

No. 735,557.

PATENTED AUG. 4, 1903.

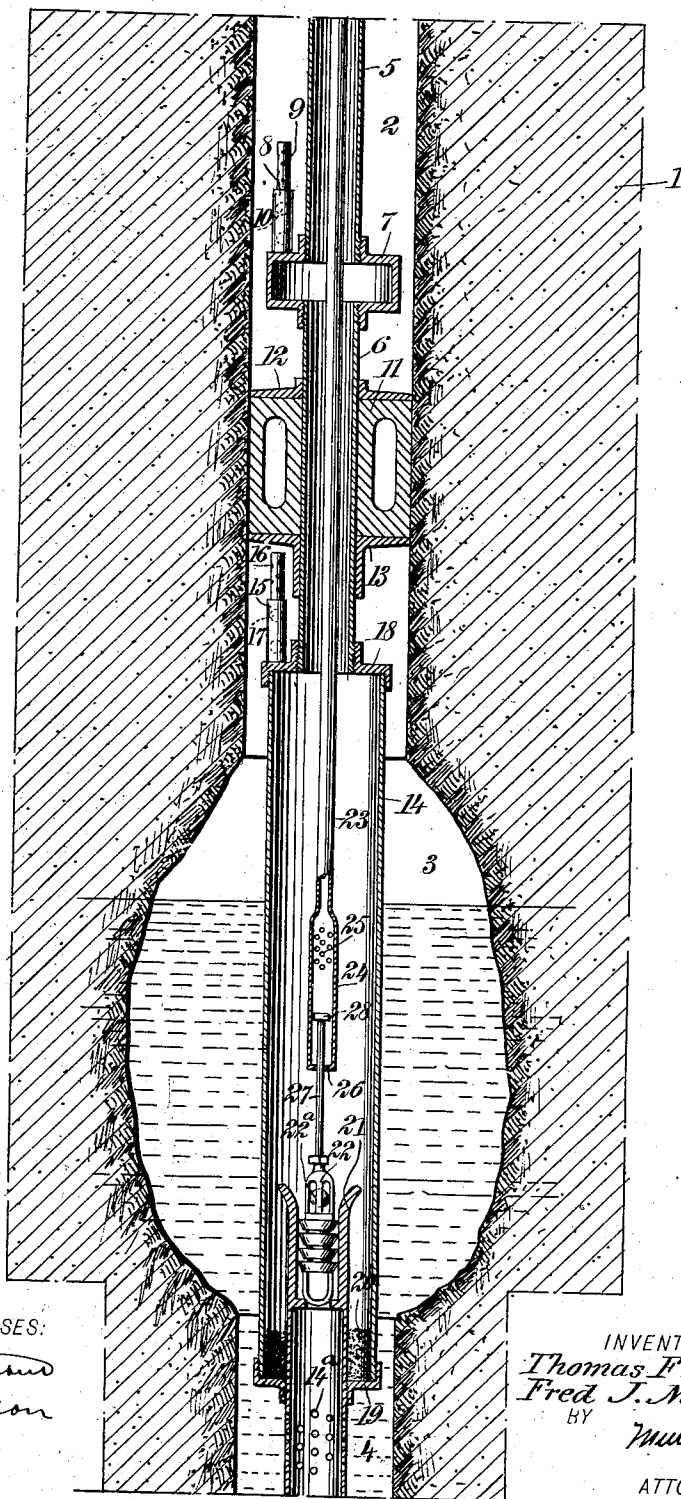
T. F. MORAN & F. J. MOSER.
APPARATUS FOR RAISING LIQUIDS FROM WELLS.

APPLICATION FILED MAR. 6, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

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W. Harrison

INVENTORS

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2 SHEETS—SHEET 2.

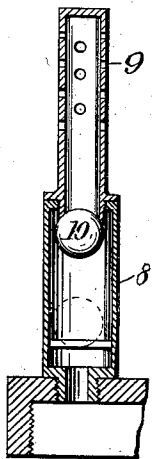
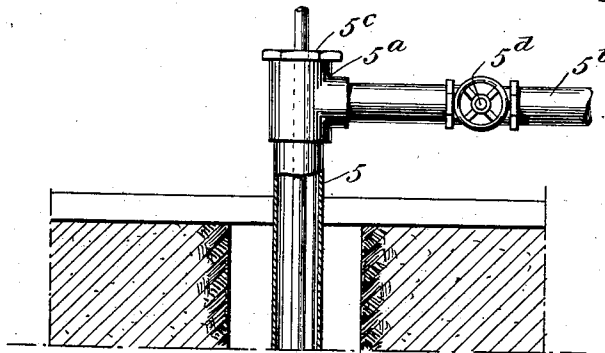


Fig. 3

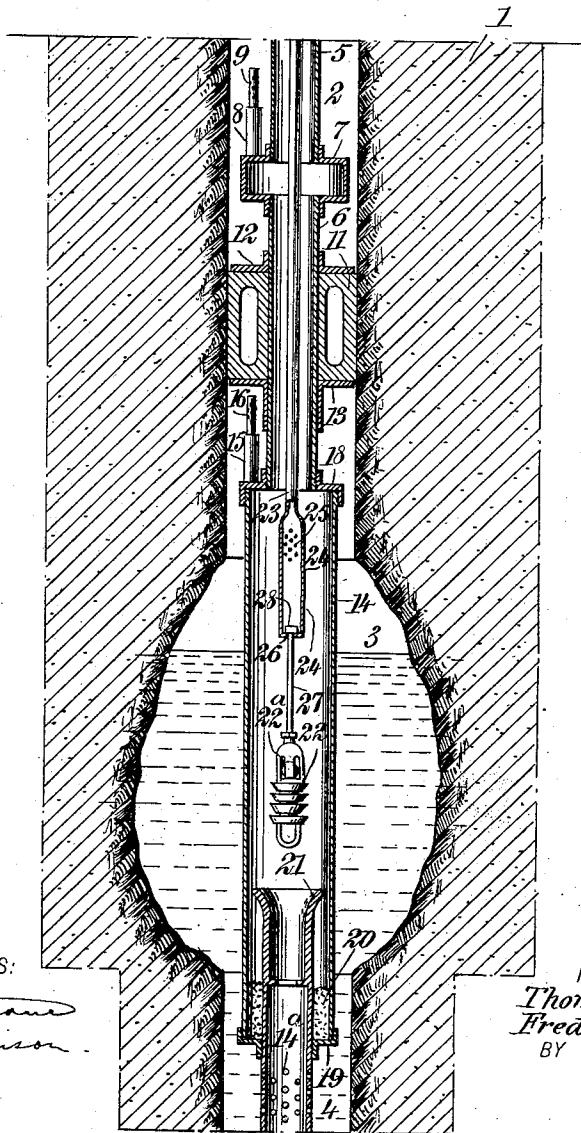


Fig. 2

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UNITED STATES PATENT OFFICE.

THOMAS FRANCIS MORAN, OF DE YOUNG, AND FRED J. MOSER, OF KANE,
PENNSYLVANIA.

APPARATUS FOR RAISING LIQUIDS FROM WELLS.

SPECIFICATION forming part of Letters Patent No. 735,557, dated August 4, 1903.

Application filed March 6, 1903. Serial No. 146,494. (No model.)

To all whom it may concern:

Be it known that we, THOMAS FRANCIS MORAN, a resident of De Young, in the county of Elk, and FRED JOSEPH MOSER, a resident of Kane, in the county of McKean, State of Pennsylvania, citizens of the United States, have invented a new and Improved Apparatus for Raising Liquids from Wells, of which the following is a full, clear, and exact description.

Our invention relates to apparatus for raising liquids from wells, and more particularly to apparatus of the kind used in the oil regions for raising liquids, such as oil and water, from oil-wells.

Our invention further relates to mechanism for cleaning the sand and other impurities from the well, and also to render the main valve, used in the bottom of the well, more readily accessible.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical section through the lower part of a well equipped with our invention. Fig. 2 is a fragmentary section showing the main valve raised from its seat, and Fig. 3 is a fragmentary section showing the inlet-valve casing and the parts related thereto.

The earth is shown at 1, the drill-hole at 2, the shot-hole at 3, and the cylindrical basin at 4, these parts having the usual form. Tubes or pipes 5 6 are connected with a drum 7, and upon this drum is a small valve-casing 8, provided with perforations 9 and with a valvular member 10, which is free to play vertically so as to close the valve upon its ascent and to open the same upon its descent. Mounted upon the upper end of the pipe 5 is a T 5^a, to which is connected a branch pipe 5^b, provided with a removable head 5^c and also with a manually-operated valve 5^d. The branch pipe 5^b also serves as a discharge for the liquid. A packer is shown at 11 and is preferably confined between packer-plates 22 13. A casing is shown at 14, and mounted upon this casing is a small valve-casing 15, provided with perforations 16 and containing a spherical valvular member 17, these three parts constituting a gas-inlet valve

opening into the casing 14. When the spherical member 17 descends, the valve is opened and when it ascends the valve is closed. The casing 14 is provided with heads 18 19, the lower end of the casing constituting a sand-trap, which may contain a large quantity of loose sand 20. A substantially funnel-shaped valve-seat 21 is mounted within the lower end of the casing 14 and projects upwardly, as shown in Figs. 1 and 2. Detachably resting upon the valve-seat is a valve 22, provided with the usual ball 22^a. The air-pipe is shown at 23 and is provided with a cylindrical end 24 and with perforations 25, together with a cylindrical opening 26. The valve-stem 27 projects upwardly from the valve 22 and is provided with a head 28, which is inclosed within the cylindrical end 24 of the air-pipe. The air-pipe may be raised or lowered slightly with reference to the valve-stem 27; but when raised beyond a certain limit the valve is lifted by means of the head 28, as indicated more particularly in Fig. 2. This arrangement allows the air-pipe 23 to be used as a jar for detaching the main valve should the same stick upon its seat, and also compensates for expansion and contraction due to heat and cold. The tubing 5 may be closed at the top in any suitable manner already known in the art.

Our invention is used as follows: The parts are disposed as above described and natural gas entering the well along with the oil may be utilized in a direct stream and practically without any interruption. The gas enters through the walls of the shot-hole 3 and the lower portion of the drill-hole below the packer and then finds its way through the perforations 16 and around the valvular member 17 into the casing 14. It thence enters the tubing proper and is carried up in a continuous flow to the surface, where it may be used in any appropriate manner and for any desired purpose. If any water should flow into the drill-hole 2 above the packer and rise to the level of the lowest of the perforations 9, it will of course flow into the drum 7 and thence downward into the casing 14, where it will gradually accumulate without going into the shot-hole 3 and without admixing with the oil in the well except as oil chances to be in the cas-

ing 14. If now air-pressure be suddenly applied to the air-pipe 23, the liquid column filling the casing 14 will be broken by the escape of the air from the perforations 25 and all the liquid above this point will be forced out through this tubing to the surface of the earth. Should there be no water or oil in the drill-hole 2 above the packer, the valve consisting of the parts 8 9 10 above the packer will simply be idle. If, however, any oil should naturally rise above the height of this valve at any time, it will accumulate in the drill-hole 2 above the packer and may be removed by successively applying air-pressure to the air-pipe 23 and relaxing the pressure. Normally, however, the space in the drill-hole above the packer is idle except for the removal of water which may seep thereinto.

To remove the oil from the well as the same accumulates from time to time, air-pressure is suddenly applied through the air-pipe 23, and the air escaping through the perforations 25 breaks the cylindrical column of oil and forces the upper portion thereof to the surface through the tubing around the air-pipe 23. When the air is applied by means of this apparatus, the oil is forced upward in a slight stream free from bubbles. If one application of the air-pressure is not sufficient to remove all of the oil which can readily be removed, one or more other applications of the air-pressure may be made.

If for any cause it is desirable to remove the main valve 22, the air-pipe 23 is merely raised to the surface and of course lifting the valve. To replace the valve after it is repaired it is lifted back in place by reverse movement—to wit, the air-pipe is simply lowered into the position indicated in Fig. 1, so that the valve 22 rests upon its seat.

Sand is removed from the well as follows: The air-pipe 23 is raised into the position indicated in Fig. 3, the tubing is closed in any desired manner—say by the valve 5^d at the surface—to prevent escape of air through the pipe 5, and the air-pressure is applied to the air-pipe 23. This forces the oil or other liquid violently from the casing 14 through the perforations 14^a into the bottom of the shot-hole 3 and basin 4, the action being so violent as to stir up any sand 20 which may lodge in the sand-trap or against the perforations 14^a in the lower tubular portion of the valve-seat 21. The liquid within the shot-hole 3 is of course in violent agitation for a few minutes, and during this time the air-pressure is released, the pipe 23 is lowered, and the main valve 22 is dropped upon its seat. The release of the air-pressure causes the liquid within the shot-hole to rush violently through the perforations 14^a into the casing 14, carrying with it vast quantities of loose sand. The air-pressure is now again applied before the sand has time to settle within the casing 14, the result being that the liquid within the casing 14 is suddenly lifted to the surface, and as the liquid carries with it the sand in

suspension the sand is thereby removed from the well. The process may be repeated two, three, or more times until practically all the loose sand in the well is removed.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, an inlet-valve connected with said system of tubing and disposed above said packer, a gas-inlet connected with said tubing and disposed immediately below said packer for normally permitting gas to enter said tubing, and means for applying pressure to a liquid contained within said tubing for the purpose of closing said valves and thereby raising said liquid.

2. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, an inlet-valve connected with said system of tubing and disposed above said packer, a gas-inlet valve connected with said tubing and disposed immediately below said packer for normally permitting gas to enter said tubing, and means for raising said liquid within said tubing.

3. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, a gas-inlet valve connected with said tubing and disposed immediately below said packer for normally permitting gas to enter into said tubing, and means for forcing air into said tubing for the purpose of raising said liquids therein.

4. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, an inlet-valve connected with said tubing and disposed below said packer, for the purpose of normally permitting gas to flow into said tubing, means for admitting liquids into said tubing, and mechanism for applying pressure to said liquids within said tubing.

5. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, an inlet-valve connected with said tubing and disposed below said packer, for the purpose of normally permitting gas to flow into said tubing, means connected with said tubing for permitting the ingress of liquids, and mechanism for raising said liquids within said tubing.

6. An apparatus for raising liquids from wells, comprising a system of tubing provided with a packer, an inlet-valve connected with said tubing and disposed below said packer, for permitting the ingress of gas into said tubing, valvular mechanism connected with said tubing, for permitting the ingress of liquids thereto, and an air-pipe for intermittently forcing said liquids to the surface.

7. An apparatus for raising liquids from wells, comprising a system of tubing provided with a casing and with a valve-seat, said casing being provided with a sand-trap disposed adjacent to said valve-seat, a valve loosely

mounted upon said valve-seat and normally free to close the same, means controllable at will for raising said valve from said seat, and means for forcing air into said tubing while said valve is thus raised for the purpose of expelling sand suspended in water from said casing.

8. An apparatus for raising liquids from wells, comprising a system of tubing provided with a casing and with a valve-seat, and also provided with a sand-trap disposed adjacent to said valve-seat, a valve mounted upon said seat and detachable therefrom, a member connected with said valve and extending upwardly therefrom for the purpose of raising said valve from said seat, and an air-pipe for expelling liquids and sand from said casing while said valve is raised.

9. An apparatus for raising liquids from wells, comprising a system of tubing provided with a valve-seat, and also provided with a sand-trap disposed adjacent to said valve-seat, a valve mounted upon said seat and detachable therefrom, and an air-pipe for forcing air into said system of tubing, said air-pipe being connected with said valve and free to raise the same when lifted bodily upward.

10. An apparatus for raising liquids from wells, comprising a system of tubing provided with a casing and with a valve-seat, and also provided with a sand-trap disposed adjacent to said valve-seat, a valve mounted upon said seat and detachable therefrom, and an air-pipe disposed within said system of tubing for forcing air thereinto, said air-pipe being loosely connected with said valve and free to move slightly in relation thereto for the purpose of jarring said valve when necessary to loosen the same, thereby being free to raise said valve when lifted bodily upward a sufficient distance.

11. An apparatus for raising liquids from wells, comprising a system of tubing provided with a casing, a substantially funnel-shaped valve-seat mounted within the bottom of said casing and projecting upwardly therefrom, so

as to form a sand-trap around said valve-seat, a valve normally free to rest upon said valve-seat, and an air-pipe within said casing and connected with said valve for raising the same from said seat.

12. An apparatus for raising liquids from wells, comprising a system of tubing provided with a casing, a substantially funnel-shaped valve-seat mounted within the bottom of said casing, and projecting upwardly from said bottom so as to form a sand-trap around said valve-seat, a valve normally free to rest upon said valve-seat, and an air-pipe disposed within said casing and loosely connected with said valve.

13. In an apparatus for raising liquids from wells, the combination of a casing provided with a valve-seat and with a portion serving as a sand-trap, a valve for said seat, and an air-pipe connected with said valve for the purpose of raising the same from said seat.

14. In an apparatus for raising liquids from wells, the combination of a casing provided with a valve-seat and with a portion serving as a sand-trap, a valve mounted upon said seat and normally free to engage the same, and an air-pipe loosely connected with said valve for the purpose of raising the same from said seat, said air-pipe being free to move while said valve rests stationary upon said valve-seat.

15. In an apparatus for raising liquids from wells, the combination of a system of tubing provided with a valve-seat, a valve loosely engaging said seat, and an air-pipe connected with said valve and movable relatively thereto for the purpose of enabling the adjustment of said air-pipe without disturbing said valve.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS FRANCIS MORAN.

FRED JOSEPH MOSER.

Witnesses:

E. C. ANDERSEN,

HUGH W. MILLIN.