

Aug. 13, 1940.

C. C. CHRISTIAN
WELL CONSTRUCTION

2,210,885

Original Filed April 30, 1936

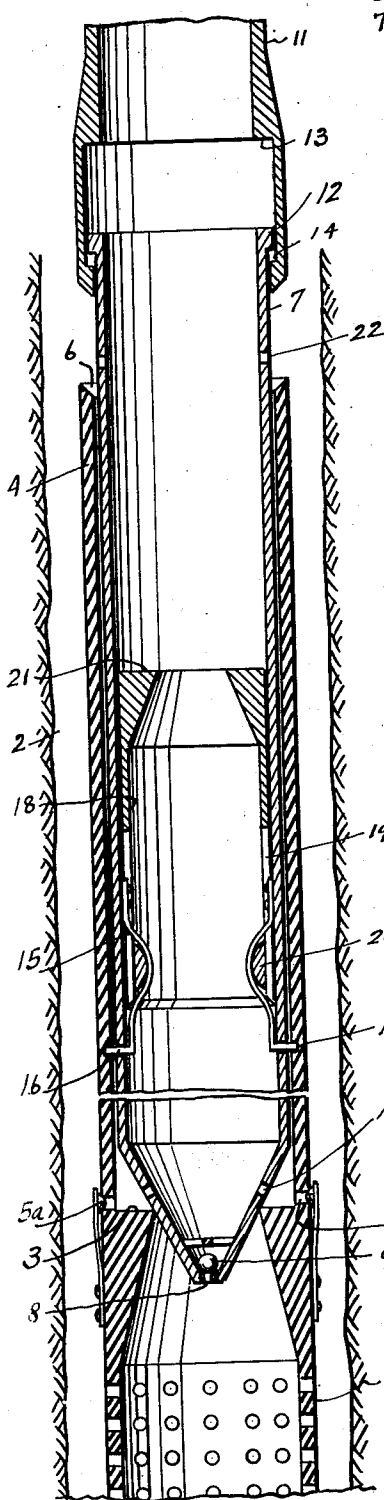


Fig. 1.

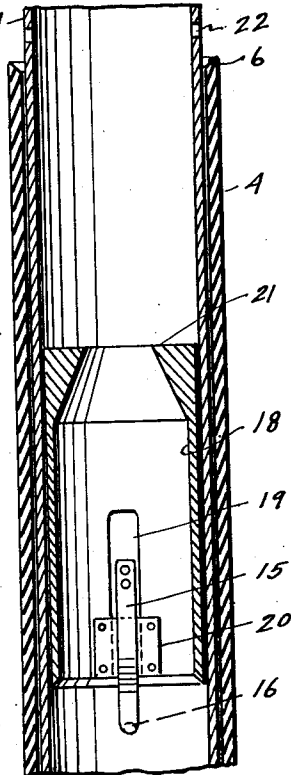


Fig. 2.

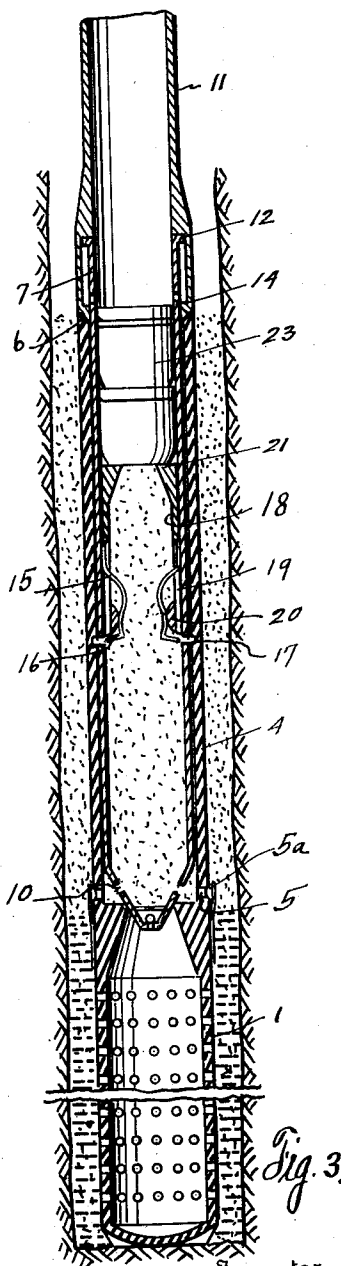


Fig. 3.

Inventor
Carl C. Christian

Hardway Tatter
Attorneys

By

UNITED STATES PATENT OFFICE

2,210,885

WELL CONSTRUCTION

Carl C. Christian, Victoria, Tex.

Application April 30, 1936, Serial No. 77,242
Renewed May 26, 1939

11 Claims. (Cl. 166-1)

This invention relates to a well construction and comprehends also the method employed.

An object of the invention is to provide means and a method for completing a well in such manner that the formation supposed to contain oil or gas can be readily tested to ascertain the contents of a formation.

The apparatus is specially designed for use in an open hole whose walls adjacent the formation to be tested are of a caving nature and is provided for the purpose of supporting the walls and preparing, what may be properly termed, an artificial rat hole for receiving and supporting a conventional type of testing tool when it is desired to run the tool for making a test of the formation thought to contain oil.

It is another object of the invention to provide a method whereby the walls of the bore may be reinforced above the producing stratum to prevent the caving thereof to the end that a testing tool may be lowered into the artificial rat hole and a seal formed between the testing tool and the walls of the rat hole at the upper end thereof and a successful test made.

It is a further object of the invention to provide apparatus whereby the method may be carried out.

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

Figure 1 shows a vertical sectional view of the apparatus employed, partly broken away and shown located in a well bore in readiness to receive and apply the cement.

Figure 2 shows a fragmentary sectional view taken at right angles to the view shown in Figure 1, and

Figure 3 shows a vertical sectional view of the apparatus located in the well bore with the cement applied, showing the string detached and ready to be withdrawn.

Referring now more particularly to the drawing wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a tubular perforated support which is designed to be lowered to the lower end of the bore 2. This support is provided with an internal annular seat 3 and is extended upwardly above said seat forming the tubular guide 4 which is provided with the side outlets 5 above the seat 3. These outlets are controlled by the outwardly opening, yieldably mounted valves 5a. The upper end of the guide is preferably flared forming a seat 6.

Fitted closely within the guide 4 there is a tubular barrel 7 whose lower end is tapered to

rest on the seat 3 and is provided with an inlet opening 8 controlled by the upwardly opening valve 9. The lower end of the barrel 7 also has the outlet openings 10 above the seat 3.

The upper end of the barrel telescopes within the lower end of the operating string 11 which extends to the ground surface and has an external annular flange 12 thereon which is confined between the upper and lower inside shoulders 13 and 14. There are the inwardly curved flat springs 15, 15 whose upper ends are secured to the inside of the barrel and whose lower ends are outwardly turned forming the latches 16, 16 which project outwardly through suitable bearings in the barrel and whose outer ends seat in the sockets 17, 17 in the wall of the guide whereby the wall support and guide may be interlocked with the barrel 7.

There is a tubular release sleeve 18, fitted within the barrel 7 and whose lower end is provided with slots 19, 19 with which said springs 15 register. The springs 15 are inwardly curved through said slots and there are transverse release bars 20, 20 secured to opposite sides of the release sleeve 18 on the inside which extend transversely through the inwardly curved springs 15 as shown in Figures 1 and 2.

The upper end of the sleeve 18 is reduced and formed with a seat 21 and the barrel 7 has the side outlet ports 22 adjacent the upper end of the guide 4 and which are spaced above the seat 21 and for a purpose to be hereinafter explained.

The apparatus may be assembled as shown in Figure 1 and lowered into the well bore as a unit until the wall support 1 lands on the bottom of the bore. The slip joint connection between the lower end of the operating string 11 and the barrel 7 will permit the string to be lowered independent of the barrel until the lower end of the string rests on the seat 6, as shown in Figure 3, so that the weight of the string may be employed to force the lower end of the support firmly against the bottom of the bore and so that the ports 22 will be closed.

Plastic cement may then be introduced into the string at the ground surface and a suitable plug 23 placed in the upper end of the string in the usual way and forced downwardly by fluid under pressure. The plastic cement will be forced downwardly ahead of the plug and will enter the barrel 7 and pass out through the openings 10 and 5 into the space surrounding the guide 4 and will be supported on the drilling fluid in the bore beneath, as shown in Figure 3, and will pass up around said guide permeating the caving formation around the bore and forming a substantial wall to maintain the formation.

When the plug 23 lands on the seat 21 the continued pressure will force the release sleeve 18 downwardly and the cross bars 20 will engage the

lower ends of the springs 15 and retract the latches 16 inwardly, releasing them from the guide 4. The upper end of the plug will clear the ports 22 and the string 11 may then be slightly elevated to lift its lower end off of the seat 6 and water may then be forced downwardly through the string and out of the ports 22 to wash out the excess cement above said ports. Thereupon the string 11, the barrel 7, with the cement remaining therein, and the release sleeve 18 may be withdrawn as a unit from the well, leaving the cement around the guide 4 to set.

An artificial rat hole will thus be provided and when the cement has thoroughly set a testing tool 15 may be run into the bore and lowered into the wall support 1 with its packer seated on the seat 6 to form a fluid tight joint and to exclude the drilling fluid above and an accurate test of the contents of the formation in which the support 1 is set may be then made.

The wall support including the upwardly extending guide 4 may be formed of cementitious material, Bakelite, cast aluminum or other frangible or drillable material, so that in case the test does not show the presence of oil the support may be readily drilled out and the bore deepened.

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. Apparatus of the character described comprising a wall support having inlets and provided with a seat above the inlets, a guide above the wall support, a barrel in and detachably secured to the guide, said barrel and guide having outlet openings above the seat and releasable means for interlocking the barrel with the guide.

2. Apparatus of the character described comprising a wall support having inlets and provided with a seat above the inlets, a guide above the seat, a barrel in said guide, said barrel and guide having outlet openings above the seat, an operating tubular string connected to the upper end of the barrel, means for interlocking the barrel with the guide and means adapted to be actuated by pressure exerted through the string and effective to release said interlocking means.

3. Apparatus of the character described comprising a tubular wall support having inlets and shaped to be lowered into and located in a well, a tubular guide upstanding from said support, a barrel in the guide, an inside seat in the support above said inlets on which the lower end of the barrel is seated, said barrel and guide having outlets above the seat, an operating string having a slip joint connection with the upper end of the barrel, releasable means for connecting the barrel to the guide, means to be actuated by fluid pressure exerted through the string and effective to release the connecting means.

4. Apparatus of the character described comprising a tubular wall support having inlets and adapted to be lowered in a well and having an inside seat above the inlets, a tubular guide upstanding from the support, a tubular barrel fitted within the guide and seated on said seat, the lower end of the barrel having a valve controlled inlet, said barrel and guide having outlets above the seat, releasable means for connecting the barrel with the guide, a tubular operating string connected to the upper end of the barrel and release means within the barrel subject to pressure

exerted through the string and effective on downward movement to release the connecting means to permit withdrawal of the barrel from the guide.

5. In apparatus of the character described a wall support adapted to be located in the bottom of a well, said support being of tubular formation and having an inlet and an inside seat above the inlet, a barrel on said seat and a tubular guide extending upwardly from the support and said barrel and said support having an outlet opening immediately above the seat.

6. An artificial support for the walls of a well bore comprising a tubular member formed of rigid material seated in the bore and having inlets and an inside seat above the inlets, a barrel on said seat, an outlet in said barrel, said member having a tubular upward extension provided with an outlet immediately above the seat.

7. Apparatus of the character described comprising a tubular wall support and adapted to be lowered into a well and having an outlet for cementitious material, a tubular barrel shaped to be fitted within said wall support and having a lower outlet for cementitious material and an upper outlet above said support, releasable means for connecting the barrel to the support, a tubular operating string connected to the upper end of the barrel movable into one position to close said upper port, release means subject to pressure exerted through the string and effective on downward movement to release the connecting means to permit withdrawal of the barrel from the wall support, said release means including a plug arranged to clear said upper outlet port upon downward movement of the plug, the operating string being movable to another position to open said upper outlet port.

8. Apparatus of the character described comprising a wall support having inlets and provided with a seat above the inlets, a guide above the wall support, a barrel in and detachably secured to the guide, said barrel and guide having outlet openings above the seat.

9. Apparatus of the character described comprising a wall support having inlets and provided with a seat above the inlets, a guide above the wall support, a barrel in and detachably secured to the guide, said barrel and guide having outlet openings above the seat, and said guide having spring controlled valves controlling the said outlets.

10. Apparatus of the character described comprising a wall support having inlets and provided with a seat above the inlets, a guide above the wall support, a barrel in and detachably secured to the guide, an inlet valve in the lower end of said barrel, said barrel and guide having outlet openings above the seat and releasable means for interlocking the barrel with the guide.

11. Apparatus of the character described comprising a tubular wall support for a well having an inlet and a seat above the inlet, a guide above the wall support, a barrel in and detachably secured to the guide, said barrel and guide each having an outlet opening above the seat, an outwardly opening valve for controlling the guide opening, means including a plug for detaching the barrel from the guide upon downward movement of the plug into the barrel and means for removing the detached barrel with the plug therein from the well.

CARL C. CHRISTIAN.