

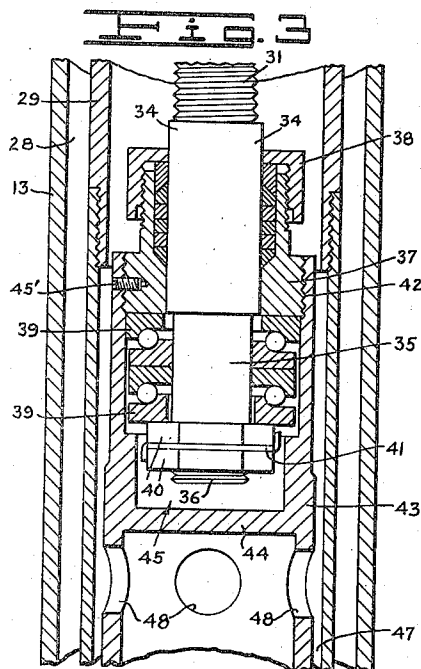
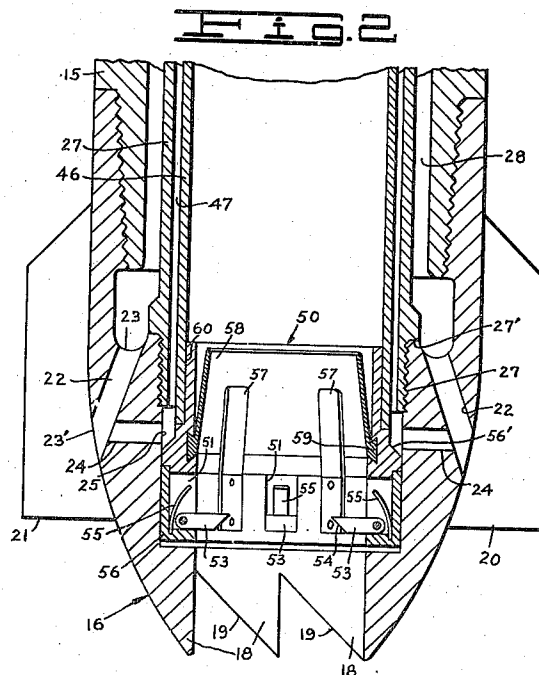
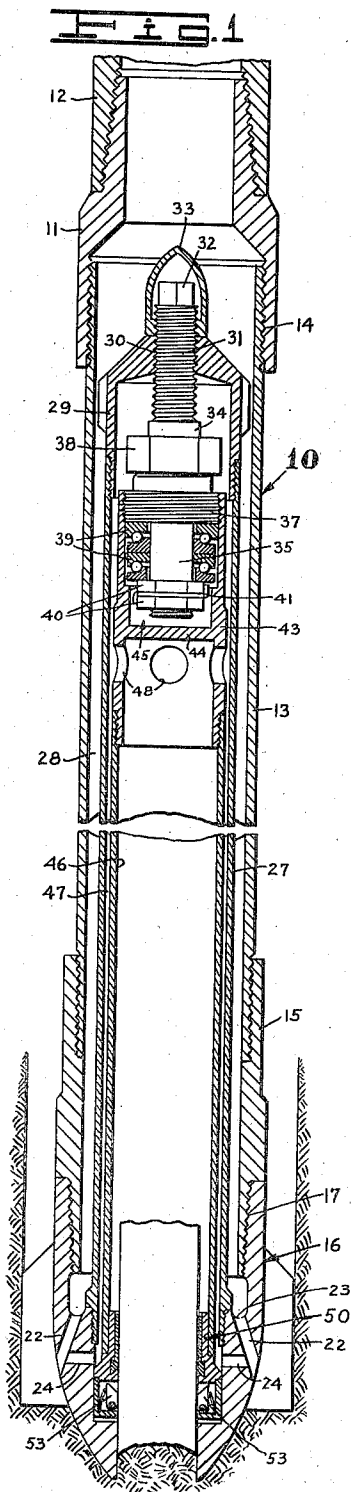
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CORE BARREL

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CORE BARREL

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10 Claims. (Cl. 255—72)

This invention relates to core barrels.

The general object of my invention is to provide a core barrel including a bit and a novel means for supporting a core barrel thereon.

A further object of the invention is to provide a core barrel including an outer and inner barrel with the inner barrel supported in fluid tight manner on the outer barrel.

Another object of the invention is to provide a core barrel including inner and outer barrels with novel means for supporting the inner barrel.

Another object of the invention is to provide novel means for securing a rubber sleeve in a core catcher assembly.

Other objects and the advantages of this invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

Fig. 1 is a central sectional view of a core barrel embodying the features of my invention;

Fig. 2 is a fragmentary view similar to Fig. 1 and on a larger scale showing the lower end of the core barrel;

Fig. 3 is a view similar to Fig. 2 showing the upper portion of the inner and outer barrels.

Referring to the drawing by reference characters I have shown my invention as embodied in a core barrel which is indicated generally at 10. As shown the core barrel is suspended by a sub 11 which is suspended at the lower end of a drill string 12.

The core barrel 10 includes a shell 13 threaded to the sub 11 at 14 and having the lower end connected to a collar 15. The collar 15 has a bit 16 secured at the lower end thereof.

The bit 16 comprises a body having an annular flange 17 thereon which is threaded to the lower end of the collar. The bit has cutting teeth 18 the lower edge of which are arranged at an angle of 45° to the horizontal as shown at 19 and also has a plurality of reamer blades 20 thereon, which blades have sharpened lower cutting surfaces 21.

The body of the bit is provided with a plurality of downwardly directed fluid apertures 22. These apertures at their upper end terminate at the lower face of a rounded shoulder 23 and at their lower ends pass to the outer surface of the bit as at 23'. The apertures 22 intersect apertures 24 which at their inner ends terminate at the inner surface 25 of the bit. Some of the apertures 22 and 24 at their outer ends open through the side of the bit behind the reamer blades 20 while other apertures open in advance of the reamer blades.

The interior of the bit is threaded as at 27 just below the shoulder 23 and the threads engage the threads of an outer barrel 27. The barrel 27 includes a collar 27' engaging the bit within the shoulder 23. The outer diameter of the barrel 27 is less than the internal diameter of the shell 13 so that a circulation space 28 is provided. The normal pump circulation passes through the space 28 and into and through the apertures 22 as will be presently explained.

Mounted upon the upper end of the outer barrel 27 I mount a cap 29 which has a threaded aperture 30 therein, and in this threaded aperture 30 I mount a stem 31 which has a wrench engaging portion 32 on the upper end thereof. A hollow lock cap 33 is mounted on the stem 31 and when this cap is tightened it locks the threaded stem 31 in adjusted position.

The stem 31 has a cylindrical portion 34 thereon with a reduced portion 35 below the cylindrical portion and terminates in a threaded portion 36. Mounted on the cylindrical portion 34 is a plug 37 which is hollow to receive the cylindrical portion and which includes a packing gland 38. Mounted on the reduced portion 35 I show anti-friction members 39 which may comprise radial and thrust bearings. The upper bearing element engages the plug 37 while the lower bearing element engages a threaded nut 40 on the end 36. A lock washer 41 serves to hold the nut in place. The outer surface of the plug 37 is threaded to fit within the threaded upper end 42 of an inner core barrel support 43. This inner core barrel support is provided with a transverse partition 44 thus providing a lower closure for the bearing chamber 45 which can be filled with suitable lubricant. A screw 45' may be employed to prevent accidental removal of the plug 37. The support 43 is threaded to an inner core barrel 46. The outer diameter of the inner barrel 46 is less than the inner diameter of the outer barrel 27 so that a space 47 is provided between the two barrels. The upper end of the space 47 communicates through apertures 48 with the interior of the inner barrel, while the lower end of the space 47 communicates with the inner end of the apertures 25.

Mounted on the lower end of the bit I show a core catcher 50 which is provided with a plurality of slots 51 in its lower end 52. In each of the slots 51 I pivotally mount a catch member 53. These catches 53 have bevelled inner faces 54 and are normally urged to the position shown in Fig. 2 by springs 55. Mounted on the lower end of the core catcher 50 I show a flanged collar

56 which fits within the bit and which has a lower end which closes the slots 51.

The collar has a bevelled face 56' to direct fluid into the apertures 24. The interior of the core catcher is provided with a plurality of resilient fingers 57 which are secured at their lower ends as by rivets. The core catcher 50 is preferably made of bronze and has a rubber lining 58 vulcanized therein. The lining 58 includes a dovetail 10 tail bead 59 which fits in an annular dovetail groove in the slip member. The rubber lining protects the core from injury due to heat developed by friction while the core is being taken.

The lower end of the inner barrel 46 fits in a 15 rabbet 60 in the wall of the slip member. The interior diameter of the core catcher is approximately the same as that of the core which is cut by the bit, while the interior diameter of the inner barrel 43 is greater than that of the core. 20 As a result there is but very little friction between the core and the core barrel and this amount of friction is confined to the portion adjacent the slip core catcher 50. Since the portion above the slip member is of greater diameter 25 the core moves free in this portion. This prevents destruction or damage to the core.

In operation my core barrel is secured to the end of the drill string and the normal circulation passes down the drill string and through the 30 space 28 between the outer core barrel and the interior of the shell and passes through the apertures 22 thence into the hole. Some of the circulation fluid will pass with the core into the inner barrel 46 and the fluid in this barrel rises 35 until it passes through the apertures 48 thence it passes downwardly through the space 44 between the inner and outer barrel and out through the apertures 25. The main circulation, of course, is through the apertures 22 and the current of fluid moving through apertures 22 creates 40 an injector effect thus maintaining the discharge opening from the end of the apertures 22 unobstructed and to a slight extent drawing the fluid through the apertures 25.

45 After the desired length of core has been secured the core barrel is withdrawn from the well and removed from the drill string. The bit is then removed and following this the core catcher assembly 50, which has a tight sliding fit with 50 the inner barrel, is withdrawn and the core removed.

On assembly the parts are positioned as shown in Fig. 1 with the cap 31 removed. The stem 31 is then turned until the collar 56 engages the 55 shoulder at the lower end of the bit. After this the stem 29 is slightly unscrewed until the inner barrel rotates freely and after this the lock cap 33 is replaced.

With my invention the circulation is maintained through the core barrel by the main fluid circulating through the apertures 22 so that there is no stoppage of apertures 24. The bearings 39 remain free from the circulation and remain lubricated. The apertures 24 are disposed at 65 the rear of the reamer blades 20 and this causes more or less of a swirling action.

From the foregoing description it will be apparent that I have invented a novel core barrel which can be economically manufactured and 70 which is highly efficient in use.

Having thus described my invention I claim:

1. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is 75 bit and extending thereabove, a cap secured on

the upper end of said outer core barrel, a stem secured to said cap, said stem having a cylindrical portion thereon, an apertured plug on said cylindrical portion, a bearing on said stem and engaging said plug, an inner barrel support secured to said plug, and an inner core barrel on said inner core barrel support, said inner barrel being spaced from said outer barrel.

2. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is supported, an outer core barrel threadedly mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, said cap having a threaded aperture in its end wall, a stem having threads thereon and fitting said cap aperture, a lock cap engaging said stem and said cap, a plug, means to rotatably support said plug on said stem, an inner core barrel support on said plug, an inner barrel secured to said support, said inner barrel being spaced from said outer barrel, said support having apertures affording communication between the interior and the exterior of the inner barrel, said inner barrel having a core engaging means therein, said bit having a plurality of apertures therein and extending downwardly therethrough and communicating with the space surrounding the outer barrel, said bit having a second plurality of apertures therein, said second plurality of apertures being disposed adjacent the lower end of the bit and affording communication between the space between the inner and outer barrels and the exterior of the bit.

3. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is supported, an outer core barrel threadedly mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, said cap having a threaded aperture, a stem having threads thereon and fitting said cap aperture, an anti-friction member engaging said stem, a core barrel support engaging said anti-friction member, said support including a partition forming a chamber about said anti-friction member, an inner barrel secured to said support, said inner barrel being spaced from said outer barrel, means affording communication between the interior and the exterior of the inner barrel, said inner barrel having a core engaging means thereon, said bit having a plurality of apertures therein and extending downwardly therethrough and communicating with the space surrounding the outer barrel, said bit having a second plurality of apertures therein, said second plurality of apertures being disposed adjacent the lower end of the bit and communicating at their outer end with the space between said inner and outer barrels.

4. In a core barrel, a bit having a central opening therethrough, an outer core barrel threadedly mounted on said bit, an inner barrel secured to said outer barrel, said inner barrel being spaced from said outer barrel, a core catcher including a part inserted in said inner barrel, said core catcher having a core opening therein, the wall of said opening having a dovetailed recess and a rubber lining vulcanized in said core catcher and including a portion in said dovetailed recess.

5. In a core barrel, a bit having a central opening therethrough, an outer core barrel mounted on said bit and extending thereabove, a cap secured on the upper end of the outer core barrel, an inner barrel, a rotatable joint member connecting said inner barrel and said cap, 75

said joint member including walls forming an oil chamber, said inner barrel being spaced from said outer barrel, means affording communication between the interior and the exterior of the inner barrel, means affording communication between the interior of the outer barrel and the exterior thereof, a core catcher mounted on the inner barrel, said core catcher having an aperture therethrough which is of substantially the same diameter as that of the bit core opening, said aperture being of less size than that of the interior of the inner barrel and a rubber lining in said core catcher.

6. In a core barrel, a bit having a central core opening therethrough, an outer core barrel mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, means to rotatably support said inner barrel on said cap, said supporting means including a lubricating chamber, said inner barrel being spaced from said outer barrel, means affording communication between the interior and the exterior of the inner barrel, means affording communication between the interior of the outer barrel and the exterior thereof, a core catcher mounted on the lower end of said inner barrel, said core catcher having an aperture substantially equal in size to the bit opening, said aperture being of less size than the interior of the inner barrel, and a rubber lining vulcanized in said core catcher.

7. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is supported, an outer core barrel threadedly mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, said cap having a threaded aperture in its end wall, a stem having threads thereon and fitting said cap aperture, a lock cap engaging said stem and said cap, said stem having a cylindrical portion thereon, an apertured plug on said cylindrical portion, said stem including a reduced portion, a bearing on said reduced portion, a nut engaging said bearing, an inner barrel support threadedly secured to said plug, said inner core barrel support including a transverse partition joining a chamber for said bearing, and an inner core barrel on said inner core barrel support, said inner barrel being spaced from said outer barrel and means affording communication between the interior and the exterior of the inner barrel.

8. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is supported, an outer core barrel threadedly mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, said cap having a threaded aperture in its end wall, a stem having threads thereon and fitting said cap aperture, a lock cap engaging said stem and said cap, said stem having a plug therein, an inner core barrel support on said plug, said support being tubular and including a partition forming a chamber, an anti-friction member in said chamber and engaging said plug and said stem to rotatably support said inner core barrel support, an inner barrel secured to said support, said inner barrel being spaced from said outer barrel, said support having a plurality of radial apertures therein affording communication be-

tween the interior and the exterior of the inner barrel, said inner barrel having a core engaging means therein, said bit having a plurality of apertures therein and extending downwardly there-through and communicating with the space surrounding the outer barrel, said bit having a second plurality of apertures therein, said second plurality of apertures being disposed adjacent the lower end of the bit and communicating at their outer end with the outlet from said first mentioned apertures and communicating at the inner ends with the space between said inner and outer barrels.

9. In a core barrel, a bit having a central opening therethrough, a shell on which said bit is supported, an outer core barrel threadedly mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, said cap having a threaded aperture in its end wall, a stem having threads thereon and fitting said cap aperture, a lock cap engaging said stem and said cap, said stem having a cylindrical portion thereon, an apertured plug on said cylindrical portion, said plug including a packing gland engaging said cylindrical portion, said stem including a reduced portion, a bearing on said reduced portion, a nut engaging said bearing, an inner barrel support threadedly secured to said plug, said inner core barrel support including a transverse partition forming a chamber for said bearing, an inner core barrel on said inner core barrel support, said inner barrel being spaced from said outer barrel, said inner core barrel support having a plurality of radial apertures therein affording communication between the interior and the exterior of the inner barrel, a core catcher on said inner barrel, said core catcher including a body having a plurality of spring pressed catches therein, a plurality of spring fingers on said catcher and a rubber lining in said catcher, said bit having a plurality of reamer blades thereon, said bit having a plurality of apertures therein and extending downwardly therethrough, said apertures being disposed in the rear of said reamer blades and communicating with the space surrounding the outer barrel and with the space between the inner and outer barrels.

10. In a core barrel, a bit having a central core opening therethrough, said bit having cutting teeth thereon, said cutting teeth being inclined at an angle of 40° to the horizontal, an outer core barrel mounted on said bit and extending thereabove, a cap secured on the upper end of said outer core barrel, means to rotatably support said inner barrel on said cap, said supporting means including a lubricating chamber, said inner barrel being spaced from said outer barrel, means affording communication between the interior and the exterior of the inner barrel, means affording communication between the interior of the outer barrel and the exterior thereof, a core catcher mounted on the lower end of said inner barrel, said core catcher having an aperture substantially equal in size to the bit opening, said aperture being of less size than the interior of the inner barrel, and a rubber lining vulcanized in said core catcher.

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