B. ANDREWS.

DEEP WELL PUMP.

APPLICATION FILED MAY 10, 1918.

1,313,245. Patented Aug. 19, 1919.

Fig. 1

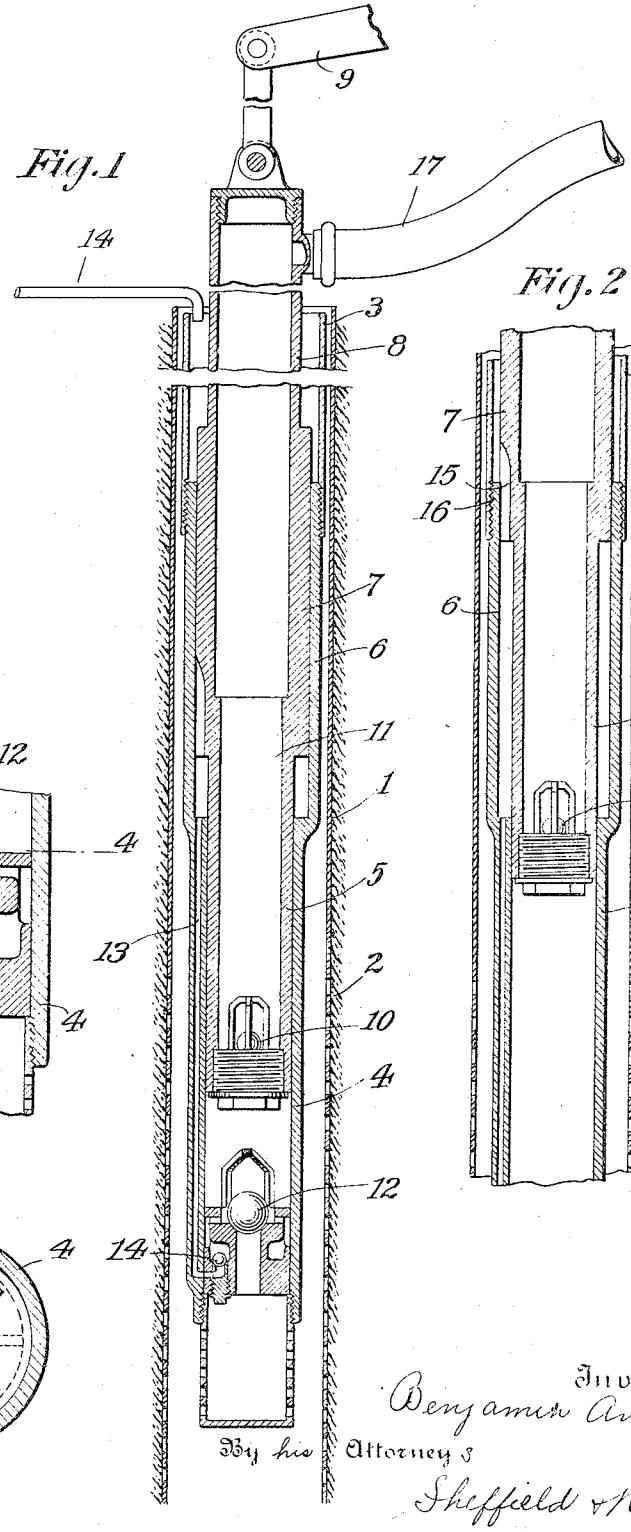


Fig. 2

Fig. 3

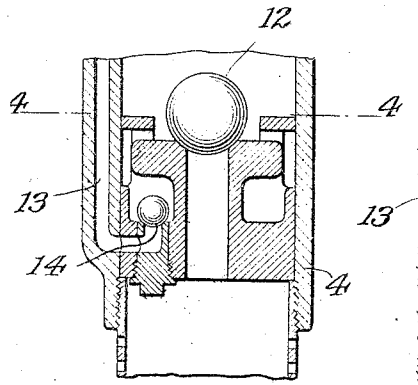
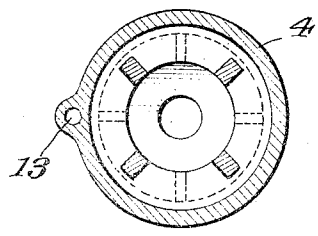


Fig. 4



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DEEP-WELL PUMP.

1,313,245. Specification of Letters Patent. Patented Aug. 19, 1919.

Application filed May 10, 1918. Serial No. 233,625.

To all whom it may concern:

Be it known that I, BENJAMIN ANDREWS, a citizen of the United States, and residing at Houston, in the county of Harris and State of Texas, have invented new and useful Improvements in Deep-Well Pumps, of which the following is a specification.

My invention relates to deep well pumps, particularly to such pumps employed for pumping oil, and is an improvement on the pump described in my prior Patent No. 1,013,579, granted January 2, 1912.

As stated in my prior patent, pumps as commonly used for pumping oil from deep wells give trouble and are inefficient owing to the accumulation of sand in the working barrel. This sand flows into the pump with the oil and tends to accumulate in the working barrel, particularly around the valves, thereby materially reducing the efficiency of the pump and the production of oil. The object of my invention, as in my prior patent, is to provide means for removing and preventing the accumulation of such sand. More particularly the object of the present invention is to provide an improved arrangement whereby the accumulation of sand in the main working barrel and around the lower valve forming a part of such barrel, will be prevented; also to provide an arrangement which will be simple in construction, durable and efficient. A further object of my invention is to provide an arrangement in which the cleaning fluid employed for flushing out the sand will also operate to prevent sand getting in between the piston and the working barrel. A still further object is to provide an arrangement which will obviate the use of pumps or other pressure means at the surface of the ground for flowing the cleaning or flushing fluid into the well.

In the drawing accompanying and forming a part of this specification I have illustrated the preferred embodiment of my invention. Referring to this drawing:

Figure 1 shows a vertical section of a well with my improved apparatus installed therein, the pistons being shown near their lower position;

Fig. 2 is a detail view showing the pistons in raised position;

Fig. 3 is an enlarged section view of the valve mechanism forming a part of the main working barrel;

Fig. 4 is a transverse section view taken on the line 4—4 of Fig. 3.

Referring in detail to the drawing, the numeral 1 designates the well in which the pump is to be used. This well may be provided with a casing 2 perforated as shown through the oil bearing rock, or the well may be uncased depending on the character of the formation. In the well a tubing 3, extending from the surface of the ground down near the bottom of the well, is provided and the pumping apparatus proper is secured to the lower end of this tubing. The pumping apparatus proper comprises a main pump consisting of a working barrel 4 and piston 5 and also of an auxiliary pump consisting of a working barrel 6 and piston 7. The working barrels 4 and 6 are preferably formed, as shown, of one piece and secured to the lower end of the tubing 3. Likewise the pistons 5 and 7 are preferably formed of one piece and are secured at their upper end to the hollow or tubular sucker rod 8. This tubular sucker rod is connected to and reciprocated by the walking beam or lever 9. The piston 5 is provided at its lower end with a valve 10 which may be of any approved construction. This valve opens upwardly and communicates through the passage 11 with the interior of the tubular sucker rod 8. The working barrel of the main pump is provided at its lower end with a valve 12 which is shown as a ball check valve, but which may be of any approved construction. A port or passage 13 extends from the working barrel of the upper or auxiliary pump down through check valve 14 into the main working barrel. The cleaning liquid, which may be oil or water, employed for washing out the sand, is supplied into the tubing 3 at the surface of the well in any suitable way as by means of a pipe 14. By reason of the construction of the apparatus there is no necessity that this liquid be flowed in under pressure.

The operation of the pump is as follows: The cleaning fluid, oil or water preferably, is flowed into the tubing through the pipe 14. When the sucker rod 8 is raised by the lever 9, the oil to be pumped, together with more or less sand, is drawn or flows into the working barrel 4. When the pistons approach the upper limit of their stroke, a recess or port 15, formed in the surface of

the piston 7, overruns the upper edge 16 of the working barrel 6 thereby permitting this working barrel to fill with the cleaning fluid. On the down stroke of the pistons the oil in the working barrel 4 is forced up through the valve 10 through the hollow sucker rod 8, and out through the discharge conduit 17. Also during the down stroke the cleaning fluid is forced by the piston 7 down through the port 13, up through the valve 14, being discharged into the working barrel 4 at and around the valve 12, thereby scouring and cleaning this valve of any accumulation of sand. This fluid also passes out through the valve 10 and tends also to keep this valve clean. It follows from the operation described that the fluid in the working barrel 6 is under a greater pressure than the oil in the working barrel 4, and the result of this is that this cleaning fluid tends to force its way down between the piston 5 and the working barrel 4, so as to keep the working surfaces of these two parts clean and free of said, and results in greatly prolonging the life of the apparatus.

While I have described my improved apparatus as particularly adapted and intended for pumping oil, it is obvious that it may also be used with advantage in water wells and in salt wells, and generally for deep well pumping, where there is a tendency for sand to flow into the wells.

Also, while I have described only one embodiment of my invention, I am aware that modifications may be made without departing from the scope of my claims.

What I claim is:

1. The method of preventing the accumulation of sand in the working barrel of a deep well pump, comprising delivering a scouring flow of fluid into the working barrel at a point in the immediate vicinity of the inlet valve within the period when the inlet valve is seated.

2. A deep well pump comprising a working barrel, an intake valve for said working barrel, and means for delivering a fluid from the surface of the ground into said working barrel adjacent said valve, while said valve is seated.

3. A deep well pump comprising a working barrel, an intake valve therefor, a second working barrel above the first, pistons in said working barrels connected to and operated by a common sucker rod, means for delivering a liquid into the upper working barrel and for forcing it on the down stroke of the sucker rod into the lower working barrel when said lower barrel is under the full static head.

4. A deep well pump comprising a working barrel, an intake valve therefor, a second working barrel above the first, pistons in said working barrels connected to and operated by a common sucker rod, means for delivering a liquid into the upper working barrel and for forcing it on the down stroke of the sucker rod into the lower working barrel at a point adjacent to the intake valve of the lower working barrel.

5. Pumping apparatus of the kind described comprising two working barrels, pistons disposed in said barrels and connected to each other and to a hollow sucker rod, means including suitable valves and ports whereby under reciprocation of said pistons one piston operates to force fluid from the well to the surface of the ground and the other operates to deliver a cleaning fluid into the working barrel of the first mentioned piston when the barrel of the first mentioned piston is under the full static head.

6. Pumping apparatus of the kind described comprising two working barrels of different diameters superimposed one on the other, an elongated hollow member having an enlarged upper portion adapted to function as a piston in the upper working barrel, and a reduced lower portion adapted to function as a piston in the lower working barrel, intake and outlet valves for said working barrels, means for supplying a fluid to the upper working barrel and for delivering it therefrom into the lower working barrel, for the purpose described.

7. In an apparatus of the kind described, a pump disposed in the well and adapted to force liquid to the surface of the ground, said pump having an intake valve, an auxiliary pump also disposed in the well, common operating means for both pumps, means for supplying a liquid from the surface of the ground to the auxiliary pump, and means for conveying liquid from the auxiliary pump to a point adjacent the intake valve of the main pump.

8. A deep well pump comprising a main working barrel, an intake valve therefor, an auxiliary barrel, pistons in said barrels connected together, and means for delivering a liquid into said auxiliary barrel and for forcing it on the down stroke of the piston in said main barrel into the main working barrel adjacent said intake valve.

9. In an apparatus of the kind described, a pump disposed in the well and adapted to force liquid to the surface of the ground, an auxiliary pump also disposed in the well, said auxiliary pump being adapted to create a higher pressure than the static head on said main pump, common operating means for both pumps, means for supplying a liquid from the surface of the ground to the auxiliary pump, and means for conveying liquid from the auxiliary pump to the main pump at a point near the bottom of the working barrel of said main pump.

10. In an apparatus of the kind described, a pump disposed in the well and adapted to

force liquid to the surface of the ground, said pump having an intake valve, an auxiliary pump also disposed in the well, common operating means for both pumps, means for supplying a liquid from the surface of the ground to the auxiliary pump, and means for conveying liquid from the auxiliary pump to a point adjacent the intake valve of the main pump while said intake valve is seated.

11. A deep well pump comprising a working barrel, an intake valve for said working barrel, and means for causing a cleaning flow of liquid over the seat of said intake valve while the intake valve is seated.

12. A deep well pump comprising a working barrel, an intake valve for said barrel having a seat fixed with respect to the barrel, and means for causing a flow of cleaning liquid over the seat of said intake valve while the intake valve is seated.

BENJAMIN ANDREWS.