Sept. 20, 1932. H. C. JOHANSEN 1,878,241

CORE DRILL

Filed March 7, 1929 2 Sheets-Sheet 1

Fig. 1.

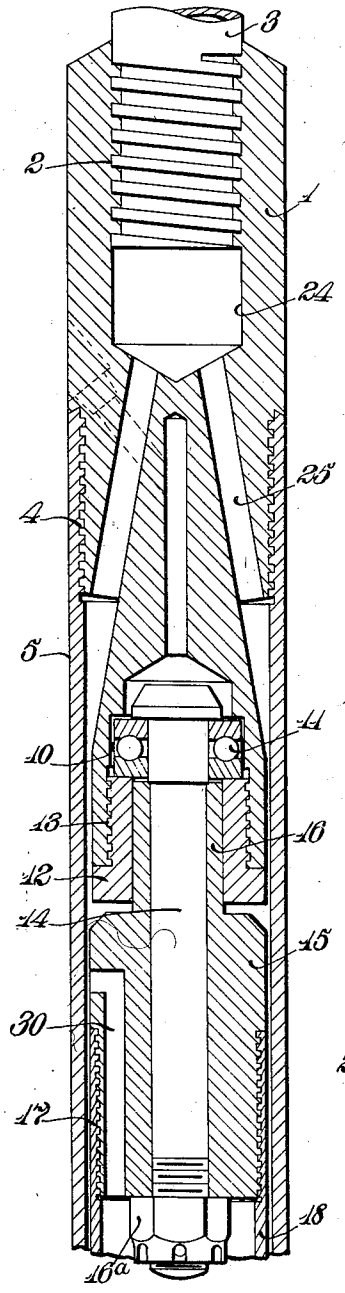


Fig. 2.

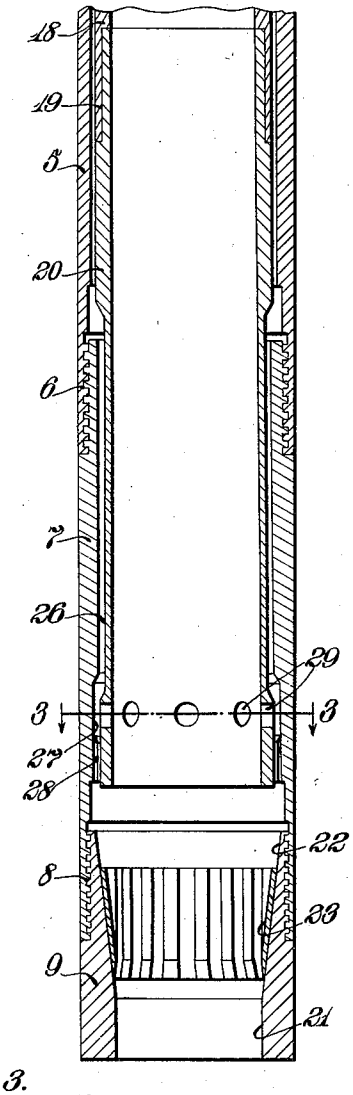
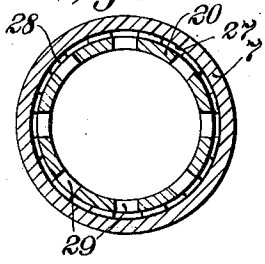


Fig. 3.



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Filed March 7, 1929 2 Sheets-Sheet 2

Fig. 4.

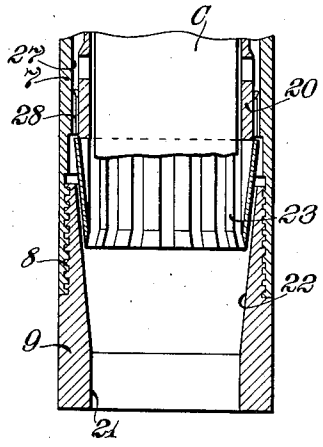


Fig. 5.

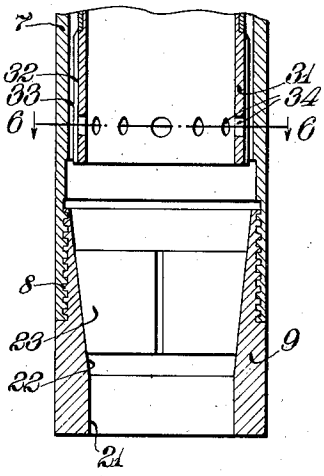
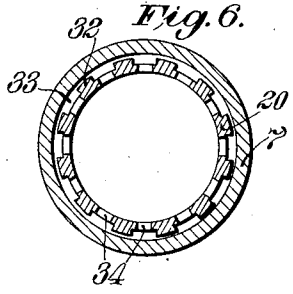


Fig. 6.



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UNITED STATES PATENT OFFICE

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CORE DRILL

Application filed March 7, 1929. Serial No. 345,110.

This invention relates to core drills and more particularly to improved core barrels for such drills.

An object of this invention is to provide an improved core barrel. Another object is to provide an improved core barrel of the double tube type. A further object is to provide an improved core barrel having improved fluid circulating means. Still another object is to provide improved fluid circulating means for a double tube core barrel whereby, when normal circulation of fluid between the inner and outer barrels is interrupted or restricted, fluid may still flow through the barrel to the bottom of the drill hole. Yet another object is to provide an improved double tube core barrel having improved fluid circulating means including a series of passages formed in the lower end of the inner core receiving tube above the core lifter whereby, when the flow of fluid between the inner and outer tubes is interrupted or restricted by the core lifter, fluid may still flow between the core and core lifter to the bottom of the drill hole. Another object is to provide an improved core barrel of the double tube type having improved guiding means for the inner tube for maintaining the latter centrally within the outer tube and fluid passage means past said guiding means. These and other objects of this invention will, however, hereinafter more fully appear.

In the accompanying drawings there are shown for purposes of illustration two forms which the invention may assume in practice.

In these drawings,—

Fig. 1 is a central longitudinal sectional view through the upper end of a core barrel having the improved fluid circulating means embodied therein in one form.

Fig. 2 is a central longitudinal sectional view through the lower end of the improved core barrel.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 2 showing the core lifter in its upper position.

Fig. 5 is a view similar to Fig. 2 illustrating a modified form of the invention.

Fig. 6 is a transverse section taken on line 6—6 of Fig. 5.

In the illustrative form of the invention shown in Figs. 1 to 4 there is shown a core barrel of the double tube type comprising a head member 1 threadedly connected at 2 to the usual hollow rod line 3. Threadedly connected at 4 to the head member is an outer barrel or tube 5. As shown in Fig. 2, threadedly connected at 6 to the lower end of the outer tube is a swell coupling 7 having an internally restricted passage therethrough and in turn threadedly connected at 8 to an annular core cutting bit 9. Positioned within a chamber 10 formed within the head member 1 is an anti-friction bearing 11 held in position by a bearing retainer or retainer sleeve 12 threadedly connected at 13 within the lower end of the head member 1. The head of a pin or bolt 14 engages the upper race of the anti-friction bearing 11 and extends axially through an inner plug 15, the latter having an upwardly extending sleeve portion 16 having a sliding fit within the bearing retainer 12. A nut 16a threadedly connected to the lower end of the bolt 14 engages the bottom surface of the inner plug and maintains the parts in assembled relation. Threadedly connected at 17 to the inner plug 15 is an inner core receiving barrel or tube 18 having secured thereto at its lower end at 19 an inner tube extension 20. The inner core receiving tube is arranged concentrically within the outer tube and is rotatable relative thereto. The annular bit 9 has a central core passage 21 and a conical bore 22 in which a usual split spring core lifter 23 is arranged. The lower end of the inner tube extension 20 forms an abutment or stop for the core lifter 23 as hereinafter described.

Fluid is supplied through the hollow rod line 3 to the bottom of the bit through a chamber 24 formed within the head member 1 and with which the passage in the rod line communicates. This chamber is connected by a series of passages 25 with the space between the inner and outer tubes. Fluid flows down between the tubes past a reduced portion 26 coextensive with the restricted passage in the swell coupling 7 and formed on the inner tube

extension 20, the fluid flowing through an enlarged chamber 27 formed in the swell coupling 7 and through the bit to the bottom of the drill hole. In this instance the swell coupling 7 is provided with a plurality of inwardly projecting ribs 28 and these ribs guide and maintain central the lower end of the inner tube, and fluid passages are formed between these guide ribs. Adjacent the lower end of the inner tube extension 20 is a series of radial openings 29. A vent passage 30 in the inner plug 15 connects the interior of the inner tube with the space between the tubes and this passage prevents excessive pressure from building up within the inner tube as the core passes therein.

In the modified form of the invention shown in Fig. 5 the guide ribs 28 on the swell coupling 7 are omitted and the inner tube extension 31 has formed externally thereon projecting ribs 32 which serve as guides for the lower end of the inner core receiving tube. Fluid passages 33 are formed between the ribs 32 and a plurality of openings 34 are formed between the ribs and connecting these passages with the interior of the inner tube. Otherwise this form of the invention is the same as the form described above. It will be noted that in both forms of the invention the inner core receiving tube may be of the swivel type as shown in Fig. 1 or of the rigid type wherein the inner core receiving tube is held against rotation relative to the outer tube.

In the use of the improved core barrel it will be noted that during the drilling operation the core (indicated at C in Fig. 4) cut by the bit 9 passes through the core lifter 23 into the inner core receiving tube 18. During the normal operation fluid flows through the rod line into the chamber 24 downwardly through the passages 25 and through the space between the inner and outer tubes, past the reduced portion 26 on the inner tube extension 20 into the enlarged chamber 27 in the swell coupling 7, through the passages between the ribs 28, and past the core lifter 23 and through the core passage 21 in the bit to the bottom of the drill hole. During the drilling operation the core lifter 23 tends to cling to the core and is forced upwardly against the bottom of the inner tube extension 20 as shown in Fig. 4, partially restricting the fluid flow between the tubes and frequently packing dirt in around the lifter and in the space between the tubes, thereby cutting off or restricting fluid flow between the tubes past the exterior of the core lifter to the bottom of the bit. Fluid then flows from between the inner and outer tubes through the openings 29 in the lower end of the inner tube into the interior of the latter, the fluid then passing between the core lifter 23 and core C and through the bit 9 to the bottom of the hole. If the openings 29 in the lower end of the inner tube were not present a considerable pressure would build up in the space between the inner and outer tubes, forcing the core lifter 23 downwardly, contracting the same against the core and practically cutting off the supply of fluid to the bit, and, due to the engagement of the core lifter with the core, causing wear of the internal gripping surface of the core lifter, rendering the same practically useless. By providing the openings in the inner tube at its lower end, this is avoided, the fluid flowing freely past the core lifter even when the flow between the lower ends of the tube is restricted or completely cut off. In the form of the invention shown in Figs. 5 and 6 the operation is the same as that described above with the exception that the fluid flows between the inner and outer tubes through the passages between the projecting guide ribs 32 on the lower end of the inner tube extension and thence past the core lifter and through the passage in the bit to the bottom of the hole.

As a result of this invention it will be noted that an improved core barrel is provided having improved fluid circulating means whereby, even when normal fluid circulation is interrupted, fluid may still flow to the bottom of the hole. It will further be noted that an improved core barrel of the double tube type is provided having improved guiding means for the inner tube and improved fluid passage means in the inner tube whereby, when fluid flow through the space between the tubes is interrupted, fluid may flow through these passages interiorly through the inner tube and past the core lifter to the bottom of the hole. It will further be evident that improved fluid circulating means is provided which may be applied to a double tube core barrel of standard construction with a minimum of change. These and other uses and advantages of this invention will, however, be clearly apparent to those skilled in the art.

While there is in this application specifically described two forms which the invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A core barrel comprising an outer tube, an inner core receiving tube arranged within and spaced from said outer tube and terminating within said outer tube, an annular core cutting bit carried by said outer tube, said inner tube receiving the core cut by said bit, means for venting the upper end of the inner tube, and means for conducting fluid through the space between the inner and outer tubes and through the bit to the bottom of the drill hole including fluid conducting passages in said inner tube for connecting

the space between said tubes with the interior of the inner tube.

2. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, an inner tube receiving the core cut by said bit and arranged concentrically within and spaced from said outer tube and terminating within said outer tube at the rear of the forward face of said bit, and means for conducting fluid through the space between the inner and outer tubes and through the bit to the bottom of the hole including a series of openings formed within the lower end of the inner tube and connecting the space between the tubes with the interior of the inner tube.

3. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, a core lifter carried by said bit, an inner core receiving tube arranged concentrically within and spaced from said outer tube and having its lower end terminating above the core lifter, and means for conducting fluid through the space between the inner and outer tubes past the core lifter and through the bit to the bottom of the drill hole including passages formed in the lower end of said inner tube and connecting the space between the tubes with the interior of said inner tube.

4. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, an inner tube receiving the core cut by said bit and arranged concentrically within said outer tube and terminating within said outer tube at the rear of the forward face of said bit, and means for conducting fluid between said tubes and through the bit to the bottom of the drill hole including radial passages formed in the lower end of said inner tube above said bit.

5. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, a core lifter carried within said bit, an inner core receiving tube arranged concentrically within and spaced from said outer tube, and means for conducting fluid through the space between the inner and outer tubes and through the bit to the bottom of the drill hole including means for conducting fluid from the space between the tubes into the interior of the inner tube when normal flow of fluid between the tubes is restricted by said core lifter.

6. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, an inner tube receiving the core cut by said bit and arranged concentrically within and spaced from said outer tube, said inner tube terminating within said outer tube at the rear of the forward face of said bit, means for venting the upper end of the inner tube, and means for conducting fluid through the space between the tubes and through the bit to the bottom of the drill hole and including by-pass means for conducting fluid through the bit when normal flow therethrough is interrupted.

7. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, an inner tube receiving the core cut by said bit and arranged concentrically within and spaced from said outer tube, said inner tube terminating within said outer tube at the rear of the forward face of said bit, means for venting the upper end of the inner tube, and means for conducting fluid through the space between the tubes and through the bit to the bottom of the drill hole and including by-pass passages in said inner tube for conducting fluid through the bit when normal flow through the space between the tubes is interrupted.

8. A core barrel comprising an outer tube having an internally restricted portion between its ends, an annular core cutting bit secured to said outer tube, an inner tube receiving the core cut by said bit and arranged concentrically within and spaced from said outer tube and having an externally reduced portion coextensive with said restricted outer tube portion, said inner tube terminating within said outer tube at the rear of the forward face of said bit, and means for conducting fluid through the space between the tubes and past said restricted portion through the bit to the bottom of the drill hole and including radial passages formed in the lower end of said inner tube below said reduced portion.

9. A core barrel comprising an outer tube, a head member secured thereto, an annular core cutting bit secured to said outer tube, an inner tube receiving the core cut by said bit and arranged concentrically within and spaced from said outer tube and freely rotatably supported by said head member for rotation relative to said outer tube, and means for conducting fluid through the space between the tubes and through the bit to the bottom of the drill hole including radial passages formed in the lower end of said inner tube.

10. A core barrel comprising an outer tube, an annular core cutting bit secured thereto, an inner core receiving tube arranged within said outer tube and having a lower free end, one of said tubes having an internally restricted portion and the other having an externally reduced portion coextensive with said restricted portion, and means for conducting fluid through the space between the tubes and past said restricted portion and the lower free end of said inner tube to the bottom of the bit and including radial passages formed in the lower end of said inner tube below said restricted portion.

11. A core barrel comprising an outer tube, an annular core cutting bit carried thereby, an inner core receiving tube arranged concentrically within and freely rotatable relative to said outer tube and adapted to re-

main stationary while said outer tube rotates, one of said tubes having an internally restricted portion between its ends while the other has an externally reduced portion coextensive with said restricted portion, and means for conducting fluid through the space between the tubes and past said restricted portion and through the core-surrounding opening of the bit to the bottom of the drill hole, said outer tube having an enlarged chamber therein within which the lower end of said inner tube projects.

12. A core barrel comprising an outer tube, an annular core cutting bit, a coupling connecting said tube and bit and forming a restricted opening in the barrel of less diameter than the main bore of said tube, and an inner core receiving tube arranged concentrically within said outer tube and freely rotatable relative thereto, said inner tube having an externally reduced portion coextensive with the restricted portion of said coupling.

In testimony whereof I affix my signature.

HARRY C. JOHANSEN.