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SAMPLE TAKING APPARATUS

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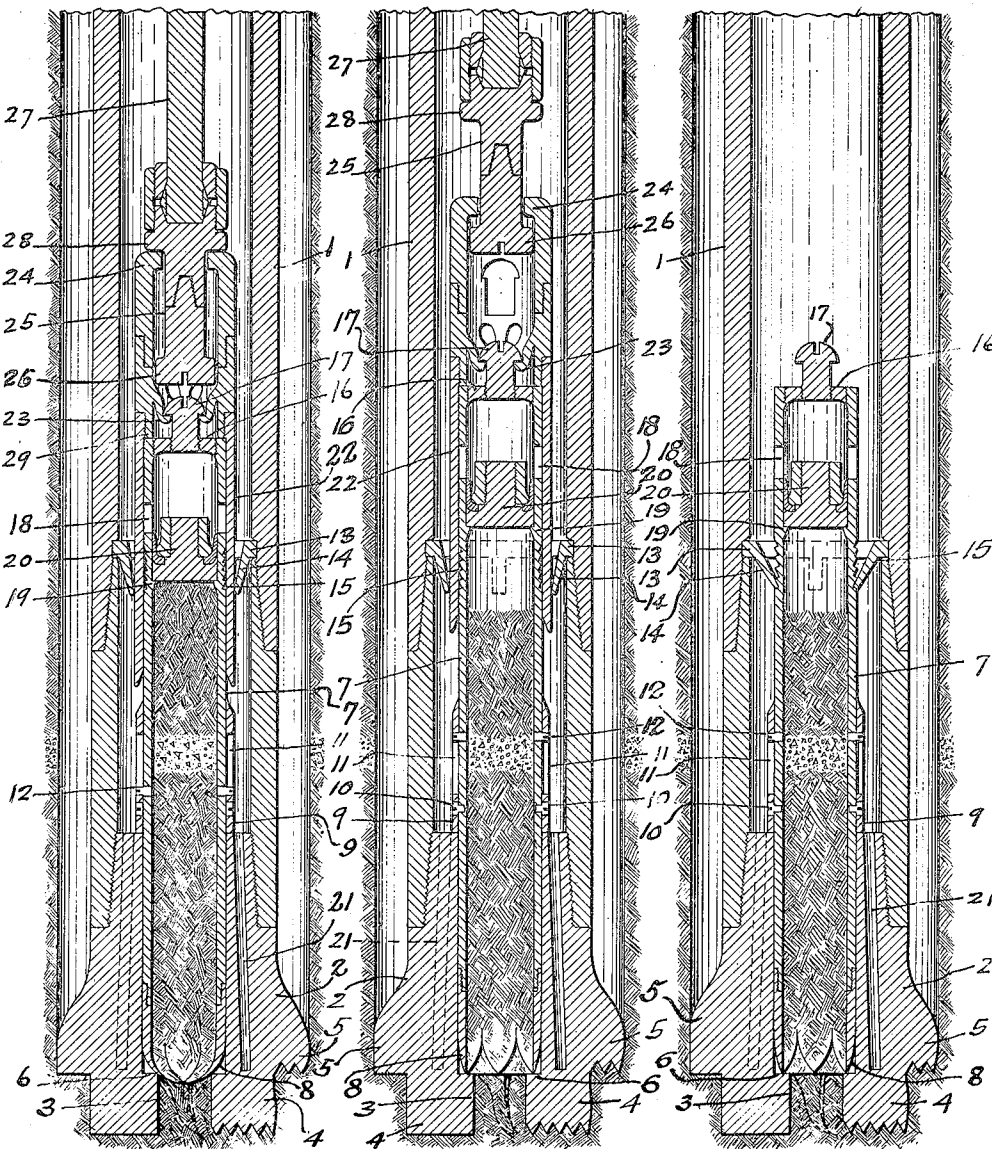


Fig. 3.

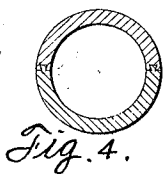


Fig. 2.

Fig. 1. INVENTOR.
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SAMPLE TAKING APPARATUS

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This invention relates to new and useful improvements in a sample taking device.

One object of the invention is to provide an apparatus of the character described specially designed for taking a core, or sample, of either soft or hard formation being pierced by the drill in drilling a well, and which may be let down into the bore, and withdrawn therefrom independently of the drilling tool employed in making the bore.

Another object of the invention is to provide a device of the character described embodying novel means for locking the core taking device in the stem of the drilling tool, novel means for releasing the same, as well as novel means for severing the core and trapping and retaining the same in the core barrel so that the core, or sample, may be withdrawn for inspection.

With the above and other objects in view this 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 drawings, wherein:

Figure 1 shows a vertical sectional view of the drilling tool showing the sample taking device locked therein in position for taking the core, or sample.

Figure 2 shows a similar view thereof showing the sample taking device in position to sever the core,

Figure 3 shows a vertical sectional view of the apparatus showing the core severed and trapped in the core barrel, ready to be withdrawn, and Figure 4 shows a cross sectional view of the core barrel.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates a tubular drill stem, to the lower end of which a drill bit 2 is attached and which is driven by the stem in the usual manner. Any type of bit may be employed having a central, core receiving bore 3. The bit shown is reduced, at its lower end, said reduced portion comprising the radial blades, as 4, which serve as pilots, and above these pilot blades are the side cutting

blades 5. Some of the blades 4 and 5 may be toothed, and others provided with sharp cutting edges, as shown. The lower end of the bore 3 is reduced, forming an internal annular shoulder 6, therein. There is a core barrel 7 in the stem 1, whose lower end section is detachable and is formed with separate prongs, or fingers 8 which are inwardly beveled. These prongs normally rest on the shoulder 6. Around the core barrel 7 there is a sleeve 9 whose upper end is inwardly beveled and this sleeve is pinned to the barrel by the frangible pins 10 and with its lower end resting on the upper end of the shank of the bit 2. This sleeve 9 has vertical slots 11 therein and screwed into the barrel with their outer ends working in said slots are the set screws 12, forming interlocking means between said sleeve and the barrel.

Anchored within the stem 1 there is a ring 13 having the downwardly converging flexible dogs 14, adapted to engage in one of the external grooves 15 formed around the core barrel and the sleeve 9 and dogs 14 thus serve to lock the core barrel in the stem 1.

The upper end of the core barrel may be closed by the plug 16, screwed therein, and which has an upstanding head 17, attached thereto and whose upper end is convex. Beneath said upper end the barrel has the lateral ports 18, 18 and beneath these parts there is an internal annular seat 19 above which is the piston valve 20. This valve in lower position closes the ports 18 to prevent the inflow of the drilling fluid into the core barrel to contaminate the sample therein, but as the core enters and fills the barrel, the valve will lift and uncover the ports 18 and the water in the barrel above the core, or the excess sample forced into the barrel, will be permitted to escape.

With the core barrel locked in the stem, as above described, as drilling proceeds a core will be formed which will be received by the bore 3 and the barrel 7 as the drilling tool descends. Drilling fluid will be forced down through the stem, but excluded from the core barrel by the valve 20 and this drilling fluid will pass on down through the channels 21 in the bit 2, and out in front of the side cutting

blades 5. The bore 3, however, being reduced, and extending beneath the lower, or discharge, ends of said channels 21 very little, if any, of the drilling fluid discharged from the channels 21 will reach the core being
 5 formed, to contaminate the same. Any water in the barrel above the core, and any excess sample forced into the core barrel will be relieved through the ports 18 as above explained.
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When the sample is in the barrel, a fishing, or grappling, tool is let down into the bore and engaged with the core barrel and the core is severed and trapped in the barrel and the
 15 barrel, with the sample therein is then withdrawn. This fishing tool will now be described:

This tool embodies a release sleeve 22, adapted to fit over the upper end of the barrel 7 and whose lower end is flared. This sleeve is formed of detachable sections, for assembly, and has the inwardly converging flexible dogs 23, therein whose lower ends are beveled inwardly. The upper end of the
 20 sleeve 22 has the inwardly extending annular flange 24 through which the hammer 25 works. The lower end of the hammer has the enlarged head 26 and connected to the upper end thereof there is an operating rod, or cable, 27. When it is desired to sever the core and
 30 withdraw the barrel and core, or other sample, the fishing tool is lowered and the release sleeve passes over the upper end of the barrel and between the barrel and dogs 14, releasing the latter from the barrel, and the beveled ends of the dogs 23 are expanded by the
 35 head 17 and said dogs pass over said head 17 and engage underneath it. The hammer 25 is then successively elevated and dropped, the enlarged upper end 28 thereof striking
 40 against the upper end of the release sleeve 22. The internal annular shoulder 29, in said release sleeve 22, rests against the upper end of the core barrel 7 and said barrel is driven
 45 downwardly by said hammer. The pins 10 will be broken or sheared and the fingers 8 will be forced inwardly, into the position shown in Figure 3, the shoulder 6 acting as a die for that purpose, and the fingers 8 will
 50 thereby sever the core, or sample, and substantially close the lower end of the core barrel to retain the sample therein. The core barrel, with the sample therein, may then be withdrawn from the drill stem 1.

As the core barrel is withdrawn the sleeve 9 will readily pass between the dogs 14 and the barrel by reason of the inwardly beveled upper end of said sleeve.

When the core barrel has been withdrawn the detachable lower section thereof may be removed and the plug 16 unscrewed and the longitudinal sections of the barrel may then be separated to expose the core. As shown in Figure 4 these sections are held together by tenon and mortise sutures so that one sec-

tion can be separated from the other by relative longitudinal movement of said sections.

In case it be desired to withdraw the drilling tool with the core barrel therein, the fishing tool described will not be used. In
 70 such case a weight, or hammer is dropped down into the drill stem and it will strike the head 17, shearing the pins 10 and actuating the barrel 7 so as to cause the core severing means at the lower end of the barrel
 75 to sever and entrap the core.

When the core taking apparatus has been withdrawn independent of the stem, leaving the stem and bit in the bore, and then if it be desired to take another core the core barrel described may be assembled and dropped
 80 down through the stem until the lower end of the sleeve 9 rests upon the upper end of the bit shank and the dogs 14 will lock in place to secure the barrel in the stem ready to receive the core.
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What I claim is:

1. A sample taking apparatus comprising a drill stem, a bit at the lower end thereof having a core receiving bore, a core barrel
 90 in the stem aligned with said bore, means at the lower end of the barrel operative upon downward movement of the barrel for severing a core contained within the barrel, means including yieldable dogs carried by the stem
 95 and an annular abutment on the barrel engageable with the dogs and normally locking the barrel in the stem, means engageable with the barrel, and effective to release said locking means and including a barrel actuating
 100 device.

2. A sample taking apparatus comprising a drill stem, a bit at the lower end thereof having a core receiving bore, a core barrel in the stem aligned with the bore, means at the
 105 lower end of the barrel operative upon downward actuation of the barrel for severing a core contained within the barrel, yieldable dogs engageable with the barrel and normally locking the barrel in the stem, means engageable with the barrel and effective to release
 110 said dogs and including a barrel actuating device, said barrel actuating device being characterized by the provision of a reciprocal hammer.
 115

3. A sample taking apparatus comprising a drill stem, a bit at the lower end thereof having a core receiving bore, a core barrel in the stem aligned with said bore, and having an external abutment means at the lower
 120 end of the barrel operative upon downward actuation of the barrel for severing a core contained within the barrel, yieldable means normally engaging said abutment and locking the barrel in the stem, means engageable with
 125 the barrel and effective to release said locking means and including a barrel actuating device, operable against the upper end of said barrel.

4. A coring apparatus comprising a drill 130

stem, a barrel therein, means operative through the actuation of the barrel for severing a core in the barrel interlocking means between the barrel and stem, and impact
5 means through which the barrel may be actuated to effect the operation of said severing means, said actuating means including also a release sleeve for releasing said interlocking means and means for withdrawing
10 the apparatus from a well bore.

In testimony whereof I have signed my name to this specification.

GRANVILLE A. HUMASON.

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