

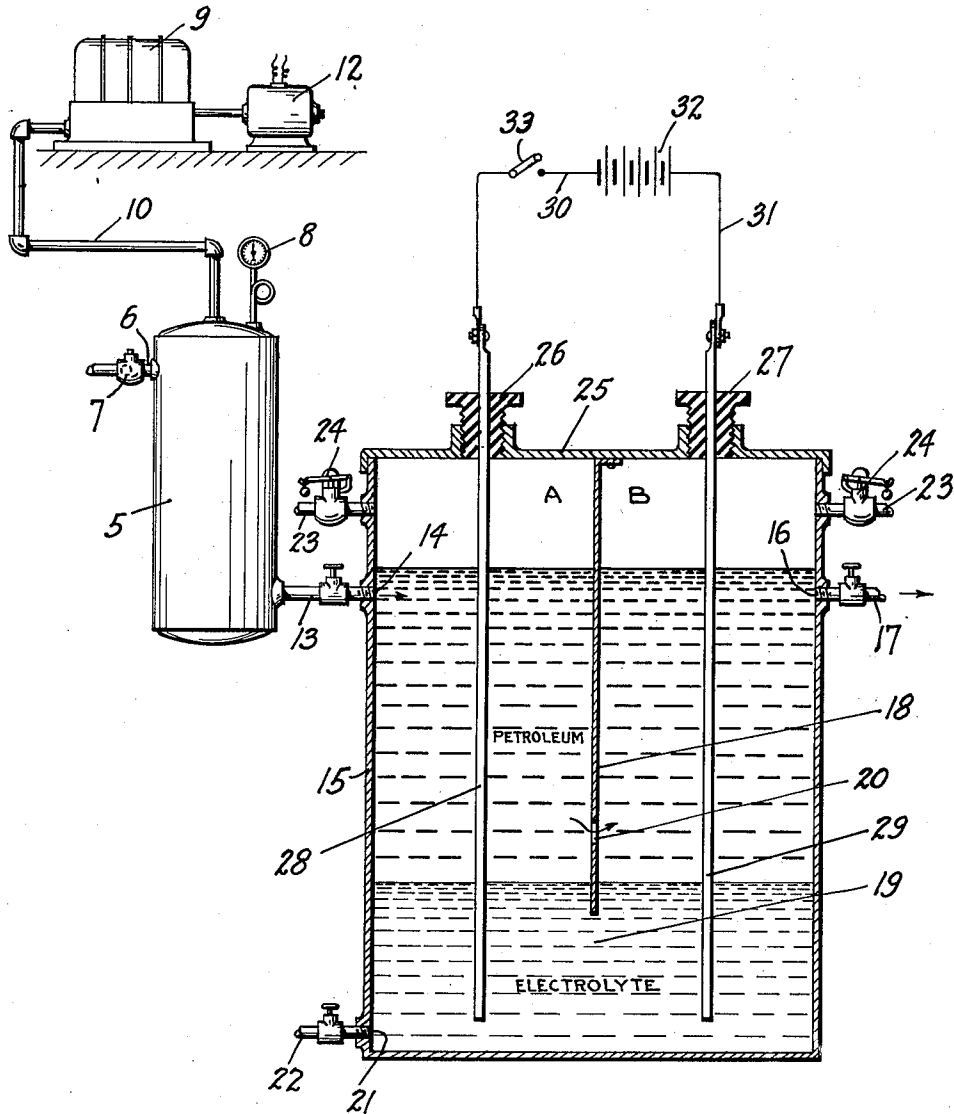
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METHOD OF TREATING PETROLEUM

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UNITED STATES PATENT OFFICE

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METHOD OF TREATING PETROLEUM

Application filed May 1, 1928. Serial No. 274,215.

My invention relates to a method of and apparatus for rendering corrosive sulphur compounds in petroleum inactive. An object of the invention is to subject petroleum containing such compounds to the action of an oxidizing gas, such as chlorine or oxide of chlorine, and then to hydrogen gas to displace the oxidizing gas.

Another object is to disperse such gases through the petroleum by means of subjecting same to pressure.

Other objects reside in details of construction of the apparatus for carrying into effect the foregoing objects, in novel combinations and arrangements of parts, and in novel steps and arrangements of steps in the process.

Reference is made to my application for patent Serial No. 274,213, filed May 1, 1928, for claims on subjects matter shown and/or described but not claimed herein.

The single figure in the drawing is a sectional elevation of a system embodying the present invention.

A pressure feed tank is shown in the drawing at 5, which is connected with a source (not shown) of petroleum by a conduit 6 having a check valve 7 to prevent the return of petroleum to the conduit. A pressure gauge 8 is provided for the tank.

To raise the pressure in the tank, a compressor 9 is connected therewith by a conduit 10. An electric motor 12 operates the compressor.

The pressure feed tank 5 has an outlet conduit 13 connected with an oil inlet 14 of a treatment tank 15. The treatment tank 15 has an outlet 16 emptying into a conduit 17. Between the inlet 14 and the outlet 16 of the treatment tank is a partition 18 that divides the upper part of the tank vertically into two compartments A and B. The partition is spaced from the bottom of the tank 15 to provide a passage 19 and has an opening 20 above the passage to afford a second connection between the compartments. An electrolyte inlet 21 connected with a conduit 22 is provided near the bottom of the tank. Gas escape conduits 23 having blow-off valves 24 are provided above the oil inlet and outlet to allow the escape of excess gases.

The treatment tank has an air-tight cap 25 that carries two insulating plugs 26 and 27 apertured lengthwise, one plug being above each compartment. An anode 28 is inserted through and fills the aperture in plug 26 and extends to within a short distance of the bottom of compartment A. A cathode 29 occupies the same position in plug 27 and compartment B.

The anode and cathode are connected by 60 wires 30 and 31 respectively, with a source of electric energy 32, in the form of direct current. A switch 33 may be employed in one of the wires.

In the operation of the present invention, 65 petroleum containing corrosive sulphur compounds, such as hydrogen sulphide and many others, is fed into the pressure tank 5 by the conduit 6. The check valve 7 prevents the return of liquid to the conduit from the tank 5.

The motor 12 is started, operating the compressor 9 and increasing the pressure in the tank 5 until the oil is fed into the treatment tank 15 at the desired rate of flow. The pressure in the tank 5 is shown on the gauge.

Any suitable electrolyte is fed into the tank by means of the conduit 22, preferably until the level of the electrolyte is above the bottom of the partition 18 but below the opening 20. The electrolyte may be brine, a solution of caustic soda, dilute sulfuric acid, or any other suitable solution that may be electrolyzed. The petroleum fed into the treatment tank settles on top of the electrolyte and finds its level in the two compartments by means of the opening 20.

When the dilute sulfuric acid is used, an inert anode is employed, such as graphite or platinum.

If brine is used, closing the electrolytic circuit by the switch 33 generates nascent chlorine at the anode and nascent hydrogen gas at the cathode.

The petroleum is subjected to the oxidizing effect of the gas (chlorine if brine is the electrolyte) in compartment A and to the effect of the hydrogen in compartment B. Oxidized petroleum flows from compartment A into compartment B by the opening 20.

When in compartment B, oxidizing gas in the petroleum is displaced by hydrogen.

The gases generated at the electrodes pass up into the petroleum, and as soon as the pressure in the compartments is raised by excess gas, the gas is dispersed throughout the oil. Since the oil will absorb a sufficient quantity of gas to completely oxidize the corrosive sulfur compounds, a complete and uniform mixture is obtained, which produces complete oxidation in compartment A and displacement of the residual oxidizing gas in compartment B. The optimum temperature is ordinary atmospheric temperatures. Since the process is to be operated directly in the oil field, this process has been worked out with a view to obtaining a process whose optimum temperature is that of the atmosphere as it is usually found.

The optimum pressure is five to ten pounds above atmospheric, which is considered enough to thoroughly disperse the gas through the oil.

The optimum concentration of the electrolyte is that which produces the greatest quantity of gas per unit of electric energy, although any concentration of electrolyte will produce gas to some degree. More specifically, by experiment it appears that 150 to 250 cubic centimeters of sulphuric acid of 60° Baumé per liter of water is the range of optimum concentration.

The petroleum that flows out through the conduit 17 is "oxidized," which merely means that the corrosive sulphur compounds have been rendered inert, neutralized, or "removed" as the literature of oil purification terms it. The word "oxidized" has been used in this sense in the present specification, which seems to be the accepted meaning in the literature of this art.

"Oil" and "petroleum" are used interchangeably in this specification, and wherever either has been used, the broadest meaning of either is meant. Moreover, the products of petroleum, such as gasoline etc. are also meant by the use of either.

Where "chlorine" is mentioned in the hereunto appended claims, it is to be understood that chlorine-containing gas, e. g., oxide of chlorine, is an equivalent.

What I claim and desire to secure by Letters Patent is:

1. A process of removing corrosive sulphur compounds from petroleum containing such compounds, comprising the steps of introducing into the petroleum oxidizing gas produced by electrolysis of brine in the presence of the petroleum and displacing oxidizing gas from the petroleum by hydrogen produced by electrolysis in the presence of the petroleum, the introduction of said gases into the petroleum being in separate and distinct steps.

2. A process of removing sulphur com-

pounds from petroleum containing such compounds, comprising introducing into the petroleum an oxidizing gas produced by electrolysis of an electrolyte in the presence of the petroleum, and displacing the oxidizing gas in the petroleum by hydrogen produced by electrolysis of an electrolyte in the presence of the petroleum, the introduction of said gases into the petroleum being in separate and distinct steps.

3. A process of removing sulphur compounds from petroleum containing such compounds, comprising floating the petroleum on a body of an electrolyte adapted to produce an oxidizing gas and hydrogen by electrolysis, electrolyzing said body and introducing the oxidizing gas and the hydrogen into the petroleum in separate and distinct steps.

4. A process of removing sulphur compounds from petroleum containing such compounds, comprising placing the petroleum under pressure, introducing into the petroleum an oxidizing gas produced by electrolysis of an electrolyte in the presence of the petroleum, and displacing the oxidizing gas in the petroleum by hydrogen produced by electrolysis of an electrolyte in the presence of the petroleum, the introduction of said gases into the petroleum being in separate and distinct steps.

5. A process of removing sulphur compounds from petroleum containing such compounds, comprising introducing into the petroleum a nascent oxidizing gas produced by electrolysis of an electrolyte in the presence of the petroleum, and displacing the oxidizing gas in the petroleum by nascent hydrogen produced by electrolysis of an electrolyte in the presence of the petroleum, the introduction of said gases into the petroleum being in separate and distinct steps.

6. A process of removing sulphur compounds from petroleum containing such compounds, comprising introducing into a stream of the petroleum an oxidizing gas produced by electrolysis of an electrolyte in the presence of the petroleum, and displacing the oxidizing gas in the petroleum by hydrogen produced by electrolysis of an electrolyte in the presence of the petroleum, the introduction of said gases into the petroleum being in separate and distinct steps.

In testimony whereof I have affixed my signature.

WARREN F. BLEECKER.