Feb. 9, 1926. 1,572,274

S. R. EVANS ET AL

COMBINATION SAND PUMP AND DRILL

Filed August 18, 1924 2 Sheets-Sheet 1

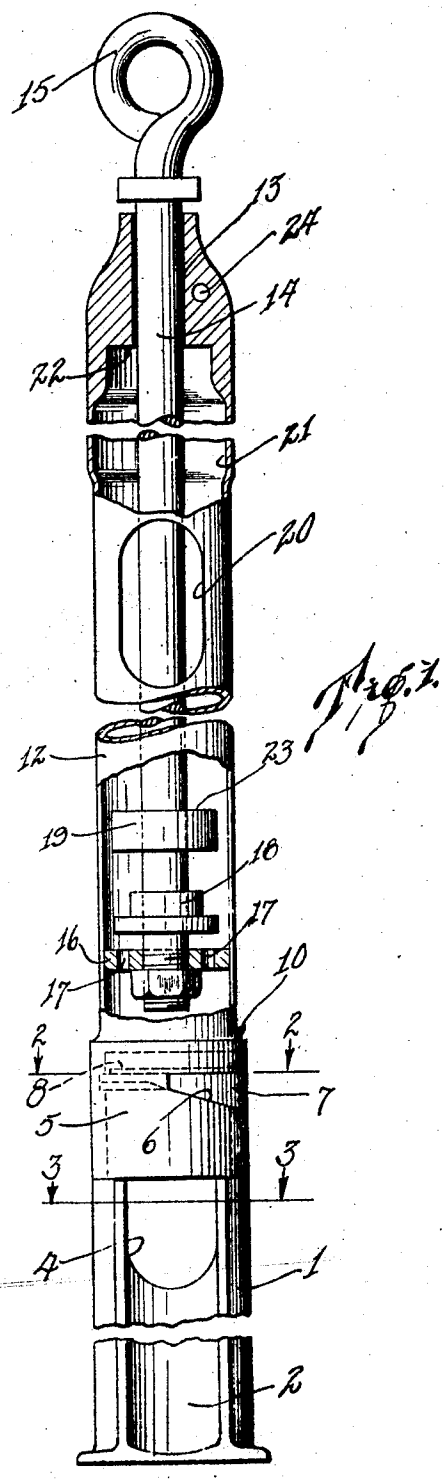


Fig. 1.

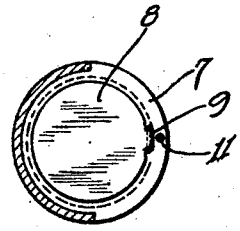


Fig. 2.

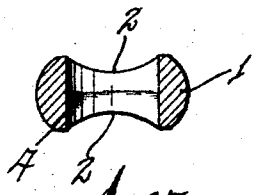


Fig. 3.

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Fig. 4.

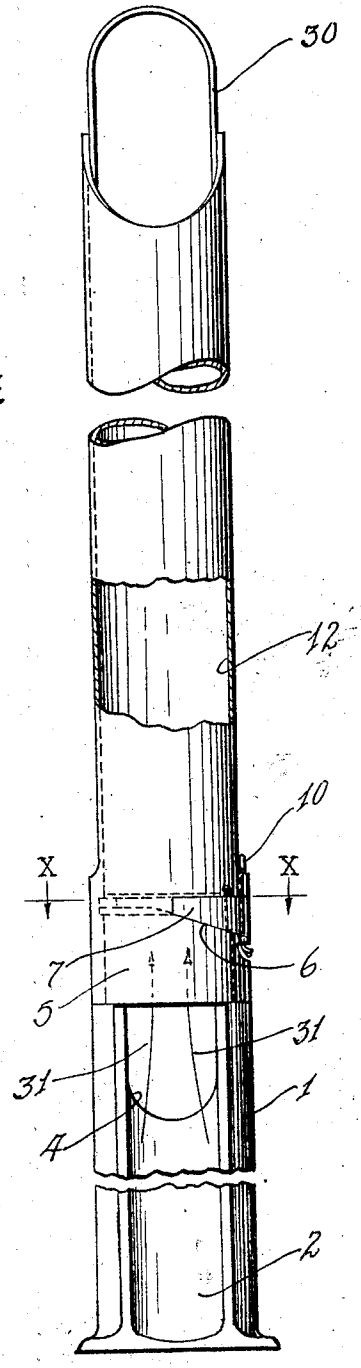


Fig. 5.

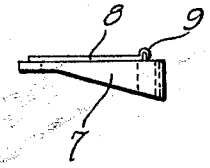
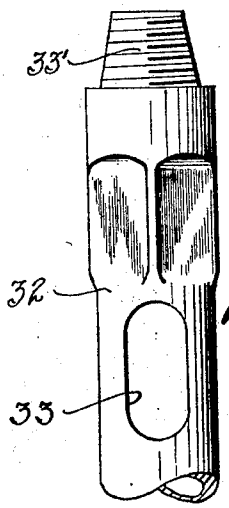


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL ROSCOE EVANS AND SAMUEL WILSON COLLINS, OF TULSA, OKLAHOMA.

COMBINATION SAND PUMP AND DRILL.

Application filed August 18, 1924. Serial No. 732,817.

To all whom it may concern:

Be it known that we, SAMUEL ROSCOE EVANS and SAMUEL WILSON COLLINS, citizens of the United States, and residents of Tulsa, county of Tulsa, State of Oklahoma, have invented a new and useful Improvement in Combination Sand Pumps and Drills, of which the following is a full, clear, and exact description.

Our invention relates to improvements in combination sand pump and drill, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of our invention is to provide a combination sand pump and drill, by means of which no time is lost between the agitation of the sand at the well bottom and the pumping of the sand into the cylinder of the pump. In the ordinary type of clean out process a string of tools are employed for loosening and agitating the sand at the bottom of the well. This string of tools is then removed from the well casing and the pump lowered for the purpose of removing as much of the agitated sand as has not settled upon the well bottom. The disadvantage of this procedure is that the time which lapses between removal of the tools and the introduction of the pump is found so long that most of the sand has settled firmly upon the well bottom and cannot be propelled into the cylinder for the purpose of removal.

A further object of our invention is to provide a combination sand pump and drill in which particularly novel means is employed for permitting the removal of sand from the pump cylinder.

A further object of our invention is to provide a combination sand pump and drill in which the cylinder is so constructed as to preclude unnecessary wear to the piston of the pump during the time that the device is used for drilling and agitating the sand at the well bottom. This improvement we deem of great importance since it obviously prolongs the useful life of the device.

A further object of our invention is to provide a combination sand pump and drill which is of such construction as is easy to operate, which is durable and which is wholly practical and efficient for the use intended.

A further object of our invention is to provide a combination sand pump and drill in which particularly novel means is employed for the speedy and complete removal of sand from the pump cylinder without the use of tools and work as is ordinarily necessary in the operation of unloading sand pumps.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

Our invention is illustrated in the accompanying drawings forming part of this application in which—

Figure 1 is an elevation of the embodiment of our invention, partly in section and parts thereof.

Figure 2 is a sectional view along the line 2—2 of Figure 1,

Figure 3 is a sectional view along the line 3—3 of Figure 1,

Figure 4 is a side elevation partially in section showing a modified form of our invention,

Figure 5 is a side elevation of the mechanism illustrated in Figure 2, and

Figure 6 is a partial side elevation of a modified form of our invention.

In carrying out our invention we make use of a drill 1, similar in construction to the ordinary type of well drill known to all of those skilled in the art. The drill 1 has an exceedingly wide water course 2 on each side thereof, (see Figure 3) and part of the drill between the water courses 2 is removed as shown in 4.

A cylinder 5 having a diameter equal to the major diameter of the drill 1 is mounted upon and fixed by welding thereto at the upper end of the drill. The cylinder 5 has a wedge shaped slot 6 therethrough, extending substantially through 180 degrees of the circumferential wall of the cylinder.

A flapper valve plate 7 is disposed substantially within the cylinder 5 by introduction of the plate through the groove 6 (see Figure 2). The plate 7 is so constructed as to exactly fill the groove thereby preventing the passage of sand and the like into the cylinder between the plate 7 and the cylinder. The lower end of the cylinder is open and sand may enter the cylinder through that end.

A flapper valve 8 is pivotally supported at 9 upon the valve plate 7 and is normally

closed by virtue of the weight of the valve and by the weight of water and sand thereupon. A cotter pin 10 is projected through a portion of the cylinder 5 and adjusted to the circumferential wall of the cylinder and through an opening 11 provided in the plate 7. This pin is employed for the purpose of holding the valve plate 7 in place when the device is in use.

A pump cylinder 12 is substantially 15 feet in length and approximately 4 inches wide and is formed integral with and at the open upper end of the cylinder 5. The cylinder 5 is slightly larger in diameter than the cylinder 12.

The upper end of the cylinder 12 is closed save for a longitudinally extending aperture 13 therethrough. A piston rod 14 having a ring or loop 15 at the outer end is projected through the aperture 13 and within the cylinder 12. A piston 16 is carried at the lower end of the rod 14 and is arranged to lie not closer than three feet from the flapper valve 8 when the rod 14 is in the position shown in Figure 1.

The piston 16 has openings 17 extending therethrough parallel with the rod 14. A valve member 18 is slidably mounted upon the rod 14 adjacent to the piston 16 and is arranged to cover and close the opening 17 when the piston is moved upwardly, but may be pushed aside by the passage of water and sand through the openings 17, as when the piston is moved downwardly.

A collar 19 is fixed to the rod 14 at a point adjacent to the member 18 so as to limit the upward movement of the valve member on the rod 14.

The cylinder 12 is provided with a pair of diametrically opposed apertures 20 adjacent to the open end thereof for the purpose of permitting the passage of water from the cylinder.

From inspection of Figure 1 it will be noted that the open end of the cylinder 12 is enlarged somewhat with respect to the major portion of the cylinder in which the piston 16 normally operates. This enlarged portion is indicated at 21 and both the inner and outer walls of the cylinder lie at greater radii than the major portion of the cylinder. The length of the enlarged portion 21 is just sufficient to permit the piston 16 to be received in the enlarged portion when the collar 19 is in engagement with the innermost surface of the upper end wall of the cylinder. This is less than one-third of the length of the portion 12 of the cylinder.

The innermost surface 22 of the top wall is machined for the purpose of engaging with the uppermost surface 23 of the collar 19, which is also machined so as to come in contact with the surface 22.

An opening 24 is provided through the uppermost part of the cylinder 12 sufficiently large to permit the projection of a locking pin therethrough. The locking pin is ordinarily 5/8 of an inch in diameter but varies depending upon the weight of the device.

From the foregoing description of the various parts of our invention, the operation thereof may be readily understood. The device usually arrives at the well with a piece of rope or wire through the loop 15 and through the openings 20, thereby holding the piston 16 at the lowermost end of its travel. A line which is to lower the device into the well casing is fastened to the loop 15 and the device is lowered in the well casing until the opening 24 comes just to the top of the casing.

A locking pin is passed through the opening 24 so that the device may swing or rest on this pin which is resting on the top of the well casing.

The rope or wire aforementioned is then removed from engagement with the loop 15 and openings 20 and the piston rod 14 is pulled upwardly by the line until the upper surface 23 of the collar 19 abuts the surface 22 of the cylinder 12.

The locking pin may then be removed from the opening 24 and the device is then ready for lowering into the casing. This opening eliminates the general practice of climbing the well derrick to untie the rope or cut the rope or wire, letting the device drop until the collar 19 contacts with the surface 22 of the cylinder. In view of the fact that these devices are many feet in length, (the cylinder 12 being approximately 15 feet in length) the work in placing the device in the well casing is not as easy as it would appear to one unacquainted with the art. However, the advantage of our present construction would be readily seen by any person skilled in the art.

The device is next lowered to the bottom of the well. At this time the piston 16 lies within the enlarged portion 21 of the cylinder 12 and the peripheral walls of the piston are out of contact with the innermost walls of the cylinder. There is, therefore, no possibility of unnecessary wear to the piston during the step in the operation of the device to follow.

This next step is similar to that of drilling the well, and the entire device is manipulated by means of a line upon which the device is suspended so that the drill 1 will loosen sand lodged at the well bottom.

The drilling action of the device or churning of the sand at the bottom of the well is kept up until a hole about three feet has been made in the sand. The drilling bit of drill 1 is made about 18 inches long so that the flapper valve 8 is in the midst of the agitated sand. When the sand is loosened sufficiently at the well bottom the

rod 14 is lowered into the working portion of the cylinder 12 and subsequently elevated. This action closes the valve plate 18 against the piston 16 and causes a partial vacuum within the cylinder beneath the piston by means of which sand and water are drawn upwardly through the flapper valve 8 from the water courses 2 of the drill. The rod 14 is again lowered whereupon the flapper valve 8 will close thus letting water pass through the piston 16, due to the fact that the valve plate 18 is elevated. The sand will remain just above the flapper valve 8 when the water is poured out by the next upward stroke of the piston through the opening 20. When the cylinder 12 has acquired its maximum load of sand it is raised to the top of the well and is emptied by merely removing the cotter pin, and thereby letting the valve drop out readily due to the wedge shape of the slot 6.

In Figure 4 we have shown a modified form of our invention. It will be noted that this form is precisely the same in construction as that form shown in Figure 1, with the exception that the piston 17, the valve 18, the piston rod 14, and its loop 15 are omitted. The enlarged portion 21 is also eliminated in this modified form, which is introduced purely for the purpose of loosening and removing sand and other débris accumulated at the well bottom. The cylinder 12 is uniform in diameter throughout its length, and is provided with a bail 30 at the uppermost end thereof, by means of which the device is lowered into the well casing. A section along the line X—X of Figure 4 is shown in Figure 2 of the drawing which is, of course, identical with the section along the line 2—2 of Figure 1. The operation of this modified form is as follows:

The device is lowered into the well casing by means of a line. The line is then elevated and lowered alternately during which process the up and down driving motion of the bit of the drill 1 loosens sand and other débris at the well bottom. The valve 8 opens on the down stroke or downward movement of the device, so that the sand and water may enter through the valve 7 in the manner shown by the arrows 31. On the upward stroke of the device the valves 8 will close, thereby keeping the water and sand in the cylinder, which, when sufficiently filled, is drawn to the surface for emptying.

The cylinder 12, in the modified form of our invention, is emptied in precisely the same manner as the preferred form. This is done by removing the cotter pin 10, thereby letting the valve 7 drop out of its place, due to the wedge shape of the slot, whereupon the sand and what water remains in the cylinder 12 escapes.

In Figure 6 we have shown still a further form of our invention, in which that portion of the device above the section line x—x of Figure 4 is fashioned in the manner of a hollow stem 32, having openings 33 similar to the openings 20 in the cylinder 12, shown in Figure 1.

The upper end of the stem 32 is provided with a threaded portion 33′, by means of which the device may be properly secured to a suitable threaded socket. In this form of the invention the provision of the hollow stem 32 to replace the cylinder 12 is for the purpose of adding weight to the device and also for providing a device in which drilling jars may be used.

We claim:

1. A device of the character described, comprising a well drill, a pump having a cylinder and a piston above said drill and a piston rod for said piston extending out of said cylinder and arranged for engagement with a line, said cylinder having an enlarged portion at the upper end thereof greater in diameter than the diameter of said piston.

2. A device of the character described comprising a well drill, a pump, comprising a cylinder and piston, and a piston rod mounted above said drill, a valve disposed at the lower-most end of said drill, whereby agitated matter surrounding said drill may enter said cylinder, said cylinder being provided with an enlarged portion at the upper-most end thereof for permitting the free movement of said piston in said portion, and having water openings through the side-walls thereof, adjacent to the upper end of the cylinder.

3. A device of the character described comprising a well drill, a pump, comprising a cylinder and a piston, and a piston rod mounted above said drill, a valve disposed at the lowermost end of said cylinder and communicating with that space immediately above said drill, whereby agitated matter surrounding said drill may enter said cylinder, said cylinder being provided with an enlarged portion at the upper-most end thereof for permitting the free movement of said piston in said portion having water openings through the side walls thereof, adjacent to the upper end of the cylinder, and means for permitting the suspension of said cylinder upon the top of the well casing.

4. A device of the character described comprising a well drill, a pump, comprising a cylinder and piston, and a piston rod mounted above said drill, a valve disposed at the lowermost end of said cylinder and communicating with that surface immediately above said drill, whereby agitated matter surrounding said drill may enter said cylinder, said cylinder being provided with an enlarged portion at the uppermost end

thereof for permitting the free movement of said piston in said portion, having water openings through the side walls thereof, adjacent to the upper end of the cylinder upon the top of the well casing, said cylinder being provided with an opening at the uppermost end for the introduction of a locking pin, whereby said cylinder may be suspended upon the top of the well casing.

5. A device of the character described comprising a well drill having wide water courses, and a portion of the drill between the water courses at the upper end of the drill removed, and having a cylinder, a piston, and a piston rod mounted at the upper end of said drill in longitudinal alignment therewith, a removable valve disposed between said pump cylinder and that space immediately above the upper ends of said water courses, said cylinder being provided with an enlarged portion adjacent the upper end thereof, having its inner side walls out of engagement when said piston is in that portion of said cylinder.

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