D. BEEDY.

DEEP WELL PUMP.

APPLICATION FILED JULY 2, 1917.

1,271,995. Patented July 9, 1918.

Fig. 1.

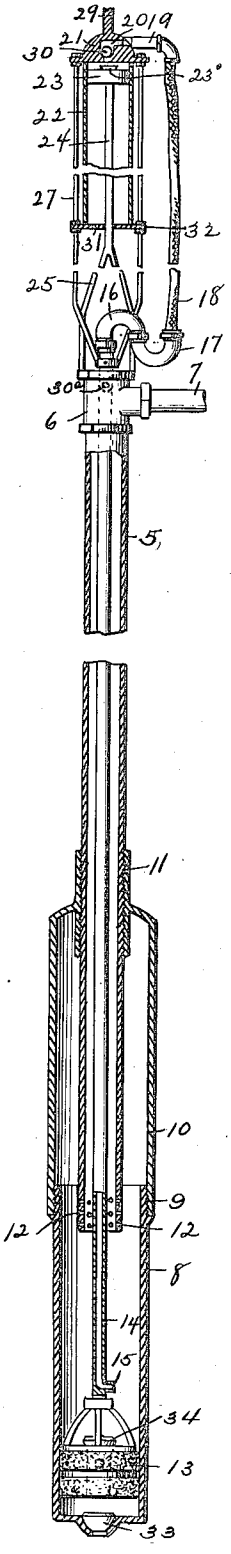


Fig. 2.

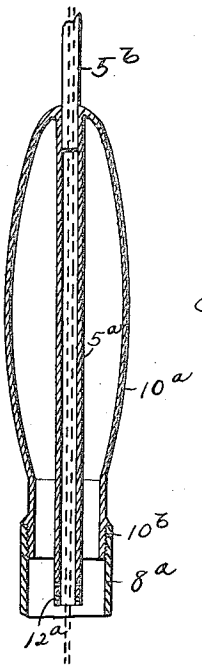
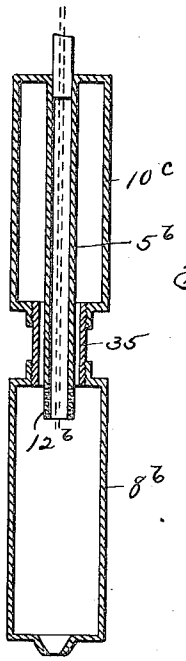


Fig. 3.



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DEEP-WELL PUMP.

1,271,995. Specification of Letters Patent. Patented July 9, 1918.

Application filed July 2, 1917. Serial No. 178,228.

To all whom it may concern:

Be it known that I, DANIEL BEEDY, a citizen of the United States of America, residing at Colby, in the county of Thomas and State of Kansas, have invented certain new and useful Improvements in Deep-Well Pumps, of which the following is a specification.

This invention relates to deep well pumps and it has for its object the provision of an improved correlation of parts arranged in such manner that a supply of air is continuously forced into an air reservoir disposed in operative relation to the pumping cylinder of the pump with the object of relieving the shock and jar which would otherwise be caused by the action of the plunger of the pump in lifting a column of water of considerable height, unaided; utilizing the surplus air to aerate the column of water; utilizing the air pressure in the reservoir to maintain a continuous flow of water during the down stroke of the pump plunger and eliminating entirely, stuffing boxes, in those cases where it is merely desired to elevate the water to the surface of the ground and is not desired to force the water to any considerable height.

Further objects and advantages of the invention will be set forth in the detailed description which now follows:

In the accompanying drawing,

Figure 1 is a view partly in side elevation and partly in vertical section of a pump constructed in accordance with the invention, and

Figs. 2 and 3 are sectional views of modified forms of air reservoirs which may be employed in conjunction with said pump.

Like numerals designate corresponding parts in all of the figures of the drawing.

Referring to the drawing and particularly to Fig. 1 it will be seen that my improved pump comprises a casing 5 which at its upper end is provided with a T 6. The discharge pipe 7 for the water connects with this T. The pump cylinder is indicated at 8 and has an air and water tight joint at 9 with an air reservoir 10, the latter being threaded or otherwise suitably secured at 11 upon the casing 5. The casing 5 extends downwardly through the reservoir and its lower end is disposed below the lower end of the reservoir. Openings 12 are formed in the lower end of casing 5. A plunger 13 of usual and well-known construction reciprocates in the pump cylinder 8 and is carried by a hollow pump rod 14, said pump rod having a lateral outlet 15. The upper end of the pump rod is connected by goose necks 16 and 17 with a tube 18. The upper end of this tube is connected by suitable connections 19 with a channel 20 formed in the head 21 of an air pump. The cylinder of this air pump is indicated at 22 and its plunger is indicated at 23. The plunger is carried by a plunger rod 24 that is held in a fixed position by arms 25 that are connected to the upper portion of the T 6. The air pump cylinder is supported by rods 27 that are connected at 28 with the end of the hollow pump rod 14. 29 designates a power connection. That is, this may be an extension adapted for connection to a windmill or other source of power as is usual in pumps.

In the operation of the device the pump cylinder 22 of the air pump moves bodily up and down and since the plunger 23 thereof is held in fixed position it follows that air will be forced past check valves 30 30^a through tube 18 and hollow pump rod 14 and discharged through the outlet 15 into the interior of the cylinder 8. This air rises and collects in the top of the reservoir 10 and as the pump continues its operation a sufficient amount of air collects in this reservoir to supply enough pressure to the water to continue the flow of the water during the down stroke of the plunger 13. During the up stroke of the plunger 13 the action is of course that of an ordinary lift pump assisted by the pressure of air in the reservoir 10. The upward flow of water is further aided by the fact that after a certain amount of air has collected in the reservoir 10 surplus air will find its way through the small openings 12 and will rise in the form of small bubbles through the pipe 5 thoroughly aerating the column of

water in the pipe 5 and causing this column of water to tend to flow upwardly. This relieves the plunger 13 of considerable work and renders the pump as a whole easy of operation.

To permit the entrance of the necessary air to the interior of the air pump cylinder 22 an opening 31 is formed in the bottom plate 32 of the air pump cylinder and the air passes through the plunger 23, to which end said plunger is provided with a valve 23′ of a usual and well known type. The presence of the air in the reservoir 10 not only makes the flow of water a continuous one and the presence of the bubbles in the casing 5 not only relieves the work upon the plunger 13 but the presence of air in both of these cases tends to relieve the shock and jar that would otherwise be present and which arises from the necessity of the plunger 13 setting a heavy column of water in motion at each up stroke of the plunger 13.

It will of course be understood that the operation of the plunger 13 is the same as the operation of usual plungers employed in lift pumps. In other words, upon the up stroke of the plunger 13 water enters through the foot valve 33 and fills the space within the cylinder 8 beneath the plunger 13. When the plunger 13 starts upon its down stroke the foot valve 33 closes and the water must then pass upwardly through plunger 13 and past the check valve 34 carried by said plunger.

Figs. 2 and 3 illustrate, as before stated, modified forms of air reservoirs. In Fig. 2 the air reservoir 10^a is of oval form and has threaded engagement at 10^b with a cylinder corresponding to cylinder 8 and marked 8^a. In this case an internal pipe 5^a is provided with openings 12^a corresponding to the openings 12 and a separate pipe 5^b serves to conduct the water upwardly. While I have shown the air reservoir and cylinder as comprising two separate pieces it is apparent that this is not essential because these parts may be made in one piece. It is true that in such case the air reservoir would be substantially merely the upper end of the pump cylinder but since, in order to secure the full advantages of the invention it is only necessary to provide a reservoir of suitable capacity into which the water conducting pipe projects, it makes no difference whether the structure comprises two parts screwed together one of which is called a reservoir and the other a cylinder or whether a cylinder is provided, of such size as to constitute within itself an air reservoir, into which the air is forced through a hollow pump rod.

In the form illustrated in Fig. 3 the air chamber is indicated at 10^c and the cylinder at 8^b. The air chamber and the cylinder are connected by an interposed nipple 35 and the air chamber 10^c is provided with a pipe 5^g having openings 12^b.

It is to be noted that each form of the device employs openings corresponding to the openings 12. A marked advantage arising from the employment of these openings to permit the escape of surplus air from the reservoir 10 is that the air is caused to pass into the water in a large number of small bubbles instead of passing around the lower ends of pipe 5 and entering the column of water in a smaller number of larger bubbles. The result is that the column of water is thoroughly aerated.

While the elements shown and described are well adapted to serve the purposes for which they are intended it is to be understood that the invention is not limited to the precise construction set forth but that it includes within its purview whatever changes fairly come within the spirit of the appended claims.

Having described my invention what I claim is:—

1. In a lift pump, the combination with an air reservoir adapted to have direct communication with a pump cylinder, said air reservoir having a closed top, of a water supply pipe extending into and through the air reservoir through the closed top and of such smaller diameter than the air reservoir as to leave a material air receiving space therebetween and a plurality of lateral openings formed through the lower end of the water supply pipe.

2. In a deep well pump, the combination with a water conducting pipe, of a receptacle constituting an air reservoir supported thereon having a closed top and into which said pipe depends through said closed top, a pump cylinder in communication with the air reservoir, a plunger in the pump cylinder, a hollow pump rod passing through the water conducting pipe, an air pump and connections between said air pump and the hollow pump rod having an outlet for the air at such point that the air discharged therethrough will find its way to the space between the water conducting pipe and the receptacle constituting the air reservoir, said water conducting pipe being provided with a plurality of lateral openings at a point below the top of the air reservoir.

3. A device of the character described, comprising a water conducting pipe, a hollow pump rod passing through the water conducting pipe, a plunger carried by the pump rod, a cylinder in which the plunger moves, a receptacle constituting an air reservoir disposed above the lower end of the water conducting pipe of materially greater diameter than the water conducting pipe and surrounding the same and having communication with the cylinder, an air pump

connected to the hollow pump rod for movement in unison therewith and a connection between the air pump and the hollow pump rod, said hollow pump rod having a lateral discharge nozzle which projects outwardly beyond the line of the water conducting pipe.

4. A structure as recited in claim 3 wherein the water conducting pipe is provided with a plurality of lateral openings at a point materially below the upper end of the air reservoir.

In testimony whereof I affix my signature.

DANIEL BEEDY.