

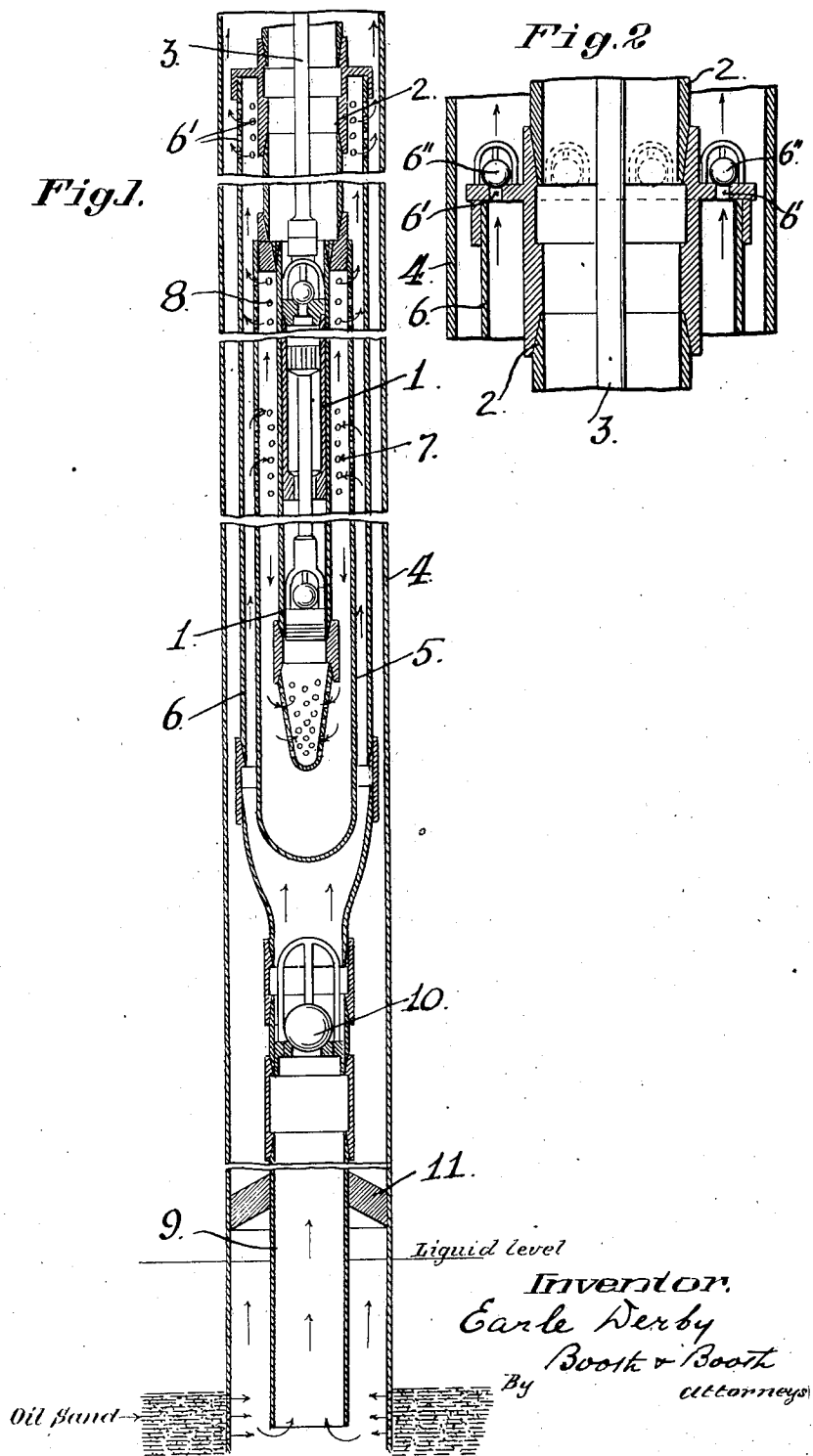
March 30, 1926.

1,578,720

E. DERBY

OIL WELL PUMP

Filed Sept. 8, 1925



UNITED STATES PATENT OFFICE.

EARLE DERBY, OF SAN FRANCISCO, CALIFORNIA.

OIL-WELL PUMP.

Application filed September 8, 1925. Serial No. 54,888.

To all whom it may concern:

Be it known that I, EARLE DERBY, a citizen of the United States, residing at the city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Oil-Well Pumps, of which the following is a specification.

My invention relates to the class of oil-well pumps, and particularly to a pump which, in view of its functions and the objects attained may with propriety be termed a semigas-lift and gas and oil separating pump.

In the usual methods of oil-well pumping, the pump is placed somewhere below the liquid level in the well and is connected to an actuating mechanism at the ground surface by a long string of rods.

Gas is present in all formations containing oil, the gas being in varying amounts and at various pressures depending on the nature of the oil, the type of formations, and the length of time that the formation has been produced from.

A well is usually a flowing producer, due to the pressure of the gas, and it is desirable to conserve this gas and make it do all the work possible in lifting the oil to the ground surface.

The object of my invention is two-fold:—first, to take advantage of the remaining gas pressure after a well has ceased to flow, to lift the oil as far as it will; and, second, to automatically separate this gas from the oil at the end of this gas lift, pumping only the oil through the tubing, thus eliminating difficulties now experienced when pumps are “gas locked” and stop pumping.

With these ends in view, my invention consists in the novel pumping apparatus which I shall hereinafter fully describe in connection with the accompanying drawings in which I have illustrated a typical form of a preferred embodiment of my invention, it being understood that changes in form, proportion, and arrangement may be made without departing from the spirit of the invention as defined by the claims hereunto appended.

In the accompanying drawings,

Fig. 1 is a vertical section, broken, of my oil-well pump.

Fig. 2 is a section enlarged of the upper portion of Fig. 1, showing the gas outlets controlled by check valves.

1 is a standard oil-well pump of any

make or description, placed at the end of tubing 2 and connected to the surface by rods 3 in the usual manner. 4 is the well casing. Around and concentric with the pump are the pipes 5 and 6. The pipe 5 is closed at the bottom and perforated at points higher up designated by 7 and 8.

The pipe 6 is open at the bottom and is directly connected to the tubing 9. At or near its top, as shown at 6', it is perforated.

A check valve 10 is located in the tubing 9, just below the entrance to the pipe 6.

The tubing 9 extends downward in the casing and into the liquid, the level of which is indicated in Fig. 1 by the inscription “Liquid level”.

At a point above the liquid level is placed a packer 11 between the tubing 9 and the casing 4.

The operation is as follows:—

Oil and gas produced from the formation pass into the casing 4 and are constrained to pass up through the tubing 9 by the packer 11, said tubing having been made the right length by experiment, and the location of the check valve 10 having been established. The oil and gas rise up through the valve 10 by virtue of pressure of such gas as still remains in the well. The gas and oil pass into the pipe 6, and the gas continues to rise and passes out from pipe 6 into the well casing, through the perforation 6' near the top. The oil, however, at the upper limit of its rise due to the gas pressure, drops through the perforations 7 to the bottom of the pipe 5 from which by the pump 1 it is raised to the surface. Any gas that may enter with the oil through the perforations 7 is discharged through the perforations 8. It will thus be seen that the oil pumped has been separated from the gas, thus eliminating troublesome “gas locks” in the pump. The advantages of this pump may be enumerated as follows:—Pumping energy required is minimized. The length of pumping rods is reduced, making a cheaper and better working mechanism. The gas flow is restricted to the amount of gas used to lift the oil. The oil and gas are separated at low pressures, making the separation more effective. On account of the effective separation of oil and gas, the pump has less tendency to “gas lock”.

In Fig. 1, I have shown the perforations

6' by which the separated gas passes from pipe 6 into the casing 4 as free and unchecked. Under certain conditions, however, it is desirable to check them, such elaboration being shown in Fig. 2. In this case the perforations 6' are placed in the head of pipe 6, and are fitted with check valves 6''.

The purpose of these check valves is to prevent the gas from returning from the well casing into the pipe 6 and thence to the pump. This check control of the perforations 6' will tend to correct a condition where a well flows intermittently to the pumping point.

As the pump operates continuously, it would, in the absence of oil, pump gas. But if the return of the gas from the well casing is prevented, the tendency is to create a suction at the valve 10, thereby aiding the flow.

I claim:—

1. An oil-well pump comprising an entrance tube extending below the oil level in the well; a packer in the well above said oil level closing the well around the entrance tube; a check valve in said entrance tube; a pipe communicating at its lower end with the upper end of the entrance tube, said pipe communicating above with the well; a second pipe within and spaced from the first named pipe, said inner pipe having a closed lower end and communicating above with the outer pipe; and a pumping instrumentality within the inner pipe.

2. An oil-well pump comprising an entrance tube extending below the oil level in the well; a packer in the well above said oil level closing the well around the entrance tube; a check valve in said entrance tube; a pipe communicating at its lower end with the upper end of the entrance tube, said

pipe communicating above with the well; a check valve controlling said latter communication; a second pipe within and spaced from the first named pipe, said inner pipe having a closed lower end and communicating above with the outer pipe; and a pumping instrumentality within the inner pipe.

3. An oil-well pump comprising an entrance tube extending below the oil level in the well; a packer in the well above said oil level closing the well around the entrance tube; a check valve in said entrance tube; a pipe communicating at its lower end with the upper end of the entrance tube, said pipe communicating above with the well; a second pipe within and spaced from the first named pipe, said inner pipe having a closed lower end and communicating with the outer pipe at separated places one at its upper end and the other intermediate its ends; and a pumping instrumentality within the inner pipe.

4. An oil-well pump comprising an entrance tube extending below the oil level in the well; a packer in the well above said oil level closing the well around the entrance tube; a check valve in said entrance tube; a pipe communicating at its lower end with the upper end of the entrance tube, said pipe communicating above with the well; a check valve controlling said latter communication; a second pipe within and spaced from the first named pipe, said inner pipe having a closed lower end and communicating with the outer pipe at separated places one at its upper end and the other intermediate its ends; and a pumping instrumentality within the inner pipe.

In testimony whereof I have signed my name to this specification.

EARLE DERBY.