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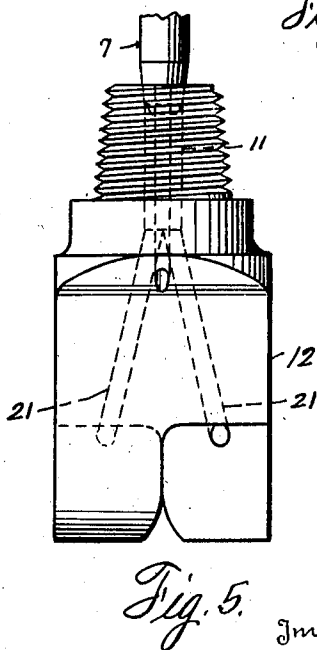
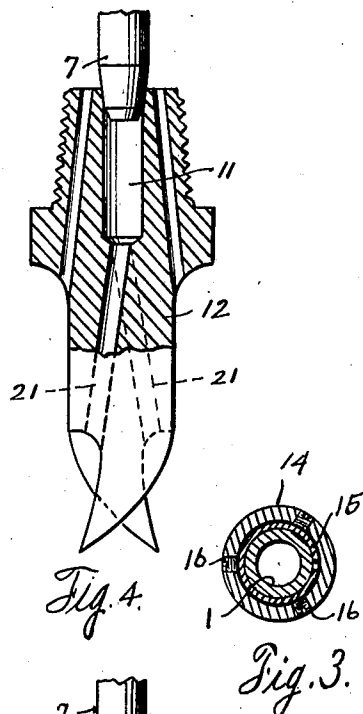
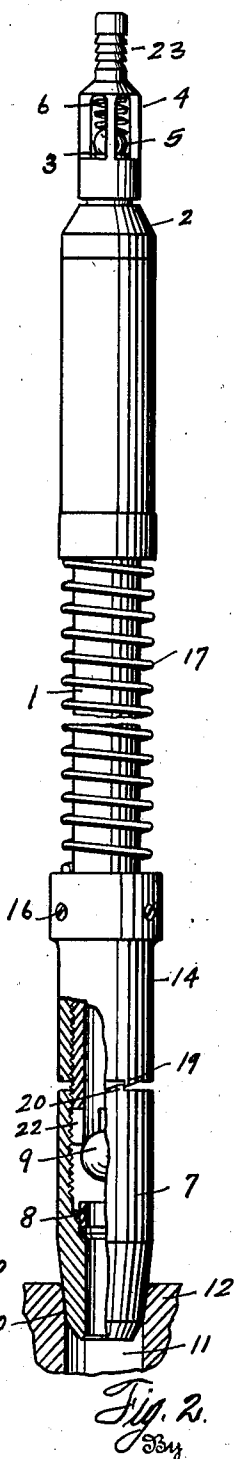
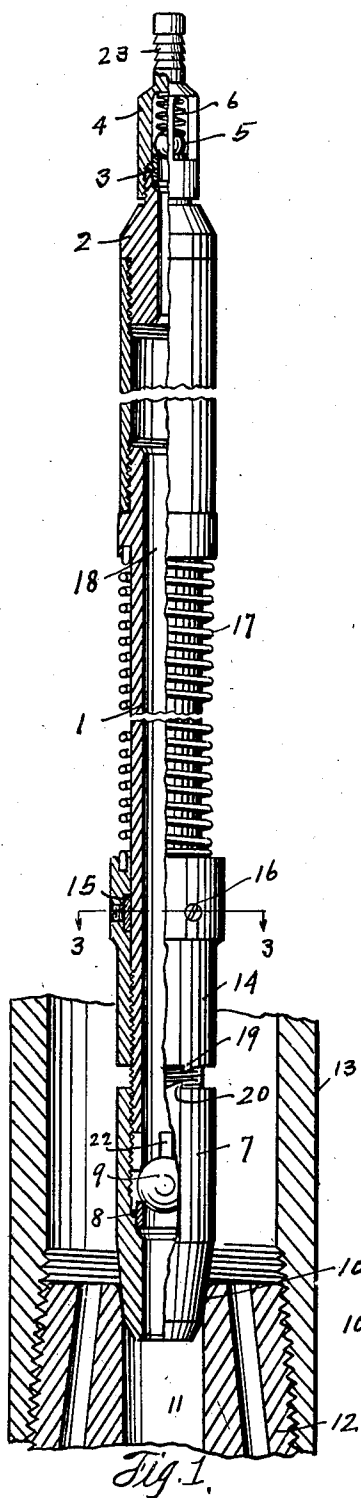
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1,998,075

SAMPLE TAKING APPARATUS

Filed Aug. 21, 1933

2 Sheets-Sheet 1



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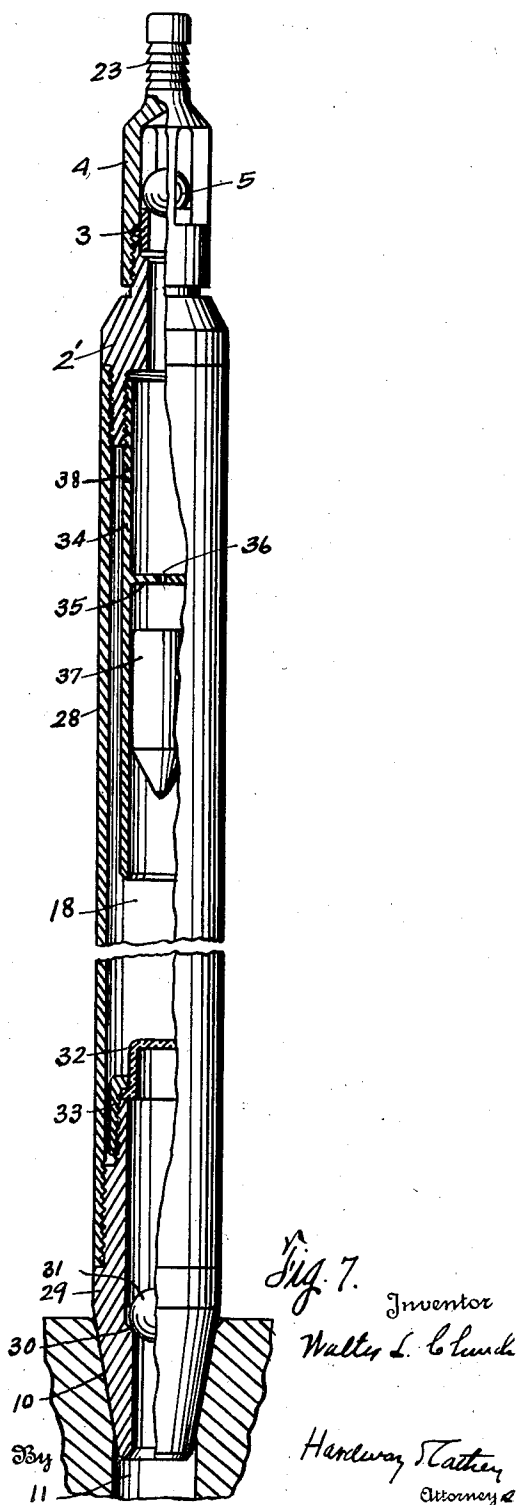
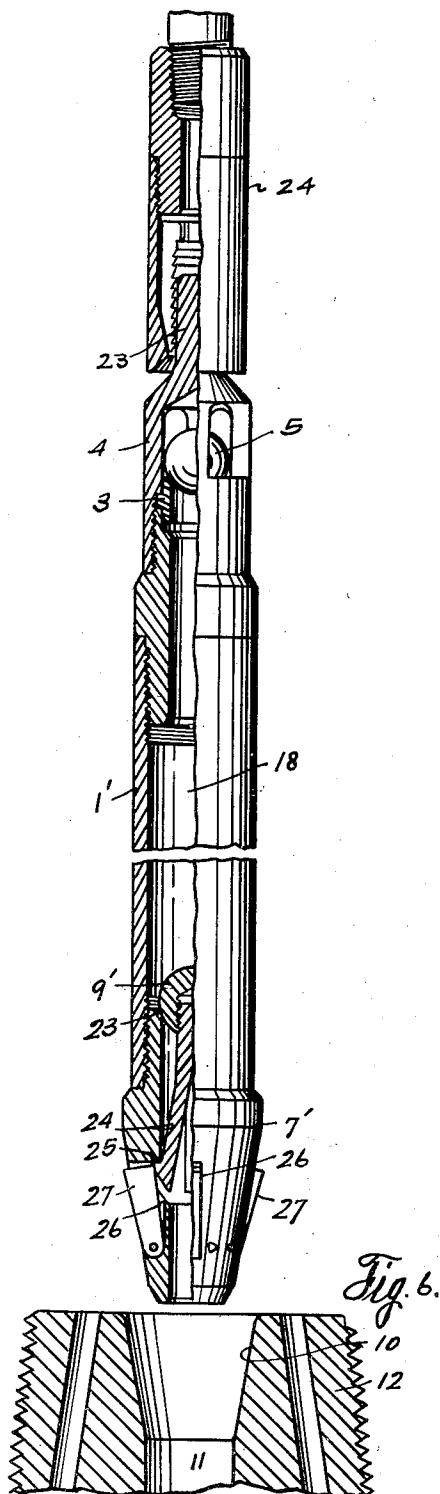
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

1,998,075

SAMPLE TAKING APPARATUS

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9 Claims. (Cl. 255—72)

This invention relates to a sample taking apparatus.

An object of the invention is to provide means for taking a liquid or semi-liquid sample from a well.

Another object of the invention is to provide a sample taking apparatus that may be dropped through the drill stem and the sample chamber maintained in closed position to prevent the entrance of the drilling fluid until the apparatus reaches final position in the drill stem and which will then be automatically opened to permit the inflow of a sample of the liquid from the stratum being pierced by the drill.

A further object of the invention resides in the provision of a sample taking apparatus that will be closed to trap the sample within the sample chamber upon the withdrawal of the apparatus from the drill stem.

A further object of the invention is to provide a sample taking apparatus that may be lowered into and withdrawn from the drill stem while the drill stem and drill remain in the bore.

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 drawings wherein:

Figure 1 shows a side elevation of one form of the apparatus shown partly in section, and located in the drilling apparatus, with the inlet valve locked closed.

Figure 2 shows a side elevation thereof partly in section showing the inlet valve released.

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

Figure 4 shows an edge view of the drill, partly in section.

Figure 5 shows an elevational view thereof.

Figure 6 shows a side view partly in section of another form of the apparatus showing the inlet valve locked in closed position.

Figure 7 shows a side view partly in section of still another form of the apparatus showing the same closed against the inlet of the sample.

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 barrel, preferably formed of upper and lower sections screwed together. Screwed into the upper end of the upper section of the barrel there is a tubular gland 2 fitted into the upper end of which there is an annular valve

seat 3 which is secured in place by the cage 4 screwed onto the upper end of the gland.

Within this cage and controlling said seat there is an upwardly opening ball valve 5 which may be held closed by the coil spring 6. Attached to the lower end of the barrel there is a tubular anchor 7 which may have an internal annular valve seat 8, located therein and controlled by the upwardly opening ball valve 9. The lower end of the anchor is tapered and thus adapted to seat in the upwardly flared seat 10 at the upper end of the axial bore 11 of the drill 12. This drill may be of any selected form and is attached to the lower end of the tubular drill stem 13, which extends to the ground surface and by means of which the drill is rotated in drilling. As shown the barrel 1 is attached to the anchor 7 by right hand threads.

Threaded onto the barrel 1 above the anchor 7 there is a sleeve 14. As shown, the threaded connection between the sleeve and barrel is formed with right hand threads. Within the sleeve 14, and countersunk therein there is a brake band 15 which surrounds the barrel 1 and set screws 16 are threaded through said sleeve with their inner ends bearing against the brake band and said set screws may be adjusted to vary the gripping or braking effect of this brake band 15.

Surrounding the barrel 1 there is a strong coil spring 17 whose upper end is attached to said barrel and whose lower end is attached to the sleeve 14. The sleeve 14 may be turned to the left and thus screwed upwardly on the barrel 1 to place the spring 17 under tension.

The apparatus may be assembled as shown in Figure 1 with the barrel screwed down into the anchor 7 against the valve 9 to hold said valve closed and the sleeve 14 may be screwed to the left and thus elevated on the barrel to place said spring under tension as above explained and when it is desired to make a test, that is to obtain a sample of the liquid at the bottom of the well bore, the apparatus may be dropped down through the drill stem until the anchor 7 seats in the seat 10. The drill stem will be filled with drilling fluid and while the apparatus is passing downwardly therethrough the valve 9 will be locked in closed position so that the drilling fluid can not enter the sample chamber 18 within the barrel 1. While the apparatus is passing downwardly through the stem, the tension of the spring 17 will cause the sleeve 14 to turn to the right and the speed of this rotation will be regulated by the brake 15. The rotation of the sleeve 14 will be stopped by the engagement of the shoulder 19 at the

lower end thereof with the shoulder 20 on the upper end of the anchor 7 but the tension of the brake 15 should be so regulated that these shoulders will not engage until the apparatus has reached its home position and the anchor 7 has seated in the seat 10. The tension on the spring 17 is such that said spring will not have been entirely unwound when the shoulder 19 engages the shoulder 20 and thereupon the tension of said spring will act to back off the barrel 1 in the anchor 7, that is, the tension on said spring will cause said barrel to turn to the left and, the anchor 7 remaining stationary, said barrel will be elevated relative to the anchor into the position shown in Figure 2, and the valve 9 will be released and thereupon the liquid in the well, which is under strong pressure, will flow in through the channels 21, 21 of the drill into the bore 11 and will thence pass up past the valve 9 and through the passageways 22 in the lower end of the barrel, and on up into the sample chamber 18, the valve 5 lifting, to permit the air to pass out at the upper end of said sample chamber. The apparatus may then be withdrawn from the drill stem and upon withdrawal the valve 9 will seat to retain the sample.

For the purpose of withdrawing the apparatus, the upper end of the cage 4 is provided with a head 23 and a suitable fishing tool such as 24 may be lowered into the drill stem and engaged with the head 23 and the apparatus then withdrawn to the ground surface for inspection of the sample therein.

In the form shown in Figure 6 the anchor 7' is screwed up into the barrel 1' and the upper end of the anchor is formed with an annular valve seat 23 which is controlled by the upwardly opening ball valve 9'. Secured to and depending from the valve 9' are the spring dogs 24 which are engageable underneath the shoulders 25 at the upper ends of the longitudinal slots 26 cut through the anchor 7'.

Mounted in said slots, and pivoted at their lower ends therein are the release latches whose upper ends are free and engage the corresponding dogs 24. The outer margins of the latches 27 extend outwardly beyond the surface of the anchor 7' so that when said anchor is seated in the seat 10 the latches 27 will be pressed inwardly and their upper ends will disengage the dogs 24 from the shoulders 25 and thus release the valve 9'. The dogs 24 when in said engaging position lock the valve 9' securely against the seat 23 to prevent the inlet of drilling fluid while the apparatus is being lowered, but when the apparatus lands in home position the dogs 24 will be released as above explained and liquid from the formation will then enter through the channels 21 and bore 11, the pressure being sufficient to lift said valve 9' and the sample sought will enter into the sample chamber 18. When the sample is entrapped, the apparatus may be removed from the well as above explained and while being withdrawn the valve 9' will seat on the seat 23 to retain the sample.

In the form shown in Figure 7 the barrel 28 has the gland 2' screwed into the upper end thereof, said gland being provided with the valve seat 3 and the valve cage 4 and the valve 5 in said cage as previously described. Screwed into the lower end of said barrel 28 there is the anchor 29 shaped to seat in the seat 10 and whose upper end is screwed into the lower end of the barrel 28. This anchor 29 is tubular and has the inside annular valve seat 30 therein controlled

by the upwardly opening ball valve 31. The upper end of the anchor 29 is closed by a frangible thimble 32 secured thereon by the clamp nut 33.

Screwed into the lower end of the gland 2' there is a cylinder 34 having a transverse partition 35 intermediate its ends, said partition being provided with a leak 36. Fitted into the cylinder 34 beneath said partition there is a cylindrical weight 37 whose lower end is preferably pointed. The cylinder 34 has an inlet port 38, which is located above the partition 35. When this form of the apparatus is employed the parts may be assembled as shown in Figure 7 and the cylinder above the partition 35 filled with liquid and the apparatus dropped down through the drill stem. This liquid will gradually leak through the opening 36 permitting the weight 37 to gradually descend but said weight will not pass beyond the lower end of the cylinder 34 until the apparatus has landed in home position with the anchor 29 seated in the seat 10 and when the weight passes beneath said cylinder it will drop and break the frangible thimble 32 and the liquid from the well stratum will then rush in lifting the valve 31 and passing up past said valve and past said weight into the sample chamber 18. The apparatus may then be withdrawn by the fishing tool 34, the valve 31 again seating to entrap the sample.

It is thus apparent that when either form of the apparatus is used the sample chamber 18 will be maintained closed until the apparatus is seated in position in the seat 10 and thereupon the inlet valve of the apparatus will be opened automatically to permit the inflow of the sample into the sample chamber.

The drawings and description disclose what are now considered to be preferred forms 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. Sample taking apparatus adapted to be lowered into a well and comprising a drill stem having a lower end inlet and a seat, a barrel having a sample chamber therein provided with an inlet and adapted to be dropped through the stem onto said seat to align the inlets, means maintaining the barrel inlet closed while the barrel is being lowered into the well and means for thereafter releasing said closing means to permit the inlet of a sample of the liquid in the well.

2. Sample taking apparatus adapted to be lowered into a well and comprising a tubular stem having a lower end inlet and a seat, a barrel having a sample chamber therein provided with an inlet at its lower end and an outlet at its upper end and adapted to be dropped through the stem onto the seat to align the inlets, an outwardly opening valve controlling the outlet, means including a valve for closing the barrel inlet to prevent the inflow of liquid through the inlet into the chamber, and automatically operable means for releasing the closing means to permit such inflow.

3. In combination a drill stem having a drill channel and having a seat therein, a sample taking apparatus shaped to be lowered through the stem and to land on said seat said sample taking apparatus comprising a barrel having a sample chamber provided with an outlet and an inlet, said inlet being positioned to align with said channel, an outwardly opening valve controlling the outlet, means maintaining the inlet closed while the apparatus is being lowered and means

for automatically releasing the closing means after the apparatus has landed on said seat to permit the inflow of liquid from the well through said inlet into the chamber.

5 4. In combination a drill stem having an inside seat at its lower end, a sample taking device shaped to be lowered through the stem and to land on said seat, said sample taking apparatus comprising a container for the sample having an
10 inlet, a valve controlling the inlet, means securing the valve closed and means for automatically releasing said securing means to permit the valve to open after the apparatus has landed on the seat to admit liquid from the well into the container through said inlet.

15 5. A sample taking device comprising an anchor, a barrel having a threaded connection with the anchor and provided with a sample chamber having an inlet, a valve controlling said inlet and
20 normally held closed by the barrel, a sleeve rotatable on, and having a threaded connection with, the barrel and movable into interlocking relation with the anchor, and a spring motor connecting the barrel and sleeve and arranged to
25 turn the barrel relative to the anchor when the sleeve is interlocked with the anchor.

6. A sample taking apparatus comprising an anchor, a sample receiving container having a threaded connection with the anchor and provided with a valve controlled outlet and an inlet,
30 a valve controlling the inlet and arranged to be held closed by the container, a release sleeve having a threaded connection with the container and manually turnable in one direction to space the sleeve away from the anchor, means for automatically turning the sleeve in the other direction to carry the sleeve into interlocking relation with the anchor, said turning means being effective to thereafter turn the container relative to

the anchor whereby said valve is released to permit the valve to open said inlet.

7. A sample taking apparatus comprising a drill stem having a seat at its lower end, a barrel having a sample chamber therein provided with a
5 valve controlled outlet and an inlet, said barrel being adapted to be dropped through the stem and having an anchor arranged to land on said seat, a valve controlling the inlet, interlocking means arranged, when interlocked to maintain
10 the valve closed, and means arranged to be actuated by said seat to automatically release said interlocking means and to thereby release the inlet valve to permit said valve to open.

8. The combination with a drilling device having a tubular drill stem and a drill at the lower end of the stem having a seat, of a sample taking apparatus shaped to be lowered through the drill stem and whose lower end is formed to fit the
20 seat, said sample taking apparatus comprising a barrel having a sample chamber therein provided with a valve controlled outlet and an inlet, a valve controlling the inlet, interlocking means arranged, when interlocked, to maintain the
25 valve closed and means arranged to be actuated by said seat to automatically release said interlocking means whereby the inlet valve is released to permit said valve to open.

9. A sample taking device comprising a barrel
30 having a sample chamber therein, provided with an inlet in its lower end, a frangible element closing said inlet, a cylinder in the barrel above said frangible element, a weight in said cylinder, a container for liquid above the cylinder and
35 having a leak into the cylinder above the weight and an inwardly opening valve controlling said inlet.

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