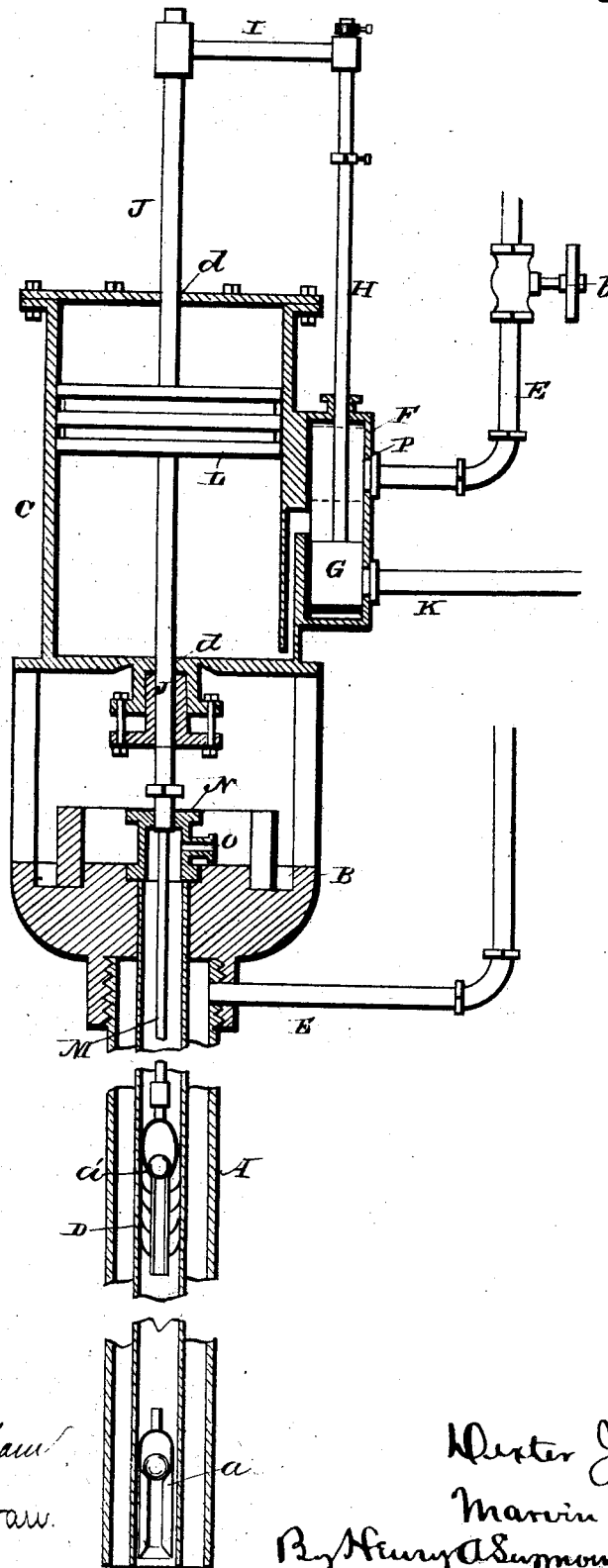


(No Model.)

D. J. THAYER & M. J. SEYMOUR.
APPARATUS FOR PUMPING OIL WELLS.

No. 245,101.

Patented Aug. 2, 1881.



WITNESSES

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DEXTER J. THAYER AND MARVIN J. SEYMOUR, OF BRADFORD, PENN.

APPARATUS FOR PUMPING OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 245,101, dated August 2, 1881.

Application filed May 25, 1881. (No model.)

To all whom it may concern:

Be it known that we, DEXTER J. THAYER and MARVIN J. SEYMOUR, of Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Pumping Oil-Wells; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawing, which forms part of this specification.

Our invention relates to an improvement in apparatus for pumping oil-wells, the object of the same being to utilize the petroleum gas which issues from the well to run an engine connected directly or indirectly with the sucker-rod of the pump.

Heretofore oil-wells have principally been worked by steam-power generated from wood or coal or gas conveyed from a considerable distance as a fuel, all of which operations are attended with danger from the close proximity of the fire to the flowing oil or tanks. Again, steam has been conveyed from a long distance through mains; but this is objectionable for the reason that the steam loses power, owing to its condensation in the pipes, especially when the wells are worked in "heads." In a large majority of the wells drilled, large quantities of gas are produced which issues from the well with great force, frequently indicating a pressure of one hundred and fifty pounds to the square inch, and, as before stated, our object is to utilize this gas in its natural state, undiluted with air or any other gas, to work the pumping mechanism.

The accompanying drawing represents one style of pumping mechanism attached directly to the casing of a well, and adapted to be operated by the pressure of gas therein contained.

A represents the outer tubing or casing of the well, onto the top of which the flange or seat B is secured, which is adapted to support the cylinder C.

D is the working-barrel, placed inside the casing A, leaving a sufficient space between the inner side of the outer casing and outside of the working-barrel for the gas to pass upward to near the top of the outer casing. The

annular space formed between the working-barrel and casing is closed at the top by the flange or seat B, which latter is secured to the casing at its upper end, the working-barrel extending down to the bottom of the well and provided with a check-valve, *a*.

Near the upper end of the casing, at the joint formed by the juncture of the flange or seat B therewith, or just below the same, a pipe, E, is connected to the casing for the exit of gas from the well, the pipe extending upward and leading into a valve-chest, F, of any suitable construction, situated on the side of the cylinder. This pipe E is provided with a valve, *b*, for cutting off the flow of gas from the well to the cylinder when desired.

The valve-chest F is connected to the cylinder by a port, *c*, for admitting the gas below the piston by shifting the valve G, which is connected to the valve-rod H, and operated by the arm I, connected to the upper end of the piston-rod J. The lower end of the valve-chest is provided with an exhaust-pipe, K, for carrying off the gas after having passed through the cylinder and operated on the piston therein.

The cylinder C, as before stated, is situated on top of the flange or seat B, and is provided with a piston-rod, J, which extends through both ends of the cylinder C, having the piston L secured thereon.

The cylinder ends *d* are provided with gas-tight packings, to prevent the escape of gas. The upper end of the sucker-rod M passes up through the seat or flange B, where it is secured to the piston-rod in any suitable manner, while the lower end of the sucker-rod is provided with a flap or ball valve, *a'*, to prevent the liquid from flowing back. The sucker-rod M passes upward through an oil-tight packing, N, in the seat or flange B, the latter being secured therein and adapted to surround the rod closely at its upper end, the packing box or cylinder being chambered, so as to allow the oil to flow upwardly around the sucker-rod to the oil-exit O, situated between the lower end of the cylinder and the upper end of the casing.

The operation of our improved apparatus and system for pumping wells is as follows:

The gas issuing from the well flows from the annular space between the casing and working barrel or tubing through the pipe E into the valve-chest, through the port c into the lower end of the cylinder, where the pressure of the gas exerted on the lower face of the piston raises the latter, and with it lifts the sucker-rods, thereby elevating the oil contained in the working-barrel and discharging a portion thereof through the oil-exit pipe. When the piston L has reached a certain and predetermined height the valve is automatically shifted, closing the gas-supply opening P and opening a communication between the port c and gas-exhaust passages K, thereby allowing the gas in the cylinder below the piston to freely exhaust, and the piston with its sucker-rods attached thereto to descend by gravity. When the piston reaches the lower limit of its stroke, the operation will continue in the manner hereinbefore described.

By the above or similar arrangement of oil-wells pumping can be carried on in a simple and economical manner, it not even requiring an attendant to run or lubricate the same, as the particles of oil held in suspension in the gas is sufficient to lubricate all the parts requiring attention.

When the gas-supply from a single well is not sufficient to run a pump, a communicating pipe from a neighboring well can be attached to the pipe E to assist, but as a general thing the gas from a single well will be sufficient to work the sucker-rod and connecting mechanism.

Sometimes gas will accumulate too fast in the valve-chest and work the plunger too rapidly, thereby damaging the parts and causing considerable delay in repairs. In such cases it is necessary to apply a safety-valve or governor thereto which will open when the pressure becomes too great, thereby allowing the superfluous gas to pass out without entering the cylinder, and to close when the normal pressure has been restored.

Instead of having the cylinder connected to the outer casing, it can be placed at one side and operate the plunger by an ordinary walking-beam, it only being necessary to close the space at the upper end between the outer casing and working-barrel, and connecting an exit-pipe thereto, for carrying off the gas to the cylinder; but the manner of attaching the parts shown in the drawings is preferable, as all that it is necessary to do when the supply becomes exhausted is to first unscrew or disconnect the piston-rod from the sucker-rod, and the seat or flange from the outer casing, A, and the pump can be transferred to another well and worked in a similar manner.

The yield of gas from some wells is greater than others; so, instead of carrying the gas directly from the well to the valve-chest, as above described, all the gas from the neighboring wells can be conducted to a central

reservoir, which will distribute the gas evenly to all the pumps, thereby saving the waste which is occasioned by the overpressure at some of the wells and making up the deficiency at others. When this latter method has been resorted to, drills and other machinery can be operated with the stored gas.

The advantages of this system of pumping oil-wells are many, as in oil-bearing districts it is exceedingly difficult and very expensive to transport wood or coal for generating steam, and it also allows the gas generated in abandoned and non-paying wells to be utilized as the motive-power and produce paying wells.

Wells producing but little gas can be pumped by attaching a counter-balance to take the weight of the sucker-rod to a great extent from off the piston, and in some cases it might be better to connect the sucker-rod direct to a lever which will allow the piston to travel a greater or less distance than the sucker-rod; also, when the pressure of the gas is very great springs or cushions are inserted for the piston to strike at the lower and upper end of the cylinder, to arrest the blow or concussion in the upward and downward stroke of the piston.

We would have it understood that we do not limit ourselves to any form of pump to be operated by the natural gas; neither do we limit ourselves to a pump attached directly to the tubing of the well, but consider ourselves at liberty to use any construction of pump for accomplishing the desired end.

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

1. The combination, with an oil-well casing, working-barrel, and sucker-rods, of a pumping cylinder and piston connected with the sucker-rods and working-barrel, a pipe for conducting gas from the oil-well to the pump-cylinder, and valve mechanism for automatically regulating the supply and escape of the gas, substantially as set forth.

2. The combination, with an oil-well casing and a working-barrel, of a cylinder and piston connected to the casing, and sucker-rods, substantially as set forth.

3. In an oil-well, the combination, with a casing and working-barrel, of a cylinder secured to the casing and a piston working in the cylinder, the lower end of the piston-rod connected to the sucker-rod of the pump and the upper end having an arm which operates the valve-rod, substantially as set forth.

4. In an oil-well, the combination, with a casing and working-barrel, of a flange or seat, detachably secured to the casing, having a central opening, into which is secured a bearing adapted at its upper end to surround the sucker-rod and produce an oil-tight joint, and chambered or hollowed out at its lower end to allow the oil to reach its exit-opening, substantially as set forth.

5 In an oil-well, the combination, with the casing, working-barrel, and sucker-rods of an oil-well-pumping apparatus, of a cylinder, piston, and valve mechanism, said piston being connected with the sucker-rods and arranged to lift the sucker-rods by the pressure of gas issuing from the well, substantially as set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 11th day of 10 May, 1881.

DEXTER J. THAYER.
MARVIN J. SEYMOUR.

Witnesses:

F. H. BAILEY,
O. H. COLTON.