Oct. 21, 1941. W. P. HOLLAND 2,259,564

MEANS AND METHOD FOR REMOVING CASING FROM WELLS

Filed July 2, 1940

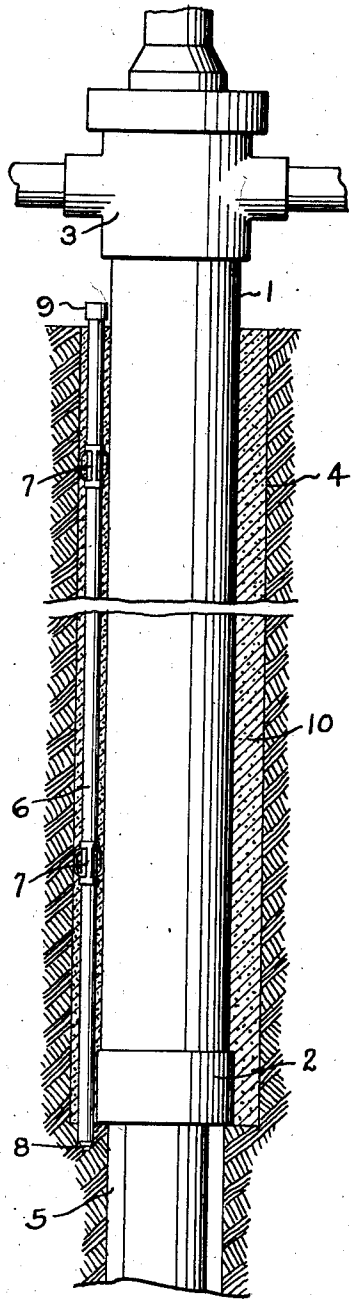


Fig. 1.

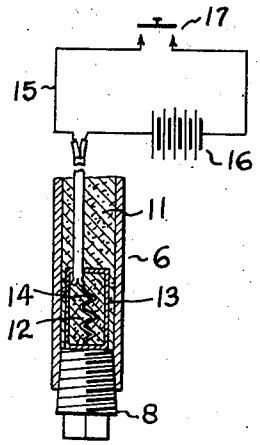


Fig. 2.

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Patented Oct. 21, 1941

2,259,564

UNITED STATES PATENT OFFICE

2,259,564

MEANS AND METHOD FOR REMOVING CASING FROM WELLS

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Application July 2, 1940, Serial No. 343,516

5 Claims. (Cl. 166—1)

This invention relates to means and method for removing casing from a well bore.

In drilling wells, particularly deep wells, a surface casing is first set. It is usually of a length from several hundred feet to several thousand feet depending on the depth to which it is contemplated the well will be drilled. After the surface casing is set the bore is reduced in diameter and drilled deeper and an inner casing, or casings, are lowered into the well as drilling progresses.

The surface casing is provided for the attachment of well head equipment thereto and must be securely anchored to prevent a blowout in case high pressures are encountered in the well.

When the surface casing has been lowered, and before the well bore has been reduced, cementitious material in plastic state is forced down through the casing, by conventional appliances for the purpose, and returns up about the casing the required distance, sometimes to the ground surface. The casing as it is lowered is maintained approximately centered relative to the bore so that the cement around the casing will be of approximately uniform thickness. This cement, or cementitious material is then allowed to set and the casing is thereby securely anchored in the well so as not only to form a firm and secure anchorage for the well head equipment but also to anchor the casing and equipment from being blown out in case strong well pressures are encountered.

This cementitious material when it sets forms a cementitious shell around the casing which is frangible.

Upon completion of the well, if the well should prove non-productive the inner casing pipe, or other tubing, may be withdrawn from the well by conventional equipment provided for that purpose but it is usually impossible to withdraw the surface casing once it has been cemented. This surface casing represents a substantial investment and it is desirable that it be withdrawn from the well and salvaged in case the well is non-productive.

It is a prime object of the present invention to provide means and a method for releasing the casing from its surrounding cementitious shell which anchors it so that this surface casing can also be withdrawn for re-use.

With the above and other objects in view the invention has particular relation to certain novel features of construction and use as well as to a novel method, an example of which is described in this specification and illustrated in the accompanying drawing, wherein:

Figure 1 shows a side elevation of the surface casing in a well bore showing also an inner casing and showing the cementitious shell around the surface casing in section, and

Figure 2 shows a fragmentary, sectional view of an explosive containing cartridge showing one means of exploding the charge.

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 surface casing for a well having a guide shoe 2 on its lower end and supporting well head equipment 3 at its upper end. The surface casing 1 is shown located in the enlarged upper end 4 of the well bore 5. This casing 1 will usually range in length from 500 feet to 2500 feet although it is apparent that its length may vary within or beyond said limits.

When the enlarged portion 4 of the bore has reached the desired depth the casing 1 is then lowered into the bore to the bottom, care being taken to center the casing as accurately as possible in the bore.

A long cartridge shell, preferably in the form of a tube 6, is then lowered into the enlarged portion of the bore alongside the casing and is spaced between the casing and the adjacent wall of the well by suitable cage-like spacers 7, 7. This cartridge shell is closed at the bottom in any preferred manner as by means of a plug 8 screwed therein.

Until it is to be used the upper end of the cartridge shell 6 may be closed by a cap 9. The enlarged bore 4 is then filled, on the outside of the casing, with cementitious material such as concrete 10 in which said casing as well as the cartridge shell 6, is embedded. This cementitious material is then allowed to set thereby anchoring the casing 1 securely in place.

When it becomes desirable to remove the casing 1 from the well an explosive charge such as 11 may be lowered into the tube, or cartridge shell, 6 thus forming a complete cartridge, said explosive charge being in the form of a fuse extending approximately from the lower to the upper end of the shell 10.

Suitable means has been provided for exploding the charge 11. The force of the explosion will occur throughout the length of the cartridge shell 6 and will completely shatter, or break up the frangible shell 10 surrounding the casing 1 and said shell will release its adherence to said casing so that the surface casing will then be un-

anchored and may be pulled from the well by a conventional pipe pulling equipment provided for the purpose.

Any suitable means may be provided for exploding the charge. As shown there is a primer charge 12 confined within a suitable casing 13 in the lower end of the cartridge shell. The filament 14 of an electrical circuit 15 extends through the primer charge. This circuit extends to the top of the ground and connected into it there is a source of electrical energy such as a battery 16. An electrical switch 17 is also connected into the circuit 15 which is normally open but which may be closed to effect ignition of the primer charge and an explosion of the main charge.

It is apparent that other suitable means for igniting the explosive charge may be employed with the desired results.

The drawing and description are illustrative merely, while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. The method of removing a surface casing which is anchored in a well by means of a cementitious shell around and adhering to the shell and anchoring the shell to the walls of the well, which method consists in applying an explosive force to the shell to disrupt the shell approximately throughout the length thereof to release it from the casing and then withdrawing the released casing from the well.

2. The method of removing a surface casing which is anchored in a well by means of a cementitious shell around and adhering to the shell and anchoring the shell to the walls of the well, which method consists in applying an explosive force to the shell approximately throughout the length thereof to shatter the shell to release it from the casing and then withdrawing the released casing from the well.

3. Well equipment comprising a surface casing set in the well bore, a shell of frangible material in the space between the casing and the walls of the well, means imbedded within the shell effective to disrupt the shell approximately throughout its length.

4. Well equipment comprising a surface casing in the well, an approximately cylindrical shell around the casing in the well bore adhering to the casing and anchoring the casing to the walls of the well, an explosive charge confined within the shell and effective, upon explosion, to shatter the shell approximately throughout its length.

5. Well equipment comprising a surface casing in the well, an approximately cylindrical shell around the casing in the well bore adhering to the casing and anchoring the casing to the walls of the well, an explosive charge confined within the shell and effective, upon explosion, to shatter the shell approximately throughout its length, and means for exploding said charge.

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