April 24, 1928. 1,667,077

H. MECOM

DRILL

Filed Aug. 9. 1926

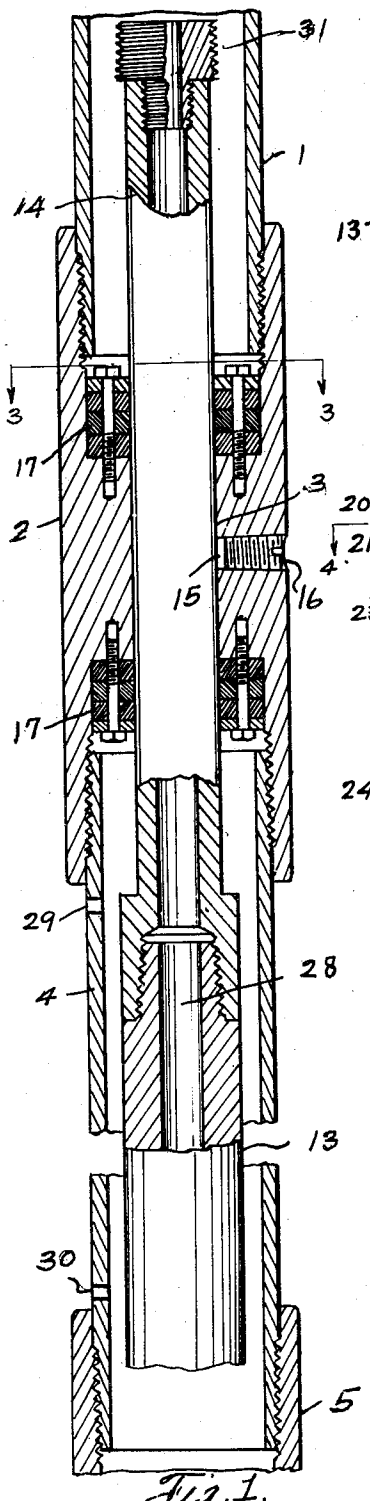


Fig. 1.

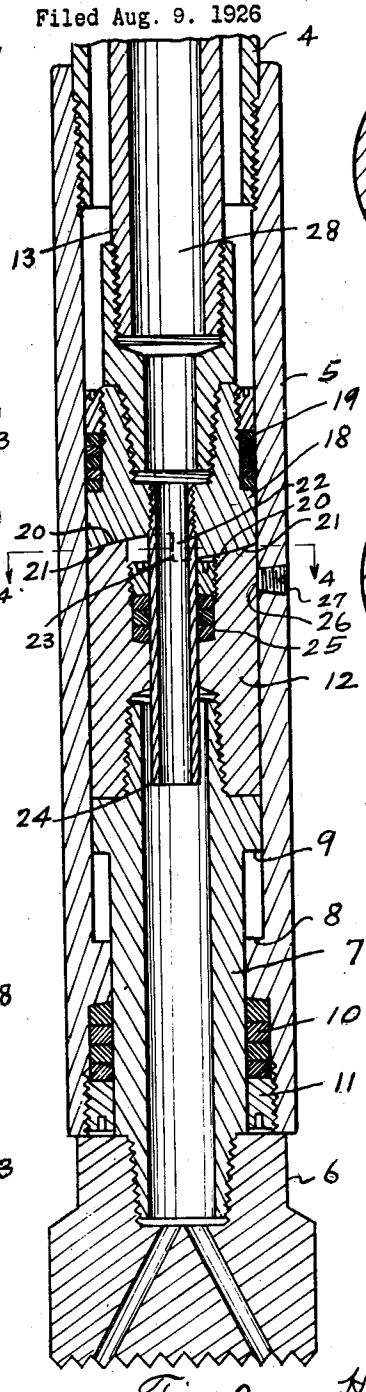


Fig. 2.

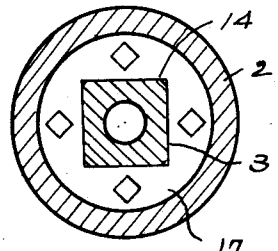


Fig. 3.

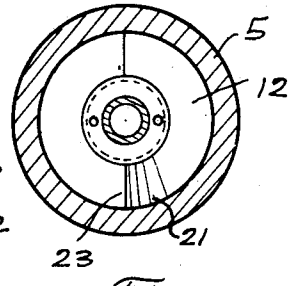


Fig. 4.

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UNITED STATES PATENT OFFICE.

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DRILL.

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

One object of the invention is to provide a drill of the character described comprising a rotatable barrel, a drilling tool associated therewith and a hammer associated with the barrel and operable thereby as the barrel is rotated by the drill stem, and adapted to strike said tool with successive blows as said stem is rotated, to effect the abrasion or disintegration, by said tool, of the formation at the bottom of the bore.

Another object of the invention is to provide a drill of the character described, of such formation that the movable parts thereof may be readily lubricated.

With the above and other objects in view this 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 vertical sectional view of the upper end of the apparatus.

Figure 2 is a vertical sectional view of the lower end thereof.

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 1, and

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 2.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates a tubular drill stem which is adapted to be rotated by the usual rotary drilling machine. Attached to the lower end of this drill stem there is a coupling 2 having a polygonal opening 3 therethrough and connected to the lower end of the coupling 2 is a tubular barrel 4. The numeral 5 designates a tubular drill collar which is connected to the lower end of the barrel 4.

There is a drilling tool embodying a bit 6 and a separable tubular shank 7 which extends up into the drill collar 5. The collar 5 has an inside annular shoulder 8, and the shank of the drilling tool has a corresponding external shoulder 9, said shoulders being adapted to interengage to prevent the detachment of the drilling tool from the drill collar. Secured within the lower end of the drill collar and surrounding said shank there is a stuffing box composed of the packing 10 and the annular retaining nut 11. Screwed on the upper end of the shank 7 there is a head 12 which fits closely within the drill collar.

Within the barrel 4 there is a tubular hammer 13 whose upper end, or shank 14, is polygonal to conform in shape to and fit through the opening 3 of the coupling 2 so that as the stem is rotated the hammer will turn with it. The coupling 2 has a lubricating port 15 normally closed by the removable plug 16 so that the bearing of the shank 14 through the coupling 2 may be lubricated and the lubricant is retained therein by means of the upper and lower stuffing boxes 17, 17, secured within the coupling 2 and through which the shank 14 works. The lower end of the hammer is formed with an enlarged detachable head 18 which fits closely within the drill collar and carries the surrounding packing gland 19 to form a fluid tight joint with said drill collar. The lower end of the hammer abuts the upper end of the head 12 and these respective abutting ends have the oppositely disposed correspondingly inclined faces 20, 20, 21, 21, which terminate in the oppositely arranged abrupt vertically disposed shoulders 22, 23, respectively, the shoulders 22 facing in the direction the opposite of that of the shoulders 23. A tubing 24 has its upper end threaded into the lower end of the hammer with its lower end free and working through the head 12 and a stuffing box 25 is mounted within said head around the tubular section 24.

In operation, with the drill collar 5 resting on the bit 6, as the stem 1 is rotated the hammer 13 will be rotated with it and the face 20 will ride up on the face 21 lifting the hammer until the shoulders 22 pass the shoulders 23 and the hammer will then drop thus striking the upper end of the head 12 in rapid succession and driving the bit 6 against the formation at the bottom of the bore and disintegrating the same. The sloping face 20 striking the sloping face 21 will impart a partial rotation to the drilling tool so that as drilling proceeds the bit 3 will turn slightly and thus abrade away the formation at the bottom of the bore.

For the purpose of lubricating the head 12 the lubricant port 26 has been provided and is normally closed by the removable plug 27 and through which the lubricant may be supplied to said head.

In drilling, water, or slush, will be forced

down through the stem and will pass on down through the channel 28 of the hammer and thence down through the drilling tool and will be discharged at the lower end thereof. The packing glands hereinbefore described, are so disposed so as to exclude this slush and grit from the working parts of the tool and to retain the lubricant supplied thereto.

The barrel 4 is provided with upper and lower ports 29 and 30 through which fluid may enter into said barrel to equalize the pressure to prevent the barrel from becoming crushed by the excessive water pressure on the outside.

There is an enlarged head 31 screwed into the upper end of the shank 14. This head is provided so that in case the drill collar, or barrel 4, should become twisted in two, in withdrawing the stem this head 31 will engage with the coupling 2, when the stem 1 is withdrawn, and the shank 14 and the parts connected thereto will be withdrawn from the bore with said stem. The head 31 is outwardly threaded to receive the ordinary pipe coupling so that in handling the hammer about the derrick the ordinary elevators may be engaged around the shank 14 underneath said head and the hammer thus more conveniently handled through said elevators.

What I claim is:—

1. A drill including a rotatable stem, a coupling attached to the lower end of the stem and having a polygonal opening therethrough, a barrel connected to the lower end of said coupling, a tubular drill collar connected to the lower end of the barrel, a drilling tool embodying a bit and a separable tubular shank which extends up into said collar and is rotatable independently thereof, said collar and shank having interengaging shoulders to prevent the detachment of the drilling tool from the collar, a head connected to the upper end of said shank and fitting within said collar, a tubular hammer within the barrel whose upper end is polygonal and fits through the opening of said coupling, an enlarged detachable head carried by the lower end of the hammer which fits closely within the drill collar and forms a fluid tight joint therewith, the lower end of the hammer head and the upper end of the shank head having oppositely disposed correspondingly inclined faces which terminate in oppositely arranged abrupt vertically disposed shoulders, a tubing whose upper end is threaded into the lower end of the hammer and whose lower end works through the head of said shank.

2. A drill including a rotatable stem, a coupling attached to the lower end of the stem and having a polygonal opening therethrough, a barrel connected to the lower end of said coupling, a tubular drill collar connected to the lower end of the barrel, a drilling tool embodying a bit and a separable tubular shank which extends up into said collar and is rotatable independently thereof, said collar and shank having interengaging shoulders to prevent the detachment of the drilling tool from the collar, a head connected to the upper end of said shank and fitting within said collar, a tubular hammer within the barrel whose upper end is polygonal and fits through the opening of said coupling, an enlarged detachable head carried by the lower end of the hammer which fits closely within the drill collar and forms a fluid tight joint therewith, the lower end of the hammer head and the upper end of the shank head having oppositely disposed correspondingly inclined faces which terminate in oppositely arranged abrupt vertically disposed shoulders, a tubing whose upper end is threaded into the lower end of the hammer and whose lower end works through the head of said shank, said barrel having ports providing for the inlet of fluid into the same.

3. A drill including a rotatable stem, a coupling attached to the lower end of the stem and having a polygonal opening therethrough a barrel connected to the lower end of said coupling, a tubular drill collar connected to the lower end of the barrel, a drilling tool embodying a bit and a separable tubular shank which extends up into said collar and is rotatable independently thereof, said collar and shank having interengaging shoulders to prevent the detachment of the drilling tool from the collar, a head connected to the upper end of said shank and fitting within said collar, a tubular hammer within the barrel whose upper end is polygonal and fits through the opening of said coupling, an enlarged detachable head carried by the lower end of the hammer which fits closely within the drill collar and forms a fluid tight joint therewith, the lower end of the hammer head and the upper end of the shank head having oppositely disposed correspondingly inclined faces which terminate in oppositely arranged abrupt vertically disposed shoulders, a tubing whose upper end is threaded into the lower end of the hammer and whose lower end works through the head of said shank, and an enlargement carried by the upper end of said hammer shank.

In testimony whereof I have signed my name to this specification.

HARVEY MECOM.