

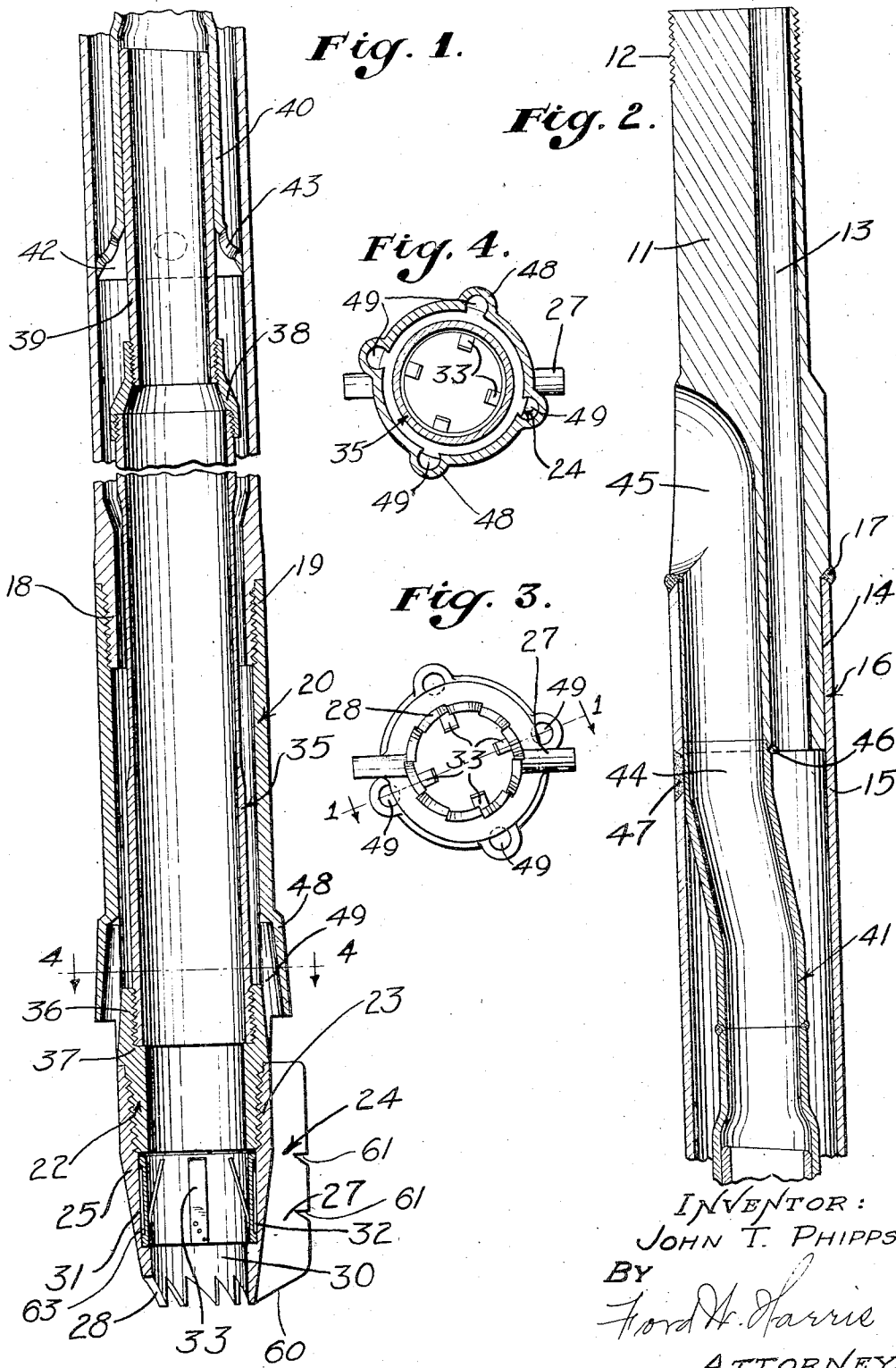
Oct. 11, 1927.

1,644,947

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CORE BARREL

Filed Aug. 23, 1926



UNITED STATES PATENT OFFICE.

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CORE BARREL.

Application filed August 23, 1926. Serial No. 130,859.

This invention relates to the oil well drilling industry. It is necessary to identify the strata which is penetrated when a well is being bored, in order to know when drilling should be stopped and the casing lowered and cemented in place. It is common practice in this industry to use a core barrel for taking cores for samples of the strata, the core being lifted to the surface of the ground with the core barrel which is attached to the lower end of the drill pipe.

It is an object of this invention to provide a new and improved form of core barrel.

The ordinary core barrel consists of a shell which is attached to the lower end of the drill pipe. At the lower end of the shell is an annular cutter and extending upward from the cutter inside the shell is a barrel. When the core barrel is rotated the annular cutter forms a core which extends upward into the barrel. The upper end of the barrel is provided with a check valve which is adapted to permit rotary mud to pass from the barrel into the shell but not in a reverse direction. Rotary mud is supplied to the cutter through the shell around the barrel, this rotary mud being prevented from entering the barrel by means of the check valve. There is a liability that the check valve will be prevented from seating. This permits the rotary mud to pass through the barrel from the shell. Since this rotary mud is under a high pressure, the core being formed is sometimes entirely washed out of the barrel.

It is an object of this invention to provide a core barrel in which the interior of the barrel has absolutely no connection with the interior of the shell.

Another object of my invention is to provide a core barrel in which the barrel thereof is vented to the exterior of the shell so that the interior of the barrel will be of the same pressure as the pressure in the lower end of the well, and therefore there can be no reverse flow of rotary mud through the barrel.

It is a further object of the invention to provide an improved cutter which will cut a true bore substantially to gage for a substantial period of time.

It is another object of the invention to make a core barrel having thorough circulation of lubricating fluid.

It is an object of the invention to provide a core barrel having a lubricated core catcher.

Other objects and advantages of the invention will be made evident hereinafter.

Referring to the drawings in which I illustrate my invention,

Fig. 1 is a vertical section taken on the line 1—1 of Fig. 3, being a section through a core barrel embodying the features of the invention.

Fig. 2 is a vertical section of the upper end of the core barrel.

Fig. 3 is a bottom plan view of Fig. 1.

Fig. 4 is a section taken on the line 4—4 of Fig. 1.

Referring to the drawings and particularly to Fig. 2, the numeral 11 denotes an upper body which is threaded at 12 at its upper end so that it may be secured to the lower end of a drill pipe. Formed vertically through the body 11 is a rotary mud passage 13. The lower end of the body 11 is reduced in size, as indicated at 14, and an upper end of a top section 15 of a shell 16 is extended onto this portion 14. The top section 15 and the body 11 may be secured together by welding 17. The lower end of the top section 16 is provided with an externally threaded portion 18, onto which an internally threaded portion 19 of a bottom section 20 of the shell 16 is secured.

The lower end of the bottom section 20 is provided with a threaded pin 22 which is adapted to be screwed into a socket 23 of a boring element 24. The boring element 24 has a body 25 from which substantially radially extending cutting wings 27 extend. Formed at the lower end of the body 25 are teeth 28 which are in annular arrangement and which surround the lower end of an opening 30 formed through the boring element 24. Placed in an enlarged part 31 of the opening 30 is a cylinder 32, to which core holders in the form of spring arms 33 are secured.

The lower end of a barrel 35 is screwed into a socket 36 formed at the lower end of the bottom section 20 immediately above a neck 37 thereof. The opening 30, the neck 37 and the interior of the barrel 35 are in communication and in axial alignment with each other.

Secured to the upper end of the barrel 35 is a reducer 38 and attached to the reducer 38 is a nipple 39 which extends upward therefrom. The upper end of the nipple 39

extends into a socket 40 which forms the lower end of a vent pipe 41. The nipple fits snugly in the socket so as to form a tight joint. The lower end of the socket 40 is provided with a tapered guide portion 42 which extends outward and engages the interior face of the shell 16. The guide portion 42 has openings 43 formed there-through. Referring to Fig. 2, the vent pipe 41 has an upper offset portion 44 which is attached to the lower end of the body 11 in communication with a vent opening 45 thereof. The offset portion 44 may be secured to the body 11, as by welding indicated at 46. It will be seen that it is necessary to offset the vent pipe 41 so that it may be connected to the vent opening 45 which is formed in the body 11 at one side of the passage 13. In order to rigidly secure the vent pipe in place, the shell 16 may be slotted at the upper end of the vent pipe and these two parts may be welded together as indicated at 47.

Rotary mud which is supplied to the boring element 24 is forced downward through the passage 13 and through the shell 16 around the barrel 35. Formed at the lower end of the bottom section 20 of the shell 16 immediately above the pin 22 are bosses 48 in which ducts 49 are formed. The ducts 49 are positioned, as will be seen in Fig. 3, so as to direct the rotary mud along the cutting face of each of the cutting wings 27. When the core barrel is set into operation, the cutting wings 27 and the teeth 28 cooperate to form a core which, as drilling progresses, gradually moves upward into the barrel 35. When a sufficient core has been formed it is broken and the core barrel is elevated. The core holders 33 which are sprung outward by the core during its entering the barrel 35 will move inward into the positions shown in Fig. 1, thus supporting the core within the barrel 35.

In order to remove the core from the barrel 35 it is necessary to separate the top and bottom sections 15 and 20 of the shell 16. The top section and the parts secured thereto are then removed, this giving access to the upper end of the barrel 35. By reason of the fact that the nipple 39 is only in frictional engagement with the socket 40, this separation may be accomplished. The barrel 35 is then unscrewed from the bottom section 20 and the core may then be removed therefrom.

An important feature of the invention is that the upper end of the interior of the barrel 35 is not in communication with the interior of the shell 16 or any of the passages in the core barrel through which the rotary mud is supplied to the boring element 24. The barrel 35, as previously explained, is connected to the exterior of the core barrel by means of the vent and vent opening

41 and 45 respectively. The static pressure inside the barrel 35 is the same as that outside of the core barrel; therefore, there will be no flow of rotary mud through the barrel 35 in a reverse direction. As the core is formed and extended through the barrel 35 the rotary mud therein will be displaced and will pass upward through the venting arrangement to the exterior of the core barrel. The mud passage is made eccentric so that the vent 45 may be made quite large. It is desirable to have a large vent so that liability of clogging will be made a minimum.

A feature of the invention resides in the form of cutter wings 27. Lower faces 60 of the wings slope upward towards the outside and have an excellent centralizing action. The outer cutting faces of the wings have notches 61 which render the cutting edges interrupted. This is found to be very helpful in boring an accurate hole.

Another feature of the invention is present in the core catcher. The cylinder is provided with an annular grease chamber 63 which may be packed with grease, thus assuring a free rotation of the cylinder and core catcher arms.

A still further feature exists in the bosses 48 in which the ducts 49 are formed. There is plenty of clearance around the bosses for upward-moving cuttings.

I claim as my invention:

1. A core barrel comprising: a body; a boring element at the lower end of said body; a barrel supported in said body, the lower end of said barrel being open to the lower end of said body, said barrel being secured to said body at its lower end; and a vent pipe supported inside said body and in communication with the exterior of said body, said vent pipe having a socket into which the upper end of said barrel extends, said barrel being vented by said vent pipe.

2. A core barrel comprising: a body; a boring element at the lower end of said body; a barrel supported in said body, the lower end of said barrel being open to the lower end of said body, said barrel being secured to said body at its lower end; and a vent pipe supported inside said body and in communication with the exterior of said body, said vent pipe having a socket into which the upper end of said barrel extends, said barrel being vented by said vent pipe, there being means in said body for conducting rotary mud to said boring element, said means not being in communication with said barrel or said vent pipe.

3. A core barrel comprising: a body; a boring element at the lower end of said body; a barrel supported in said body, the lower end of said barrel being open to the lower end of said body; and a vent pipe supported inside said body and in communication

tion with the exterior of said body, said vent pipe having a socket into which the upper end of said barrel extends, said barrel being vented by said vent pipe, there being a guide portion at the lower end of said vent pipe for guiding said barrel thereinto. 5

4. In combination in a core barrel: a boring element; and wings extended outward

from said boring element, lower faces being sloped upward towards the outside and having notches formed in the outer cutting faces. 10

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 17th day of August, 1926.

JOHN T. PHIPPS.