June 11, 1929. H. J. SMITH 1,716,934

OIL AND WATER SEPARATOR

Filed April 19, 1927

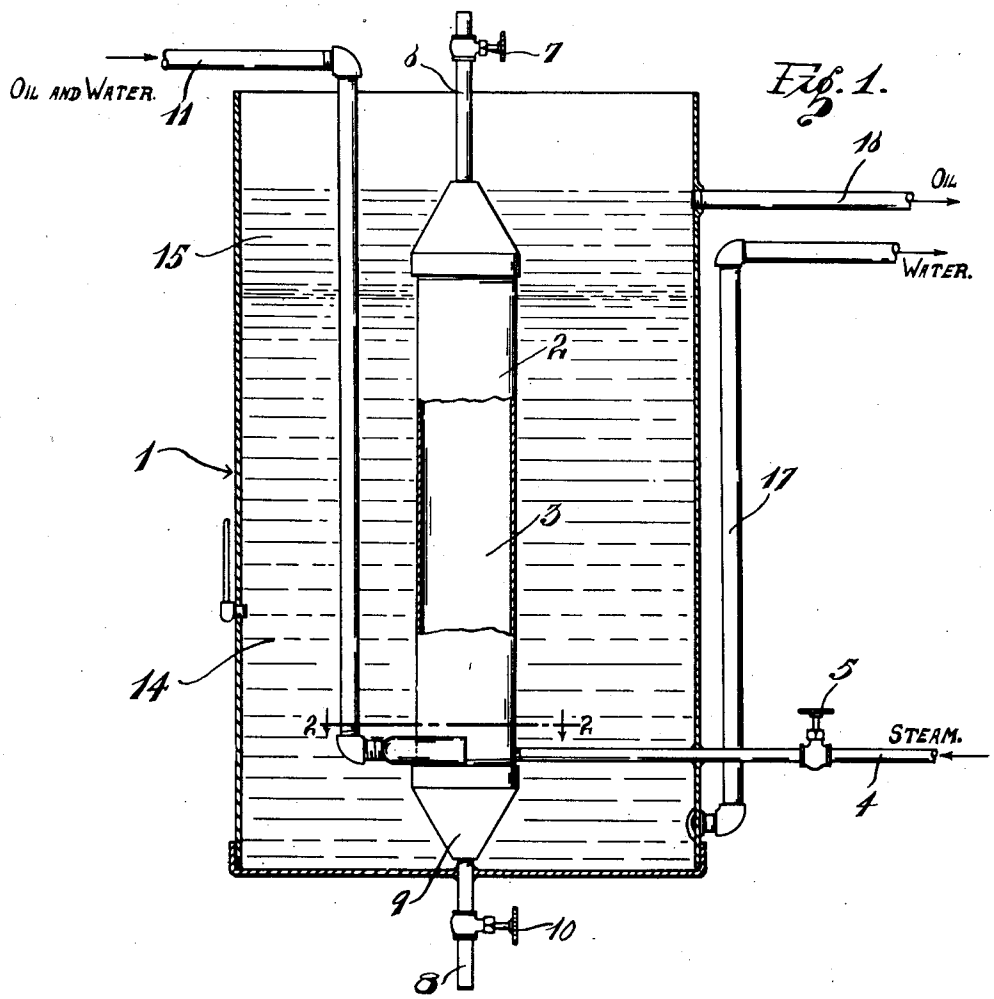


Fig. 1.

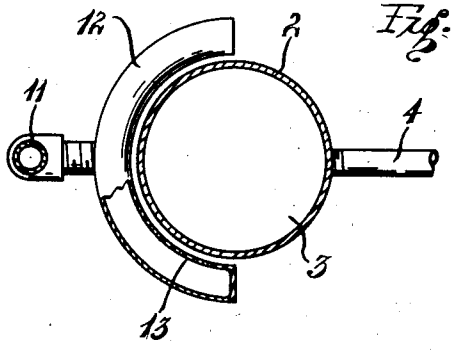


Fig. 2.

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UNITED STATES PATENT OFFICE.

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OIL AND WATER SEPARATOR.

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In producing oil wells particularly those which have produced for a considerable length of time, a certain quantity of water is removed from the well with the oil. This water may be either salt or fresh, but is usually found to be salt water. Before the oil can be marketed it is necessary to remove the water and heretofore this has been accomplished by various mechanical, chemical, and electrical treatments which were expensive and entailed a considerable amount of additional labor above that required for the ordinary production of the well.

An object of my invention is to provide a simple and inexpensive method and means of separating the oil and water which will not require the expenditure of additional labor.

Another object is to provide an oil and water separator which utilizes the heat of the steam found in or adjacent to every producing well.

A further object is to utilize heat for the separation of oil and water which heat is directly applied to the incoming liquid and which eliminates the danger of losing a large percentage of the more volatile oil constituents.

In the drawing:

Fig. 1 is a longitudinal sectional view of my separator.

Fig. 2 is a sectional view taken on line 2, 2 of Fig. 1.

Referring more particularly to the drawing:

The numeral 1 indicates a large tank adapted to receive the liquid from the well and in the center of this tank I position a heater 2, said heater extending vertically in the tank and is substantially the entire height thereof. My heater 2 comprises a hollow cylinder 3 and a steam pipe 4 extends through the wall of the tank 1 and into the heater 2 adjacent the bottom thereof. If desired, steam walls may be placed within the cylinder 3 although I do not find this absolutely essential.

The steam which enters the pipe 4 may be the exhaust from the pumping engine or it may be steam fed directly from the boilers. A valve 5 in the pipe 4 regulates the amount of steam entering the cylinder 3. A steam exhaust pipe 6 rises from the top of the cylinder 2 and a valve 7 is set in the pipe 6, said valve being useful in event that steam is used directly from the boilder tending to prevent the free escape of the steam, retaining it longer in the cylinder and thus utilizing more of its heat. This valve may be adjusted to suit the particular conditions as found in actual practice.

A drain pipe 8 extends from a reduction nipple 9 on the bottom of the cylinder 3 and extends through the bottom of the tank 1. A valve 10 is provided in the drain pipe 8 which may be opened to drain the condensate from the cylinder 3.

The oil and water enters through the pipe 11 from the gas trap, or similar device, said pipe extending downwardly through the tank 1 and extends into an arcuate manifold 12 which partly surrounds the heater 2 adjacent the lower end thereof. Perforations 13 are provided in the manifold 12 through which the oil and water passes and impinges upon the outer surface of the cylinder 3 opposite the point where the steam enters through the pipe 4. Thus it will be seen that as the liquid enters the tank 1 it is brought into direct contact with a heated surface thus quickly raising the temperature thereof, and this heating of the incoming liquid tends to materially assist in the separation of the oil and water. The oil being lighter passes upwardly in the tank through the water, as shown at 14, and floats in a layer at the top of the tank, as shown at 15.

An oil drain pipe 16 extends from the tank 1 adjacent the top thereof and within the oil area 15, the oil draining through this pipe by gravity. A water outlet pipe 17 extends from adjacent the lower edge of the tank 1, said pipe rising to a point adjacent the top of the water layer 14, and drains away by gravity.

I have found it desirable to maintain the temperature of the water in the tank 1 below the boiling point thereof but the exact temperature of this water will vary for the different types of oil which may be produced from different wells. That is, some oils will separate from the water more readily at a temperature around 180 degrees F., plus or minus, while others will require a temperature of 135 degrees, more or less, but this point will be determined more readily by experimenting with the particular oil found.

It is, of course, desirable to maintain as low a temperature as possible in the tank 1 in order that little or none of the lighter constituents of the oil should be lost.

Having described my invention, I claim:

1. An oil and water separator comprising a tank, a heater in said tank adjacent the

center thereof and extending substantially the depth of the tank, oil and water intake means extending from the well, said intake means terminating adjacent said heater and adjacent the bottom of the tank, whereby the incoming liquid impinges upon the heater, an oil drain pipe adjacent the top of said tank, and a water drain pipe adjacent the bottom of said tank.

2. An oil and water separator comprising a tank, a heater in said tank adjacent the center thereof and extending vertically therein for substantially the depth of the tank, said heater comprising a hollow cylinder, a steam intake pipe adjacent the bottom of said cylinder, an exhaust pipe extending into the top of said cylinder, an oil and water intake pipe extending from the well and terminating adjacent said heater and adjacent the bottom of the tank whereby the incoming liquid is caused to impinge upon said heater.

3. An oil and water separator comprising a tank, a heater in said tank adjacent the center thereof and extending vertically therein, said heater comprising a hollow cylinder, a steam intake pipe adjacent the bottom of said cylinder, an exhaust pipe extending from the top of said cylinder, an oil and water intake pipe extending from the well and terminating adjacent said heater whereby the incoming liquid is caused to impinge upon said heater, a drain pipe extending from said heater, a valve in said drain pipe, an oil outlet pipe extending from the tank adjacent the top thereof, and a water outlet pipe extending from the tank adjacent the bottom thereof.

4. An oil and water separator comprising a tank, a heater in said tank adjacent the center thereof and extending vertically therein, a steam intake pipe extending to said heater adjacent the bottom thereof, an oil and water intake pipe, a manifold adjacent the bottom of the heater, said oil and water intake pipe extending to the manifold, said manifold having perforations therein through which the oil and water passes, and impinges upon the heater, a drain pipe in said heater, an exhaust pipe extending from the heater, an oil drain pipe extending from the tank adjacent the top thereof, and a water outlet pipe extending from the tank and adjacent the bottom thereof.

In testimony whereof, I affix my signature.

HUBERT J. SMITH.