

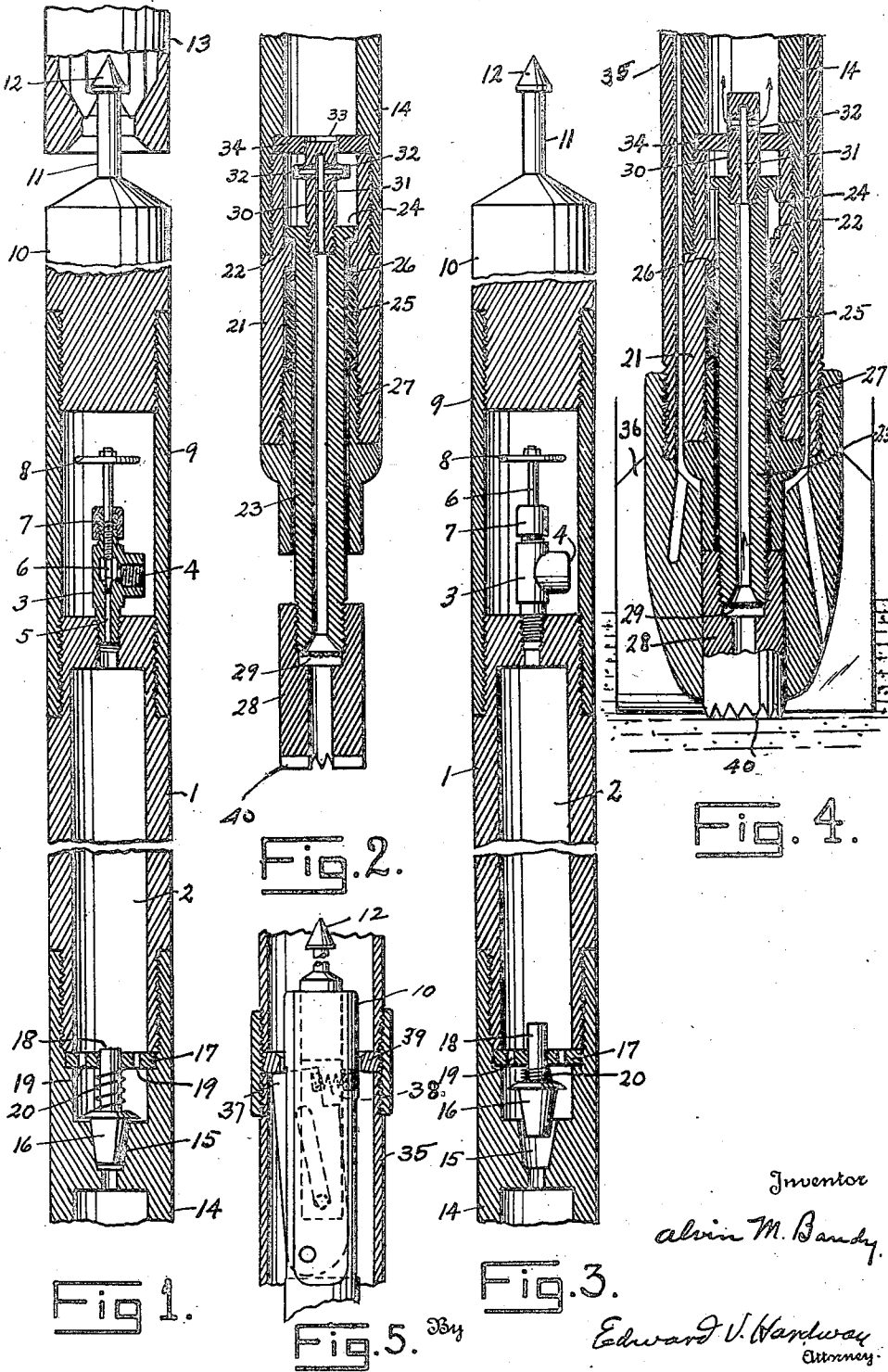
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A. M. BANDY

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SAMPLING DEVICE FOR WELLS

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Inventor
alvin M. Bundy.

Edward V. Hardway
Attorney.

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SAMPLING DEVICE FOR WELLS

Alvin M. Bandy, Canado, Tex.

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3 Claims. (Cl. 255—1)

This invention relates to an apparatus for taking samples of fluid from wells and has particular relation to means for taking a sample of either liquid or gas from the stratum at the bottom of the well.

It is an object of the invention to provide a sample taking apparatus that may be lowered into and withdrawn from a well bore by means of a flexible line such as a cable and which contains a sample receiving chamber wherein the liquid or gas flowing into the well bore, from the stratum being tested, may be entrapped and withdrawn to the ground surface for inspection.

It is a further object of the invention to provide a sample taking apparatus of the character described containing a sample receiving chamber with means for completely closing said chamber against the entrance of fluid in the well while the apparatus is being lowered preparatory to taking the sample.

The invention further comprehends a novel method for securing a liquid or gas sample from a producing formation in a well.

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

Figure 1 shows a vertical sectional view of the upper end of the apparatus showing the sample receiving chamber closed.

Figure 2 shows a vertical, section view of the lower end of the apparatus showing the parts in the position they will occupy while being lowered preparatory to obtaining a sample.

Figure 3 shows a vertical, sectional view of the upper end of the apparatus showing the inlet valve open to admit the sample.

Figure 4 shows a vertical, sectional view of the lower end of the apparatus shown in active position to admit a liquid or gas sample, and

Figure 5 shows a fragmentary sectional view showing the locking device for locking the apparatus in the drill stem.

Referring now more particularly to the drawing wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates a tubular container having the sample receiving chamber 2.

The upper end of the container is closed and threaded into said ends is a connection 3 having the internally threaded side opening 4 and also having an axial duct 5 leading from the chamber 2. The upper end of this duct is opened and

closed by the needle valve 6 which has a threaded connection with the upper end of the connection 3 and which is surrounded by the stuffing box 7. The upper end of the needle valve has a hand wheel 8 fixed thereon. The connection and needle valve are enclosed by a tubular housing 9, which is threaded to the upper end of the container 1 and whose upper end is closed by the head 10, which is threaded thereto. This head has the upstanding neck 11, whose upper end terminates in a cone 12 with which a grappling tool 13 may be engaged when it is desired to remove the apparatus from the well. Any conventional type of grappling tool may be employed and it may be lowered into the well and withdrawn by means of a cable in the well known manner.

Attached to the lower end of the container 1 there is a tubular barrel 14 whose upper end is formed with a downwardly converging valve seat 15 with which the upwardly opening check valve 16 cooperates.

Secured in the barrel above said check valve there is a spider 17 having a central bearing through which the valve stem 18 on the upper end of the valve works. The spider also has the side ports 19 for the purpose to be hereinafter stated. The valve is normally maintained closed by means of a coiled spring 20, which surrounds the stem and is interposed between the valve and spider.

A tubular packing housing 21 is threaded into the lower end of the barrel 14 and its upper end is enlarged internally forming the inside annular upwardly facing shoulder 22.

A tubular stem 23 is located within and extends beneath the packing housing 21. The upper end of this stem has an outwardly extending annular flange 24, which rests on the shoulder 22. Packing 25 is located within the housing 21 around the stem and is confined by the inside, annular, downwardly facing shoulder 26, in the housing 21, and the gland 27 which is screwed into the lower end of the packing housing 21 and which abuts said packing.

The lower end of the gland 27 is reduced so as to fit into the central bore of the drill. It is to be understood that the apparatus will usually be lowered through the drill stem with its lower end projecting through the central bore of the drill and resting on the bottom of the bore.

The stem 23 extends beneath the gland 27 and a tubular point 28 is screwed onto the lower end of the stem and contains a screen 29, which spans the passageway therethrough. With the flange

24 resting on the shoulder 22, the point 28 will be spaced beneath the lower end of the gland 27. A nipple 30 is screwed into the upper end of the stem 23 and has an axial duct 31, extending therethrough from its lower end but terminating beneath the upper end thereof.

Screwed into the side of the nipple 30 and extending outwardly therefrom there are the hollow plugs 32, 32, which communicate with the duct 31 and whose outer ends are closed. These plugs are formed of material which may be readily sheared or broken.

The upper end of the nipple 30 fits closely through a central bearing 33 of the ring 34. This ring is secured in the barrel 14 above the plugs 32.

In operation the apparatus is assembled as shown in Figures 1 and 2 with the valve 6 closed. The drill stem 35 should then be elevated so as to lift the drill 36 off of bottom. The apparatus shown in Figures 1 and 2 may then be dropped through the drill stem and it will pass down through the drilling fluid therein and its lower end will project through the central bore of the drill. The head 10 has a latch 37 seated in a slot in said head and whose lower end is pivoted in the head with its upper end held projected out by the spring 38. The drill stem 35 has an inside, inwardly projecting ring 39 through which the head passes and when the latch clears said ring it will be forced outwardly, into the position shown in Figure 5 and will engage underneath the ring 39 to lock the apparatus in place. The point 28 projects beneath the drill 36 and may be provided with radial teeth 40. The drill stem may then be lowered until the point 28 lands on the bottom of the well and as the drill stem is further lowered the ring 39 will engage the latch 37 and will force the housing 9, container 1 and tubular barrel 14 on downwardly causing the ring 24 to engage with and shear off the plugs 32 and the lower end of the gland 27 will land on the upper end of the point 28 as shown in Figure 4 with the sheared plugs 32 above the ring 34. The teeth 40 and the cutting edges of the drill will be forced into the formation at the bottom of the well by the weight on them thus sealing the lower end of the point 28 against the entrance of the drilling fluid so that the gas or oil in the formation beneath the point 28 may pass up through the tubular point 28 and stem 23 and on up through the duct 31 and out through the sheared plugs 32 and will lift the valve 16 passing on up through the ports 19 into the chamber 2. When the pressure in the chamber 2 is equalized with that beneath the valve 16, said valve will close and entrap the sample of the liquid or gas in the chamber 2.

The grappling tool 13 may then be lowered into the drill stem or well, by means of a cable and engaged with the cone 12 and upon an upward pull the latch 37 will be retracted and the apparatus may then be withdrawn to the ground surface for inspection of the sample. While withdrawing the apparatus through the

drilling fluid the particles of sand and detritus in said fluid will soon clog the screen 29 to prevent the entrance of drilling fluid to mingle with and contaminate the sample. The housing 9 may then be removed from the container 1 and a gauge screwed into the tapped opening 4 and the needle valve 6 opened and the pressure contained in the chamber 2 thus ascertained, and with the gauge detached, the valve 6 may then be opened and the contents of the chamber 2 drained out 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 sampling device for wells shaped to be lowered into a well and to land on the bottom and comprising a container having a sample chamber, a barrel attached to the container, a stem slidable in the barrel and having an inlet conduit, means for confining the inlet end of the conduit to the bottom of the bore, means normally closing the conduit and adapted to be broken, said stem being movable upwardly relative to the barrel, means effective to break said closing means to open said conduit upon such upward movement to admit fluid from the well, said container having a controlled inlet through which the admitted fluid may enter the chamber and means arranged to automatically close said inlet and to thereby entrap the fluid in said chamber.

2. A sample device for wells comprising a container having a sample chamber provided with an inlet, means arranged to open to admit a sample of fluid into the chamber through said inlet and arranged to thereafter close to prevent the outflow of said admitted fluid, said device including a slidably mounted stem thereon provided with an inlet channel, a screen across the channel, means on the stem normally closing said channel and arranged to be opened, when the device lands in home position at the bottom of the well, whereby the well fluid will be permitted to flow inwardly through said channel.

3. A sample taking device for wells shaped to be lowered into a well and to land on the bottom and comprising a container having a sample chamber, a barrel attached to the container, a stem slidable in the barrel and having an inlet conduit, means normally closing the conduit and adapted to be broken, said stem being movable upwardly relative to the barrel, means effective to break said closing means to open said conduit upon said upward movement to admit fluid from the well, said container having an inlet through which the admitted fluid passes into the chamber and a back pressure valve controlling said inlet and mounted to open to permit passage of the inflowing fluid and to thereafter close and entrap said fluid in said chamber.

ALVIN M. BANDY.