Dec. 17, 1946. B. W. SEWELL 2,412,915

PRESSURE CORE BARREL

Filed June 15, 1942 2 Sheets-Sheet 1

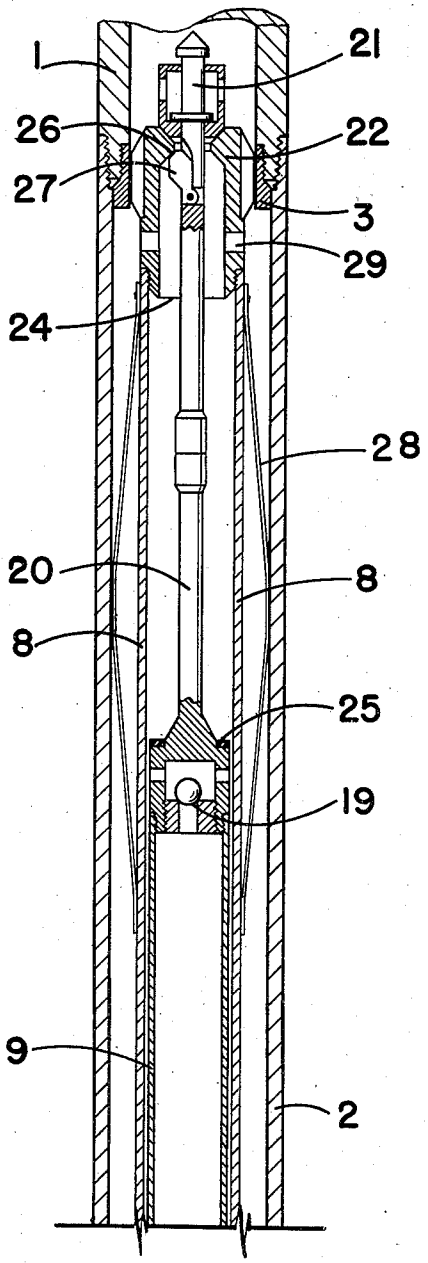


FIG. 1.

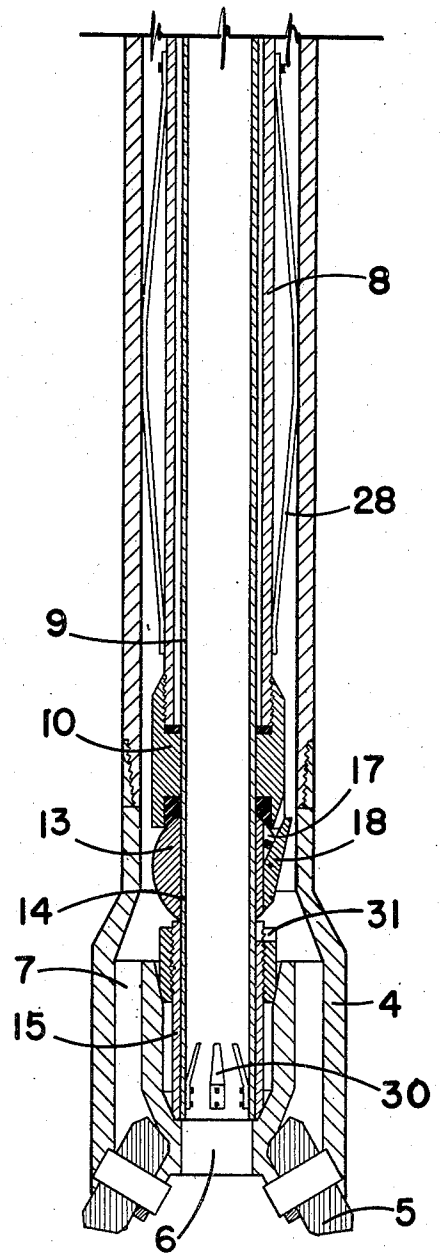


FIG. 2.

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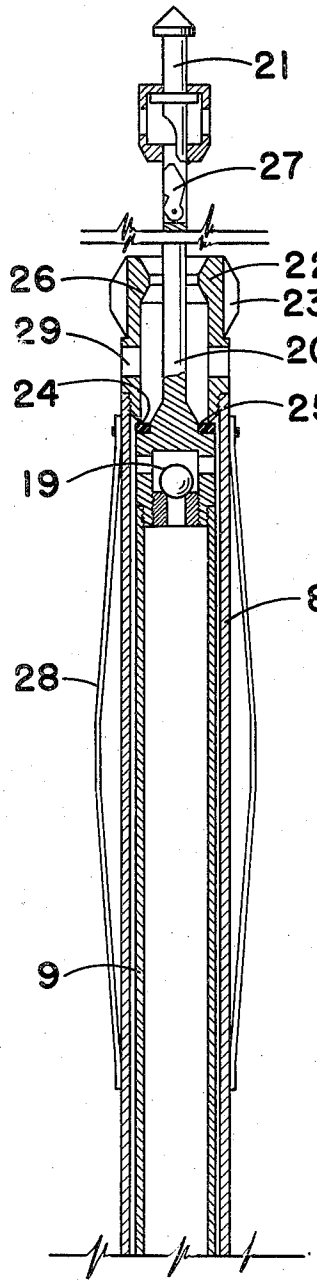


FIG. 3.

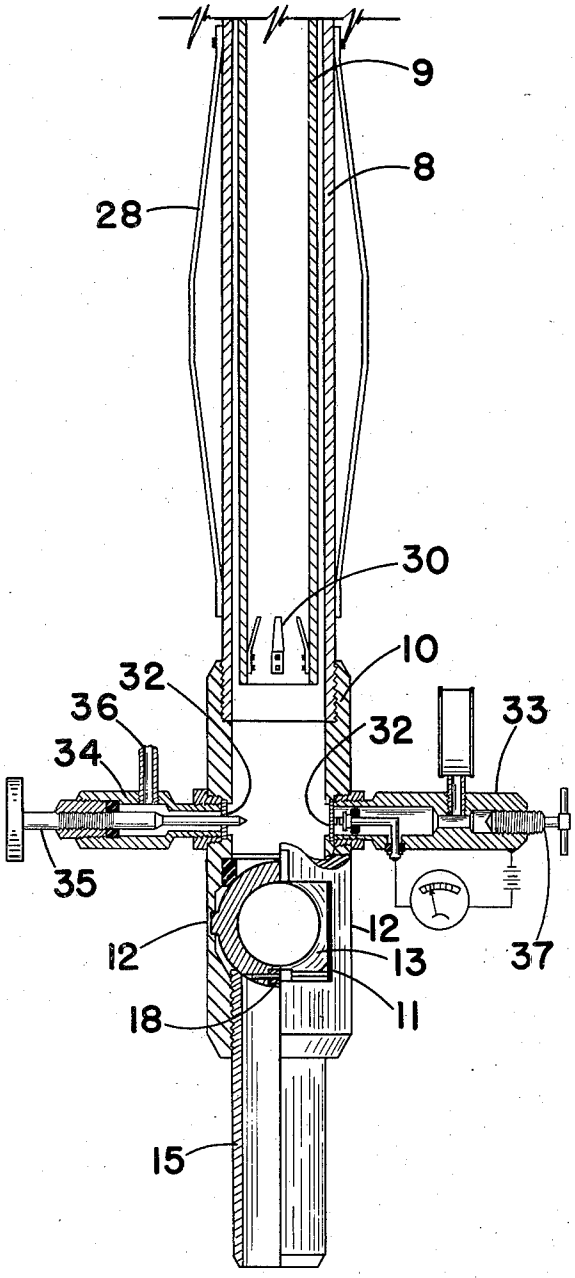


FIG. 4.

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UNITED STATES PATENT OFFICE

2,412,915

PRESSURE CORE BARREL

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Application June 15, 1942, Serial No. 447,047

5 Claims. (Cl. 255—72)

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The present invention is directed to a wire line pressure core barrel.

The principal object of the present invention is the provision in a device of the character described of an improved valve actuating means. Other objects of the present invention are to simplify construction of a device of the character described and to impart more positive action to the parts thereof.

Further objects and advantages of the present invention will appear from the following detailed description of the accompanying drawings, in which—

Fig. 1 is a front elevation, partly in section, of the upper part of one type of pressure core barrel according to the present invention in coring position;

Fig. 2 is a similar view of the lower part of the same core barrel in the same position;

Fig. 3 is a similar view of the upper part of the same core barrel with parts in position for the recovery therefrom of the trapped constituents; and

Fig. 4 is a similar view of the lower part of the same barrel in the same position.

Referring to the drawings in detail, numeral 1 designates the upper portion of the drill collar of the drill string, and 2 the lower portion. The two are screwed together, and mounted in the joint between them is a ring 3 having an internal diameter which, for the purpose of description, will hereinafter be referred to as X. Secured to the lower end of the bottom section 2 of the drill collar is the drilling head 4 which is provided with rotary cutters 5 and a central passage 6 for receiving the core. Drilling mud passages 7 connect the interior of the drill collar with the seats of the rotary bits.

Fixed in place in the lower section of the drill collar is the core barrel assembly, consisting essentially of a pressure tube 8 in which the core receiving barrel 9 is slidingly arranged. Attached to the lower end of the pressure tube is a valve body consisting essentially of a sleeve 10 having an external diameter such as to make a sliding fit with X. The upper end of the sleeve is in screw thread engagement with the lower end of the pressure tube. The intermediate position of the sleeve is cut away to form two opposed windows 11 and two opposed arms 12 having flat inside faces. Set in the cut away portion in such a way as to protrude is a ball valve 13 having a central passage adapted to pass the core receiving barrel 9. The ball is seated on one side on the inner circumference of the sleeve 10 and on the other

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side on the upper rim of a liner 15. When the core barrel is in its core receiving position, the ball valve has on one side a vertically arranged groove 17 in which is fixed a pawl 18 the finger end of which protrudes upwardly beyond the outside diameter of the sleeve 10. The periphery of the latter is slotted to receive the pawl for the purpose hereafter specified. The panel is normally spring pressed outwardly.

The upper end of the core receiving barrel carries a check valve 19 which is adapted to permit the flow of fluid outwardly from the barrel and prevent flow in the opposite direction. Extending upwardly from this valve is stem 20 which terminates in a spearhead 21. The upper end of the pressure tube 8 carries a plug 22 which has an outside diameter substantially less than X, but which carries longitudinally disposed ribs 23 which are of only slightly smaller diameter than X. The space between the ribs is provided for the passage of the drilling fluid. The lower end of the plug 22 carries a ring 24 which is adapted to seat on a gasket 25 carried in the annular surface provided on the upper end of the check valve 19.

The upper end of the plug 22 is provided with an inwardly directed lip 26 which is adapted to receive a lug 27 pivoted in a slot in the stem 20. This lug is so shaped that when the spearhead is in its lowermost position the lug is forced outward. When the spearhead is pulled outwardly, the lug can move inwardly in the recess in the stem 20.

The exterior of pressure tube 8 is provided with circumferentially spaced longitudinal leaf springs 28 which perform the double function of breaking means and spacing means. In use, the entire assembly is dropped into the drill stem. The springs 28 are so designed as to provide sufficient friction against the interior of the drill stem to impede the downward fall of the assembly sufficient to prevent it from being injured when it reaches the bottom.

With the parts in the position shown, the core is cut and passes upwardly into the core receiving barrel. The barrel is held in suitably spaced relation in the drill collar by spacers 28. When sufficient core is cut a fishing tool is dropped into the drill stem to engage the head and an upward pull is exerted on the stem 20. This draws the core receiving barrel upward in the pressure tube until the ring 24 is seated on the gasket 25, thereby sealing the interior of the core barrel. It may be observed here that as core material enters the barrel the fluid in the barrel leaves

through the check valve 19 and passes upwardly to leave the pressure tube through radial passages 29. When the core barrel is pulled upwardly, the core is cut off at the bottom by a core catcher 30. When the ring 24 is seated on the gasket 25 the bottom end of the core receiving barrel has cleared the upper end of the ball valve 13. Further pull on the stem 20 causes the whole assembly to move upwardly. When the sleeve 10 passes through the ring 3 the lower edge of the latter engages the finger of the valve and with continued upward movement of the assembly causes the pawl to rotate around the horizontal axis. At this end there is a slot 31 in the sleeve 10 and the liner 15 to receive the pawl 18. This results in the sealing of the lower end of the core receiving barrel and the assembly is then brought to the surface.

As shown in Fig. 4, the collar is provided above the arms 11 with opposite disposed diaphragm discs 32. These enter into the operations at the surface when the barrel is recovered. Through one of these discs there is connected a pressure measuring device 33 of the character illustrated in Fig. 2 of U. S. Patent 2,243,398, issued May 27, 1941. It may be noted that in this case the pressure on the outside of the disc is created by screwing in screw 37. To the opening covered by the other disc, is attached a fitting 34 in which is arranged a plunger 35 for rupturing the disc, and to permit the fluid contents thereof to pass out through a tube 36. The valve 13 is then opened and the upper end of the stem 20 is taken off, and the core receiving barrel is withdrawn from the pressure tube.

It will be apparent that many changes may be made in the specific structure without departing from the scope of the present invention. The specific embodiment illustrated is a preferred embodiment to which the present invention is not necessarily limited.

The nature and objects of the present invention having been thus described and illustrated, what is claimed as new and useful and is desired to be secured by Letters Patent is:

1. A pressure retaining coring assembly for bringing a core to the surface of the ground at the same pressure the core left the formation, comprising a string of drill tubing, a core barrel adapted to be lowered into and raised completely out of the string of drill tubing during normal drilling operations, a bit having a passage in the center thereof attached to the end of the drill tubing to cut the core, the core when cut passing upwardly through the passage in the bit and into the lower end of the core barrel, means on the core barrel to receive lifting means lowered within the drill tubing to lift the core barrel completely out of the drill tubing when coring is completed, a valve for closing said core barrel when the latter is lifted out of the coring position and co-acting means carried by said valve and said drill tubing for actuating said valve.

2. A pressure retaining coring device for bringing a core to the surface of the ground at the same pressure the core left the formation, comprising a string of drill tubing, a core catching assembly adapted to be lowered into and raised completely out of the string of drill tubing during normal drilling operations comprising a casing and a core barrel slidingly mounted in said casing, a valve carried by said casing adapted to assume an open and a closed position and to pass said barrel when in open position, a bit having a passage in the center thereof attached to the end of the drill tubing to cut the core, the core when cut passing upwardly through the passage in the bit and into the lower end of the core barrel, means on the core barrel to receive lifting means lowered within the drill tubing to lift the core barrel completely out of the drill tubing when coring is completed, co-acting elements carried by said core barrel and said casing for causing the latter to rise after a predetermined upward movement of the former and co-acting means carried by said valve and said drill tubing to move said valve to a closed position during the upward movement of said casing.

3. A coring device according to claim 2 in which the means for receiving lifting means is an upwardly extending stem on said core barrel adapted to receive a wire line and in which said core barrel and said casing are provided with mating elements for sealing the upper end of said casing after a predetermined upward movement of said barrel relative to said casing.

4. A coring device according to claim 2 in which the coring assembly is adapted to be dropped through the drill tubing during the drilling operation and is provided on its outer surface with means for frictionally engaging the inner surface of the drill tubing to retard the rate of fall of said assembly therethrough.

5. A coring assembly according to claim 1 in which the coacting means for actuating the valve comprises an arm extending laterally from and moveable with the valve normally occupying a laterally extended position when the valve is open and an abutment carried by the tubing and arranged in the path of the laterally extended arm whereby the latter contacts said abutment when the coring assembly is moved upwardly relative to the tubing and actuates the valve upon further movement of said assembly and whereby further upward movement of the assembly is prevented if there is any obstruction in the valve preventing its closing.

BENJAMIN W. SEWELL.