May 24, 1932. J. A. ZUBLIN 1,859,950

CORE CATCHER

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Fig. 1.

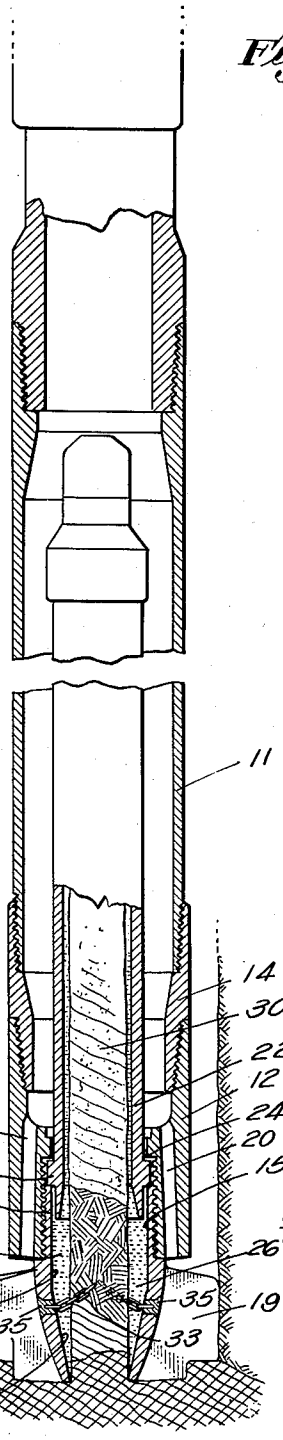


Fig. 3.

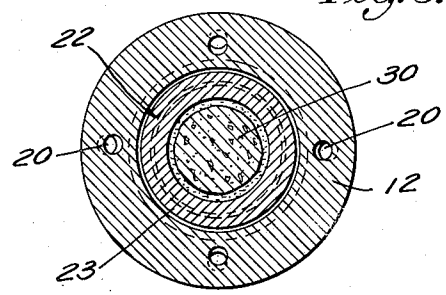


Fig. 4.

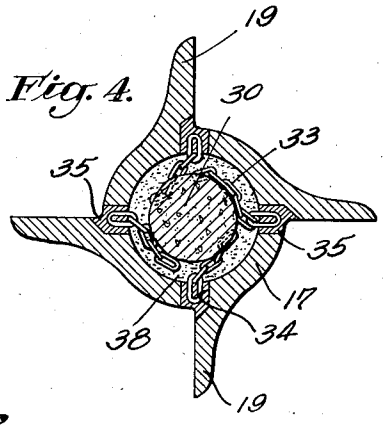
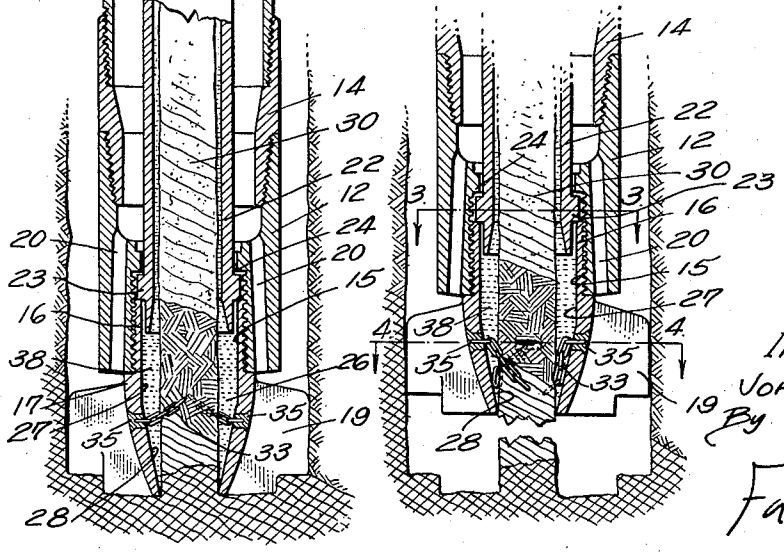


Fig. 2.



INVENTOR
JOHN A. ZUBLIN
By
Fad Dennis
ATTORNEY

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Fig. 5.

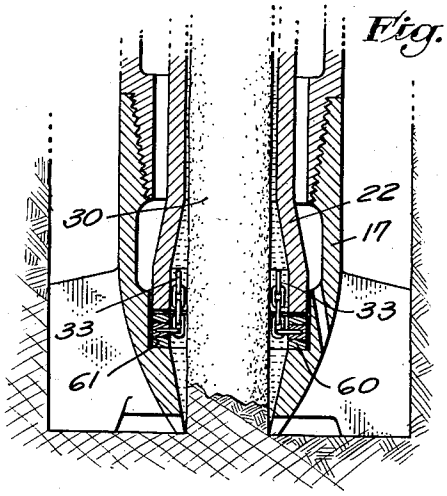


Fig. 6.

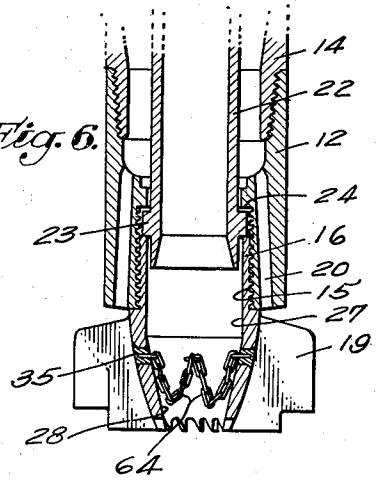


Fig. 7.

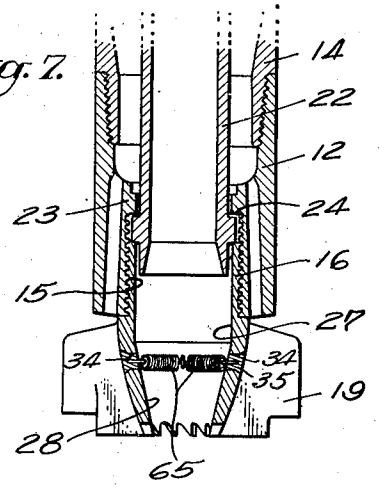
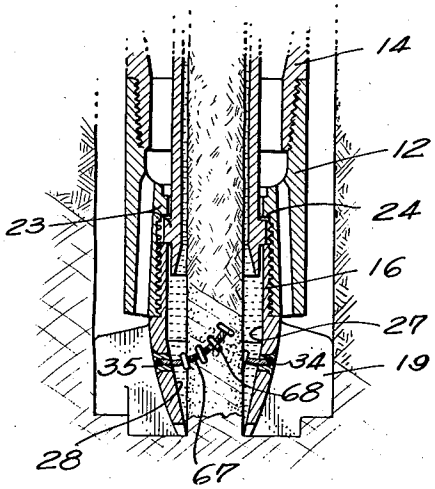


Fig. 8.



INVENTOR:
JOHN A. ZUBLIN,
By

ATTORNEY.

Patented May 24, 1932 1,859,950

UNITED STATES PATENT OFFICE

JOHN A. ZUBLIN, OF LOS ANGELES, CALIFORNIA

CORE CATCHER

Application filed July 3, 1930. Serial No. 465,477.

My invention relates to core barrels used in the well-drilling art for taking samples of the subterranean strata, and it consists of a unique core-catching means.

In order that the advantage of my invention may be readily appreciated, I will briefly refer to present core barrels with which I am familiar. The core barrel includes a shell, to the lower end of which a cutter is secured, and within which is a core-receiving barrel. Near the entrance to the core-receiving barrel is a core catcher. The core catcher of the type now employed has a plurality of upwardly extending spring fingers adapted to frictionally engage the core when the core barrel is raised, and to break the core near where it projects from the bottom of the well, and to raise it to the top of the well.

During the forming of the core the spring fingers engage the core and have a cutting action on the wall thereof. This action reduces the diameter of the core and breaks it into sections which must be properly aligned when the core pieces are removed.

The spring fingers are not positive in operation and usually a portion of the core is lost, which of course means that the core record of the well will be incomplete.

It is an object of my invention to provide a core barrel in which a complete, full-size core may be taken, and in which the diameter of the core will not be reduced by the core-catching means.

It is another object of my invention to provide a core barrel in which a part of the core will not be lost by the core-catching means.

A further object of my invention is to provide a core barrel having a core-catching means which, during the forming of the core, occupies a position in which it will not engage the core to wear it down or break it up.

A still further object of my invention is to provide a core barrel having core-catching means which will move into core-gripping position upon the initial upward movement of the core barrel and will cause the core to break at the lower end of the core barrel.

My invention in its broad concept provides a core-catching means which includes a member positioned in the entrance of the core-receiving barrel. This member is movable from a non-gripping position during the forming of the core into a gripping position.

In its preferred embodiments, the member is made flexible or pliable and is moved into and from its different positions by friction of the core, and the flexible member is more or less floating except when it is in gripping position. During the forming of the core the flexible member of the preferred form of my invention is embedded in a body of rotary mud which surrounds the core in the entrance. This prevents the core from being worn or broken by the core-catching means.

In the course of the following description, various additional objects and especial advantages will be emphasized.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is an elevational sectional view through a core barrel embodying the first form of my invention, the core-catching means being in non-gripping position.

Fig. 2 is a section like Fig. 1, with the core-catching means in gripping position.

Figs. 3 and 4 are sections taken on the indicating lines of Fig. 2.

Figs. 5 to 8, inclusive, are fragmentary vertical sectional views showing four other embodiments of my invention.

The core-catching means of my invention, irrespective of its embodiment, may be used in any type of core barrel. For illustrative purposes I have shown a somewhat general type of core barrel which includes (as shown best in Fig. 1) a shell 11, to the lower end of which a head 12 is joined by means of a connector 14. The head 14 is internally threaded at 15, and threadedly receives a threaded pin 16 of a cutter body 17. Cutter wings 19 extend outward from the cutter body 17, they being supplied with rotary mud fluid by passages 20 formed in the head 12. Positioned within the shell 11 is a core-receiving barrel 22, the lower end of which has a shoulder 23 which rests between an internal annular ledge 24 of the body 12 and the upper end of the threaded pin 16. The cutter body 17 has an entrance 26 of cylindrical cross-section which

connects to the interior of the core-receiving barrel 22. The entrance 26 is defined by a cylindrical wall 27 and a conical or tapered wall 28.

The core identified by the numeral 30 is formed by rotating the core barrel, the wings 19 cutting away the bottom of the well around the core. As the core 30 is formed it extends upward into the entrance 26 and into the core-receiving barrel 22.

I will now describe the core-catching means which, of itself and in combination with the parts described, constitute my invention.

The form shown in Figs. 1 to 4, inclusive, has one or more members 33 which are lineal, flexible or pliable members. In these figures the members 33 are link chains. One end of each chain 33 is secured to the cutter body 17 so that it rests in the entrance 26. A convenient way of attaching the chains 33 is to form openings 34 in the cutter body 17 and secure the ends of the chains 33 by welded plugs 35 formed in the openings 34.

The chains 33 are free in the entrance 26 and are caused to assume a position in the entrance in accordance with the direction of friction or pressure against them. During the forming of the core, the chains 33 assume the position shown in Fig. 1. Since the core 30 is moving upward through the entrance 26, and since the core barrel is rotating, the chains 33 are caused to occupy an upward spiral position, or in other words, a "wrapped" position around the core 30. The chains 33 are in the larger part of the entrance 26 where there is ample space for them around the core. The rotary mud fluid which is supplied to the core barrel and the cuttings and sediment enter the entrance around the core 30 and pack in it as indicated by the numeral 38. The chains 33 are practically embedded in the granular material 38, which acts as a retaining means for the chains and holds them away from the core, thus preventing a cutting down or breakage of the core.

When a length of core 30 has been formed, it may be raised to the surface of the ground by raising the core barrel. When the core barrel is raised, the chains 33 move from the position shown in Fig. 1 into a gripping position as shown in Fig. 2. The chains in this gripping position may still be wrapped around the core, but the free ends thereof rest in the tapered part of the entrance 26 and are caused to firmly grip the core 30, so as to sever it from the bottom of the well and enable raising it to the surface of the ground. The packed granular material 38, so far as I can now determine, assists in the gripping of the core.

It is a part of the invention that the chains wrap themselves around the core, and they do this because the friction is in a spiral or helical direction.

In order that it may be appreciated that my invention is not limited to a single form, I have illustrated four other embodiments to which I will now refer.

In Fig. 5 the core-catching members 33 are secured to a ring 60 which rests in a counterbore 61 of the cutter body 17 below the lower end of the core-receiving barrel 22. The ring 60 may or may not rotate, as desired, depending upon the closeness of fit in the counterbore 61. If the ring 60 rotates, the chains 33 will operate the same as the chains in Figs. 1 to 4, but if the ring 60 remains non-rotatable, the chains will occupy axial positions, as shown. Notwithstanding, the chains will occupy either non-gripping or gripping positions and operate in about the same manmanner as the core-catching means of Figs. 1 to 4.

In Fig. 6 I show a form of my invention in which both ends of the core-catching members are attached to the cutter body wall at each end, thus leaving loops 64, as distinguished from the two forms of my invention already described, in which one end of each chain is free.

In Fig. 7 the core-catching members are provided in the form of flexible springs 65 which are connected at each end by welded plugs 34, as in the other forms of my invention. These springs are movable by the friction or pressure of the core from non-gripping position into gripping position and vice versa.

The form of the invention shown in Fig. 8 has the core-catching means in the form of flexible cables 67. In order that the cables 67 may grip the core 30, they may be provided with enlargements 68 which may be welded thereon.

I claim as my invention:

1. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, the combination with: core-catching means including a chain-like member movable from non-gripping to gripping positions.

2. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, the combination with: core-catching means including a chain-like member, free at one end and secured to said core barrel at the other end, movable from non-gripping to gripping positions.

3. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, the combination with: core-catching means including a chain-like member, secured to said core barrel at both ends and forming a loop, movable from non-gripping to gripping positions.

4. In a core barrel having a cutter, a core-

receiving barrel, and an entrance through which the core enters said core-receiving barrel, said entrance having a tapered portion, the combination with: core-catching means including a chain-like member in said entrance, said member being movable by said core from a non-gripping position into a gripping position in said tapered portion of said entrance.

5. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, said entrance having a tapered portion, the combination with: core-catching means including a chain-like member in said entrance adapted to wrap around said core, said member being movable by said core from a non-gripping position into a gripping position in said tapered portion of said entrance.

6. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, said entrance having a tapered portion, the combination with: core-catching means including a chain-like member in said entrance, said member being movable by said core from a non-gripping position into a gripping position in said tapered portion of said entrance; and an enlargement on said member to facilitate gripping of said core.

7. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, said entrance having a tapered portion, the combination with: core-catching means including a chain-like member in said entrance adapted to wrap around said core, said member being movable by said core from a non-gripping position into a gripping position in said tapered portion of said entrance; and an enlargement on said member to facilitate gripping of said core.

8. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, said entrance having a tapered portion, the combination with: core-catching means including a flexible member consisting of a link chain in said entrance, said member being movable by said core from a non-gripping position into a gripping position in said tapered portion of said entrance.

9. In a cutter for use on a core barrel: a body having an entrance passage; cutting means on said body; and a chain-like member secured in said entrance.

10. In a cutter for use on a core barrel: a body having an entrance passage; cutting means on said body; and a chain-like member secured in said entrance, one end of said member being secured to said body.

11. In a core barrel having a cutter, a core-receiving barrel, and an entrance through which the core enters said core-receiving barrel, the combination with: a chain-like member disposed in said entrance and having a portion of pliable characteristics which enable it to embed itself in the granular material which enters said entrance around said core.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 1st day of July, 1930.

JOHN A. ZUBLIN.