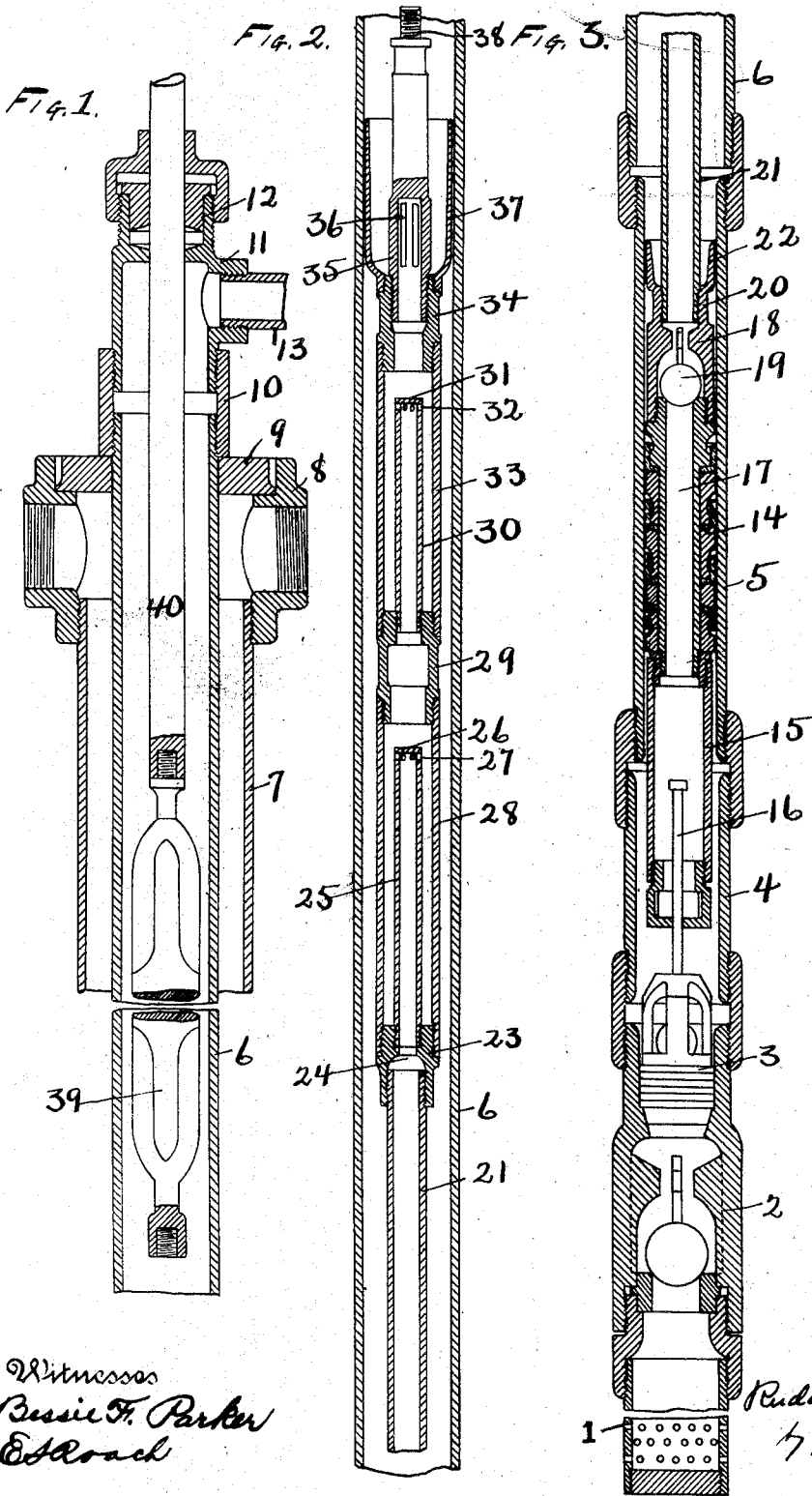


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SAND TRAP FOR PUMPS.

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SAND-TRAP FOR PUMPS.

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To all whom it may concern:

Be it known that I, RUDOLPH CONRADER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Sand-Traps for Pumps, of which the following is a specification.

This invention relates to sand traps for pumps and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

The object of the invention is to provide means for preventing the accumulation of sand above the plunger in reciprocating pumps. A deposit of sand above the cups of the ordinary plunger cuts out or destroys the cups in a very short time. In pumping oil from wells a large part of the sand is carried with the oil and discharged. After the well is pumped off, there remains in the tubing a column of liquid equal to the depth of the well and the sand in the oil in this column settles on the top of the plunger with the result above described.

My invention is designed not only to prevent the settling of this sand on the plunger, but to a large extent to separate out and catch the sand as it is pumped.

The invention is illustrated in the accompanying drawings as follows:

Figure 1 is a central section through a pumping mechanism, the parts being those at the top of the well. Fig. 2, a similar section through an intermediate portion of the pumping mechanism, the parts being slightly above the working barrel. Fig. 3 is a similar section of the parts at the bottom of the pump.

It will be understood that in ordinary practice the parts will be very much longer relatively to the diameter of the pump than as shown in the drawings.

1 marks the strainer, arranged below the working barrel; 2 an auxiliary valve secured to the working barrel; 3 the standing valve arranged above the auxiliary valve; 4 an extension to the working barrel; 5 the working barrel; 6 the tubing; 7 the casing; 8 the casing head; 9 the cap for the casing head; 10 the collar by which the tubing is supported; 11 the fitting at the top of the tub-

ing containing the gland 12 and discharge connection 13.

The plunger 14 has an extension 15. A pin 16 is secured to the standing valve and extends into the extension 15, its purpose being to withdraw the standing valve with the plunger. The plunger has the passage 17 through it and the liquid pumped is carried through this passage. A crown 18 is secured to the upper end of the plunger and the valve 19 is arranged in this crown. A fitting 20 extends upwardly from this crown and a pipe 21 is screwed into this fitting. A cup shaped sand trap 22 is formed on the upper end of the fitting 20 and is preferably approximately the size of the working barrel, with its upper end open so that any sand settling from the liquid immediately above it is caught in the cup 22. The pipe 21 is screwed into a fitting 23. This fitting is internally screw threaded at the bottom for connection with the pipe 21 and has an exterior and interior screw thread at the top. It is also provided with a passage 24 through which the liquid passes.

The pipe 25 is screwed into the interior thread of the fitting 23 and extends upwardly therefrom. It has the cap 26 and lateral opening 27 near its top. The larger pipe 28 is screwed into the exterior thread of the fitting 23 and extends above the cap 26 and is secured to a fitting 29. The fitting 29 is externally threaded at the bottom for connection with the pipe 28 and has a passage through it and is internally and externally threaded at the top. The pipe 30 is screwed into the interior thread on the fitting 29 and extends upwardly from the fitting. It is closed at the top by the cap 31 and has the lateral opening 32 immediately beneath the cap. A pipe 33, larger than the pipe 30 is screwed onto the exterior thread of the fitting 29 and extends upwardly above the cap 31. A fitting 34 is screwed into the upper end of the pipe 33. The top of this fitting is externally and internally threaded and the sucker rod connection 35 is screwed into the interior thread. This connection has an opening through it forming a passage for the liquid passing from the trap formed by the pipes 33 and 30 and has lateral openings 36 which open into a trap

37. The trap 37 is cup shaped, open at the upper end and is preferably as large as can be used in the tubing. The lateral openings 36 are preferably near the bottom of the trap 37 and the upper end of the connection 35 is closed and is provided with the screw thread 38 by means of the ordinary sucker rod 39. The ordinary polished rod 40 is secured to the sucker rod and extends through the gland 12.

In operation the liquid is carried through the hollow plunger through the pipe 21 through the lower trap formed by the pipes 25 and 28 and through the second trap formed by the pipes 30 and 33 and then into the upper trap 37. This is discharged into the lower part of the trap 37 and moves upwardly and out of the trap as the liquid is forced upwardly. In a former application, Serial No. 346,430, Dec. 5, 1906, I have shown the general arrangement of the parts herein shown. In that construction, however, openings corresponding to the opening 36 are above the trap 37. The result is that the sand which settles from a column of liquid will in time fill the sand trap and but little of the sand so settling will pass into the lower traps, thus the capacity of the device is limited. In the present construction the liquid passing from the openings 36 is deflected by the bowl of the trap 37 so that all the liquid is moving in an upward direction as it leaves the bowl so that the sand in suspension is carried up with the oil and discharged after leaving the trap; whereas with these lateral openings arranged above the trap, the liquid passing in a lateral direction from the openings tends to precipitate the sand so that a smaller quantity of sand is carried out with the discharged liquid. In this construction also I have arranged the lower auxiliary trap 22 and also a pipe 21 which brings the trap somewhat above the working barrel. With the present construction more or less sand is caught by the trap during the pumping action, the lateral arrangement of the openings 27 and 32 particularly facilitating this. When, however, the well is pumped off, leaving the column of liquid above the trap, the sand settling from this liquid is nearly all caught in the trap 37. From it the sand settles and passes through the openings 36 down to the lower traps and if sufficient to fill the trap formed with the pipe 33 it will pass through the openings 32 into the lower trap. In this way the capacity may be very much increased. In practice, the greater amount of such particles as will be caught by traps similar in construction to the inclosed trap comprising the pipes 28 and 33, will be deposited in the lower trap. On the other hand, the sand settling from the column at the completion of the pumping will be deposited principally in the upper trap. The

diameter of the cup 37 being as nearly as practicable the size of the tubing, it is possible for very little sand to get by it so that the liquid below this cup and which operates on the plunger is very clear. The auxiliary cup 22 catches practically all of this as it settles so that the chances of sand getting in contact with the cups of the plunger is very slight.

It will be noted that the tubing has a larger interior diameter than the working barrel. This is desirable in order to permit the removal of the pump plunger. This is also desirable in the present construction, in that it permits a larger sand trap and consequently one better protecting the working surfaces of the pump barrel. By providing the pipe 21 which extends up out of the working barrel, it is possible to make the inclosed traps as well as the open traps larger.

What I claim as new is:

1. In a sand trap for pumps the combination with the pump plunger; of a sand trap arranged above the plunger having an open upper end and having a connection with the plunger through which the pumped fluid discharges into the trap.
2. In a sand trap for pumps the combination with the plunger and sucker rod; of a sand trap arranged above the plunger having an open upper end; and a connection between the sucker rod and plunger through which the pumped fluid passes and from which fluid is discharged into the trap.
3. In a sand trap for pumps the combination with the pump plunger, working barrel and tubing of a sand trap arranged above the plunger having an open upper end and having a connection with the plunger from which the pumped fluid discharges into the trap, said trap being of a diameter approximating the interior diameter of the tubing.
4. In a sand trap for pumps the combination with the plunger and working barrel, tubing and sucker rod of a sand trap arranged above the plunger having an open upper end and being of a diameter approximating the interior diameter of the tubing; and a connection between the sucker rod and plunger through which the pumped fluid passes and from which the fluid is discharged into the trap.
5. In a sand trap for pumps the combination with a hollow plunger of a sand trap arranged above the plunger having an open upper end; a connection between said plunger and said open trap arranged to discharge into said open trap and comprising an inclosed trap through which the liquid passes.
6. In a sand trap for pumps the combination with a hollow plunger of a sand trap arranged above the plunger having an open upper end; a connection between said plunger and said open trap arranged to discharge

into said open trap and comprising an inclosed trap formed of an outer inclosing pipe; and an upwardly extending pipe within the outer pipe, being of such relative size as to leave a space between the walls thereof.

7. In a sand trap for pumps the combination with a hollow plunger of a sand trap arranged above the plunger having an open upper end; a connection between said plunger and said open trap arranged to discharge into said open trap and comprising an inclosed trap formed of an outer inclosing pipe and an upwardly extending pipe within the outer pipe, being of such relative size as to leave a space between the walls thereof and having a closed top with lateral openings near the top.

8. In a sand trap for pumps the combination with the pump plunger of a sand trap arranged above the plunger having an open upper end and having a connection with the plunger from which the pumped fluid discharges into the trap; and an auxiliary trap arranged immediately above the plunger and having its upper end open.

9. In a sand trap for pumps the combination with a hollow plunger; a sand trap arranged above the plunger having an open upper end; a connection between the plunger and the sand trap arranged to discharge into said sand trap; an inclosed sand trap having its discharge in a confined passage of less diameter than the body of the trap between the plunger and the open sand trap; and an auxiliary open trap having its upper end open arranged between the inclosed trap and the plunger.

10. In a sand trap for pumps the combination of the combined crown and fitting; an open trap formed of parts 18, 20 and 22 respectively; the pipe 21 extending upwardly from said crown; the inclosed trap formed with the pipes 25 and 28; a second inclosed trap formed of the pipes 30 and 33 above the same; a trap 37 open at the top and connected with the inclosed trap; and a connection between the inclosed trap and the trap 37 arranged to discharge into the trap 37.

11. In a sand trap for pumps the combination with the open trap bowl and a connection 35 extending upwardly from the bottom of the same and having a passage with lateral openings 36 leading into the bowl 37.

12. In a sand trap for pumps the combination with a fitting having an external and internal thread; a sand trap bowl 37 arranged on the exterior thread; the fitting 35 screwed into the interior thread having a passage with lateral openings leading into the bowl 37 and having a sucker rod connection 38 at the top thereof.

13. In a sand trap for pumps, the combination of a pump plunger, of a sand trap arranged above the plunger, having a con-

nection with the plunger through which the pumped fluid discharges into the trap and a sucker rod connection above the sand trap, connected with the sand trap below the top edge of the sand trap, forming a continuous opening into the said trap along the top edge.

14. In a sand trap for pumps, the combination of a pump plunger, a working barrel, a tubing above the barrel of a greater interior diameter than the interior diameter of the barrel, and a sand trap arranged above the barrel, having an open upper end and having a connection with the plunger from which the pumped fluid discharges into the trap, said trap being of a diameter approximating the interior diameter of the tubing.

15. In a sand trap for pumps, the combination of a pump plunger, a working barrel, a sand trap arranged above the plunger having an open upper end, the connection between said plunger and said open trap being arranged to discharge into said open trap and comprising an inclosed trap through which the liquid passes, said inclosed trap being of less diameter than the diameter of the top of the open trap and having its discharge in a confined passage of less diameter than the body of the trap.

16. In a sand trap for pumps, the combination of a working barrel, a pump plunger arranged in the working barrel, a pipe 21 connected with the plunger through which the pumped liquid passes, said pipe extending above the working barrel, a sand trap comprising an inclosed trap connected with the pipe 21 and an open top trap having its discharge in a confined passage of less diameter than the body of the trap connected with the inclosed trap, the connection between the inclosed trap and the open trap, being arranged to discharge into the open trap.

17. In a sand trap for pumps, the combination of a working barrel, a tubing in continuation of the working barrel but of greater interior diameter than the working barrel, a plunger in the working barrel, a pipe 21 extending upwardly from the plunger above the working barrel and an open top trap connected with the pipe 21 and approximating the diameter of the tubing.

18. In a sand trap for pumps, the combination of a working barrel, a tubing in continuation of the working barrel, but of greater interior diameter than the working barrel, a plunger in the working barrel, a pipe 21 extending upwardly from the plunger above the working barrel, and an inclosed sand trap having its discharge in a confined passage of less diameter than the body of the trap arranged above the working barrel and connected with pipe 21, an open top trap connected with the inclosed

trap and approximating the diameter of the tubing.

19. In a sand trap for pumps, the combination of a working barrel; a tubing in
5 continuation of the barrel, a plunger in the working barrel; an open top trap above the plunger; a connection between the plunger and the trap independent of the tubing and forming the passage for the pumped fluid,
10 said connection discharging into the trap near its bottom; and an elongated receptacle

below and connected with the sand trap of less diameter than the trap, and into which material can settle from the trap.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

RUDOLPH CONRADER.

Witnesses:

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BESSIE F. PARKER.