

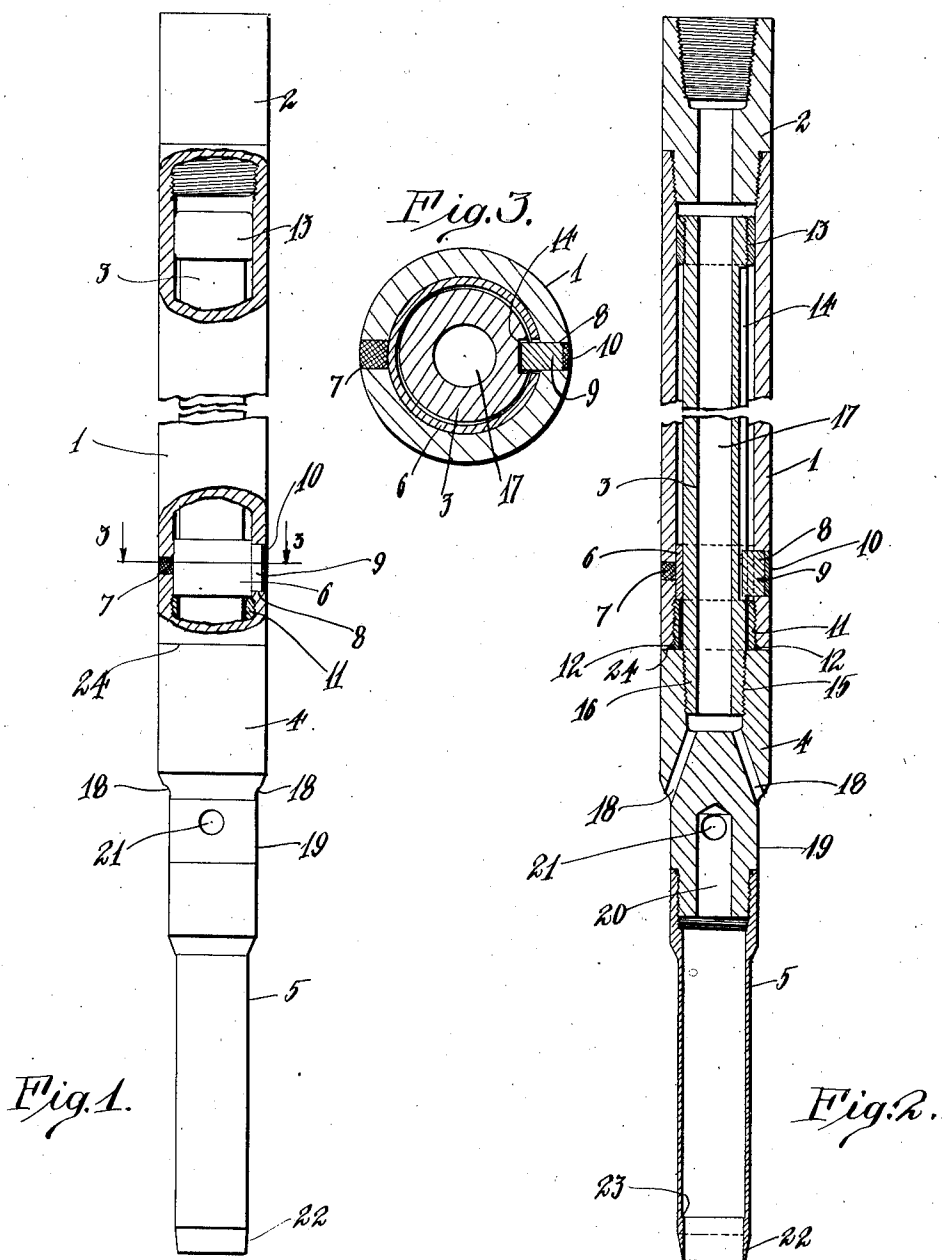
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CORE BARREL

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# UNITED STATES PATENT OFFICE.

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## CORE BARREL.

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This invention relates to a core barrel for forming and removing a core from a hole being drilled in the ground and is more particularly directed to a core barrel adapted to be used in prospecting for oil, and which core barrel will permit the determination of the dip and strike of the substrata formations, as well as permit the determination of the nature of the formation being drilled.

In prospecting for oil, it is necessary that the dip and strike of subterranean formations be determined, as well as the nature of the formation being drilled. When oil has been discovered in oil sands or pools, it is necessary to learn the extent and direction of the oil pool discovered which can be done by determining the dip and strike of the subterranean formations immediately surrounding the oil pool.

Core drills as now employed are for the most part of the rotary type which depend upon a rotary drilling action of a core taking bit to form the core. These core barrels will not form or take cores which will indicate the direction of dip and strike of the formations from which the core is taken, due to the fact that the cores are fractured in several places during the taking thereof and the separate sections of the fractured core rotated out of proper relation to each other. Among the causes of such rotation of the sections of the core, is the friction caused between the core and the core bit at the point where the core enters the central bore of the bit.

Among other disadvantages of the rotary core bit is the "burning" of the core due to the friction between the core and the core barrel. This friction is greatest at the point where the cutting teeth are adjacent to the core.

Another disadvantage of the rotary core barrel is the washing of the core by the cooling fluid which is used to reduce the burning of the core. The use of this cooling fluid, which may be water or mud, is detrimental for the reason that it cuts into the core at or near the point of contact between the formation being cut and the cutting teeth of the core barrel and dissolves or washes away certain of the original constituents of the core.

It is, therefore, an object of this invention to provide a core drill which is adapted to

take and remove from subterranean strata a core in a single piece so that strata of the core will remain in proper relation to the adjacent strata.

Another object of this invention is to provide a core drill in which the core is taken in advance of the water or mud circulating fluid in such manner that the water or mud cannot come in contact with the core.

Another object of this invention is to provide a core drill in which the burning of the core is eliminated by doing away with the rotation of the core bit.

Another object of this invention is to provide a core barrel of the punch or percussion type embodying a jar construction for imparting the percussion impact to the core barrel for taking the core.

Other objects and advantages of this invention will be apparent from the following detailed description of a preferred embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a side elevation partly broken away of a core barrel embodying this invention.

Fig. 2 is a central sectional side elevation thereof.

Fig. 3 is a sectional end elevation taken substantially on the line 3—3 of Fig. 1.

In the preferred embodiment of this invention illustrated in the drawings, 1 illustrates an outer barrel secured at its upper end to a tool joint 2.

Mounted within the outer barrel 1 and spaced therefrom is a section of pipe 3. A coupling member 4 connects the outer barrel 1 and the core cutting bit 5. A collar 6 is rigidly secured within the central bore of the outer barrel 1. This collar 6 is secured in position after the core barrel is assembled by welding the collar 6 to the barrel 1 through a perforation 7 provided in the outer barrel 1. The barrel 1 is slotted at 8 to receive a key 9 which key 9 is securely held in position by means of the weld illustrated at 10. The lower end of the barrel is female threaded to accommodate a collar 11, which collar 11 has a bore of slightly greater diameter than the outside diameter of the pipe 3. The collar 11 may be welded in position as is illustrated at 12. Secured to the pipe 3, at its upper end, is a collar

13 which collar 13 acts as a spacer between the pipe 3 and the barrel 1. A longitudinally extending keyway 14 is provided in the outer surface of the pipe 3 in position to engage the key 9 secured to the barrel 1 so that there can be no rotation of either the barrel 1 or the pipe 3 independent of the other. The lower end of the pipe 3 is screw threaded to the coupling member 4, which coupling member 4 comprises a cylindrical body having an internally tapered threaded chamber 15 adapted to receive a male member 16 of the pipe 3. The chamber 15 communicates with the bore 17 of the pipe 3 and also with the exterior of the core barrel through a plurality of passages 18 so that the circulating fluid may pass out of the core barrel into the well. The lower end of the coupling member 4, below the ports 18, is of reduced diameter, as at 19 and contains an axial passage 20 communicating at one end with the bit 5 and at the other end with a laterally extending passage 21 communicating with the exterior of the core barrel so that air, fluid or debris may escape from the interior of the bit 5 and permit the entrance of a core.

The bit 5 comprises a cylindrical body open at both ends and having female threads at one end to receive the male threads of the coupling member 4. The opposite or lower end of the bit 5 is chamfered inwardly as illustrated at 22 to provide a sharp cutting edge. A shoulder 23 is provided within the bore of the bit 5 near its lower end to aid in grasping and retaining the core and in breaking the core loose from the strata when it is desired to remove the same. It will thus be seen that the barrel 1 is not directly connected to the coupling 4 but is slidably mounted upon the inner pipe 3. The lower shoulder of the barrel 1 rests upon the upper shoulder of the coupling 4 at 24. Thus the barrel 1 can be raised in the same manner that the jars drive a drill when drilling by the standard cable tool method.

When employing this core barrel for the taking of cores, muddy fluid is first circulated downward through the tubing string, not shown, connected to the tool joint 2 and out through the passages 18 in the coupling member 4, thus carrying away drill cuttings, which were formed during the previous well drilling operation, upward and out of the well. If the said drill cuttings are not removed prior to the taking of the core, they will fill up the core barrel and prevent the entrance of a core which will illustrate the true formation or true dip or strike of the formation. When the well is clean, the tube string is raised a short distance but not high enough to cause the bit 5 to be raised from the formation upon which it has been resting and is dropped lightly

so that the barrel 1 strikes upon the shoulder 24 of the coupling 4, which coupling 4, being rigidly secured to the bit 5, drives the bit 5 downwardly into the formation at the bottom of the well. This driving, or "spudding" operation, as it is called, may be continued until a sufficient length of core has been cut. The tubing string is then elevated until the split collar 6 engages the collar 13 and continues elevating of the tubing string which causes the core to be broken away from the formation and the core barrel is then lifted to the surface of the well.

It will be noted that, as heretofore described, the outer barrel 1 is prevented from rotating in relation to the pipe 3 and hence the bit 5, and it will thus be readily seen that there can be no rotation of the bit 5 and its core independent of the other parts of the tubing string and core barrel. Consequently, any rotation of the core, while being drawn to the surface of the well, must be due to the rotation of the entire tool string. Any such rotation of the tubing string can be accurately determined by marking the tube as it is withdrawn from the well and knowing the amount of rotation that has occurred. The core recovered may then be oriented to correspond with its original position in the well and the direction of the dip and strike of the original subterranean formations from which the core was taken.

Having fully described the preferred embodiment of my invention, it is to be understood that I do not wish to be limited to the exact construction herein set forth which may, obviously, be varied in detail without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A core drill adapted to be secured to a section of rotary drill pipe, said core barrel comprising an outer tubular member having a key extending into the inner bore thereof, an inner tubular member situated concentrically within the bore of said outer member and having a longitudinal keyway in the outer surface thereof adapted to receive the key attached to said outer member, means to prevent said outer barrel becoming detached from said inner barrel, a core cutting bit comprising a tube having one end chamfered to a cutting edge and the other end provided with a passageway adapted to provide an exit from the interior of said punch member, and means to rigidly connect said inner member with said punch member.

2. A core drill comprising an outer barrel adapted to be secured to a section of drill pipe, an inner tubular member suitably mounted within said outer barrel, means to prevent rotation of said inner member with

respect to said outer barrel, means to prevent said outer barrel from becoming detached from said inner barrel, a coupling member adapted to be secured to said inner member and having a plurality of passages communicating with the bore of said inner member and with the exterior of the core barrel, and a tubular core cutting bit adapted to be secured to said coupling member.

3. A core drill comprising an outer tubular member, an inner tubular member longitudinally slidable within the said outer member, a coupling member secured to the inner member in advance of the outer tubular member and presenting a shoulder against which the outer member strikes on telescoping of the said outer and inner member to impart a driving jar against said coupling member and means held in advance of and secured to the coupling member for taking a core.

4. In a core drill, the combination of an outer barrel, a tool joint secured to the upper end of the said outer barrel, a collar secured to the lower end of the said barrel, an inner tubular member mounted in the said barrel, a key secured in position in the said barrel and extending into the interior thereof, a longitudinal extending key-way formed in the said inner tubular member

into which the said key projects, a collar secured to the upper end of the said inner tubular member in position to engage the collar secured to the said barrel when the said cutter barrel and inner tubular member are moved longitudinally relative to each other, a coupling member secured to the lower end of the said inner tubular member and presenting a shoulder adapted to engage the lower end of the said barrel, and a core cutting bit secured to the said coupling member at its lower end.

5. A core drill comprising an outer tubular member, an inner tubular member longitudinally slidable within the said outer member and providing a fluid passage, a coupling member secured to the inner member and presenting a shoulder against which the outer tubular member strikes on telescoping of the said outer and inner members to impart a driving jar against said coupling member, means secured to the coupling member for taking a core, and a plurality of ports formed in the said coupling member for directing fluid from the passage formed through the inner tubular member to the exterior of the said core taking means.

Signed at Bakersfield, California, this 17th day of July 1925.

WALTER N. THOMPSON.