Dec. 26, 1933. G. A. HUMASON 1,940,866

SAMPLE TAKING APPARATUS

Filed June 9, 1932

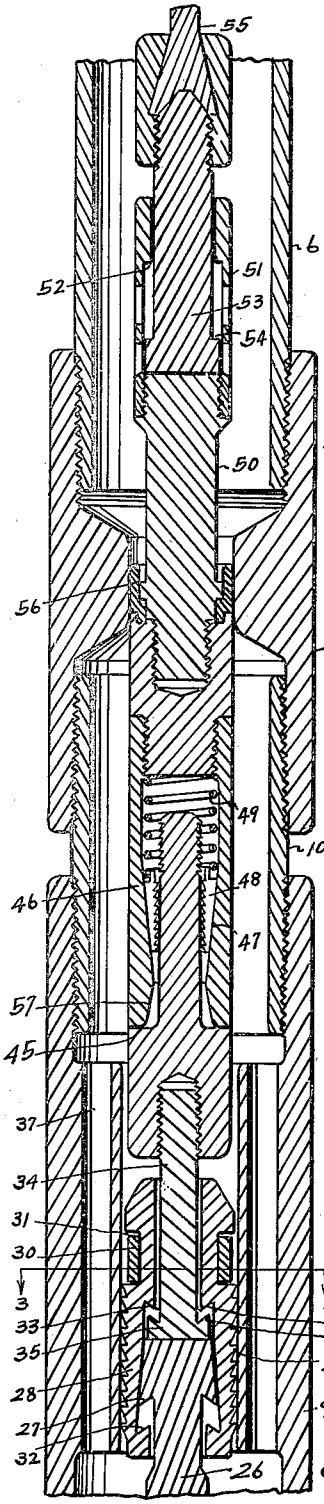


Fig. 1.

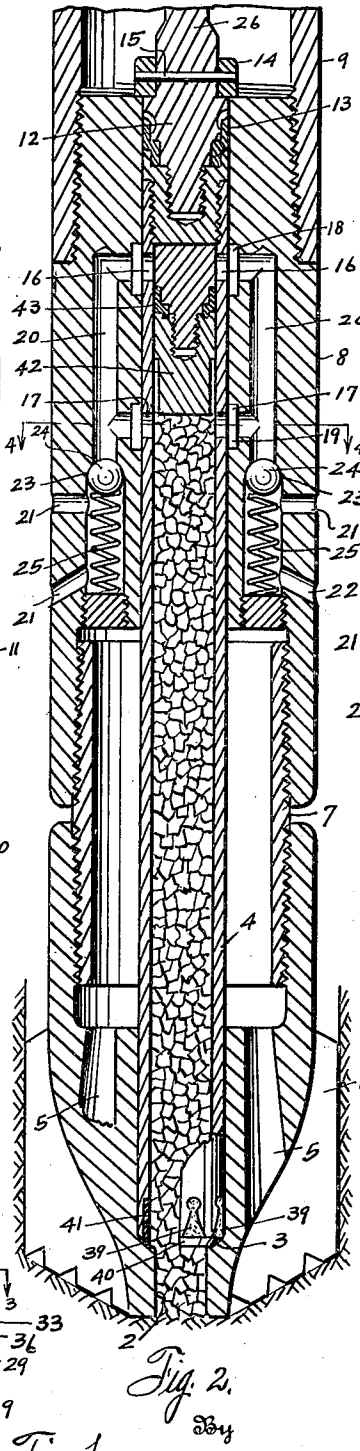


Fig. 2.

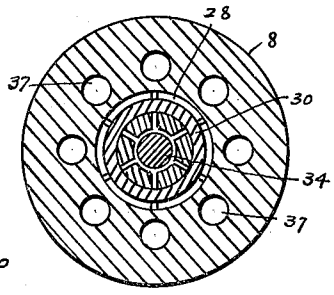


Fig. 3.

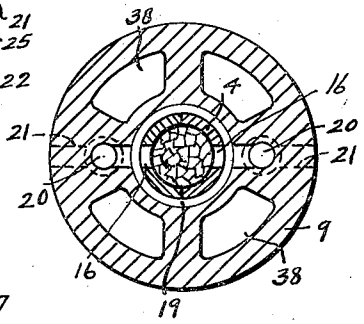


Fig. 4.

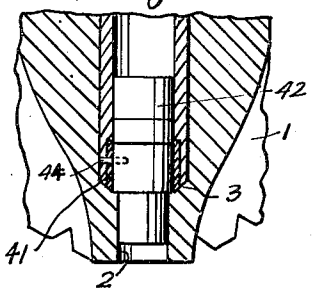


Fig. 5.

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SAMPLE TAKING APPARATUS

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4 Claims. (Cl. 255—72)

This invention relates to a sample taking apparatus.

An object of the invention is to provide, in a sample taking apparatus, a sample receiving barrel with novel means for severing the core or sample and for closing the lower end of the barrel to retain the sample therein.

Another object is to provide, in an apparatus of the character described novel means for actuating the core barrel to effect the closing of the lower end thereof.

A further object is to provide novel means for anchoring the core barrel in position to receive the core or sample, said anchoring means being releasable to permit the withdrawal of the core barrel through the drill stem, without withdrawing the stem and drill attached thereto.

The invention also embodies novel means for effecting such withdrawal of the core barrel.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawing, wherein:

Figures 1 and 2 show vertical sectional views of the upper and lower ends, respectively, of the apparatus showing the sample therein and the parts in readiness to sever the sample and close the lower end of the core barrel.

Figure 3 shows a cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 shows a cross sectional view taken on the line 4—4 of Figure 2, and

Figure 5 shows a fragmentary sectional view of the lower end of the barrel, showing the plug closing the lower end of the barrel.

In the drawing the numeral 1 designates a drill of any selected design having the sample receiving inlet 2 therein which is reduced forming the downwardly converging seat 3 on which the lower of the tubular core barrel 4 rests. This core barrel may be formed if desired, of complemental longitudinal sections as illustrated in Figure 4 so that when the core barrel is withdrawn it may be readily separated for access to the core or sample. The drill may have the water passageways 5, 5 on the outside of the core barrel through which a flushing fluid may be supplied to the drill.

The numeral 6 designates a tubular drill stem whose lower end is provided with a nipple 7 to which the drill is attached and attached to the upper end of this nipple there is a special coupling 8. Attached to the upper end of the coupling 8 there is a long tubular section 9 whose upper end is connected to the nipple 10 which in turn is attached to the lower end of the drill stem proper by means of the coupling 11.

The upper end of the coupling 8 is inwardly thickened and the upper end of the core barrel 4 is fitted snugly within said coupling. The upper end of said core barrel is closed by a sectional head 12 having the upwardly opening cup ring 13 clamped between the sections of said head and fitted closely within said coupling 8. Around the head 12, and seated against the upper end of the coupling 8 there is a ring 14 which is secured in place by a frangible pin 15.

The core barrel has the upper and lower ports 16, 16 and 17, 17 which align with the corresponding annular channels 18, 19 around the inside wall of the coupling 8 and leading from these channels through the wall of the coupling 8 are the conduits 20 which terminate in the outlet ports 21, 22 leading outwardly through the wall of said coupling 8. Above said ports 21, 22, the conduits 20 have the valve seats 23, 23 closed by the downwardly opening valves 24, 24 which are seated on and normally held closed by the coil springs 25, 25.

A stem 26 extends upwardly from the head 12 and its upper end is provided with the annular downwardly flared shoulder 27.

The upper end of the tubular section 9 is inwardly thickened and fitted within said inwardly thickened portion are the sectional slips 28 which have the external upwardly pitched ratchet teeth 29 engageable with the wall of the section 9. The sections of these slips are held in assembled relation by means of a surrounding band 30 which is counter sunk into an external groove 31, around said slips. The lower ends of the slips 28 have the inside upwardly converging shoulders 32 engageable with the opposing shoulder 27. The upper end of the stem 26 above the shoulder 27 is upwardly tapered and the inner sides of slips 28 are correspondingly tapered upwardly, said upwardly tapering portions of the slips terminating in the downwardly converging internal shoulders 33. There is a stem 34 which is fitted between and extends above the upper end of the slips 28 and whose lower end has an enlarged head 35 provided with the external upwardly flared shoulder 36 engageable with the inside shoulders 33 of said slips.

The inwardly thickened portion of the tubular section 9 has the vertical channels 37 therethrough and the inwardly thickened portion of the coupling 8 has the vertical channels 38 therethrough, through which a drilling fluid may be

conducted from the stem 6 down through the passageways 5 to the drill 1.

The lower end of the core barrel has the downwardly widened slots 39, 39 cut therethrough and spaced apart therearound forming a cage which has the continuous annular ring 40 therearound, tapered to conform to the taper of, and to seat upon the seat 3 and moulded within this cage and into said slots 39 there is an inside sleeve 41 formed of rubber or other suitable resilient material.

In the core barrel there is a plug 42 having the annular upwardly opening cup ring 43 thereabout to fit closely within the core barrel.

When it is desired to take a core the apparatus as hereinabove described may be assembled and let down into the bore, with the plug 42 in the lower end of the core barrel and closing the inlet 2 against the inlet of drilling fluid into the core barrel and the plug may be secured in place by a frangible pin 44. The slips 28 will be held expanded by the co-acting tapering inner faces of said slips and the external tapering faces on the upper end of the stem 26 and will thus be held in engagement with the inner wall of the section 9 to anchor the core barrel in place. As drilling proceeds and as a core is formed it will enter the core receiving inlet 2 and gradually force the plug 42 upwardly, forcing the contents of the barrel 4 above said plug out through the conduits 20 past the valves 24 and then out through the ports 21, 22.

In some cases the drill will be employed in ordinary drilling when a core or sample is not desired and in such case the core barrel will not be used until a stratum has been reached which is to be tested. In such case when a sample is desired the drill should be lifted off of the bottom and the drill stem and drill washed out. The core barrel 4 with the slip assembly attached thereto may be then dropped through the drill stem 6 and will finally land on the seat 3 and the barrel will be anchored in position by the slips 28 as hereinabove explained and drilling may be proceeded with, the core being formed displacing the plug 42 and entering the core barrel 4 as previously explained.

The stem 24 is formed of sections, the upper section thereof having the annular external shoulder 45.

When it is desired to secure the sample in the barrel 4 and to retain the same therein the barrel 4 is actuated downwardly and the downwardly tapering seat 3 will contract the cage into which the lower end of the barrel is formed, breaking the ring 40 and finally closing the lower end of said barrel, thus severing the sample and forming means for retaining the sample in the core barrel.

The resilient sleeve 41, when contracted, will form a seal at the lower end of the barrel 4 to retain the fluid of the entrapped sample.

Any suitable means may be employed for actuating said barrel to close the lower end thereof and for withdrawing the barrel. A special type of overshot fishing tool has been provided for this purpose and will now be described.

This fishing tool embodies a slip socket 46 having the downwardly tapering inside seat 47 on which are seated the downwardly tapering slips 48, adapted to engage over the upper end of the upper section of the stem 34 and there is a coil spring 49 in the slip socket which presses downwardly against said slips 48 to hold them contracted inwardly against said stem to grip the same. The slip socket 46, is attached to the lower end of the shank 50 whose upper end carries a cage 51 having the annular internal shoulder 52. Within this cage there is the impact member 53 having the external annular shoulder 54 therearound arranged to interengage with the shoulder 52, said impact member having a limited longitudinal movement in said cage. To the upper end of said impact member a suitable cable 55 may be connected in any appropriate manner.

The coupling member 11 has its midportion thickened inwardly and the shank 50 has an upwardly opening cup ring 56 therearound which fits closely within said thickened portion of the coupling 11.

When it is desired to withdraw the sample the fishing tool, as above described, may be lowered through the stem 6 by the cable 55 and the slip socket 46 will readily pass over the upper end of the stem 34, the lower end of said slip socket being flared to form a guide 57 to guide the slip socket over said stem. The lower end of the slip socket 46 will land on the shoulder 45 with the cup ring 56 located within the inwardly thickened portion of the coupling 11 and thereupon pump pressure may be applied through the stem 6 to force the core barrel downwardly and at the same time the impact member 53 may be elevated and dropped striking against the upper end of the shank 50 to force the same downwardly and the core barrel 4 will thereby be actuated downwardly and its lower end collapsed as hereinabove explained to sever the core or sample and to completely close the lower end of the core barrel. When the lower end of the core barrel has been thus collapsed the cup ring 56 will have moved on down past the thickened portion of the coupling 11 permitting the drilling fluid to pass freely on down through the drill stem and out through the passageways 5 and thus permitting the pump to speed up indicating to the operator that the sample has been trapped in the core barrel. An upward pull may now be exerted on the cable 55, elevating the fishing tool, and the slips 48 will engage the upper end of the stem 34 lifting the shoulder 36 of said stem into engagement with the opposing shoulders 33 of the slips 28 and said last mentioned slips will be thus contracted inwardly and pulled upwardly releasing the wall of the tubular section 9 and thereupon the shoulders 32 of the slips 28 will engage underneath the shoulder 27 of the stem 26 and the core barrel 4 with the sample entrapped therein may be then readily withdrawn from the drill stem to the ground surface for inspection.

The drawing and description disclose what is now considered to be a preferred form of the invention by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A core taking apparatus comprising a tubular stem, a drill at the lower end thereof having an inlet for a core; a core barrel in said stem and aligned with said inlet; holding means to releasably hold said core barrel; a collapsible core catcher associated with said barrel; means to normally prevent said core barrel from collapsing said core catcher; said stem, drill and barrel being constructed to provide a fluid channel to direct to said drill fluid pumped downwardly through said stem; and an overshot movable downwardly in said stem to engage said core barrel and close said channel so that the pressure of

the fluid in said stem may be utilized to cause said barrel to collapse said catcher; said overshot being constructed to open said channel when said core catcher is collapsed; said core barrel being removable through said stem by said overshot; said overshot serving, when removed upwardly, to release said holding means.

2. A core taking apparatus comprising a tubular stem, a drill at the lower end thereof having an inlet for a core; a core barrel in said stem and aligned with said inlet; holding means to releasably hold said core barrel; a collapsible core catcher associated with said barrel; means to normally prevent said core barrel from collapsing said core catcher; said stem, drill and barrel being constructed to provide a fluid channel to direct to said drill fluid pumped downwardly through said stem; and an overshot movable downwardly in said stem to engage said core barrel and close said channel so that the pressure of the fluid in said stem may be utilized to cause said barrel to collapse said catcher; said overshot being constructed to open said channel when said core catcher is collapsed; said core barrel being removable through said stem by said overshot; said overshot serving, when removed upwardly, to release said holding means; said core barrel having therein an outlet opening having a relief valve; said opening being open before said core catcher is collapsed and closed when said core catcher is collapsed.

3. A core taking apparatus comprising a tubular stem, a drill at the lower end thereof having an inlet for a core; a core barrel in said stem and aligned with said inlet; holding means to releasably hold said core barrel; a collapsible core catcher associated with said barrel; means to normally prevent said core barrel from collapsing said core catcher; said stem, drill and barrel being constructed to provide a fluid channel to direct to said drill fluid pumped downwardly through said stem; and an overshot movable downwardly in said stem to engage said core barrel and close said channel so that the pressure of the fluid in said stem may be utilized to cause said barrel to collapse said catcher; said core barrel being removable through said stem by said overshot; said overshot serving, when removed upwardly, to release said holding means.

4. In a core taking apparatus a core barrel having a plurality of annular, spaced, inwardly collapsible fingers and rubber between and moulded on said fingers and means to collapse said fingers.

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