

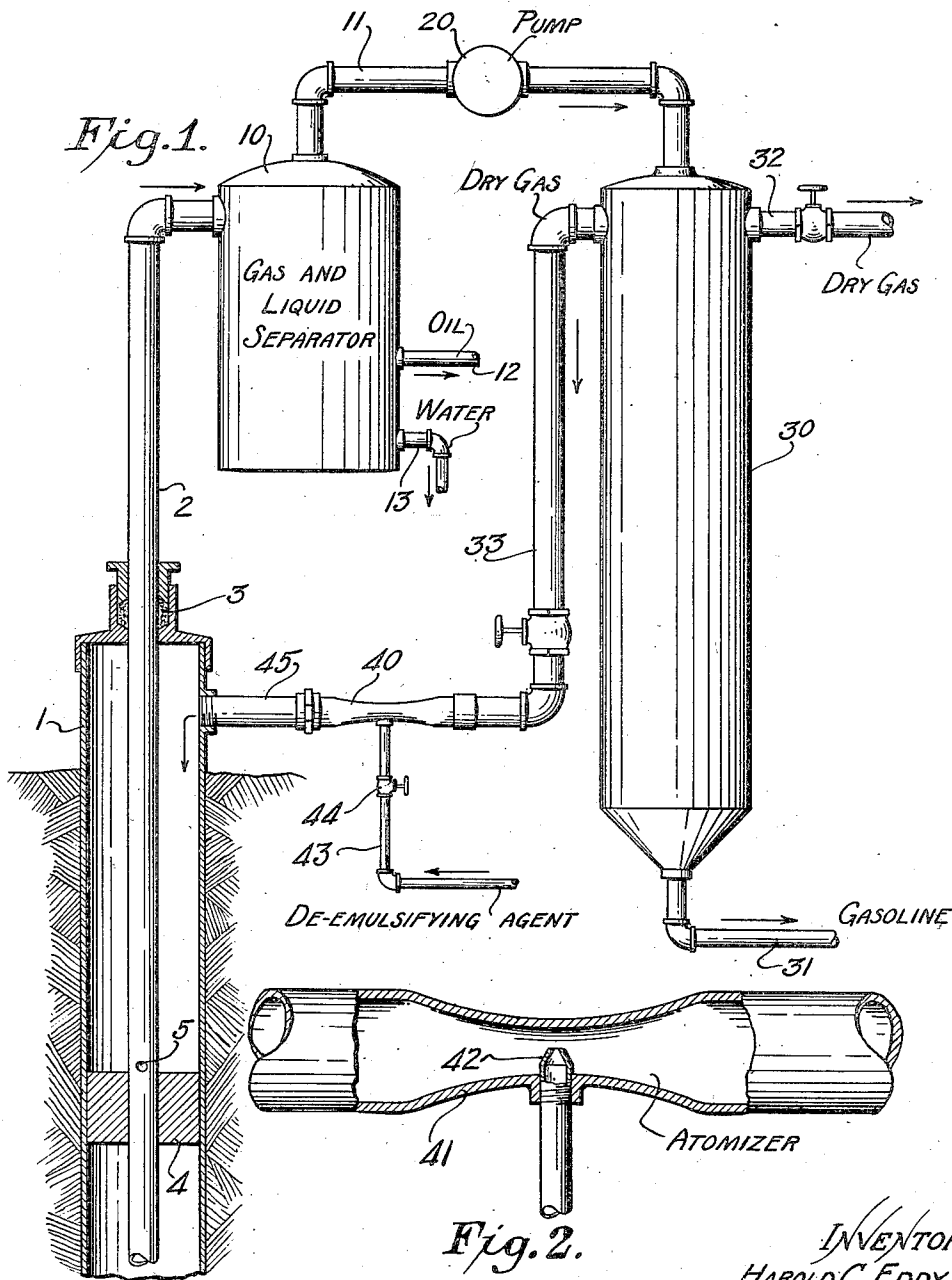
Oct. 5, 1926.

1,602,190

H. C. EDDY ET AL

METHOD OF DEHYDRATING PETROLEUM EMULSIONS

Filed Jan. 4, 1926



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METHOD OF DEHYDRATING PETROLEUM EMULSIONS.

Application filed January 4, 1926. Serial No. 79,095.

Our invention relates to the art of pumping oil wells and more particularly to the art of pumping wells by the use of a hydrocarbon gas or vapor. In the production of oil it is quite common to cause the oil to flow from the well by injecting a gas into the oil in the well, this gas forming fine bubbles which lighten the column of oil, thus allowing the natural rock pressure to force the mixture of oil and gas upwardly to a point above the surface of the ground. It is quite common to use air for this purpose, this method of causing oil to flow being known as the air lift method.

It is also quite common to use natural gas for this purpose, and in many cases the well itself produces sufficient gas for this purpose.

Where air or gas is used to pump a well in this manner, particularly where there is some water present, emulsions are usually formed and these emulsions are often of such a nature that they resist the ordinary methods of treatment. If the emulsion produced consists of extremely fine bubbles of gas or water, the ordinary settling methods employed in separating emulsions are not sufficient to cause separation and the emulsion so formed is often of such a nature that it cannot be readily separated by the ordinary electrical or chemical treatment.

It is an object of our invention to provide means in connection with the air or gas lift method of pumping wells which will prevent the formation of emulsions which are difficult to separate.

Further objects and advantages will be made evident hereinafter.

On the drawings:

Figure 1 is a diagrammatic assembly of the apparatus.

Figure 2 is a vertical section of the atomizer.

Referring to the drawings which show diagrammatically a novel assembly of well known apparatus adapted to carry on our process, 1 is a steel casing secured in an oil well and extending downwardly to a point near the bottom thereof, 2 is a tubing suspended inside the casing 1, the casing 1 being provided with a stuffing box 3 which makes a tight joint around the tubing 2. A

packer 4 is provided, this packer making a tight joint between the casing 1 and the tubing 2 at a point in the well preferably just above the oil sands, a small opening 5 being provided in the tubing 2 just above where it passes through the packer 4. Packers are well known in the art and are often used to make a removable tight joint between the tubing and casing of a well.

The tubing 2 is carried upwardly and discharges into a gas and liquid separator 10, in which the gas and any entrained liquid are separated, the gas being delivered to a pipe 11, the oil being delivered to suitable storage (not shown) through a pipe 12 and the water being delivered to a suitable drain (not shown) through a pipe 13. The gas and liquid separator is also well known in the art and its specific construction need not be described.

A pump 20 is provided, this pump compressing the gas delivered through the pipe 11 to a desired degree and delivering it to a separator 30. In the separator 30 the gasoline carried by the gas is separated and is delivered under compression to suitable storage through a pipe 31. Any excess of dry gas, that is to say, gas from which the gasoline has been separated, may be delivered to suitable storage (not shown) through a pipe 32. A portion of the dry gas is carried through a pipe 33 to an atomizer 40. This atomizer consists of a constricted tube 41 and a nozzle 42 which projects thereinto. A suitable de-emulsifying agent, such for example as a soap solution, is delivered under pressure to the atomizer 40 through a pipe 43 having a valve 44. The atomizer nozzle 42 and the constricted tube 41 are so constructed that the de-emulsifying agent which is preferably in liquid form is delivered in an extremely fine state of suspension into the stream of dry gas passing through the tube 41. The dry gas containing the de-emulsifying agent in the form of a very finely divided mist then passes through a pipe 45 and into the interior of the casing 1 near the top thereof. This gas carrying the de-emulsifying agent in mist-like form is under approximately the pressure produced in the pump 20. This pressure may amount to several hundred pounds

per square inch so that the interior of the casing 1 outside the tubing 2 is full of gas under this pressure containing the de-emulsifying agent. This gas passes through the opening 5 into the interior of the tubing 2 and acts as the lifting agent, forming fine bubbles in the body of oil in the tubing and thereby decreasing the specific gravity of the oil column carried in the tubing 2 to such a degree that the natural rock pressure of the well forces the mixed oil and gas column upwardly into the separator 10.

It is a well known fact that emulsions are readily broken by certain alkali or soap solutions. A very common agent used for this purpose is a solution of sodium oleate which may be combined with small quantities of sodium resinate and sodium silicate. By injecting such an agent in the form of a fine mist or spray into the gas used in our method, we provide for a very fine division of the de-emulsifying agent and provide for its wide distribution through the body of the rising column of oil in the tubing 2. A very small amount of such de-emulsifying agent is sufficient to counteract the tendency of the oil to emulsify due to the injection of the gas bubbles thereinto.

We claim as our invention:

1. A method of pumping an oil well which comprises: introducing into the oil in the well a gas containing a de-emulsifying agent.

2. A method of pumping an oil well which comprises: introducing into the oil in the well a gas containing a de-emulsifying agent in suspension.

3. A method of pumping an oil well which

comprises: placing an eduction tube in the well, which eduction tube extends downwardly into the oil in the well; introducing a gas containing a de-emulsifying agent into said eduction tube below the oil level; delivering the oil from said eduction tube into a separator in which the gas and liquid are separated; compressing said gas to increase the pressure thereof; and introducing into said compressed gas a de-emulsifying agent, said compressed gas containing said de-emulsifying agent then being delivered to said eduction tube.

4. A method of pumping an oil well which comprises: placing an eduction tube in the well, which eduction tube extends downwardly into the oil in the well; introducing a gas containing a de-emulsifying agent into said eduction tube below the oil level; delivering the oil from said eduction tube into a separator in which the gas and liquid are separated; compressing said gas to increase the pressure thereof; separating from said compressed gas any liquid condensed therein; and introducing into said compressed gas a de-emulsifying agent, said compressed gas containing said de-emulsifying agent then being delivered to said eduction tube.

In testimony whereof, the said HAROLD C. EDDY has hereunto set his hand at Los Angeles, California, this 15th day of December, 1925, and the said GORDON B. HANSON has hereunto set his hand at Houston, Texas, this 23 day of December, 1925.

HAROLD C. EDDY.
GORDON B. HANSON.