Nov. 28, 1933. J. A. RITTER 1,937,247

DEVICE FOR CEMENTING WELLS

Filed May 11, 1929

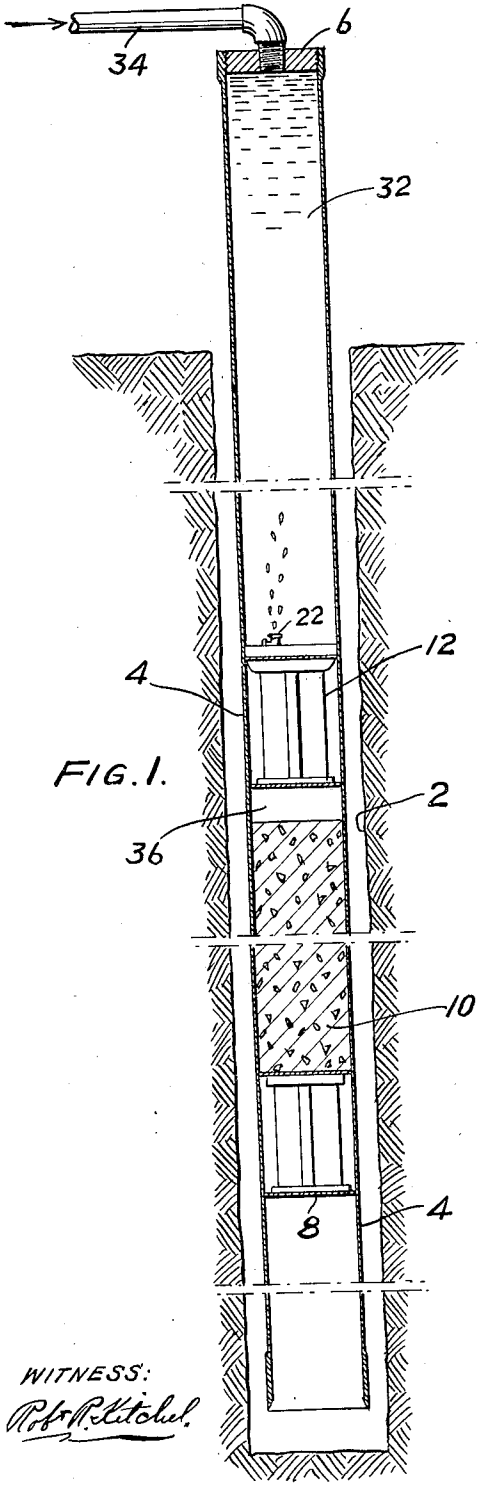


FIG. 1.

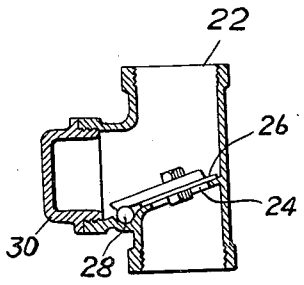


FIG. 3.

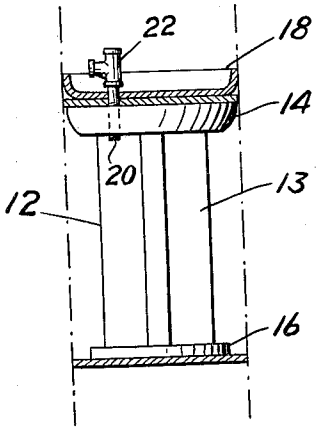


FIG. 2.

WITNESS:
Robt. R. Kitchel

INVENTOR
John A. Ritter
BY
Bussey & Harding
ATTORNEYS.

Patented Nov. 28, 1933 1,937,247

UNITED STATES PATENT OFFICE

1,937,247

DEVICE FOR CEMENTING WELLS

John A. Eitter, Dallas, Tex., assignor to Sun Oil Company, Philadelphia, Pa., a corporation of New Jersey

Application May 11, 1929. Serial No. 362,271

5 Claims. (Cl. 166—21)

This invention relates to the art of cementing casings in wells and particularly relates to a plug adapted to be used in connection with such cementing.

In the casing method of cementing casings in oil or other wells, it is customary to lower within the casing first the bottom plug, then a charge of cement and a top plug, the combination being pressed downwardly to the lower end of the casing by pumping above the top plug water or mud under pressure so as to force the plugs and cement downwardly, thereby pressing the cement upwardly around the outside of the casing and sealing the bottom within the bore hole. It is found that frequently a pocket of air is carried down between the cement and the top plug, this pocket of air being forced downwardly when the top plug approaches the bottom and upwardly outside the casing, causing a destruction of the continuity of the cement by reason of air bubbles therein.

It is the object of the present invention to provide means for automatically removing a pocket of air which may be entrapped above the cement, which means is further adapted to prevent the upward passage of cement after the air pocket has been removed.

In the drawing:

Fig. 1 is a vertical section through a bore hole and casing therein, showing the operation of the improved device;

Fig. 2 is a vertical sectional view of a top plug made in accordance with this invention; and

Fig. 3 is an enlarged sectional view of a check valve used in the top plug.

Referring to Fig. 1, the bore hole of an oil well is indicated at 2. Within this bore hole is located, as is customary, a casing 4 extending downwardly to a position adjacent the bottom of the bore hole, this casing being surmounted by a removable cap 6. In cementing the casing in position in the bore hole, a lower plug 8 is first inserted in the casing. Above this plug is then inserted a charge 10 of cement sufficient for the purpose of filling up the space between the lower portion of the casing and the side walls of the bore hole. A top plug 12 is inserted above the charge of cement. Because of the weight of the charge of cement, the cement and lower plug usually move to a position intermediate the top and bottom of the casing, so that the top plug 12 must drop a considerable distance before approaching the top of the cement. Inasmuch as the top plug has a substantially air-tight contact with the walls of the casing, it will serve to compress a pocket of air between itself and the top of the column of cement. The plug of the present invention permits the escape of such air, as will be later described.

The plug 12 comprises a central skeleton portion 13 of light wooden construction adapted to permit its ready destruction upon continuation of the drilling. This skeleton portion 13 carries upper and lower discs 14 and 16, which are provided with leather washers arranged to maintain the plug in proper position relative to the walls of the casing. A leather or composition cup 18 carried by a top disc lies in substantial liquid-tight contact with the walls of the casing, so as to prevent the passage of liquid from one side of the plug to the other.

Extending through the upper disc 14 is a vent tube 20 surmounted by a check valve 22 of the form shown in Fig. 3, this check valve being provided with an annular seat 24 on which a valve member 26 rests, the valve member being pivoted at 28. A cap 30 may close the side of the valve 22 permitting removal of the valve member 26.

Assuming the parts to be in the positions shown in Fig. 1, during the cementing of a well mud or water 32 will be introduced under pressure through the pipe 34, serving to force downwardly the top plug 12 and through the medium thereof the column of cement and the bottom plug 8. An air pocket 36 may, during this process, be entrapped between the top plug and the cement. The air may freely pass about the lower disc 16 of the top plug and passes upwardly through check valve 26, the pressure on the lower side of which will be slightly greater than the pressure on the upper side, thereby permitting its opening. The escaping air will bubble through the water 32. When all of the air escapes, any cement which passes upwardly to the valve will fail to pass through the same and the valve will automatically close by reason of the fact that the plug is now resting upon the cement and the pressures on the upper and lower faces of the valve are substantially the same, inasmuch as there is liquid on both sides. Accordingly, intermixture of the water or mud above the plug with the cement therebeneath will be prevented, passage of the water downwardly through the check valve being positively prevented by its closure and there being no tendency for passage of cement upwardly because of the reasons above mentioned.

It will be obvious that the specific type of check valve may be replaced by many equivalent types and accordingly it is not desired to limit the

claims to the specific means disclosed for effecting the results described.

What I claim and desire to protect by Letters Patent is:—

1. A device for cementing wells including a plug arranged to pass through a well casing above a charge of cement and including a body, a lower washer secured to the body, an upper washer of cupped shape secured to the body and adapted to engage the walls of a casing, and an upwardly opening check valve controlling a passage between the upper and lower sides of the upper washer.

2. A device for cementing wells including a plug arranged to pass through a well casing above a charge of cement and including a body, a washer secured to the body and adapted to engage the walls of a casing to close the casing, and an upwardly opening check valve controlling a passage between the upper and lower sides of the washer.

3. A device for cementing wells including a plug arranged to pass through a well casing above a charge of cement, and means allowing the passage of entrapped air upward past the plug while preventing the upward passage of cement, said means including a vent opening through the plug and an upwardly opening check valve controlling said opening, the check valve including a valve member and a seat therefor so related that the valve will open and pass air when the plug is subjected to hydraulic pressure from above.

4. A method of cementing wells including locating within a well casing a charge of cement, lowering within the casing above the cement a plug provided with means allowing the passage of entrapped air upward past the plug while the plug is subjected to hydraulic pressure from above but preventing the passage of cement, and applying hydraulic pressure above the plug to force the cement downwardly within the casing.

5. A method of cementing wells including locating within a well casing a charge of cement, lowering within the casing above the cement a plug provided with a check valve allowing the passage of entrapped air upward past the plug while the plug is subjected to hydraulic pressure from above but preventing the passage of cement, and applying hydraulic pressure above the plug to force the cement downwardly within the casing.

JOHN A. RITTER.