

March 14, 1950

L. B. ICE

2,500,252

SIDE WALL CORING DEVICE

Filed Jan. 31, 1947

2 Sheets-Sheet 1

Fig. 2

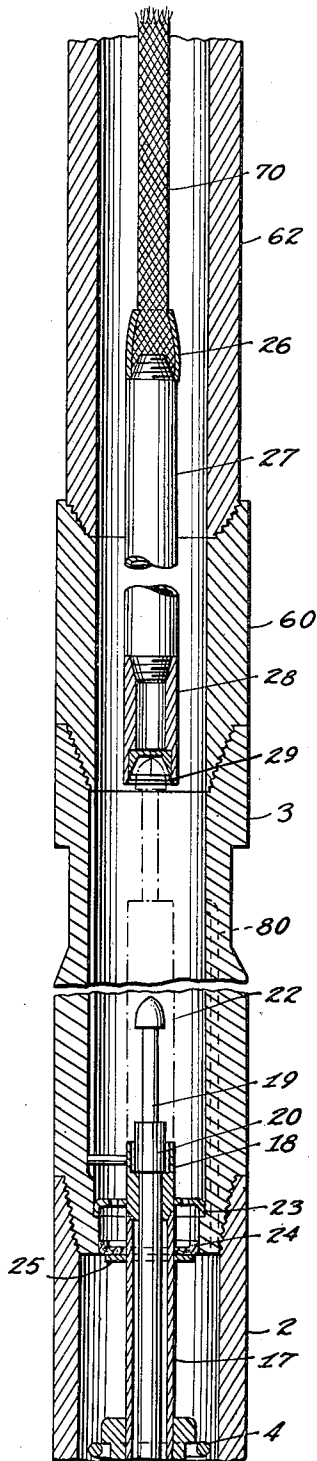


Fig. 5

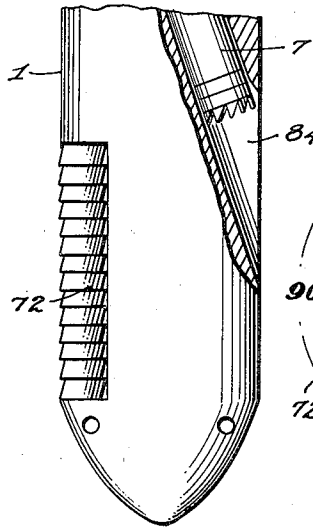


Fig. 6

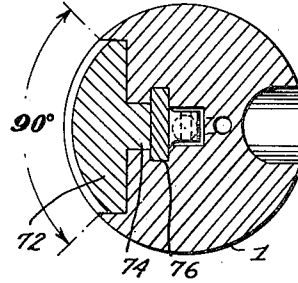


Fig. 8

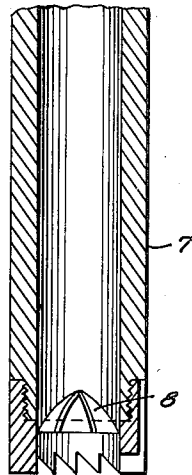
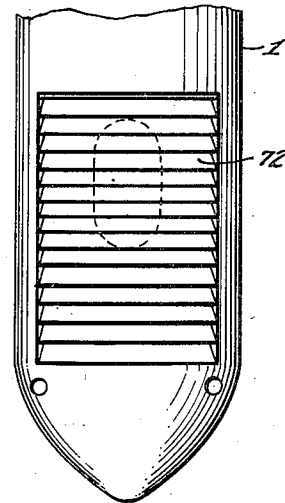


Fig. 7



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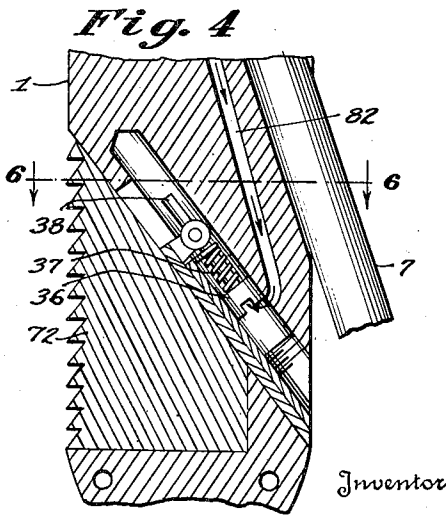
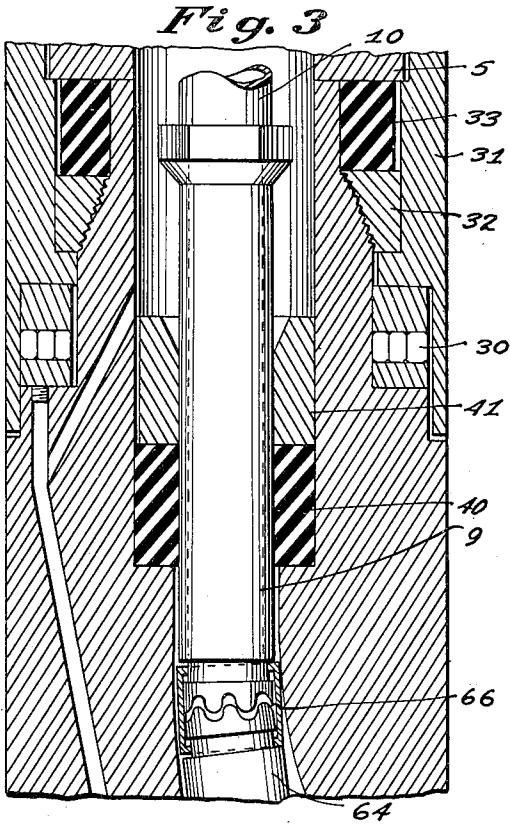
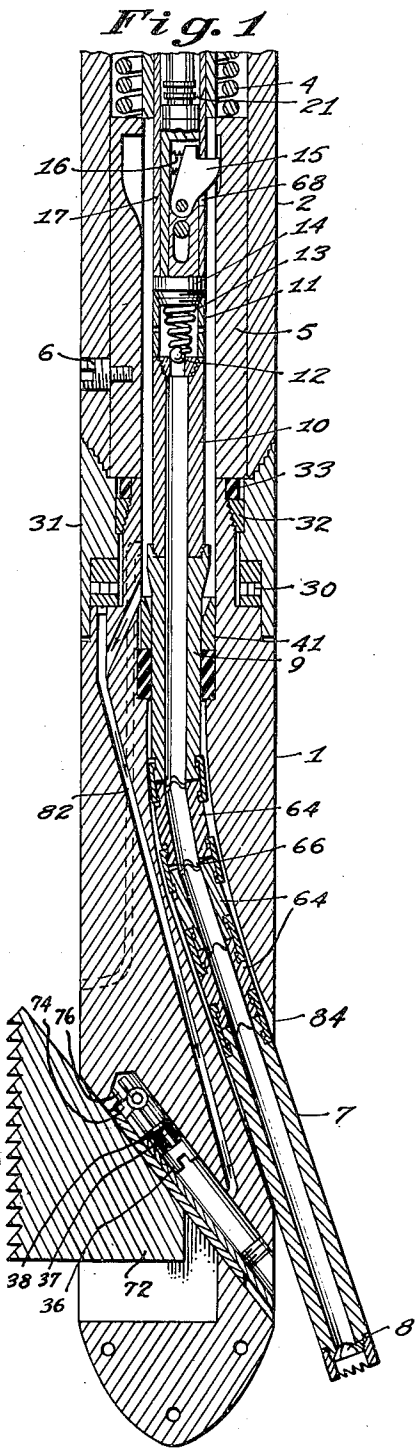
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UNITED STATES PATENT OFFICE

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SIDE WALL CORING DEVICE

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Application January 31, 1947, Serial No. 725,653

1 Claim. (Cl. 255—1.4)

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This invention relates to devices for taking core samples from the side walls of wells.

An object of the invention is to provide a device for taking a lateral core from the side wall of a well at intervals therealong, whereby the nature of the various strata may be determined from examination of the cores.

Another object of the invention is to provide a device for taking lateral side wall cores which is so constructed as to take a sizable core on the order of about one inch in diameter and about two feet long, whereby examination of the core may be facilitated during logging of the well strata.

A further object of the invention is to provide a hydraulic lateral side wall core boring device including a hollow, relatively stationary casing with a core drilling member disposed in the casing, and means for extending the drilling member out of the casing and for actuating it to drill a core, and for retracting the drilling member inside the casing when the core has been taken.

Still another object of the invention is to provide a lateral side wall core boring device which is simple in design, easily constructed and supported in a well, and effective in operation.

Other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings, and in which:

Figure 1 is a vertical sectional elevation of the lower portion of my improved side wall coring device,

Figure 2 is a vertical sectional elevation of the upper portion of the device shown in Figure 1, the two views being joinable along the upper line of Figure 1 and the lower line of Figure 2,

Figure 3 is an enlarged sectional elevation of the central portion of the parts shown in Figure 1,

Figure 4 is a sectional elevation of the lower portion of the parts shown in Figure 1,

Figure 5 is an outside view of the lower portion of the device shown in Figure 1, a part of the view being sectioned to show the core drilling member in retracted position,

Figure 6 is a sectional plan view taken on line 6—6 of Figure 4,

Figure 7 is a left side elevational view of the device shown in Figure 5, and

Figure 8 is a longitudinal sectional view of a portion of the core drilling member.

In order to understand the nature of the invention and the best means for carrying it out,

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reference may now be had to the drawings, in which like reference characters denote similar parts throughout the several views. As shown, there is a body 1, the lower end of which is rounded and shaped as shown, and the upper end of which fits into the substitute adapter 3f. A nut 37 is threaded onto the reduced upper end of the body 1, as best shown in Figures 1 and 3, the nut also bearing against an inner shoulder of the adapter 3f, to hold the body and adapter in engagement. An anti-friction roller thrust bearing 38 is disposed in an annular recess formed in the abutting portions of the adapter 3f and the body 1, to permit them to turn relative to each other.

A drill collar 2 is threaded at its lower end to the upper end of the substitute adapter 3f, and a substitute coupling 3 is threaded onto the upper end of the drill collar 2. A tool joint 60 is threaded onto the upper end of the coupling 3, and a stem element 62 is threaded onto the upper end of the tool joint 60, as shown in Figure 2. A coil spring 4 is disposed inside the drill collar 2, with its lower end seated on the upper end of the driving sleeve 5. The lower end of the driving sleeve 5 bears against the packing 33 and the upper end of the body 1, forming a tight seal therebetween.

A hollow head tanged driving screw 6 is threaded into both the wall of the drill collar 2 and the driving sleeve 5, holding them together against relative rotation.

The body 1 has an axial bore which is inclined outwardly at its lower end portion as shown in Figures 1 and 3, to receive the core cutter 7 which is secured to the inner core barrel main body 19 by means of a core cutter substitute coupling 9 and a number of knuckle joint elements 64 interposed therebetween. A core catcher 8 fits inside the core cutter 7, as best shown in Figure 8, the core cutter being provided with a toothed lower end for cutting the core as it rotates.

As shown best in Figures 1 and 3, the knuckle joint elements are formed, as at 66, with teeth secured with a flexible liner inside to keep them together, and with short flexible sleeves over each joint to engage the joint elements and hold them together while allowing the whole assembly to flex as it moves and rotates inside the inclined exit tube from which the core cutter protrudes when the core is to be taken.

A valve case assembly includes a cage 11, having an axial end opening in which is seated a ball valve 12, the ball being biased into seating

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engagement with the opening by a spring 13. Apertures are also formed in the side walls of the cage 11 as shown. The cage 11 is threaded onto the upper end of the inner core barrel main body 10, and the lower end of a latch body 14 is threaded into the upper end of the cage 11. A latch 15 is pivoted to the latch body 14, being biased outwardly as shown in Figure 1 by means of springs 16.

A hollow tubular spear sleeve and latch trip 17 fits around and over the latch assembly as shown in Figures 1 and 2, being apertured at 68 to allow the tongue of the latch to protrude therethrough. A spear sleeve top member 18 is threaded onto the upper end of the sleeve 17. A spear head 19 and sleeve 20 fit inside the spear sleeve and latch trip 17 and 18, as shown in Figure 2, keepers and springs being disposed at 21 to keep the assembly together. An overshot spear head 22 fits onto the upper end of the spear head 20.

A steel disc 23 which has a number of spaced apertures formed therein to allow passage of fluid under pressure is fitted securely onto the spear sleeve top 18 to guide the inner barrel and protect the leather cup type piston 24 from fouling, and for guiding the same into the cylinder of the drill collar 3. A steel disk 25 furnishes support for the leather piston 24 from beneath.

For lowering the core boring device into position, and for retrieving it with the core, I provide a rope socket 26 for engaging a wire rope 70, the rope being thus secured to a sinker bar 27, the lower end of which is secured to an overshot 28 with a spear head catcher 29 to engage the spear head 22.

A core barrel stop sleeve is shown at 41 in Figures 1 and 3, with a packing 40 therebelow to seal off the fluid to permit a dry core to be taken. The packing 33 seals off drilling mud and fluid from the bearing 30.

A toothed dog 72 has an inner extension 74 riding in an inclined groove 76 under the influence of a piston rod 38 having a piston cup 36 on one end, a spring 37 acting between a yoke extension of the body and the piston and serving to bias the piston rod and cup downwardly as seen in Figures 1 and 4, holding the dog in its lower or retracted position shown in Figure 4 and in Figure 5. Suitable ducts, as at 82, are provided through the members 3 and 2 to conduct the liquid under high pressure from above to the ducts 82 in the body 1, to press the piston rod and cup 36 and 38 upwards as shown in Figure 1, thus moving the dog 72 along its inclined path upwards and outwards beyond the outer surface of the body 1, to engage firmly against the wall of the well bore, pressing the opposite surface of the body having the inclined opening 84 against the opposite well bore surface.

The device can be placed on the end of the drill pipe and lowered to the deepest show, the pumps being then started up to build up the pressure inside the drill pipe and inside the tool body 1, actuating the piston 36 and engaging the toothed dog 72 to the well bore side wall. The teeth will keep the body 1 from rotating or turning as the well rotary on the derrick floor is engaged to start rotation of the elements shown, that is, all except the body 1. As the inner barrel assembly is dropped or pumped down, it automatically locks in place as the latch snaps outwardly to the position shown in Figure 1, and the rotation is transferred from the rotary to the drill pipe and in turn is transferred from the drill pipe to the inner barrel by the driving hollow tanged

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screw 6 into the slot in the driving sleeve 5. As the barrel automatically locks in place, the latch drives the inner barrel. The pressure from the pumps will feed the core cutter bit out into the formations through the opening 84, the cutter 7 rotating as it is pressed into the formation, thus cutting the core.

When the core is taken, the quick opening valve will release the pressure, and the spring 4 which was compressed will expand, retracting the cutter inside the body 1. Then the wire line overshot is dropped or pumped down to catch the spear head, the upward pull relieving the latch by drawing upwards on the sleeve 17 and camming the latch 15 inside the aperture 68 and out of blocking position. Continuation of the pull draws up the entire inner assembly together with the core for examination, the core being removed from the cutter 7 upon disassembly thereof. When the parts are assembled and re-lowered, they automatically snap into place as they enter the couplings and body 1, the latch snapping into position, thus permitting a number of cores to be taken as desired, the body being disposed at any desired portion of the well bore for this purpose.

This is of great assistance, particularly in verifying the results of an electrical logging device. As an example, I estimate that a core can be taken by means of this device in about thirty minutes in a 6000 foot test.

Although I have described a preferred embodiment of my invention in specific terms, it is to be understood that various changes may be made in size, shape, materials, and arrangement without departing from the spirit and scope of the invention as claimed.

I claim:

In a device for taking cores from the walls of a well, comprising an elongated body having an axial bore extending a distance down into the body from the upper end thereof and having a downwardly extending inclined section opening obliquely thru one side of said body above the lower end thereof, core boring means rotatably disposed in the bore and adapted to be advanced therein to extend downwardly out through the obliquely opening in said body in response to fluid pressure applied in said bore to the core boring means within said body, the latter having a dog recess forming a cavity opening to another side of said body and a dog movable into and out of the dog recess and provided exteriorly with a plurality of teeth for engaging with a side of the well, the features which include having the dog recess opening to the side opposite to that of the oblique opening for the core boring means and being substantially transversely opposite thereto, an upwardly inclined wall portion in said elongated body forming the upper bounding wall of said dog recess, a corresponding upwardly inclined upper portion upon the dog, said body having an inclined cylindrical bore parallel and adjacent to the upwardly inclined wall portion and the latter having elongated guide groove portions therein, the inclined cylindrical bore being closed at both ends and communicating along the upper portion thereof through a slot in said upwardly inclined wall portion with said dog recess, and said body also having a pressure fluid passage connecting the lower portion of said inclined cylindrical bore with the portion of aforesaid axial bore subjected to fluid pressure in order to communicate the latter to said inclined cylindrical bore when the core boring means is extended

thereby, a piston reciprocable in said inclined cylindrical bore, and an elongated extension upon said dog slidably mounted in said elongated guide groove portions, said extension being rigid with said dog and connected to said piston so that upward movement of the piston in its inclined cylindrical bore will cause corresponding rearwardly upward and outward extension of said dog against the wall of the well in which the device is located substantially transversely opposite to the extension of the core boring means through the oblique opening in said elongated body.

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