July 7, 1931. J. C. WRIGHT ET AL 1,813,375

CORE DRILL

Filed Nov. 15, 1927

Fig. 1.

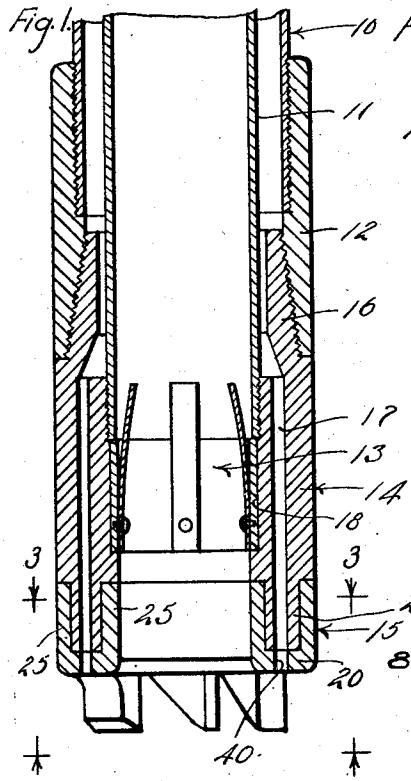


Fig. 4.

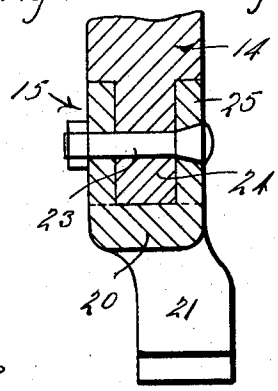


Fig. 5.

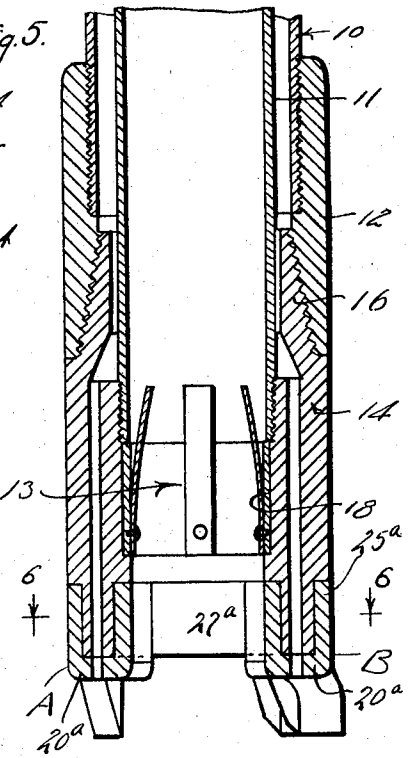


Fig. 2.

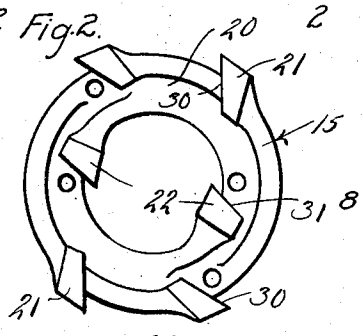


Fig. 7.

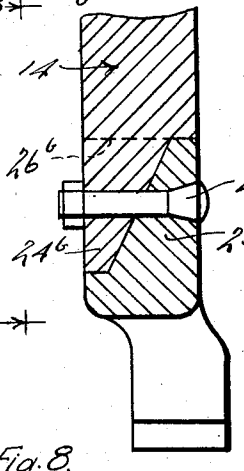


Fig. 6

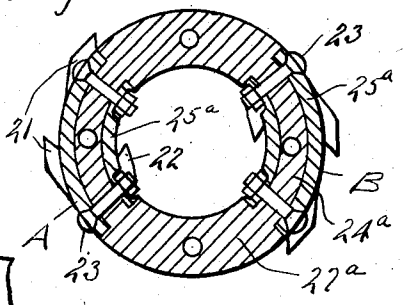


Fig. 3.

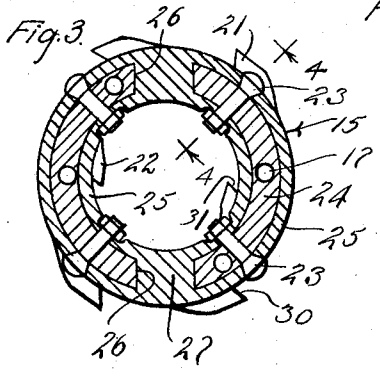
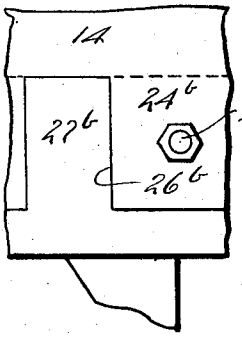


Fig. 8.



Inventors
Jesse C. Wright
and
Lynn F. Bonney
by W. A. Mapwell
Their Attorney

Patented July 7, 1931 1,813,375

UNITED STATES PATENT OFFICE

JESSE C. WRIGHT, OF HUNTINGTON PARK, AND LYNN F. BONNEY, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO WIEMAN, KAMMERER, WRIGHT CO., INC., A CORPORATION OF CALIFORNIA

CORE DRILL

Application filed November 15, 1927. Serial No. 233,351.

This invention has to do with a core drill, and it is an object of the invention to provide a drill for use in well drilling for the purpose of taking a core or sample of the formation being drilled.

It is a primary object of our present invention to provide a practical and improved arrangement and formation of cutting parts in a core drill.

Another object of the invention is to provide a core drill which is simple and inexpensive and in which the wearing parts can be readily renewed.

Another object of the invention is to provide a core drill having a detachable cutter construction whereby the wearing parts can be easily and quickly replaced.

Another object of the invention is to provide an effective and improved means for mounting the cutting parts of the drill.

The various objects and features of the invention will be best and more fully understood from the following detailed description of typical forms and applications of the invention, throughout which description reference is had to the accompanying drawings, in which:

Fig. 1 is a vertical, detailed, sectional view of the core drill provided by our invention;

Fig. 2 is a bottom or end view of the drill, being a view taken as indicated by line 2—2 on Fig. 1;

Fig. 3 is a transverse, sectional view of the drill, taken as indicated by line 3—3 on Fig. 1;

Fig. 4 is an enlarged, detailed, sectional view, taken as indicated by line 4—4 on Fig. 3;

Fig. 5 is a view similar to Fig. 3, showing another form of construction;

Fig. 6 is an enlarged, detailed, sectional view, taken as indicated by line 6—6 on Fig. 5;

Fig. 7 is an enlarged, detailed, sectional view, similar to Fig. 4 showing another form of construction; and

Fig. 8 is a view taken as indicated by line 8—8 on Fig. 7.

The core drill provided by our invention is suitable for use in connection with a string of drill pipe 10 and the usual form of core barrel 11. In Fig. 1 of the drawings, we show the drill provided by our invention mounted on the lower end of a string of drill pipe 10 by means of a suitable collar or coupling 12, and we show a core barrel 11 carried by the drill to project upwardly in the drill pipe 10. A core catcher 13 is shown in connection with the drill and core barrel.

Referring particularly to Figs. 1 to 4 of the drawings, the drill includes a body 14 and a cutter 15 detachably mounted on the lower end of the body.

The body 14 is tubular in form and has an upwardly and inwardly projecting extension 16 on its upper end. The exterior of the extension is threaded to receive the coupling 12 applied to the lower end of the drill pipe 10. In accordance with our invention, the extension 16 fits around the core barrel 11 with clearance, allowing circulating fluid to pass from the casing 10 into circulation openings 17 extending downwardly in the body 14 from its upper end. The upper inner portion of the body 14 is provided with a recess 18 to receive the core catcher 13. The core barrel 11 screws into the recess 18 above the core catcher.

The cutter 15 is applied to the lower end of the shank 14 and includes, generally, a curved body 20 fitting the lower end of the shank and a plurality of teeth 21 and 22 projecting downwardly from the body to make an annular cut in the formation, leaving a core to project upwardly past the core catcher 13 and the barrel 11. The cutter and shank are connected through over-lapping flange parts which are secured together by bolts 23. In the form of the invention under consideration, the body 20 of the cutter is annular in form, the cutter or cutting means being in the form of a single integral unit. In this case, the shank 14 has a single central flange 24 projecting downwardly from its lower end, while flanges 25 project upwardly from the body 20 to engage the inner and outer sides of the flange 24. With this construction, the body 20 and flanges 25 completely surround the flange of the shank. In accordance with our present invention, one or

more cuts or openings 26 are provided in the flange 24 of the shank and lugs 27 are formed between the flanges 25 of the cutter to fit the openings 26, as clearly illustrated in Fig. 3 of the drawings. With this arrangement, driving or rotating strain is imparted to the cutter through the cooperative engagement of the lugs and ends of the flange 24 formed by the openings 26. The flanges of the cutter and shank are connected by means of a plurality of bolts 23. The bolts serve mainly to hold the flanges 24 and 25 together and thus retain the cutter on the end of the shank. As above pointed out, the rotative strain is taken between the flange 24 and the lugs 27, thus relieving the bolts.

The teeth 21 project downwardly and outwardly from the body of the cutter to make the outer portion of the annular cut, while the teeth 22 project downwardly and somewhat inwardly from the body to make the inner portion of the annular cut. Each outer tooth 21 is provided at its lower end with a cutting edge 30 that extends inwardly and rearwardly with reference to a radial line, while each inner tooth 22 is provided at its lower end with a cutting edge 31 that extends outwardly and rearwardly with reference to a radial line. By thus oppositely pitching the inner and outer teeth, they are made particularly effective in cutting their respective portions of the bore. In accordance with our invention, there may be various numbers of teeth on the cutter. In the drawings, we have shown four outer teeth 21 and two inner teeth 22. The inner teeth 22 are located diametrically opposite each other, while the outer teeth are suitably arranged between the inner teeth.

Our present invention provides for the introduction of circulating fluid to the cutting teeth. The circulation openings 17, provided in the shank 14, extend downwardly from its upper end to its lower end where they communicate with openings 40 in the body 20. In the particular form of the invention shown in the drawings, there are circulation openings discharging immediately ahead of the inner teeth and also circulation openings discharging immediately ahead of certain of the outer teeth. It is to be understood that the circulation openings may be arranged to discharge in the most effective manner.

In Figs. 5 and 6 of the drawings, we disclose a modified form of construction wherein the cutter 15*a* is divided into separate sections A and B. In this case, each cutter section has a body part 20*a* carrying two outer cutters 21 and one inner cutter 22. The body part 20*a* has spaced upwardly projecting flange parts 25*a* which fit over flange parts 24*a* on the lower end of the shank. The flange parts 24*a* and 25*a* are segmental in form, corresponding in extent to the cutter sections. In this form of the invention, lugs 27*a* or downward continuations of the body may be provided between the segmental flange parts 24*a* to engage the ends of the segmental flange parts 25*a*. Bolts 23 may be provided for connecting the flange parts to retain the cutter sections in place on the shank. In this form of the invention, circulation openings may be provided to discharge through the shank and cutter sections, as shown in Fig. 5, or they may be arranged to discharge directly from the shank through the lug portions 27*a*. In this form of the invention, the rotative driving strain is borne through the lugs 27*a* and the ends of the segmental flange parts 25*a* of the cutter sections.

In Figs. 7 and 8 of the drawings, we disclose another form of connecting flange construction that may be used in place of that hereinabove described. In this case, there is a flange 24*b* projecting downwardly from the lower end of the shank and a flange 25*b* projecting upwardly from the body of the cutter. The flanges 24*b* and 25*b* are preferably wide at their base and taper outwardly, and are preferably proportioned to fit together, as shown in Fig. 7. In this case, the flange 24*b* of the shank may be provided with one or more cuts or openings 26*b*, and the cutter flange 25*b* may be provided with lugs 27*b* to fit the openings. Bolts 23 may be employed to connect the flanges 24*b* and 25*b*, as clearly shown in the drawings.

From the foregoing description, it will be apparent that our invention provides a construction in which the cutting or wearing parts are effectively secured to the permanent shank at the same time being detachable so that they can be easily and quickly renewed or replaced, when desired. It is also to be noted that our construction is very simple and inexpensive and that the parts are so arranged and proportioned as to cut effectively and leave a core of the formation to be received by the core barrel.

Having described only typical preferred forms of our invention, we do not wish to limit ourselves to the specific details set forth, but wish to reserve to ourselves any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims:

Having described our invention, we claim:

1. A core drill including an annular shank having a flange projecting downwardly from its lower end, a cutter having downwardly projecting teeth and upwardly projecting flanges overlapping the inner and outer sides of the flange on the shank, and cooperating lugs and openings at the flanges whereby the cutter is rotated by the shank.

2. A core drill including, a shank having a flange projecting downwardly from its lower end, a cutter having downwardly projecting teeth at its lower end, spaced up-

wardly projecting flanges on the upper end of the cutter overlapping the inner and outer sides of the flange of the shank, and bolts extending through the flanges of the cutter and shank.

3. A core drill including, a shank having a flange projecting downwardly from its lower end, a cutter having downwardly projecting teeth at its lower end, spaced upwardly projecting flanges on the upper end of the cutter overlapping the inner and outer sides of the flange of the shank, and a lug on the cutter extending between its flanges and cooperating with an opening in the flange of the shank whereby the cutter is rotated by the shank.

4. A core drill including, a shank having a flange projecting downwardly from its lower end, a cutter having downwardly projecting teeth at its lower end, spaced upwardly projecting flanges on the upper end of the cutter overlapping the inner and outer sides of the flange of the shank, bolts extending through the flanges of the head and cutter, and a lug on the cutter extending between its flanges and cooperating with an opening in the flange on the shank whereby the cutter is rotated by the shank.

In witness that we claim the foregoing we have hereunto subscribed our names this 1st day of November, 1927.

JESSE C. WRIGHT.
LYNN F. BONNEY.