June 6, 1939. R. L. CHAPPELL 2,161,135

WELL FLOW AND TEST TOOL

Filed May 21, 1937 2 Sheets-Sheet 1

FIG. 1.

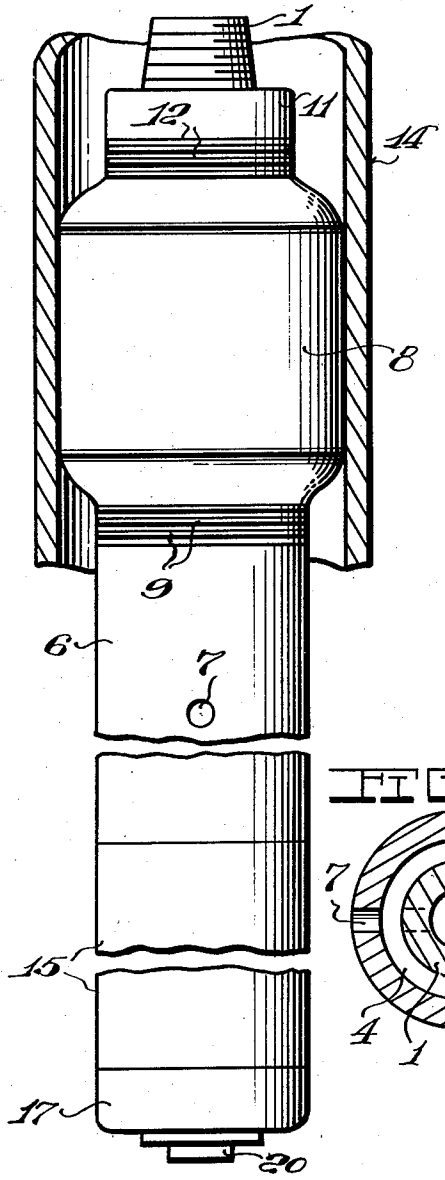


FIG. 2.

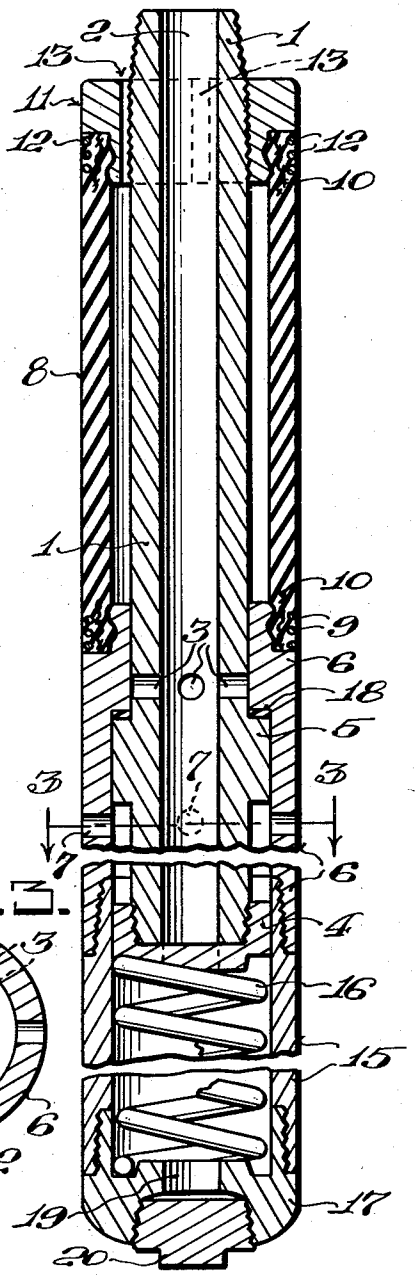
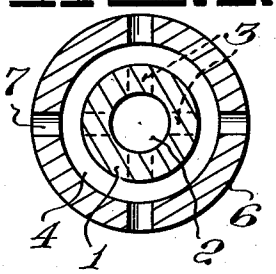


FIG. 3.



Robert L. Chappell
INVENTOR.

BY Smeet & Ames

ATTORNEY.

June 6, 1939. R. L. CHAPPELL 2,161,135

WELL FLOW AND TEST TOOL

Filed May 21, 1937 2 Sheets-Sheet 2

FIG. 4.

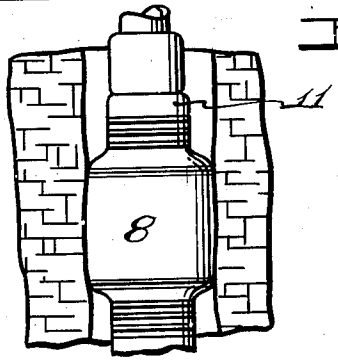


FIG. 5.

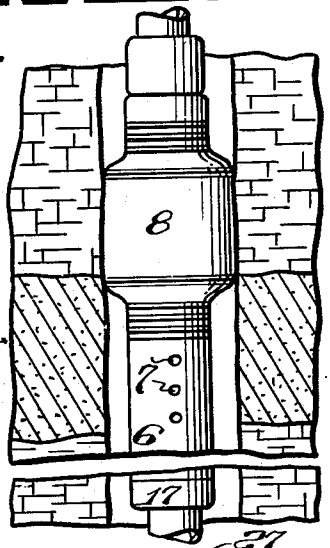


FIG. 6.

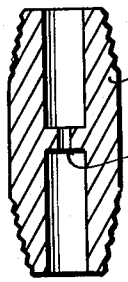
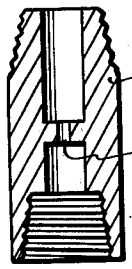
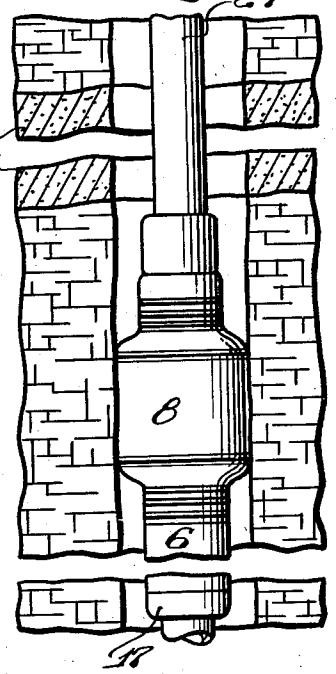


FIG. 7.





Robert L. Chappell
INVENTOR.

BY Ernest G. Hood
ATTORNEY.

Patented June 6, 1939 2,161,135

UNITED STATES PATENT OFFICE

2,161,135

WELL FLOW AND TEST TOOL

Robert L. Chappell, El Campo, Tex.

Application May 21, 1937, Serial No. 143,958

1 Claim. (Cl. 166—1)

This invention relates to oil well tools, and it has particular reference to a tool so arranged that it may be employed for obtaining a sample of the liquids in a well at any desired depth.

The principal object of the invention is to provide a well tool which may be lowered into a bore hole and subsequently accomplish its purpose of sampling, or testing in an efficient manner, and with a minimum of manipulation from the surface of the earth.

Another object of the invention is to provide a sampling tool by which a true liquid sample may be taken at a desired depth with the exclusion of liquids both from above and below the region under test.

With the foregoing objects as paramount, the invention has particular reference to its salient features of construction and arrangement of parts which will become manifest as the description proceeds taken in connection with the accompanying drawings, wherein:

Figure 1 is an elevational view of the well tool shown with portions broken away.

Figure 2 is a view of the tool in vertical section.

Figure 3 is a view on the line 3—3 on Figure 2.

Figure 4 is an elevational view of the tool applied to the taking of a liquid sample at the bottom of the bore hole.

Figure 5 is an elevational view of the tool arranged to sample the liquids in a well within a region intermediate the top and bottom of the hole.

Figure 6 is a view in vertical section of a choke.

Figure 7 is a view similar to Figure 6 of a modified form of the choke.

Referring primarily to Figures 1 to 3, 1 denotes a hollow, tubular member or body having an axially disposed passage 2 therethrough, and radially disposed ports 3 which communicate with the passage 2. The upper and lower ends of the member 1 are threaded as shown in Figure 2. A cap 4 is threadably secured to the lower end of the member 1 when the tool is used for taking a fluid sample within a well as hereinafter explained. The tubular body 1 is formed with an enlarged portion 5 which is arranged to be slidably received by a sleeve 6, which sleeve has a stepped and axially disposed passage therethrough. The sleeve 6 is provided with a plurality of radial ports 7 which normally communicate with the annular space around the member 1 below its enlarged portion 5.

A packer 8 surrounds the member 1 and is secured to the upper end of the sleeve 6 by wires 9 or other suitable means. The packer 8 is reinforced adjacent its ends by fabric strips 10.

An annular and internally threaded collar 11 is threadably mounted on the upper end of the member 1 and serves to support the upper end of the packer 8 which latter is secured to the collar 11 by wires 12. Recesses 13 are provided in the collar 11 to prevent formation of a partial vacuum within the packer 8 when the latter is expanded to operative position against a casing 14 as shown in Figure 1, or against the walls of the bore hole.

A second sleeve 15 is threadably connected to the sleeve 6 and serves to enclose a spring 16 which is interposed between the cap 4 and a plug 17. The spring 16 normally urges the member 1 to the upper position shown in Figure 2, in which position the enlarged portion 5 of the member 1 bears against a packing ring 18, and the packer 8 is in inoperative position. An opening 19 in the plug 17 is closed when desired by a plug 20.

Figure 4 illustrates the application of the tool for taking a fluid sample at the bottom of a bore hole. A pair of the testing tools are preferably employed in making the test, in order that fluids from above the region to be stested will be positively excluded from the sample taken. The upper tool is a "dummy" and is not provided with ports 3 and 7. This tool is provided with an axial passageway therethrough by using a cap 4, shown in Figure 2, having an opening therein as shown in dotted lines.

The lower tool is provided with ports and is positioned a desired distance from the bottom of the well by a pipe 20 which is threadably secured to a solid shoe 21 which rests on the bottom of the bore hole during the test.

A choke 22 having an orifice 23 is shown in Figure 6, and a modified choke 24 having an orifice 25 is illustrated in Figure 7. Either type of these chokes may be threadably connected in the string adjacent the tools in order to obtain a slower rate of flow and consequently a more uniform and truer sample of the fluids to be tested.

In making a bottom hole test, the tools are lowered into the bore hole, the packers 8 being in inoperative position. No fluids can enter the tubing string during the lowering of the tools since there is no fluid connection between the ports 7 and the central passage 2. When, however, the shoe 21 contacts the bottom of the hole the springs 16 are compressed by the weight of the tubing and the tubular members 1 slide downward within their respective sleeves, thereby ex-

panding the packers 8 against the walls of the bore hole. Simultaneously, the ports 3 in the tubular body 1 of the lower tool move downward and communicate with an annular space which is defined by the outer surface of the body 1 and the inner surface of the sleeve 6. Fluids from the sand 26 are then free to flow through ports 7 and 3 into the central passage 2. When the sample has been obtained, the string is raised, thereby allowing the springs 16 to collapse the packers 8 and close the tool against further ingress of fluids.

Figure 5 illustrates the method of using the tool when a sample of the fluids intermediate the top and bottom of the hole is desired. The upper tool is provided with ports and a "dummy" tool is connected to the upper tool and spaced therefrom a desired distance by the pipe 27. By this arrangement composite fluid samples from the sands 28 and 29 can be obtained. The packers 8 serve to seal the region under test against entrance of fluids other than those from the sands to be tested. The sliding action of the tool members and expansion of the packers 8 when the downward movement of the pipe below the bottom tool is checked, is the same as that above described relative to Figure 4.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed within the scope and meaning of the appended claim is also considered to be within the spirit and intent of the invention.

What is claimed is:

A tool for sampling well fluids comprising a tubular body having an annular enlargement thereon providing an annular shoulder, a sleeve slidably mounted on the body and having a stepped interior to provide an annular shoulder and an annular chamber with the wall of which the enlargement has intimate sliding engagement, said sleeve having ports therein opening into said chamber, said body having ports therein adapted to communicate with the chamber when the enlargement moves downwardly in the sleeve, whereby fluid communication is established between the respective ports, and spring means mounted in the sleeve to resist sliding movement of the sleeve and tubular body.

ROBERT L. CHAPPELL.