May 25, 1926. 1,586,415

O. DUDA

ROTARY CORE DRILL

Filed Nov. 1, 1923 2 Sheets-Sheet 1

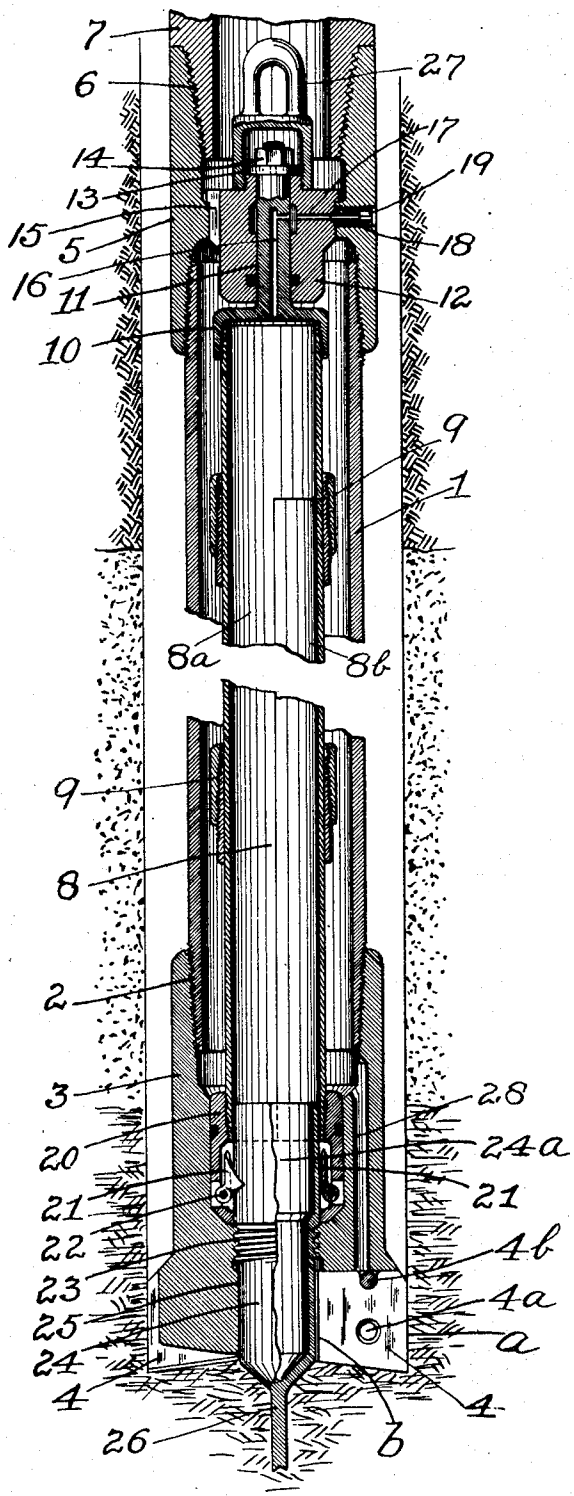


Fig. 1

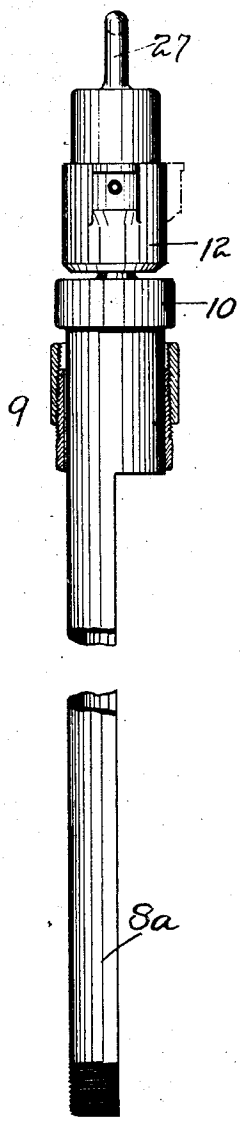


Fig. 2



Fig. 3

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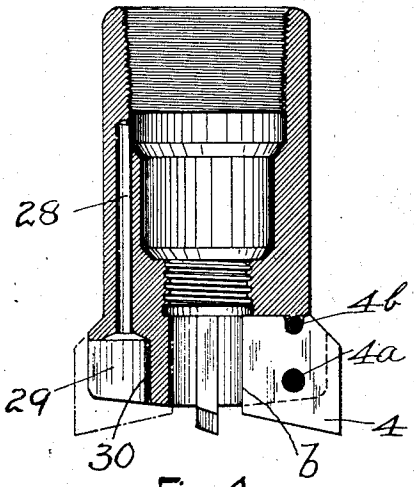


Fig. 4.

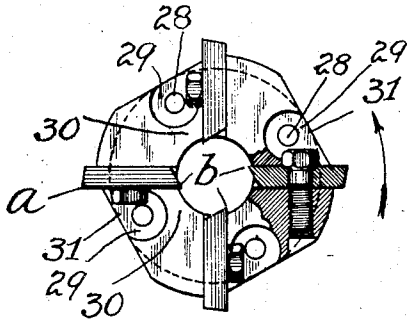


Fig. 5.

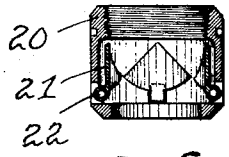
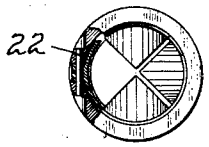


Fig. 6.

Fig. 7.



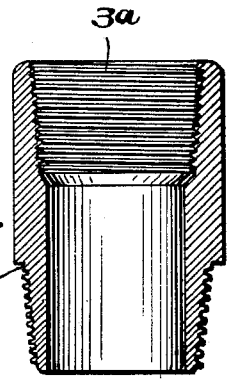


Fig. 10.

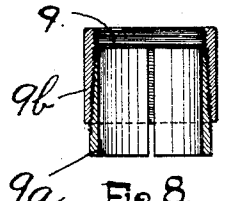


Fig. 8.

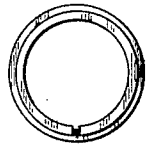


Fig. 9.

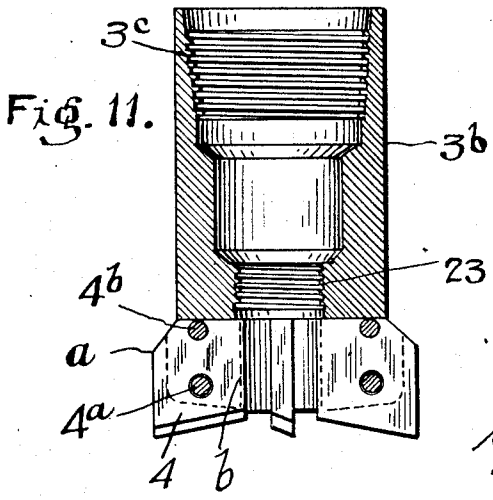


Fig. 11.

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UNITED STATES PATENT OFFICE.

OSWALD DUDA, OF HOUSTON, TEXAS, ASSIGNOR TO REED ROLLER BIT COMPANY, OF HOUSTON, TEXAS, A CORPORATION OF TEXAS.

ROTARY CORE DRILL.

Application filed November 1, 1923. Serial No. 672,189.

The invention is designed to form and extract from the ground a core which will show the character of the formation at the point under investigation and it consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the drawings:

Figure 1 is a vertical sectional view of a core drill embodying the invention.

Fig. 2 is a view of part of the core tube and associated parts.

Fig. 3 is a view of the removable section of the core tube.

Fig. 4 is a sectional view of the cutter head.

Fig. 5 is a bottom plan view of Fig. 4.

Fig. 6 is a vertical sectional view of the member which carries the core trapping devices.

Fig. 7 is a bottom plan view of Fig. 6.

Figs. 8 and 9 show a clamp for holding the parts of the core tube together.

Fig. 10 is a vertical sectional view of the upper member of a two part cutter head, adapted to screw into the other part of the head, Fig. 11.

Fig. 11 is a vertical sectional view of the lower member of the cutter head, carrying the cutters, and adapted for connection with the upper member of this head, shown in Fig. 10.

In these drawings 1 represents the outer casing of the core bit body, having screw threaded thereto at 2 the cutter head 3 carrying cutters. The casing or tube 1 at its upper end is screw threaded into a coupling 5 having a screw thread connection at 6 with a coupling member 7 to which the drill stem is connected. A tube 8 is located within the barrel or casing 1 to receive the core which is cut from the bottom of the hole by the cutters 4. This core receiving tube is made in sections 8^a, 8^b, Figs. 2 and 3, which are held together by clamps 9, Figs. 8 and 9. These clamps are made up of two members 9^a, 9^b, the former of which is a split ring tapered and screw threaded exteriorly and receiving the member 9^b, which is in the form of a complete collar tapered and screw threaded interiorly to press the split ring about the two members of the core tube to hold them together.

At its upper end the core tube has a cap 10 screw threaded thereon, which cap has a stem 11, which is swivelled in a block 12, the connection between these parts being formed by the collar or washer 13 and the nut 14. The nut is screw threaded onto the upper reduced end of the stem 11 and the collar overlies a part of the block 12. The block 12 has a passage or passages as at 15 for the downflow of flushing water. The stem 11 of the swivel connection has a central bore 16 to vent the core tube to the outside of the apparatus.

This central bore connects with a passage 17 extending laterally through block 12 and through a screw plug 18 threaded into the coupling 5 and having its inner end seated in a depression in the side of the block 12. This plug has a recess at 19 to receive a wrench. When in place the plug holds the block 12 against longitudinal displacement.

At the lower end of the core tube there is connected thereto by screw threads a member 20 in the form of a collar. This collar has a plain exterior surface and a plain bevelled lower end. It is seated in the lower cutter head which may rotate around this collar. The collar carries the traps or holding devices 21 which are intended to entrap the core when the latter has risen relatively within the core tube. These traps or core retainers are pivotally mounted at 22 within openings or recesses of the collar.

The cutter head at 23 is provided with a coarse thread with which the threaded part of a plug 24 engages. This plug initially closes the lower end of the core tube and the bore 25 through the cutter head leading thereto, so that as the apparatus is being lowered into the hole the core tube will be closed and therefore will not receive scrapings or other material not desired as a sample. The plug is provided with an extension 26 which embeds itself in the bottom of the hole and prevents the plug from rotating in unison with the apparatus itself when this is rotated. When this rotation of the apparatus takes place, the plug being held against rotary movement equal to that of the apparatus, will unscrew from connection with the cutter head and in this action it will rise in relation thereto and thus it will enter the core tube and thus open the said tube at its lower end for the relative passage upwardly thereinto of the core which is

formed or left standing at the axial center of the hole being cut, and this core will now, relatively, rise into the core tube to fill the same. Any flushing water or fluid mud which may have entered the upper part of the core tube will be expelled through vent 16, 17 as the core fills the core tube. The plug or closure 24 is hollow and it has an upward hollow extension or sleeve portion 24^a which, when the plug is in normal position, as shown in Fig. 1, will hold back the detents or retainers 21 and this position of the retainers will persist until the plug or closure rises to a level above the upper ends of the retainers, whereupon they will engage the core.

When the desired length of core has been cut and has been received in the core tube, the apparatus is withdrawn from the well. The retainers 21 will engage the core, as just stated, and upon removal of the apparatus from the well or hole the core will come with it, being now lodged in the core tube and retained by the traps or holders 24.

The cutters 4 are held in place by bolts 4^a and by cross pins 4^b extending across the recesses in which the cutters are located, and through notches in the cutters.

These cutters have outer and inner cutting edges *a*, *b*, as shown in Fig. 5, their inner ends being disposed at sufficient distance apart to leave a core of the diameter proper to be received by the core tube.

Instead of forming the lower cutter head in one piece, as shown in Fig. 1, this head may be formed in two pieces, as shown in Figs. 10 and 11, in which the upper part 3^a screws into the lower part 3^b, the threads being coarse, as at 3^c, and a shoulder joint being provided at 3^d, to enable "breaking out" at this point without danger of stripping threads, such as has occurred when fine threads have been used.

To remove the core tube with its contained core of material from the apparatus, the connection at 6, 7 is broken, screw plug 18 is screwed back and the core tube is removed by pulling on the loop 27, the base portion of which is screw threaded onto the block 12. When the tube is removed access to the core can be gained by separating the two parts 8^a and 8^b.

By reason of the swivel connection at the upper end of the core tube and the fit of the collar 20 relative to the head, the core tube will remain relatively stationary while the core bit and the stem 1 rotate around it. This will prevent the core from being twisted off and destroyed.

With my construction a core intact throughout may be obtained.

By the sectional character of the core tube the core can be readily removed without breaking.

The core bit head, as shown in Fig. 5, is of substantially rectangular or square cross sectional shape. This provides clearance for the upflow of flushing water and detritus.

Flushing water will pass down through the space between the core tube and the casing or stem 1, thence through the passages 28 to the cutters, and thence up between the outer side of the apparatus and the wall of the well.

The invention is adapted for use in drilling oil or other wells in connection with which it is desirable to obtain samples or cores to show the character of the material through which the drilling is to be performed.

The core is cut a little smaller in diameter than the bore of the core tube.

The extension 26 may terminate in the form of a fish tail bit to cut its way into the bottom of the hole.

It will be noticed from an inspection of Figs. 4 and 5 that the flushing water passing through the conduits 28 flows, after leaving these conduits, through the spaces 29 which are defined on their inner sides by the walls 30 extending down and acting as shields against the impinging of the water upon the central core of the material. The recesses or spaces 29 are open laterally at 31 for the outward or lateral flow of the water or flushing mud after this leaves the lower outlets of the passages 28 and this lateral flow of the flushing water is along the side face of the cutter and directly to the cutting edge thereof, keeping the latter cool. From this construction it will be seen that the core of material is protected from any action thereagainst by the flushing water.

The collar 20 virtually seals the lower end of the tube from the flushing water and it forms substantially an extension of the core tube. It remains stationary therewith and carries the traps or core retainers so that these also remain stationary.

I claim:

1. In combination in a core drill, a hollow head carrying cutters, a hollow drill stem carrying the head, a core receiving tube within the drill stem, a swivel support for the upper end of the core tube, a collar fixed on the lower end of the core tube, and having relative rotative contact with the wall of the head and forming a seal for the lower end of the tube against the access of flushing water, conduits through the head for the flushing water, core retainers pivoted to said collar and a plug screwed into the head and having an extension projecting up into the collar and holding the retainers initially in retracted position, substantially as described.

2. In combination, a drill bit having cutters and a central bore, a drill pipe, a core tube within the drill pipe, a coupling for the drill pipe, a block removably attached to and within the coupling, a swivel connec-

tion between the core tube and said block, comprising a hollow stem having a lateral port, said block and coupling having aligned ports and a hollow screw for holding the block in place, substantially as described, and a pulling device connected with the block by which the core tube can be withdrawn from the drill pipe, substantially as described.

3. In combination, a drill bit having substantially radial slots, cutter blades mounted in said slots and having outer and inner cutting edges, screw bolts passing through the cutter blades and into the drill bit body, said cutters having notches at their upper edges, and pins passing through said notches and into the body of the bit, substantially as described.

4. In combination in a core drill, a cutter head, a sectional casing connected thereto to rotate the head, a core tube within the casing, a coupling between the sections of the casing, a block removably seated in the coupling, detachable means for holding the block in place on its seat in the coupling, a stem connected with the upper end of the core tube swivelled in the block, and means attached to the block for engagement by hoisting means, substantially as described.

In testimony whereof, I affix my signature.

OSWALD DUDA.