July 29, 1930. A. H. RANKIN 1,771,690

VALVE TRIP

Filed May 18, 1929

Fig. 1.

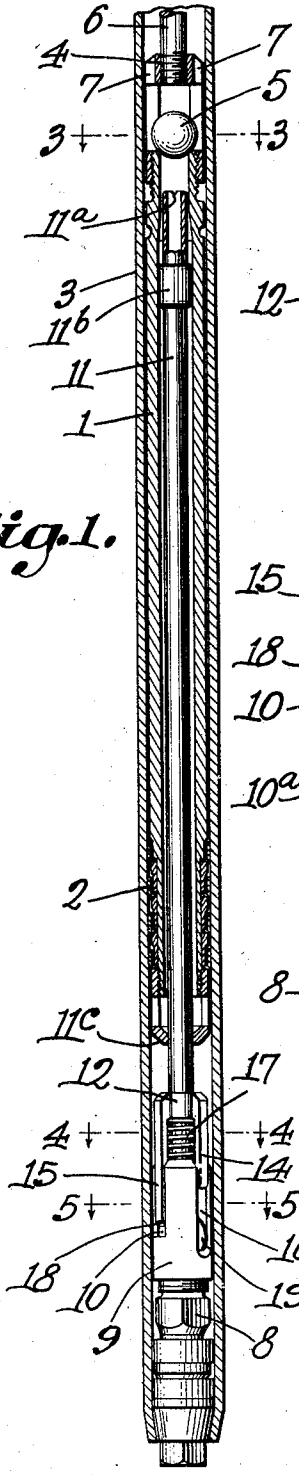


Fig. 2.

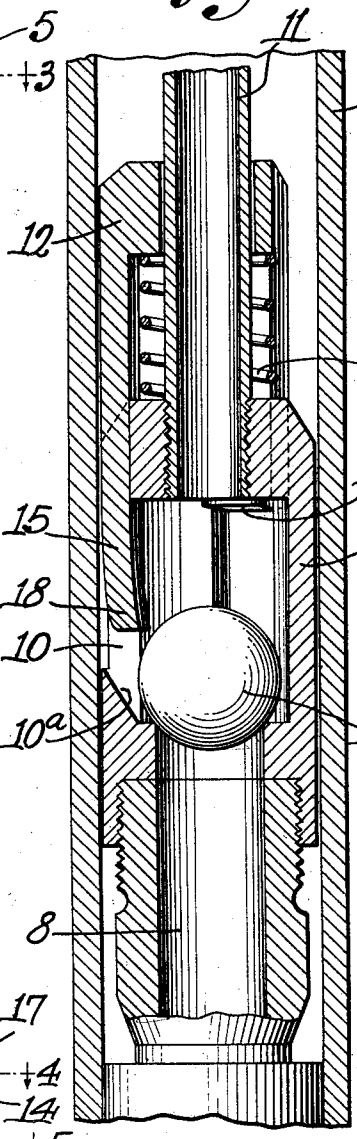


Fig. 3.

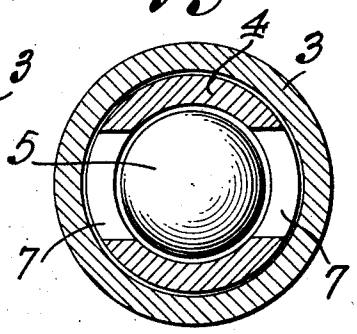


Fig. 4.

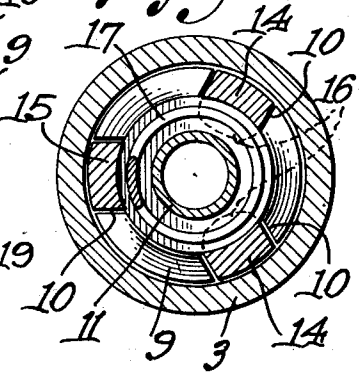
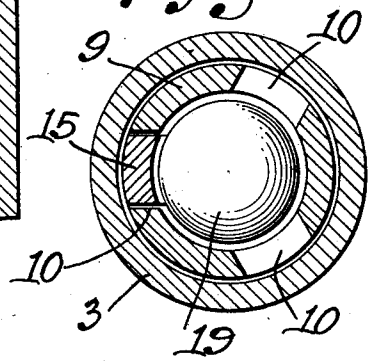


Fig. 5.



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UNITED STATES PATENT OFFICE

AUSTIN H. RANKIN, OF STOY, ILLINOIS

VALVE TRIP

Application filed May 18, 1929. Serial No. 364,232.

By way of explanation, it may be stated that conditions of one kind and another often prevent the foot valve and the working valve in a deep well from closing, the pumping operation being stopped or being impaired accordingly. Moreover, it is at times, for other purposes, desirable to open both the foot valve and the working valve. The foregoing being understood, this invention aims to provide a novel means whereby, at the will of an operator, the valves specified may be held open, to permit a washing out of the valve seats by the oil or other liquid which is standing in the well, and to provide a means whereby the aforesaid valves may be opened for any purpose whatsoever, connected with the operation and maintenance of oil or other wells.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that sort to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter set forth, it being understood that changes may be made in the precise embodiment of the invention, within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:

Figure 1 shows in longitudinal section, a device constructed in accordance with the invention, parts being in elevation;

Figure 2 is an enlarged longitudinal sectional detail;

Figure 3 is a transverse section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1.

The numeral 1 marks a tubular plunger of the kind used in the deep wells, and, generally, in oil wells. The plunger 1 is packed in any suitable way, as shown at 2, to fit closely but slidably in a barrel 3. A cage 4 is threaded or secured otherwise upon the upper end of the plunger 1, and within the cage 4 is located a ball valve 5 which seats on the upper end of the plunger 1. The operating means is disclosed in the form of a pump rod 6 attached to the cage 4. The cage 4 has longitudinal slots 7 which open upwardly through the upper end of the cage 4 and permit the upward passage of liquid when the ball valve 5 is raised.

A foot valve casing 8 is mounted in the lower end of the barrel 3. A cage 9 is threaded or secured otherwise on the upper end of the foot valve casing 8 and is spaced from the inner surface of the barrel 3. The cage 9 has longitudinal slots or guides 10 extended through the upper end of the cage 9. The cage 9 has a downwardly and inwardly inclined surface 10^a located at the lower end of one of the slots 10.

An upstanding tubular finger 11 is mounted at its lower end in the top of the cage 9. There are notches 11^a in the upper end of the finger 11. Near to its upper end, the finger 11 has an enlarged shoulder 11^b. The shoulder 11^b is too large to pass through the opening 11^c in the lower end of the plunger 1. The finger 11 is long enough so that the plunger 1 can make a working stroke without bringing the shoulder 11^b on the finger 11 into contact with the lower end of the plunger 1.

The device comprises a displacer including a head 12 mounted to slide on the finger 11, the head 12 of the displacer carrying short arms 14, and a long arm 15, the arms 14 and 15 being received slidably in the guide slots 10 of the cage 9. A compression spring 17 surrounds a portion of the finger 11 and is interposed between the top of the cage 9 and the head 12 of the displacer, the upward movement of the displacer, under the action of the spring 17, being limited, because the short arms 14 have projections 16 which engage beneath the top of the cage 9. The long arm 15 of the displacer has an inwardly extended part 18 adapted to ride on the inclined surface 10^a of the member 9 and spring inwardly, thereby to displace a ball valve 19 located within the cage 9 and seated in the cage.

In practical operation, the plunger 1 can

make a pumping stroke in the usual way, the valves 19 and 5 operating in a manner well understood by those skilled in the art. In the event that it is desired to displace the valves 5 and 19, then the plunger 1 is lowered until it rests upon the top of the displacer, the displacer moving downwardly and the spring 17 being compressed. When the displacer moves downwardly, the finger 15 rides along the inclined surface 10^a of the cage 9 and springs inwardly, the long finger 15 having some resiliency. When the finger 15 springs inwardly, the ball valve 19 is displaced. When the plunger is moved downwardly, as and for the purpose specified, the upper end of the finger 11 ultimately comes into contact with the ball valve 5, and the ball valve 5 is unseated at the same time that the ball valve 19 is unseated.

When the operator wishes to pull the plunger 1 out of the barrel 3, he raises the plunger until the shoulder 11^b is caught on the lower end 11^c of the plunger 1, and, then, the foot valve can be pulled out of the well along with the working valve and the plunger 1.

Having thus described the invention, what is claimed is:—

In a device of the class described, a foot valve casing having guide grooves and provided with a downwardly and inwardly inclined surface at the base of one of the grooves, a ball valve seated in the casing, a displacer including long and short arms slidable in the grooves, the long arm being of such length as to ride along the said inclined surface of the casing, move inwardly, and unseat the ball valve laterally, when the displacer moves downwardly, the long arm being thick enough, and the diameter of the ball valve being such, compared with the internal diameter of the valve casing, that the long arm cannot ride over the surface of the valve, and seat under the valve, spring means for holding the displacer yieldably against downward movement, the short arms leaving the corresponding grooves open at their lower ends when the displacer is raised by said spring means, a stem mounted on the displacer, a plunger slidable on the stem, a valve carried by the plunger and located in the path of the stem, so as to be unseated by the stem when the plunger moves downwardly upon the displacer to depress the displacer and unseat the first-specified valve, the stem having a shoulder which, engaging the lower end of the plunger, enables the foot valve casing to be pulled, along with the plunger.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

AUSTIN H. RANKIN.