Nov. 9, 1926. 1,606,685

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APPARATUS FOR TREATING CUT OIL AND THE LIKE

Filed Oct. 24, 1923 4 Sheets-Sheet 1

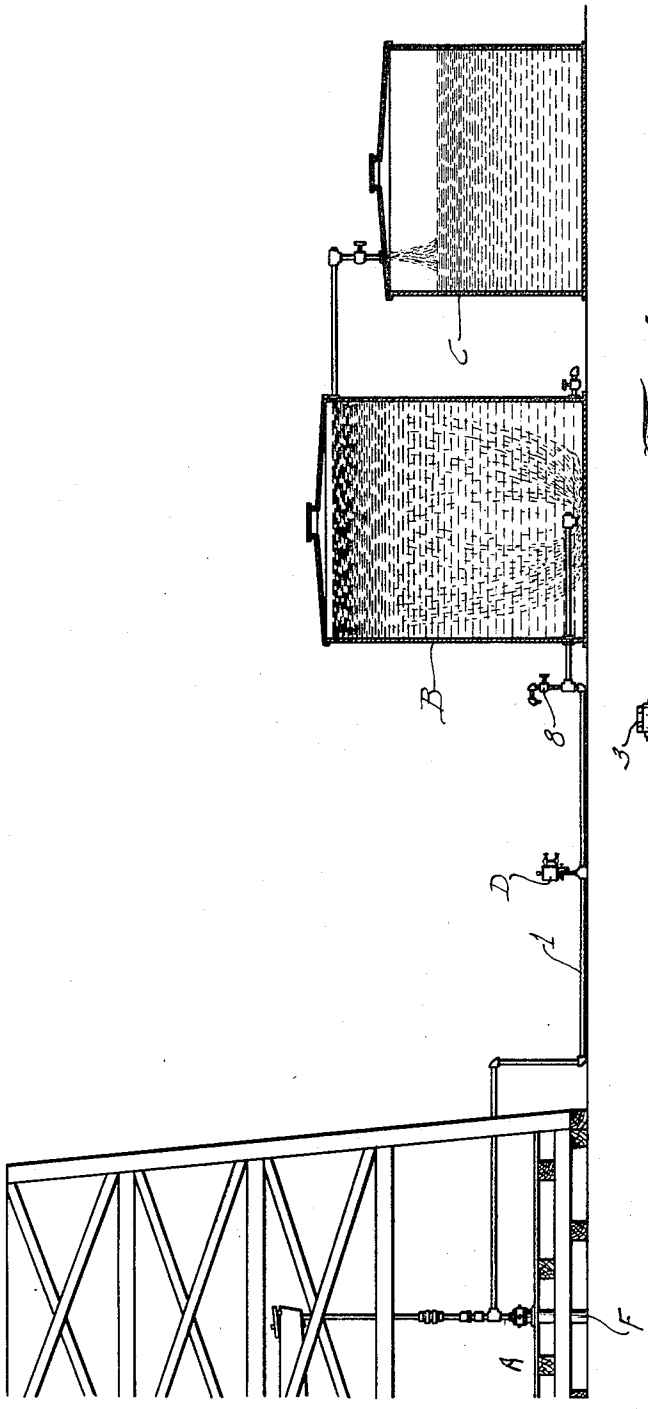


Fig. 1.

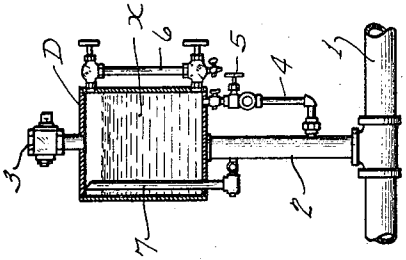


Fig. 2.

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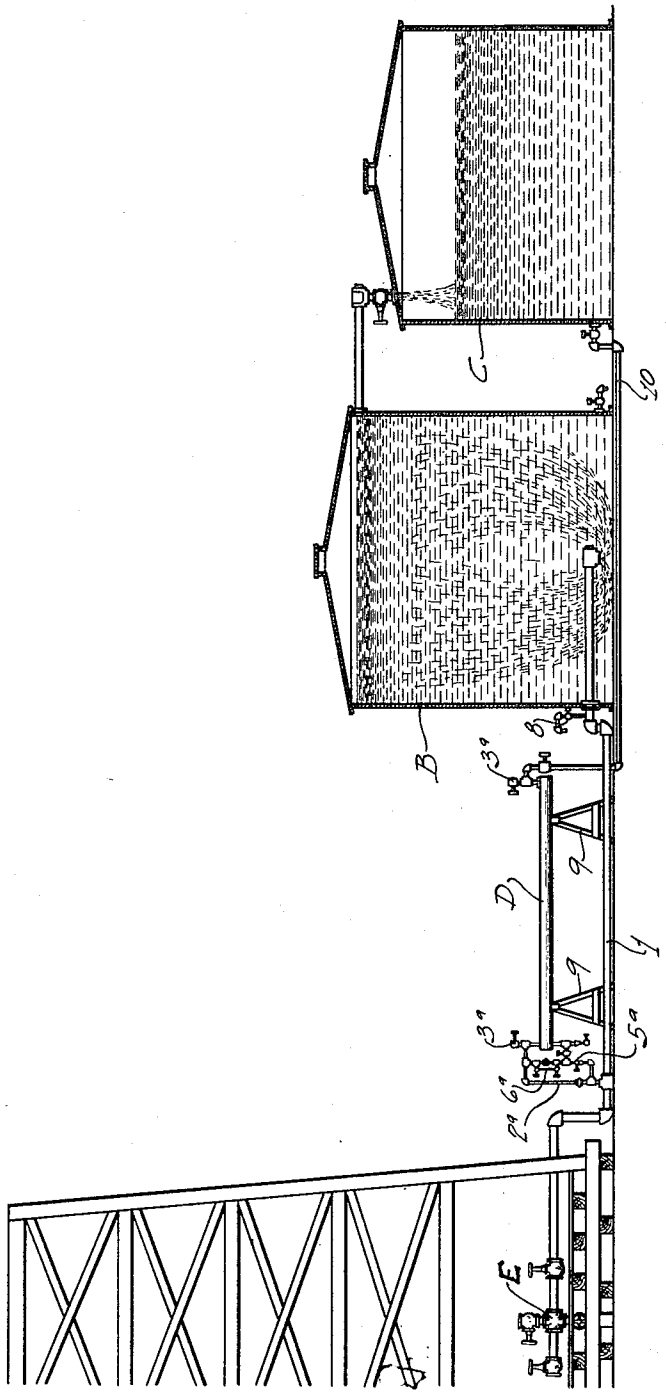


Fig. 3.

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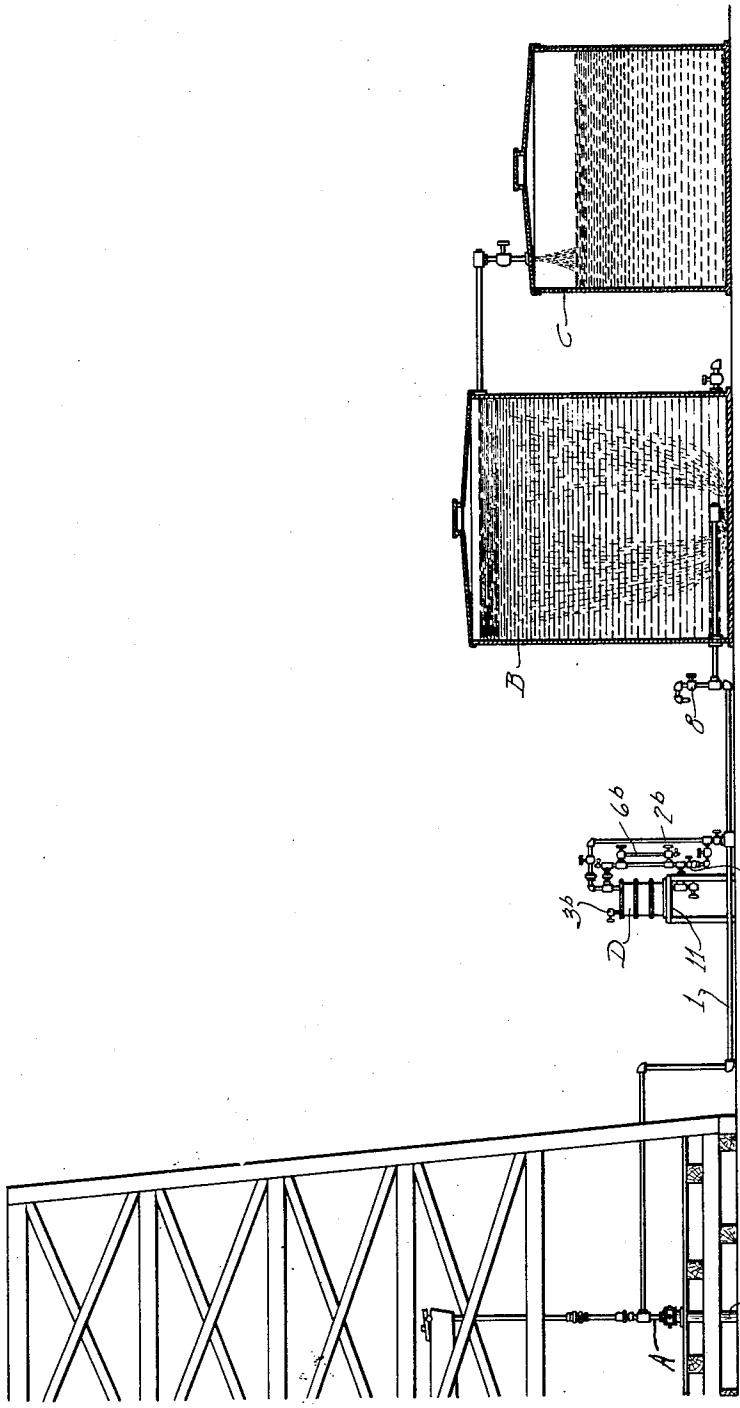


Fig. 4.

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APPARATUS FOR TREATING CUT OIL AND THE LIKE

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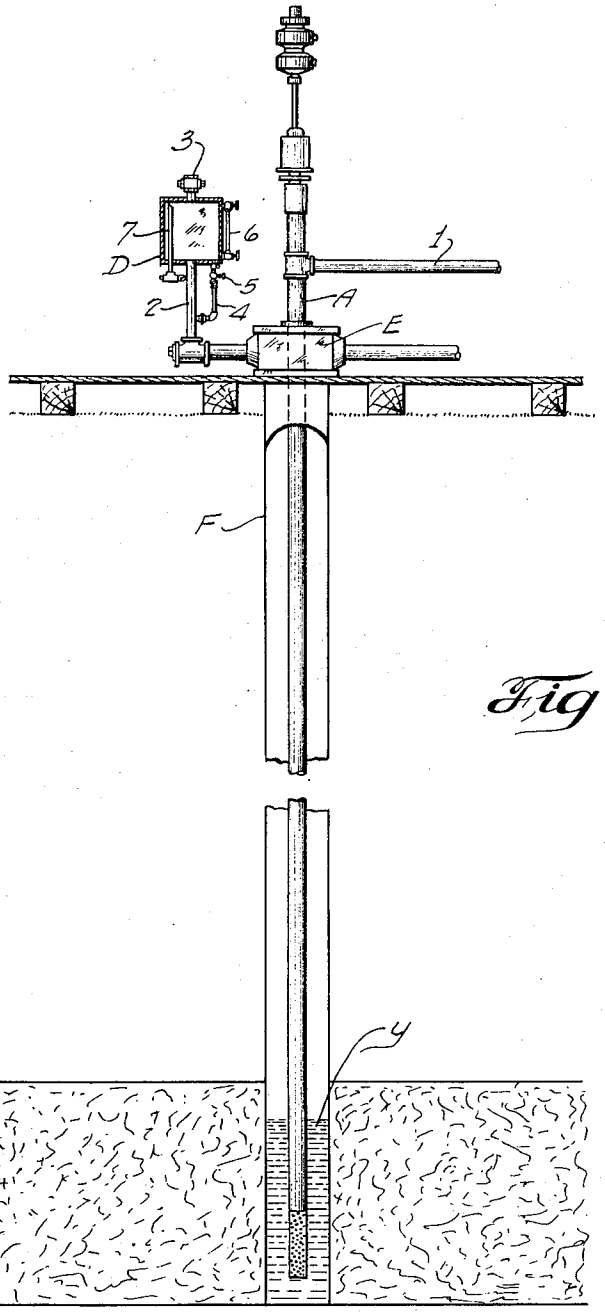


Fig. 5.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING CUT OIL AND THE LIKE.

Application filed October 24, 1923. Serial No. 670,583.

This invention relates to the treatment of crude oil emulsions of the kind commonly referred to as "cut oil" and "roily oil" for the purpose of effecting the separation of the oil in the emulsion from the water or brine and rendering the oil fit for commercial use.

One process that is used extensively for treating crude oil emulsions of the kind referred to contemplates introducing a treating agent into the emulsion so as to cause the emulsion to "break", and thus permit the oil to separate from the water and foreign matter in the emulsion. The treating agent can be introduced into the emulsion while the emulsion is confined in a settling tank, or it can be introduced into the emulsion while it is traveling through the flow line leading from the well in which the emulsion is produced, but when the treating agent is fed into the flow line, it is necessary to use a pump, compressor or the like to introduce it into the flow line under pressure, owing to the fact that the gases which emerge from the ground with the emulsion create considerable pressure in the flow line.

The main object of my invention is to overcome the necessity of using a pump, compressor or the like to introduce a treating agent into crude oil emulsion before it is discharged from the well or while it is traveling through a flow line leading from the well to a settling tank.

To this end I have devised a process for treating crude oil emulsions that contemplates using the pressure of the gases that emerge from the ground with the emulsion to equalize a pressure in the container that holds a treating agent, thereby enabling the treating agent to be fed by gravity to the point where it comes in contact with the emulsion. I have also devised a novel apparatus for practicing my process, which, in its simplest form, consists of a container for holding the treating agent connected by a feed pipe to a well casing or to a flow line leading from a well, and a pressure equalizing pipe that establishes communication between the upper end of said container and said flow line or well casing, thereby producing the same pressure in said container above the level of the treating agent therein that exists in the flow line or well casing, and thus causing the treating agent to be fed by gravity to the point where it is used. As such an apparatus overcomes the necessity of using a pump or the like to introduce a treating agent into a crude oil emulsion, it is less expensive to build and operate than the line treating plants heretofore used, and moreover, it enables the quantity of the treating agent that is introduced into the emulsion to be accurately regulated and controlled, due to the fact that the treating agent is discharged from its container by gravity.

Figure 1 of the drawings illustrates one form of apparatus that may be used in practicing my process.

Figure 2 is an enlarged sectional view of the container for holding the treating agent and the mechanism associated with said container for governing the discharge of the treating agent from same.

Figures 3 and 4 illustrate other forms of apparatus that may be used for introducing a treating agent into a flow line; and

Figure 5 is a sectional view of an apparatus embodying my invention that is adapted to be used for introducing a treating agent into the casing of a well in which crude oil emulsion is being produced.

In the various views of the drawings the reference character A designates a pipe leading from the bottom of a well up through which crude oil emulsion of the kind commonly known as "cut oil" or "oily oil" is discharged by the pressure in the well or by means of a pump, B designates a settling tank that is connected by means of a flow line 1 with the discharge pipe A of the well, C designates a receiving tank for receiving and holding oil which is fit for commercial use, commonly referred to as "pipe line oil", and D designates a container for holding a treating agent that is mixed with the crude petroleum traveling through the flow line 1 for causing said emulsion to "break" after the emulsion has entered the settling tank B, and thus permit the oil in the emulsion to rise to the top of the mass and thereafter be discharged into the receiving tank C.

In the apparatus illustrated in Figure 1, which is particularly adapted for use with pumping wells, the container D consists of a closed vessel or chamber of relatively small dimensions mounted on a riser 2 that projects upwardly from the flow line 1 and provided at its upper end with a filling valve 3 through which the treating agent x is in-

troduced into the container. A discharge pipe 4 that leads from the lower end of the container D and discharges into the riser 2 is provided with a valve 5 for regulating the quantity of the treating agent that is admitted to the flow line and a glass gauge 6 is arranged at the side of the container, as shown in Figure 2, so as to enable the operator in charge of the apparatus to ascertain the quantity of treating agent in the container D.

In order that gravity may be used to carry the treating agent from the container D into the flow line 1, I have provided the container D with a pressure equalizing device consisting of a tube 7 arranged inside of said container with its upper end open and in close proximity to the top of the container D and its lower end tapped onto the riser 2. When crude petroleum is passing from the well to the settling tank B through the flow line 1 that is connected to the discharge pipe A of the well, the gases in the flow line are free to enter the upper end portion of the container D through the riser 2 and pressure equalizing pipe 7, thereby causing the pressure in the upper portion of the container D above the level of the treating agent to be the same as the pressure in the flow line. Accordingly, the treating agent x in the container D can pass freely into the flow line 1 and mix with the petroleum emulsion that is traveling through said line to the settling tank B. By manipulating the valve 5 the operator in charge of the apparatus can accurately regulate the amount of treating agent that is mixed with the emulsion traveling through the flow line, said flow line being equipped with a testing valve 8 arranged near the settling tank which the operator opens at intervals and draws off a sample of the treated emulsion.

In the apparatus shown in Figure 3, which is particularly designed for use with flowing wells, the container D which holds the treating agent is formed from a piece of pipe, usually 10 or 12 inches in diameter, closed at its opposite ends and arranged in a horizontal position on supports 9 four or five feet above a flow line 1 that is connected to the casing head E at the upper end of the well casing. Said container D is provided at each end with a filling valve 3^a through which the treating agent can be introduced into same and it is equipped with a glass gauge 6^a for indicating the level of the treating agent and with a regulating valve 5^a for governing the discharge of the treating agent into the flow line 1. The riser 2^a on the flow line into which the treating agent is discharged from the controlling valve 5^a extends upwardly to the upper side of the container D, so as to permit the gas mixed with the emulsion traveling through the flow line to pass upwardly through the riser 2^a and enter the top of the container D above the level of the treating agent therein, thus equalizing the pressure in said container and permitting the treating agent to flow by gravity from same into the flow line 1. Preferably, an oil pipe 10 leads from the receiving tank C to the container D so as to permit oil to be admitted to the container D when the treating agent that is used is of such a character that it is necessary to mix oil with same before said treating agent is admitted to the flow line.

The apparatus illustrated in Figure 4 is also particularly adapted for use with pumping wells, and it is so constructed that the container in which the treating agent is shipped from the factory of the manufacturer of the treating agent can be hooked up with the flow line 1, thereby overcoming the necessity of transferring the treating agent from its shipping container to a separate container that forms an integral part of the apparatus. In the apparatus shown in Figure 4 an elevated support 11 is arranged in proximity to the flow line 1 for receiving a barrel or small drum, usually about 50 gallon capacity, in which the treating agent is shipped from the factory where it is made to the point where it is used. Said barrel or drum, which I have also designated by the reference character D, is provided in its top with a filling valve 3^b, and the bottom and top of said drum are provided with threaded openings for receiving a discharge pipe and a pressure equalizing pipe, respectively. As shown in Figure 4, a discharge pipe that is connected to the bottom of the drum leads to a controlling valve 5^b that governs the discharge of the treating agent from the drum into the flow line 1 and a riser 2^b that is tapped onto the flow line is connected with the top of the drum. A glass gauge 6^b is combined with the drum so as to enable the operator in charge of the apparatus to ascertain the quantity of treating agent in the container D. The operation of said apparatus is the same as the operation of the other forms of apparatus previously described. While I have herein illustrated each form of my apparatus as being equipped with a single settling tank, it will be obvious that additional settling tanks may be used in case a relatively large quantity of crude petroleum is being discharged from the well.

In some instances it is desirable to introduce the treating agent into the emulsion before the emulsion is discharged from the well, and in such cases the container D that holds the treating agent is mounted on a riser or feed pipe 2 that is connected with the head E of the well casing F, as shown in Figure 5. The gases in the well casing F pass upwardly into the upper portion of the container D through the pressure equal-

izing tube 7 that is tapped onto the riser 2, thereby creating the same pressure in the container D above the level of the treating agent therein that exists in the casing F of the well, and consequently, permitting the treating agent to be discharged by gravity from the container D into the well casing F down through which it passes to the emulsion *y* at the bottom of the well.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

An apparatus for treating crude petroleum emulsions, comprising a tank, a flow line leading from a well to said oil tank and adapted to serve as a conduit for petroleum emulsion and gases which emerge from the ground with said emulsion, an elevated container for holding a treating agent, a feed pipe for the treating agent leading from the lower end of said container to the flow line, means for utilizing the gases in the flow line to equalize the pressure in the upper portion of said container, whereby the treating agent will flow by gravity through said feed pipe into the flow line, and an oil pipe leading from said oil tank to said container for permitting oil to be mixed with the treating agent in the container.

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