

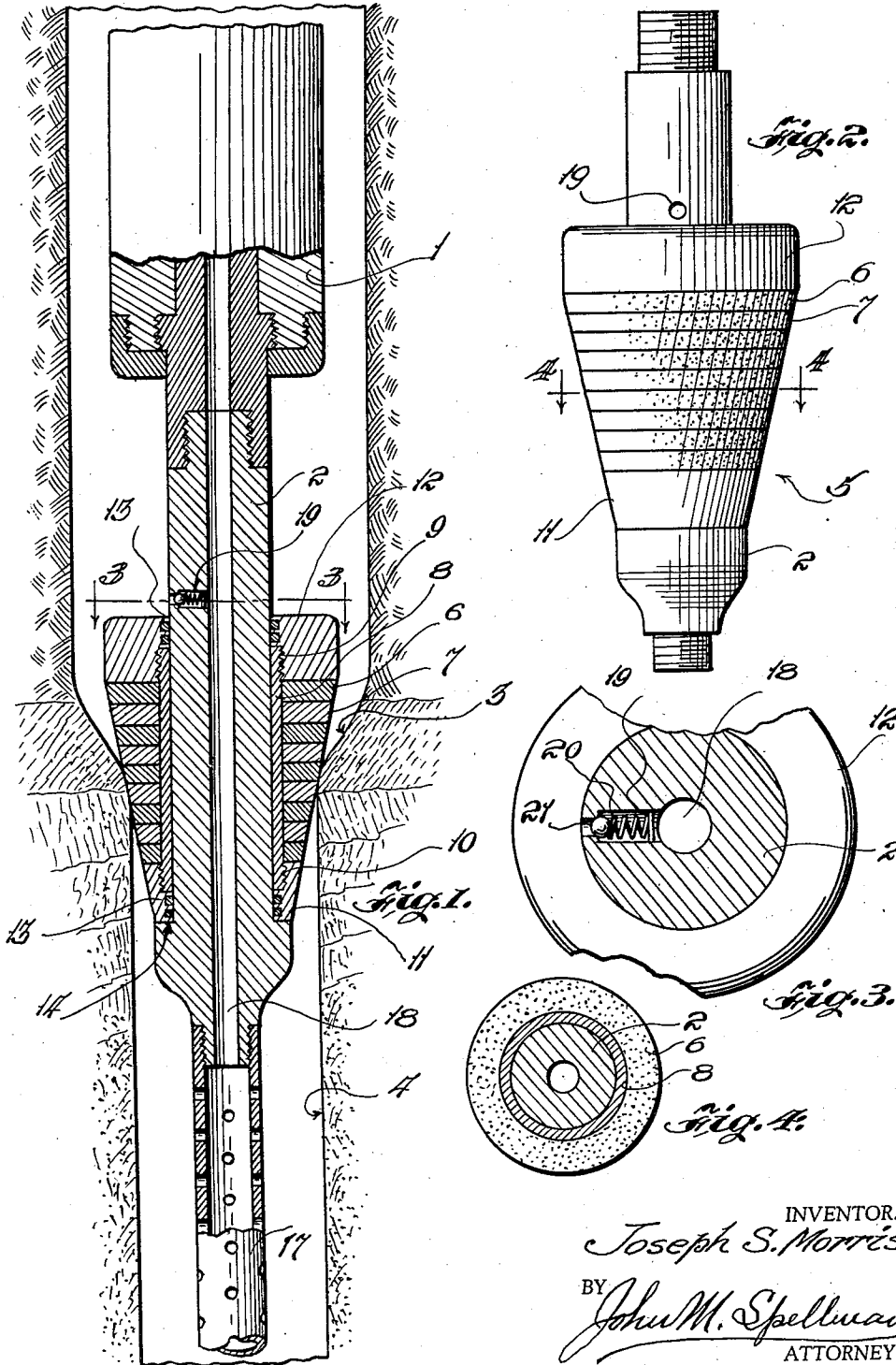
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PRESSURE RELEASE FOR SAND TESTING TOOLS

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PRESSURE RELEASE FOR SAND TESTING
TOOLS

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1 Claim. (Cl. 166—1)

This invention relates to improvements in apparatus for deep well drilling, particularly where a sand testing tool is employed.

Preliminary to a thorough understanding of the invention it will be profitable to state that the invention hereinafter described and claimed has particular reference to sand testing tools and particularly to a sand testing tool covered by Letters Patent of the United States, No. 1,804,620, issued May 12, 1931, to Frank Hux, which includes an elongated container having a valve for admitting and retaining samples of fluid from the lower portion of the well and having means at its upper end for attachment to the hollow drill stem or pipe which serves as an operating member for the testing device as fully set forth in said patent. It may be used, however, with such types of sand testing tools as may be found practicable.

In the drilling of deep wells the practice of what is known as "rat-holing" is resorted to as an economic means to ascertain what is ahead of the regular depth and diameter of the hole before proceeding with the regular drilling of the usual diameter hole. The "rat-hole" is a boring of small diameter just sufficient to gather a test of the strata and in drilling this smaller diameter hole a different sort of packer is used to choke or cut off the mud and water from the regular diameter hole. After the test of the rat-hole extension is made it is difficult to lift the packer, owing to the column of mud and water in the regular hole, bearing down upon the rat-hole packer, to lift the packer from the hole. In so removing the packer breakage and loss of time and labor frequently occur, as it is difficult to lift the packer from the hole against the aforesaid weight of mud and water.

In keeping with the foregoing it is the principal object of this invention to provide means for quickly creating a pressure within the rat-hole and in the tubular passage of the tool equal to or in excess of the external hydrostatic pressure, whereby the packer is relieved from the weight of mud and the like above the same, and is in fact urged upwardly when the pressure acting beneath the packer exceeds the external fluid pressure. In accomplishing this result a tubular or cylindrical member is slidably mounted within the packer and is so proportioned as to function as a pump plunger when reciprocated through the medium of the drill stem or pipe which serves as an operating member. This cylindrical pumping member is provided with an inwardly opening radial valve to admit fluid from the outside

to assist in equalizing internal and external pressures, while preventing passage of high pressure fluid from the interior after a pressure has been built up substantially equal to or greater than the pressure of the outside fluid, thus permitting ready removal of the packer.

The invention will be readily understood from a perusal of the following detailed description, taken in connection with the accompanying drawing and wherein:

Figure 1 is a vertical sectional view through a packer, the lower end of a sand testing tool, and the suction pipe through which a test is drawn, and embodying the invention, the view including a vertical section through a regular diameter well and the strata below the well showing the rat-hole extension.

Figure 2 is a side elevational view of a conical packer for rat-holing in position on its supporting member or tube.

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 1, and

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 2.

Having more detailed reference to the drawing, 1 denotes the lower end of a sand testing tool which is preferably of the type shown in the Hux Patent No. 1,804,620, referred to above, which comprises an elongated container having a valve for admitting and retaining samples of the fluid from the lower portion of the well, and which is likewise provided at its upper end with means for attachment to an operating member or pipe, i. e. the usual drill stem tubing. As shown, the testing tool is provided with a coupling thread for connection thereto of a tubular or cylindrical member 2 having relatively thick walls as compared with the diameter of the internal duct 18, and which in effect serves as a pump plunger or rod when reciprocated in a manner to be hereinafter described. This pumping effect is accentuated by an enlarged extension of the member 2 at the lower portion thereof. An inlet pipe 17 reaching to the bottom of the well is secured below the enlarged portion of the tubular member. Near the upper portion of the tubular member 2 there is provided a radial opening 19 within which is mounted an inwardly opening valve 21, shown as of the ball type and preferably held against its seat by a spring 20. A conical shaped packer 5 is shown as slidably mounted upon the tubular member, whose position is limited below by the enlargement of the tubular member and above by the lower end 1 of the testing tool.

The usual well hole is shown as having its walls

extended down to a point 3 and beyond this depth the rat-hole extension 4 is made, so that when the conical shaped packer 5 is placed in the well there will be a wedged or tightened contact of the periphery of the packer with the walls between the regular hole and the extension, as clearly shown in Figure 1.

This packer is commonly made of several layers of material suitable for the purpose and indicated at 6 and 7 and as herein shown there is embodied in the construction a sleeve 8 with screw-threads 9 and 10. The layers of the material are superimposed one upon the other between the rings 11 and 12 and these rings thus hold the structure together. A tight seal is thus effected between the sleeve and the tubular member 2 which is slidable therein and may be reciprocated by means of the drill stem tubing. Each ring is further provided with gaskets or washers 13 to further enhance the sealing means. The upper ring 12 is off-set to extend inwardly over the top of the sleeve, likewise the lower ring 11 is similarly arranged. The lower ring 11 is seated on the annular step or extension 14 of the tubular member 2.

Operation

In operation the entire device is lowered until the packer element reaches the position shown in Fig. 1, at which the conical walls of the packer engage the well at the top of the rat-hole. In this position the opening 19 in the cylindrical pumping member 2 is above the packer. As soon, however, as the weight of the testing tool and drill stem attached to the upper end of the tubular member comes into play, the member 2 will slide downwardly within the packer until the opening 19 is within the sleeve 8, while at the same time forcing the packer into tight engagement with the inclined walls of the well. Owing to the thickness of its walls as compared with the small diameter of the duct 18, the member 2 serves as a pump plunger and forces some of the material from the rat-hole upwardly into the testing tool,

where it is retained by manipulation of the valve, with which said tool is provided.

To remove the packer after the test has been taken, the thick walled cylindrical pumping member 2 may be reciprocated, thereby quickly building up a pressure in the rat-hole below the packer which is equal to or greater than the outside pressure. In such operation it will be noted that the valve 21 permits fluid to flow inwardly, but does not permit fluid to pass outwardly after an internal pressure has been built up equal to or greater than the pressure on the outside.

What is claimed as new is:

For use with an elongated container having a valve for admitting and retaining samples of a fluid from the lower end of a well and having means at its upper end for attachment to an operating member or pipe; a cylindrical pumping member adapted to be secured to the lower portion of the container and having an intake at its lower end, and a downwardly tapering packer member having a limited sliding movement on said cylindrical pumping member, said cylindrical pumping member having an unobstructed duct leading from its intake into the receptacle, the duct being of small diameter as compared with the diameter of the cylinder, whereby the liquid, displaced when the packer is wedged into a rat-hole entrance and the cylinder descends into the rat-hole, is forced up into the container, said cylindrical pumping member also having a radial opening communicating with the duct, said opening being located within the tapering packer member when the latter is in its uppermost position with respect to said cylinder and above it when it is in its lowermost position with respect to the cylinder, and an inwardly opening valve in said radial opening to prevent passage of high pressure fluid from the interior of the duct after a pressure has been built up substantially equal to or greater than the pressure of the outside fluid, thus permitting ready removal of the packer on the completion of a test.

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