Oct. 20, 1936. O. J. WILLIAMS 2,058,119

FORMATION TESTING AND CORE TAKING DEVICE

Filed Jan. 18, 1936 2 Sheets-Sheet 1

Fig. 1.

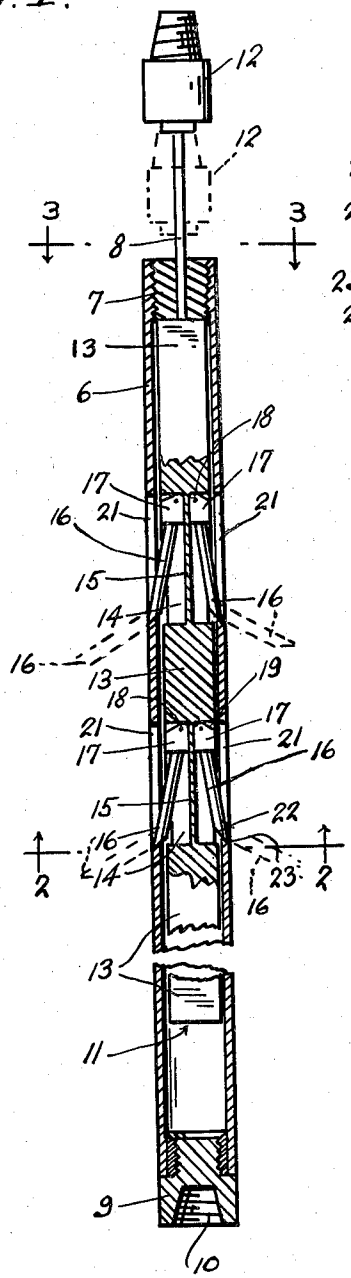


Fig. 2.

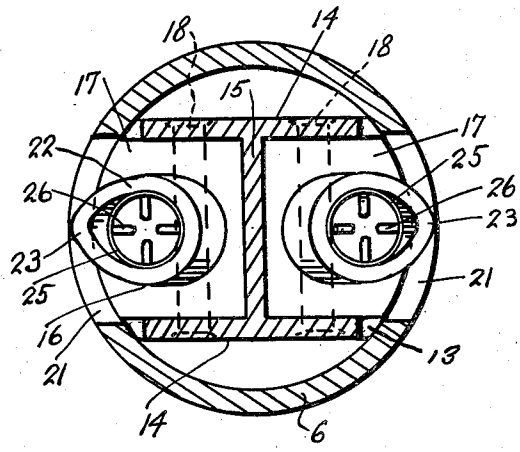
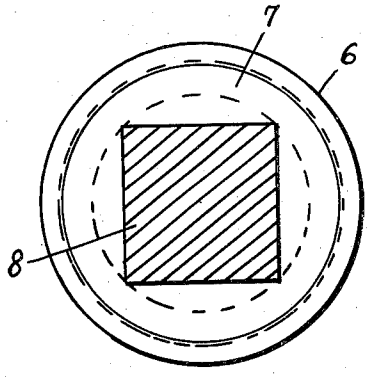


Fig. 3.



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Filed Jan. 18, 1936 2 Sheets-Sheet 2

Fig. 4.

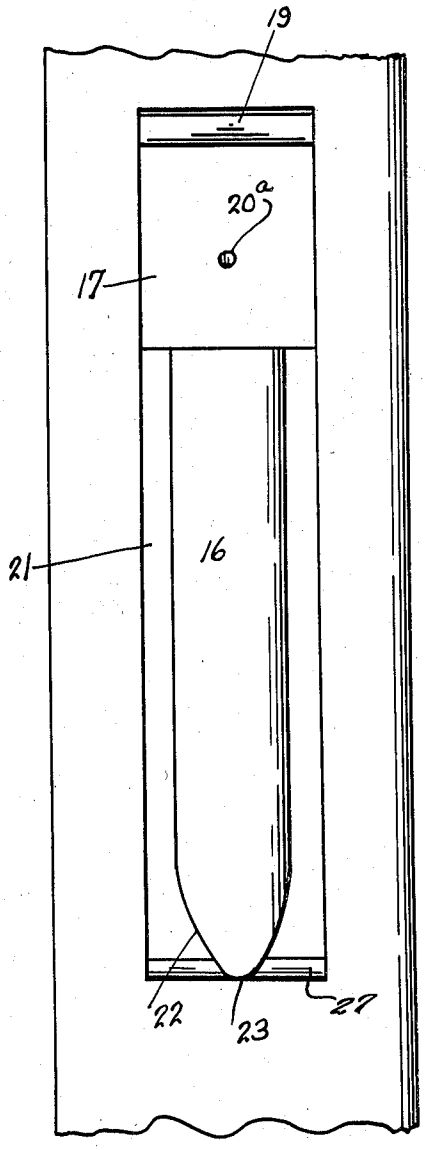
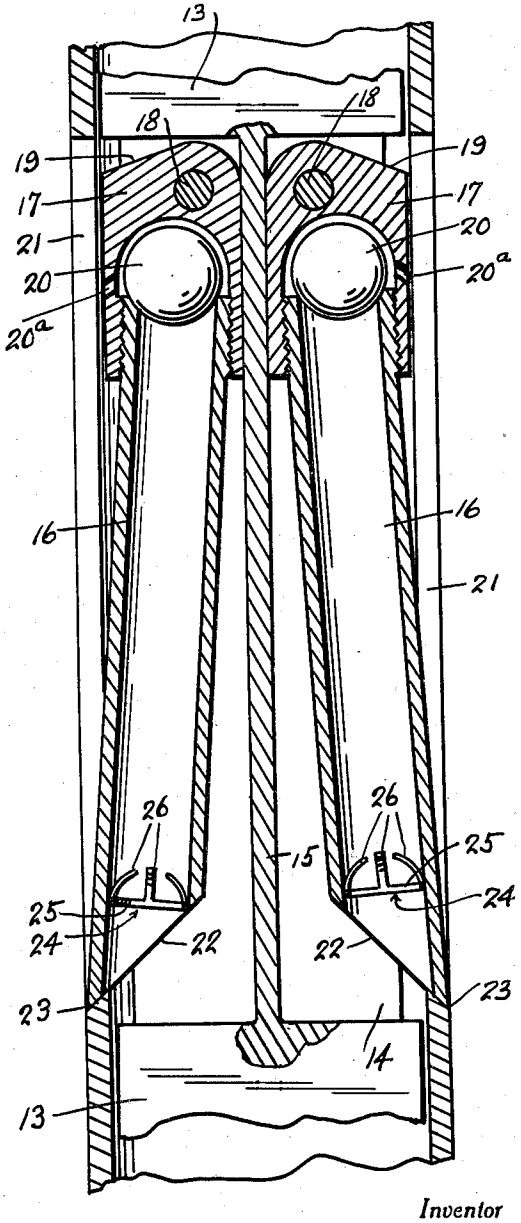


Fig. 5.



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UNITED STATES PATENT OFFICE

2,058,119

FORMATION TESTING AND CORE TAKING DEVICE

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Application January 18, 1936, Serial No. 59,737

5 Claims. (Cl. 255—1)

This invention relates to a well tool or implement expressly designed for the purpose of taking samples or cores of the formation of wells where the recovery has not been satisfactory in the taking of the original core and for testing formations that have not previously been cored at various depths.

Classified in greater detail in order to distinguish from various other types of core testing devices, it may be said that the invention pertains to that special category of devices wherein the core sampling tool is independent of the regular drill structure and is designed in particular for collecting and salvaging earth formation after the well hole has been previously drilled.

By way of comparison with similar prior art devices, I regard the invention as individual and distinct in that it is characterized by a unique outer casing or shell construction and a telescoping weighted follower unit telescopically mounted therein and equipped with a multiplicity of diametrically opposed pairs of simultaneously operable projectable and retractable core taking and retention barrels or tubes.

One feature and advantage which distinguishes the structure as highly practicable has to do with the adoption and use of a unique follower-type carrier unit for the pivotally mounted projectable and retractable core taking unit wherein the barrel portions of said unit are threadedly connected with their special adapter mountings so that they may be detached above the surface and the trapped core successfully retrieved substantially free from excess water and liquid.

Another outstanding factor regarded as a highly feasible improvement has to do with the adoption of a core or sample taking barrel wherein the lower swingable or free end is tapered and pointed to facilitate penetrating the wall of the hole, said barrels being provided inwardly of said tapered ends with resilient retention means allowing the formation to enter the barrel and thereafter preventing it from dropping out by gravity or otherwise.

Additional novelty is predicated upon the incorporation in the asemblage of ball valve means cooperable with ported hanger or mounting blocks which arrangement provides for the escape of water so as to maintain the collected formation substantially intact.

More explicitly, the preferred embodiment of the invention relates to an arrangement including a slotted tubular casing to accommodate the internal carrier or follower for the collector barrels wherein the carrier functions as valving means for the slot and the barrels that swing out and provides a successful and dependable holder or mounting unit for the diametrically opposed pairs of freely swingable core taking barrels.

Numerous other features and advantages will doubtless become apparent from the succeeding detailed description and the accompanying illustrative drawings.

In the drawings:

Figure 1 is a view, partly in section, and partly in elevation, showing the complete assembly and illustrating, in a partial way, the method of projection of the core taking barrels.

Figure 2 is an enlarged cross-sectional view taken approximately on the plane of the line 2—2 of Figure 1 looking upwardly in the direction of the arrow.

Figure 3 is a correspondingly enlarged horizontal section on the line 3—3 of Figure 1.

Figure 4 is an enlarged fragmentary view showing a portion of the casing and one of the wall penetrating pendulous type core taking barrels.

Figure 5 is an enlarged fragmentary section showing the diametrically opposed relationship of the pairs of barrels and other associated pocket forming details.

From a unitary standpoint it may be said that the structure is composed primarily of two essential units, that is the relatively stationary cylindrical casing or shell 6 and the relatively movable or reciprocatory follower type barrel carrier and operating unit. The latter unit is mounted for sliding movement inside of the casing as is evident.

Considering now the casing means, this comprises an open ended internally screw-threaded cylinder having a centrally bored screw plug 7 at its top. Incidentally the aperture in this plug is preferably square in cross-sectional formation to accommodate the correspondingly shaped reciprocatory stem 8, on the relatively movable carrier or follower unit. This permits the unit to slide up and down in the casing but prevents rotation thereof. At the bottom is an appropriately constructed screw plug 9 which functions primarily as a closure for the lower end and which is also provided with a screw socket 10 to accommodate a depending or hanging string of weights, such as for example a drill. It is evident that this drill could of course be directly coupled into the lower end of the casing if necessary or desired. In practice the drill or other part attached to the coupling or plug 9 constitutes the means which serves as a stop to engage the bottom of the hole so that by

determining the length of the drill in the first instance it is possible to determine, from the complete depth of the hole, just how far the core taking device, as a complete assembly, has been lowered into the hole. This in itself constitutes an important feature in the discovery.

The internal carrier or follower type unit is differentiated by the numeral 11 and is preferably a weighted construction. It includes the aforementioned lowering and hoisting stem 8 and a coupling head 12, constructed to accommodate the hoisting and lowering cable or other means (not shown), and to further serve as a stop to engage the plug 7 and to determine the downward telescoping movement, or degree of movement, of the part 11. This part 11 may be of one-piece formation and includes a series of longitudinally spaced solid block members 13 having intervening H-shaped adapters. Each adapter as shown in Figure 2 comprises spaced parallel flanges 14 and a central partition or web 15 defining diametrically opposed pockets. These pockets serve to accommodate the respective pairs of sample or core taking barrels 16. Inasmuch as each barrel assembly is the same in construction, a description of one will suffice for all. Attention is therefore called to Figure 5 wherein it will be observed that the upper open ended screw-threaded portion of the barrel is tapped into a socket in the block-like hanger or mounting. This hanger is pivotally suspended in the pocket by an appropriate pivot pin 18. It is observed that the pivoted end includes a tapered surface 19 which as it swings outwardly and comes in contact with the adjacent surface of the block 13 causing said block to serve as a stop element to limit the outward swinging movement of the barrel. This gives the weight 13 the additional function of stops. Furthermore each block is bored to provide a recess for a ball check valve 20. Associated with the ball check valve is a fluid release or relief port or orifice 21 which registers with the adjacent vertically elongated slot in the casing. This slot is obviously to permit the barrel to swing in and out to provide the desired projectable and retractable feature. The lower end of the barrel is tapered downwardly and outwardly as indicated at 22 and terminates in a wall penetrating point 23. This permits the barrel to serve as a sort of a miniature drill so that it easily bores its way into the wall of the hole (not shown). As the sample or core is fed into the barrel it is retained therein by a simple retention device 24. This comprises an annular ring 25 with curved spring fingers 26 properly shaped to allow the dirt to go in but to prevent its downward accidental discharge.

The tapered surfaces 22 have the additional function of cams and are engageable with the lower beveled end or edge portion 27 of the slot as is evident from Figure 4. It is manifest, therefore, that as the casing stops in the hole and the carrier unit 12 continues to ride down, the cams 22 engage the beveled surfaces 27 and this starts to feed the barrels out into engagement with the wall.

In operation it is evident that the complete sample taking device is lowered into the already drilled hole by suitable means (not shown). As the device goes down into the hole the parts assume the positions shown in Figure 1 wherein the core taking barrels 16 are retracted completely within the casing. This permits free descent of the device. When the closed bottom of the casing comes in contact with the bottom of the hole the cam elements come into play to start the barrels out and as the unit 11 comes down further, the barrels swing out in diametrically opposed relationship and literally dig into the wall of the hole to gather sample formations.

It is also evident that as the plunger-like carrier, which is sufficiently weighted, moves down telescopically into the casing, the blocks 13 then position themselves opposite the major portion of the slot, that is, the portion of the slot above the barrel and themselves function as closing valves. In other words, these blocks 13 are of sufficient cross-section so as to function as effective closures for the slots above the protruding barrels to prevent water and mud from washing into the casing and interfering with the upward lift action of this unit 11.

It is further clear that as the device is pulled up out of the hole, the part 11 goes back to the position shown in Figure 1 and the barrels swing into the casing with their trapped cores or samples. Then too, as previously pointed out, as the dirt fills into the barrel it opens the check valve 20 and allows the escape of water through the passages 21, thus obtaining an accurate test of the soil and preventing loss of the core by a wash-out.

It is thought that the description taken in connection with the drawings will enable a clear understanding of the invention to be had. Therefore, a more lengthy description is thought unnecessary.

While the preferred embodiment of the invention has been shown and described, it is to be understood that minor changes coming within the field of invention claimed may be resorted to if desired.

What I claim is:

1. In a structure of the class described, a casing having a pair of diametrically opposed slots, a slide mounted for reciprocation in said casing, said slide having portions to serve as closures for the slots, and a pair of diametrically opposed core taking barrels pivotally mounted on said slide and cooperable with said slots.

2. In a structure of the class described, a carrier unit, a mounting block pivotally mounted therein, said block being provided with a liquid discharge orifice and a valve accommodation recess, a sample taking barrel connected to said block, and a ball check valve cooperable with the barrel and block as well as the orifice, whereby to relieve excess water and to insure trapping of an intact sample.

3. In a structure of the class described, a casing having a longitudinally elongated slot, a core taking barrel pivotally mounted in the casing and projectable through the slot, the lower end of the slot being provided with a beveled surface to function as a cam, and the adjacent end of the barrel being beveled to cooperate therewith to facilitate the initial outward swinging movement of the barrel in the manner and for the purposes described.

4. In a core taking construction of the class described, a vertically elongated casing adapted to be lowered into a drilled hole, said casing being provided at a predetermined point with a pair of diametrically opposed apertures, a reciprocatory carrier unit slidably mounted in the casing and provided with self-contained projectable and retractable pivotally mounted sample

taking barrels, said barrels being diametrically opposed and in registry with said apertures and being automatically brought into play as said carrier unit drops down inside the casing when the descent of the casing has been stopped by the bottom of the hole in the manner and for the purposes described.

5. In a core sample taking structure of the class described, a vertically elongated casing adapted to be lowered into a drilled hole, said casing being provided at a predetermined point with diametrically opposed longitudinally elongated slots, a reciprocatory carrier unit slidably mounted in the casing and provided with self-contained pockets adapted for alignment with said slots, and a pair of valved independently operable sample taking barrels, said barrels being pivotally mounted in the pockets and adapted for projectable and retractable association with the slots in the manner and for the purposes described.

OSCAR J. WILLIAMS.