Feb. 9, 1926. 1,572,748

J. S. MITCHELL

METHOD AND APPARATUS FOR PRESSURE TESTING DRILL HOLE CASING

Filed July 19, 1922

Fig. 2.

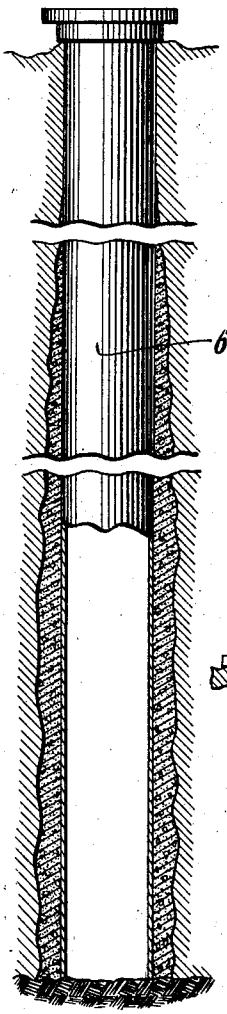


Fig. 1.

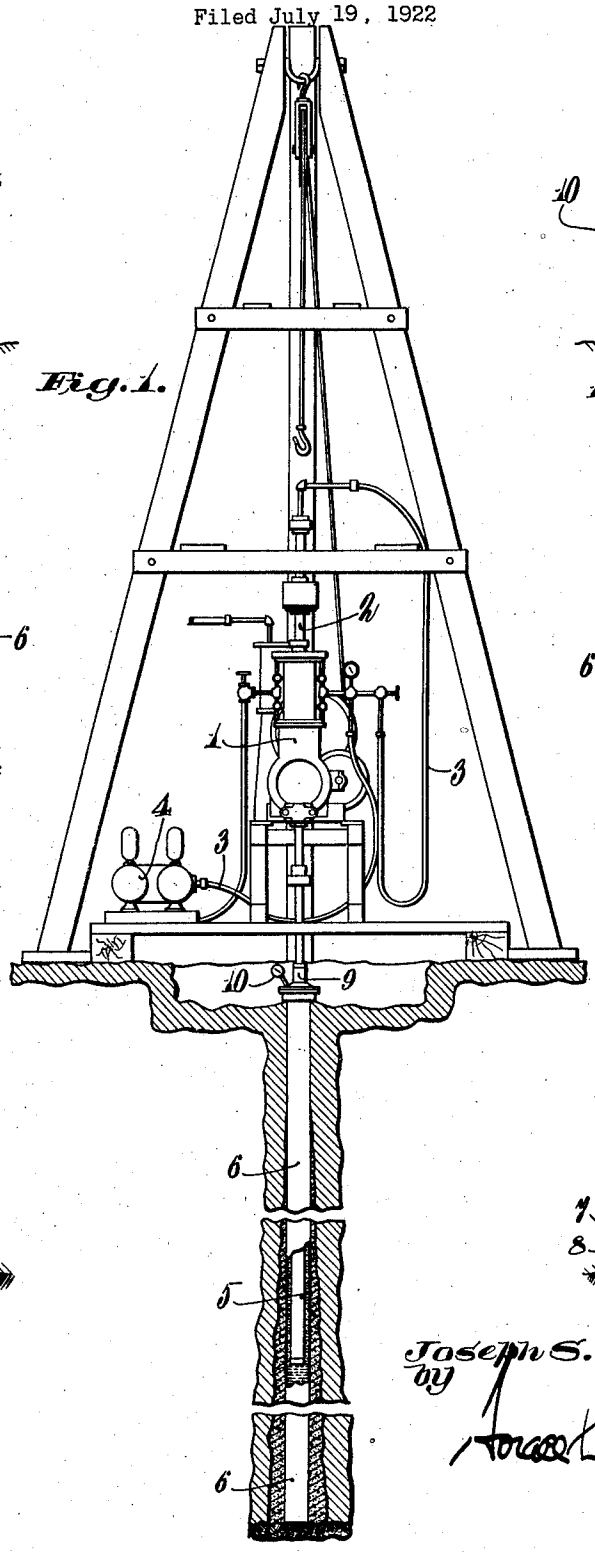
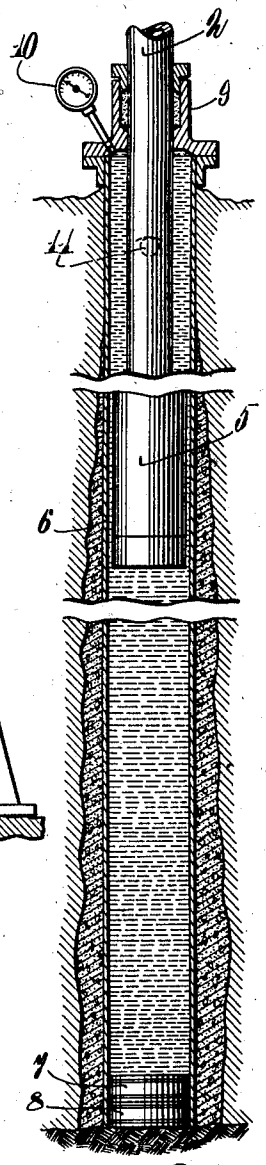


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR PRESSURE-TESTING DRILL-HOLE CASING.

Application filed July 19, 1922. Serial No. 576,090.

To all whom it may concern:

Be it known that I, JOSEPH S. MITCHELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods and Apparatus for Pressure-Testing Drill-Hole Casing, of which the following is a full, clear, and exact specification.

My invention relates to methods and apparatus for pressure testing drill hole casing.

It has for its object to provide an improved method and apparatus for pressure testing drill hole casing and more particularly the casings in oil wells whereby it is made possible to eliminate the necessity for the special and expensive high pressure pump and to utilize elements of the drilling mechanism. A further object of my invention is to provide an improved method and apparatus for pressure testing core drill hole casings and especially those used in oil wells, whereby the mechanism of the drill may be utilized to provide the desired pressure in the hole without the provision of the supplemental high pressure pump which has previously been thought necessary and supplied at large expense.

In the accompanying drawings I have for purposes of illustration shown my improved method and apparatus in use in connection with an oil well drilling mechanism of the type described and claimed in my copending application Serial No. 533,603, filed Feb. 2, 1922.

In these drawings,—

Fig. 1 is a side elevation, partially in section, showing this complete mechanism operating upon a hole during pressure testing.

Fig. 2 is an enlarged partial longitudinal sectional view of the casing after cementing.

Fig. 3 is a view similar to Fig. 2, showing the casing and the testing means.

The drilling mechanism comprises in general a hydraulically operated diamond core drill mechanism including a usual rod rotating, raising and lowering, and hydraulic feeding mechanism, generally designated 1, which is adapted to act upon a rod line 2 and to supply liquid thereto through a piping 3 from a pump 4, the rod line carrying at its lower end as usual a core barrel 5.

In my improved construction, when the capping is reached, the hole is suitably cased as at 6 and cemented in a usual manner, the pump 4 being used in this operation. After the cement has set and usually before the cementing plugs 7 and 8 and the cement below the same are bored out, and again after the same are bored out, the hole is subjected to a pressure test. In certain fields, for example the Mexican fields, the pressure required is very high, sometimes running as high as six hundred pounds per square inch. This pressure test is obtained in my improved construction by the use of the rod line, improved as hereinafter described, and a stuffing box 9, the latter herein having a pressure gage 10 thereon, and being suitably fixed on the top of the casing 6, herein directly thereon, the test preferably being carried out or, preferably, by first filling the hole with water by suitable means, as, for example, through the rod line which extends through the stuffing box 9 and carries a check valve 11 disposed in the line, preferably above the point of connection of the core barrel 5, and then when the water filled casing is thus completely sealed by the valve rods extending through the stuffing box 9, lowering the rods into the hole, the check valve 11 in the rod line then operating to prevent the upward passage of water up through the rods and the stuffing box 9 preventing the escape of liquid around the rods, so that the pressure is increased as the rods are lowered. Where a deep hole is being tested, it is found that the mere lowering of one thousand feet or so of rods will create the desired pressure which may be noted on the gage 10 on the stuffing box. Moreover, when for any reason the weight of the rods is insufficient, it is possible through the hydraulic feed of the mechanism 1 to feed the rods by power and thereby increase the pressure as necessary although obviously any other power means may be used when necessary. It will also be evident that since the valve 11 is located above the core barrel 5, the latter may be removed from the rod line if desired.

As a result of my improvement it is possible to test a cemented hole without the provision of the special high pressure pump heretofore used, the volume of the rods introduced into the hole acting to increase the pressure therein as necessary, either when the rods are simply lowered into the hole as

in deep holes or where the rods are forced down into the hole where the weight of the rods is itself insufficient. Thus, it will be observed that it is unnecessary to provide any substantial amount of mechanism other than the standard drilling mechanism and that, in fact, where a stuffing box is provided and used in another relation as in my previous application mentioned, this same stuffing box may be used in both relations, thereby obviating the necessity for any additional mechanism. It will further be observed that it is possible, not only thus to reduce the cost of the necessary equipment, but also to obtain the desired pressure test with facility and dispatch.

While I have in this application specifically described my improved method and one apparatus by which the same may be carried out, it will be evident that various modifications of this illustrative disclosure may be made without departing from the spirit of the invention or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. The method of pressure testing drill hole casings located in a well hole which consists in, sealing off the casing, and passing through a seal mechanical means in increasing volume.

2. The method of pressure testing drill hole casings located in a well hole which consists in passing through a seal into liquid in the casing mechanical means in increasing volume.

3. The method of pressure testing drill hole casings which consists in passing through a seal into liquid in the casing suitably valved drill rods in increasing volume.

4. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, means for supplying liquid to said casing disposed adjacent the end of said casing to which said stuffing box is connected, and mechanical means movable through said box in increasing volume to increase the pressure in the casing, said box and means uniting to seal the casing.

5. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, and mechanical means for supplying liquid and pressure to said liquid movable through said box in increasing volume to increase the pressure in the casing.

6. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, and valved liquid supply means movable through said box in increasing volume to increase the pressure in the casing, said box and means uniting to seal the casing.

7. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, means for supplying liquid to said casing disposed adjacent the end of said casing to which said stuffing box is connected, mechanical means movable through said box in increasing volume to increase the pressure in the casing, said box and means uniting to seal the casing, and power means for feeding said mechanical means.

8. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, means for filling the casing with liquid, and mechanical means movable through said box in increasing volume to increase the pressure in the casing, said box and means uniting to seal the casing.

9. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, and mechanical means movable through said box in increasing volume to increase the pressure in the casing comprising a line of drill rods closed against the upward passage of fluid therethrough, said box and rod line uniting to seal the casing.

10. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, and means for filling a casing with liquid and subjecting the latter to pressure including a line of drill rods closed against the upward passage of fluid therethrough, said box and rod line uniting to seal the casing.

11. Pressure testing mechanism for drill hole casings including a stuffing box thereon connectible to a casing, mechanical means movable through said box in increasing volume to increase the pressure in the casing comprising a line of drill rods closed against the upward passage of fluid therethrough, said box and rod line uniting to seal the casing, and power means for feeding said rod line.

12. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, means for supplying liquid to the casing and placing the liquid under pressure including a line of drill rods closed against the upward passage of fluid therethrough, said box and rod line uniting to seal the casing, and power means for feeding said rod line.

13. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, a gage connectible to the casing, and means for supplying liquid to the casing and subjecting said liquid to pressure including a line of drill rods closed against the upward passage of fluid therethrough, said box and rod line uniting to seal the casing.

14. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, and mechanical means movable through said box in increasing volume to increase the pressure in the casing comprising a line of drill rods having a

check valve therein for preventing an upward flow therethrough, said box and rod line uniting to seal the casing.

15. Pressure testing mechanism for drill hole casings including a stuffing box connectible to a casing, a gage connectible to a casing, means for supplying liquid to the casing, and means for subjecting said liquid to pressure including a line of drill rods having a check valve therein for preventing an upward flow therethrough, said box and rod line uniting to seal the casing.

16. Pressure testing mechanism for core drill casings including a stuffing box connectible to a casing, and mechanical means movable through said box in increasing volume to increase the pressure in the casing and including a line of drill rods having a core barrel thereon and a check valve in said line between the top thereof and said core barrel for preventing an upward flow through said line, said box and rod line uniting to seal the casing.

In testimony whereof I affix my signature.

JOSEPH STUART MITCHELL.