the sections of the cutting rollers are arranged, as shown in Fig. 3, so as to give said rollers substantially a conical shaped form, the sections fitting up closely together. When shale or other comparatively soft formation is encountered, the sections 11 and 12, may be reversed, and they are so beveled that when reversed, their operative faces will be spaced apart, as shown in Fig. 4, thus forming operative faces on the rollers that will penetrate and disintegrate a shale-like formation very rapidly.

It is obvious that the roller sections can be milled or toothed in any desired manner, so as to present an abrading or cutting operative surface, depending upon the character of the formation to be pierced, and it is further obvious that the sections of one roller may be arranged in staggered relation with respect to the sections of the other roller, so that the roller on one side of the head will cut away any formation which may be left by the roller on the other side.

What I claim is:

1. A drill including a head, whose lower end is formed with diverging faces, spindles anchored in the head, and extending at approximately right angles to the respective faces, an approximately conical shaped cutting roller rotatably mounted on the inner end of each spindle, and formed of independent sections and a reamer carried by the outer end of one of said spindles.

2. A drill including a head, whose lower end is formed with diverging faces, spindles anchored in the head, and extending at approximately right angles to the respective faces, an approximately conical shaped cutting roller rotatably mounted on the inner end of each spindle, and formed of independent sections, and a reaming roller rotatably mounted on the outer end of each spindle.

3. A drill including a head, provided with a lubricant conduit, a spindle carried by the head, a cutting roller mounted on the spindle, and being approximately conical shaped in contour, said roller being composed of independent sections, a duct in said spindle communicating with the conduit and terminating in the roller bearings, a lubricant retainer from which lubricant is discharged through said conduit and duct to the roller bearing, and a side reamer mounted on the outer end of the spindle.

4. A drill including a head, whose lower end is formed with diverging faces, spindles anchored in the head, and extending at approximately right angles to the respective faces, said head being formed with a recess on each side, into which the outer end of the corresponding spindle projects, an approximately conical shaped cutting roller rotatably mounted on the inner end of each spindle, and formed of independent sections, and a reamer located in each recess of the head, and rotatably mounted upon the outer ends of the spindles.

5. A drill including a head, having a face angularly disposed relative to the axis of the head, a spindle anchored in the head, at approximately right angles to said face, whose inner end projects beyond said face, and whose outer end extends beyond said head, an approximately conical shaped cutting roller rotatably mounted on the spindle and operating against said face, said roller being formed of independent sections, a reamer rotatably mounted upon the outer end of the spindle, said spindle being provided with a lubricant duct, which terminates in the roller and the reamer bearings, a lubricant retainer and a conduit leading therefrom and communicating with the spindle duct.

6. A drill including a head, whose lower end is formed with diverging faces, spindles anchored in the head and extending at right

angles to the respective faces, an approximately conical shaped cutting roller rotatably mounted on the inner end of each spindle and a reamer carried by the outer end of each spindle.

7. A drill including a head, whose lower end is formed with diverging faces, spindles anchored in the head, and extending at approximately right angles to the respective faces, a cutting roller mounted on the inner end of each spindle, and a side reamer carried by the outer end of each spindle.

In testimony whereof he has signed his name to this specification in the presence of two subscribing witnesses.

MARCH J. A. CULMORE.

Witnesses:
E. V. HARDWAY,
IRENE BRUNS.