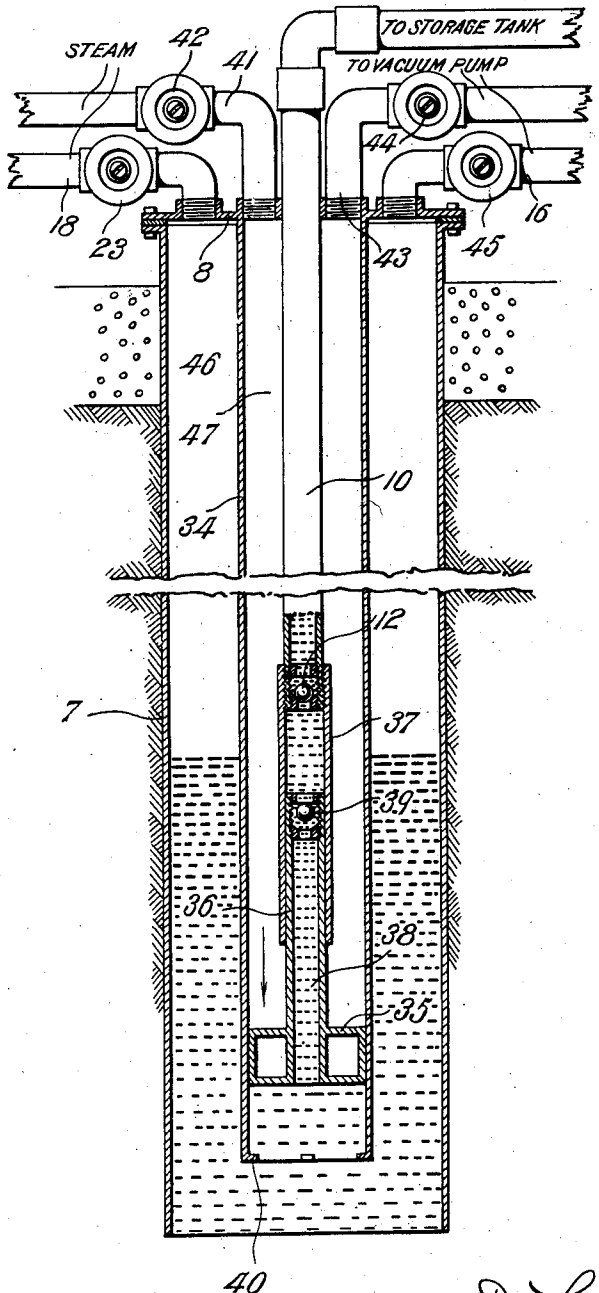
Sept. 13, 1927. 1,642,211

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DEEP WELL PUMP

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DEEP-WELL PUMP.

Original application filed August 4, 1926, Serial No. 127,099. Divided and this application filed March 31, 1927. Serial No. 179,908.

The present invention relates to deep well pumps, and aims to provide novel and improved means for pumping oil, water or other liquid from a deep well in a practical and efficient manner, this application being a division of application Serial No. 127,099, filed August 4, 1926.

Another object of the invention is the provision of a device of the characater indicated having a liquid outlet pipe extending down into the well casing and provisions for alternately creating pressures within the casing below and above atmospheric pressure, with pumping means controlled by the differences in pressures to force the liquid upwardly through said pipe.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts, as hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein the figure is a vertical section of the apparatus, portions being broken away and portion shown in elevation.

In carrying out the invention a tubular casing 7, which may be composed of pipe sections as usual, extends down into the well to the stratum containing the oil, water or other liquid, and a liquid outlet pipe 10 extends down into the well within the casing 7 to a point near the lower end of the casing, the casing 7 having a head 8 at its upper end through which the pipe 10 extends.

A pipe 34 depends from the head 8 within the casing 7 to a point near the lower end thereof, and the lower portion thereof serves as a cylinder for a piston 35 movable vertically within said pipe. The piston 35 has a piston plunger 36 of smaller diameter working within a cylinder 37 screw-threaded on and depending from the lower end of the pipe 10. A check valve 12 is provided within the lower end of the pipe 10 and a similar valve 39 is provided within the upper end portion of the piston plunger 36, permitting the upward flow of liquid but preventing the downward flow thereof. The pipe 34 has stops 40 at its lower end to limit the downward movement of the piston 35 and the plunger 38 has a passage or opening extending longitudinally therethrough to establish communication between the cylinder 37 and lower portion of the pipe 34 below the piston 35.

The steam or pressure fluid supply pipe 18 is connected to the head 8 in communication with the annular chamber 46 between the casing 7 and pipe 34, and another steam or pressure fluid supply pipe 41 is connected to the head 8 in communication with the chamber 47 between the pipes 10 and 34. Similarly, vacuum pipes 16 and 43 leading to a vacuum pump are connected to the head 8 in communication with the respective chambers 46 and 47. The pipes 18, 41, 43 and 16 have the respective valves 23, 42, 44 and 45 to be controlled by hand or otherwise.

In operation, with the valves 42 and 45 open and the valves 23 and 24 closed, steam is admitted into the chamber 47 while the steam in the chamber 46 is pumped therefrom through the pipe 16. As a result, the liquid is lifted into the chamber 46 and, simultaneously, the piston 35 is moved downwardly within the pipe 34 by the steam in the chamber 47. When the piston 35 is moved downwardly liquid will flow upwardly through the piston plunger 38 into the cylinder 37, the valve 39 opening upwardly while the valve 12 supports the liquid in the pipe 10. Now, by closing the valves 42 and 45 and opening the valves 23 and 44, steam is admitted into the chamber 46 while the steam in the chamber 47 is drawn therefrom through the pipe 43 to the vacuum pump. Thus, the vacuum within the chamber 47 and pressure within the chamber 46 effective upwardly within the lower portion of the pipe 34 will force the piston 35 upwardly, the pressure above and below said piston being below and above atmospheric pressure. Therefore, the liquid in the cylinder 37 above the valve 39 is forced upwardly through the pipe 10 past the valve 12. The operation is then repeated as before, and when the valves 23 and 44 are closed and the valves 42 and 45 opened, the pressure on the piston 35 below and above same will be above and below atmospheric pressure. In this way, the piston 35 is moved both upwardly and downwardly by pressure on opposite sides thereof below

and above atmospheric pressure working in unison.

With this apparatus there is no substantial loss in heat units so that the use of steam will be efficient, and the use of a partial vacuum in withdrawing the steam from the well will also provide for efficiency. The steam may be condensed and the water of condensation returned at almost the boiling point to the boiler so as to conserve fuel for heating the boiler. Although the use of steam is preferred, compressed air or other pressure fluid may be used.

Having thus described the invention, what is claimed as new is:—

1. A deep well pump comprising a well casing, a liquid outlet pipe and a second pipe extending downwardly in the casing with a space between said second pipe and well casing; means for preventing downward flow of liquid in said outlet pipe, means for admitting pressure fluid into and withdrawing it from the second pipe and said space, and pumping means associated with said pipes and operable by alternating pressures in said second pipe and space and having a check valved passage communicating with said outlet pipe to force the liquid upwardly in said outlet pipe.

2. A deep well pump comprising a well casing, a liquid outlet pipe and a second pipe extending downwardly in the casing with a space between said second pipe and well casing, means for preventing downward flow of liquid in said outlet pipe, means for admitting pressure fluid into and withdrawing it from the second pipe and said space, and a piston working in the second pipe and having a sliding connection with the outlet pipe to be reciprocated by alternating pressures in said second pipe and space and having a check valved passage communicating with said outlet pipe to force liquid upwardly in said outlet pipe when the piston is reciprocated.

3. A deep well pump comprising a well casing, a liquid outlet pipe and a second pipe extending downwardly in the casing with the outlet pipe within the second pipe and a space between said second pipe and casing, means for preventing downward flow of liquid in said outlet pipe, means for admitting pressure fluid into and withdrawing it from the second pipe and said space, and a piston member working in said second pipe and having a slidable connection with said outlet pipe to be reciprocated by alternating pressures in said second pipe and space, said piston member having a check valved passage communicating with said outlet pipe to force the liquid upwardly in said outlet pipe.

4. A deep well pump comprising a well casing, a liquid outlet pipe and a second pipe extending downwardly in the casing with the outlet pipe within the second pipe and a space between said second pipe and casing, means for preventing downward flow of liquid in said outlet pipe, means for admitting pressure fluid into and withdrawing it from the second pipe and said space, said outlet pipe having a cylinder at its lower end, and a piston working in the second pipe and having a plunger working in said cylinder, said plunger having a passage therethrough and a check valve therein to force the liquid upwardly in said outlet pipe when the piston is reciprocated.

In testimony whereof I hereunto affix my signature.

JESSE D. LANGDON.