

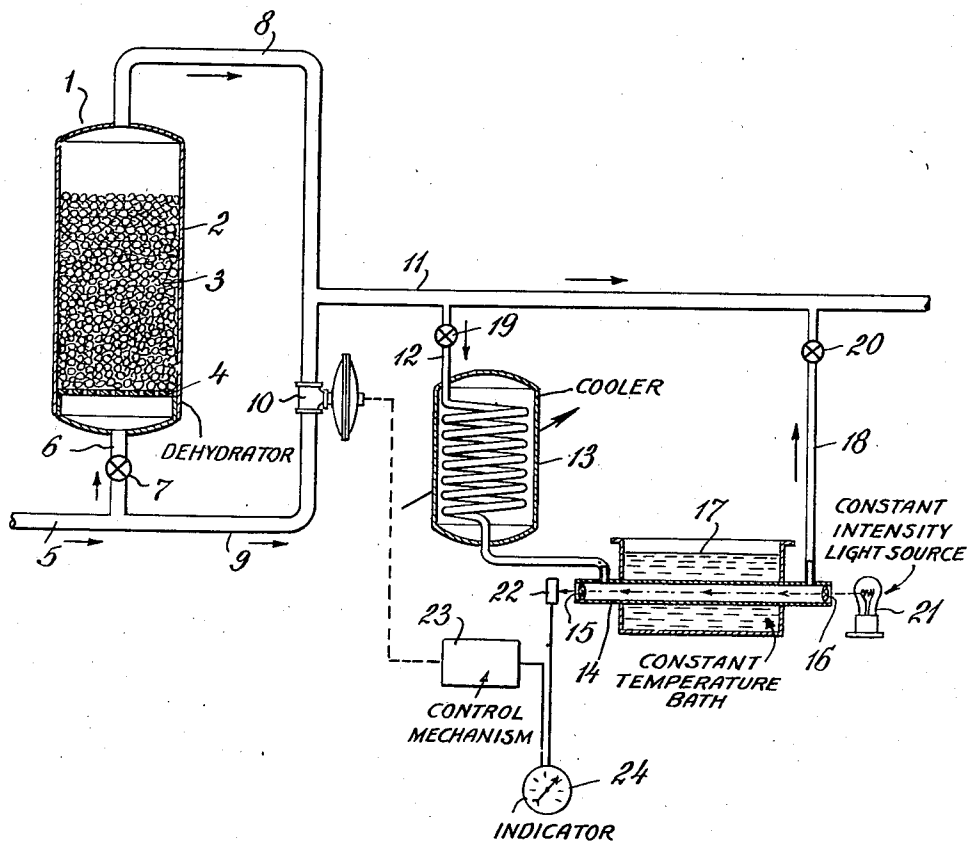
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H. A. RICKETT

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CONTROL METHOD AND APPARATUS

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HENRY A. RICKETT
INVENTOR

BY
Myron J. Burkhart
ATTORNEY

UNITED STATES PATENT OFFICE

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CONTROL METHOD AND APPARATUS

Henry A. Rickett, Riverside, E. L., assignor to
Socony-Vacuum Oil Company, Incorporated,
New York, N. Y., a corporation of New York

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2 Claims. (Cl. 196-4)

This invention has to do with method and means for controlling the degree of dehydration of gasolines, kerosenes and similar hydrocarbon oils.

In United States Patent 2,195,989, to Edward L. Hoffman, there is disclosed a method of controlling the internal corrosion of pipe lines carrying light hydrocarbon oil products by removing from those oils, prior to transportation, the water dissolved in the oil to a sufficient extent to prevent its separation from the oil while passing through the pipe.

In refining, for example in certain treating processes utilizing copper salts for the removal of mercaptans, the control of the amount of dissolved water in an oil is of importance.

This invention has for its object the provision of method and apparatus whereby an indication of the amount of water present in an oil may be readily and accurately arrived at and from which, if necessary, control of dehydrating apparatus and processes may be derived.

The invention may be readily understood by reference to the drawing attached to this specification, the single figure of which shows, in diagram form, both the apparatus for the determination of water and one of the manners in which it may be used to control a dehydration process in connection with which it may be operated.

In the drawing there is shown a dehydrator 1 which may be of any type but is usually a vessel 2 packed with an adsorbent dehydrating material 3 such as activated alumina, or rock salt, supported upon a grid 4 and through which oil to be dehydrated is introduced by pipe 5 and pipe 6 controlled by valve 7, dehydrated oil leaving through pipe 8. A convenient means of controlling degree of dehydration is by dehydrating a major portion of the oil to a greater extent than required and by-passing a portion of undehydrated oil through pipe 9 under control of valve 10 to furnish a final blend of oil in pipe 11 which has the desired amount of moisture.

It must be emphasized here that this process about which we are speaking has nothing to do with the separation of discrete water, such as breaking of emulsions, and the like, but only with treatments for the removal of water completely dissolved in the oil. As pointed out in the Hoffman patent it is frequently not appreciated that fairly considerable quantities of water may be present in optically clear solution in light oils. For example, a gasoline of usual type at 70° F., when saturated, will contain about 0.0080% of

water, and the cooling of such a solution, in the quantities in which gasolines are handled in refineries and pipe lines, will precipitate an appreciable amount of water.

Returning to the drawing, it will be remembered the finished dehydrated gasoline is flowing in pipe 11. From this pipe 11 a by-pass pipe 12 is provided, leading through cooler 13 and pipe 14, which pipe 14 is provided with transparent ends, preferably of optically clear glass, at 15 and 16, and which pipe 14 is immersed in a constant temperature bath 17, which bath is equipped with controls of the usual type, here omitted for simplicity. The by-passed oil stream is returned to pipe 11 through pipe 18 and the entire by-pass may be isolated by cutoff valves 19 and 20.

The method of usual operation is as follows. If the dehydration is desired to be so carried on that the product oil carries not more than a certain maximum amount of water, there is, of course, a certain temperature level at which that amount of water will just saturate the oil, and below which water will be precipitated and form a haze in the oil. If the oil is being dehydrated for purposes of preventing pipe line corrosion, as in the Hoffman patent, it is desired that the water be so reduced that none will separate if the oil is cooled to a certain temperature. In either event, a critical temperature is associated with the operation. In operation then, the constant temperature bath 17 is held at that temperature which is the dividing line between optically clear and hazed oil for the desired water concentration. In such operation the cooler 13 is merely utilized to perform the bulk of the temperature control, leaving to bath 17 the precise control, as is usual in such operations.

Then, a light source 21 may be observed through the oil contained in tube 14, either visually or by some light responsive device as, for example, a photo-electric cell 22. In either event, the absence of haze at the predetermined temperature will indicate acceptably dehydrated oil, and the presence of haze at that temperature will indicate insufficiently treated oil. If visually observed, manual control responsive thereto may effect control of the dehydration, as by adjustment of bypass valve 10, or if observed electrically a suitable control mechanism 23 actuated responsively to the light incident upon cell 22 may be utilized for control of that valve 10. Several such mechanisms may be worked out, and their provision does not at this time constitute a portion of this invention. It is of interest to note that by provision of a tube of suitable length,

the difference between the light transmitted by an optically clear solution and one containing even a slight haze may be quite marked.

Several methods for running dehydration of oils to produce final products of desired water content are noted in the Hoffmann patent mentioned, and this control may be applied equally well to any.

While the bare method above described is merely an inspection of the "pass-no pass" type, a complete supervision to prevent over-dehydration can be accomplished by the addition of a second sight tube and constant temperature bath working at a temperature spaced from and below the temperature of the first bath, in which case an optically clear oil in the first sight tube indicates that enough dehydration is being practiced, while a hazed oil in the second tube gives the information that over-dehydration is not being practiced.

Equally well, with a light intensity responsive device at 22, so connected as to indicate at 24 the intensity of the light falling thereon, the bath temperature may be so chosen as to create a desired intensity of haze with oil of a given water content. Then, greater light transmission than that corresponding to this desired haze intensity indicates over dehydration, and lower light transmission indicates under-dehydration. In this set-up the functioning of control 23 would be no different than before noted.

As in all such mechanisms of this general class, the light source 21 must be one of the many forms

of constant intensity light source usually provided for similar duties.

I claim:

1. Apparatus for control of the degree of dehydration of an oil containing dissolved water comprising an agency capable of reducing the amount of dissolved water to a variable degree, a sight tube through which at least a portion of the dehydrated product from such agency is passed, a constant temperature bath surrounding said sight tube, means for holding said bath at a predetermined temperature, a constant intensity light source at one end of said sight tube, light-intensity responsive means at the other end of said sight tube, and means to control the variably operating dehydrating agency in response to the intensity of transmitted light at the predetermined temperature.

2. A method for the control of a dehydrating apparatus which is removing dissolved water from oil comprising the steps of passing at least a portion of the dehydrated oil through a sight tube at a temperature adjacent the saturation temperature corresponding to the desired water content, passing a light beam of constant intensity through said sight tube, observing the comparative light transmission through the oil in said tube as influenced by the presence, absence, or degree of haze at the predetermined temperature, and varying the operation of the dehydrator in response to said comparative light transmission.

HENRY A. RICKETT.