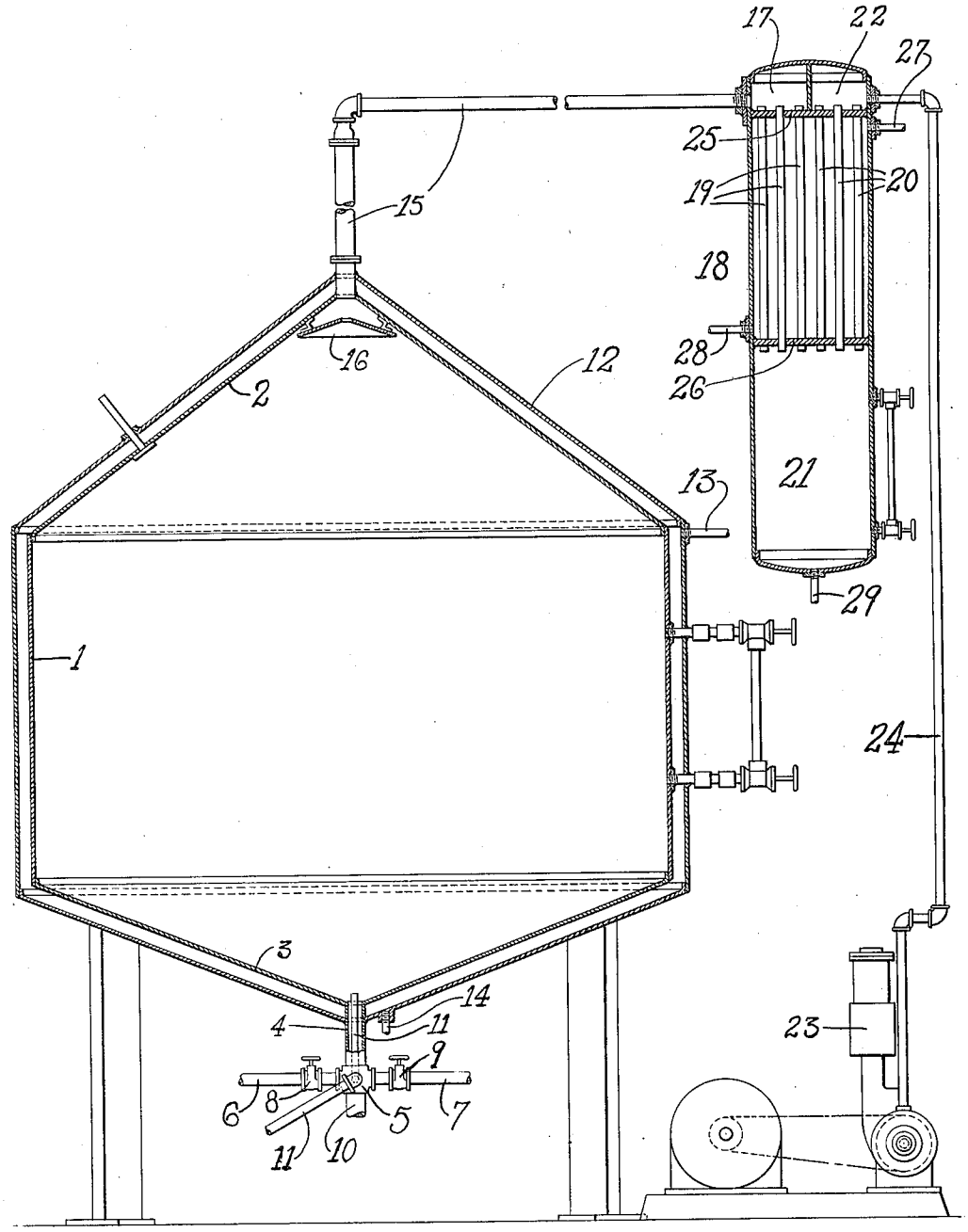
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DEHYDRATION OF OIL

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DEHYDRATION OF OIL

Application filed February 18, 1929. Serial No. 340,693.

This invention relates to the dehydration of oil particularly mineral lubricating oil in a condition such as obtains with used lubricating oil which has previously been treated and washed in a reconditioning process.

In general, the object of the invention is to provide a method and an apparatus for dehydrating oil which permits such a treatment to be carried on much more expeditiously and thoroughly than has been possible heretofore.

How the foregoing together with other objects and advantages are obtained will be clear from a consideration of the following description taken in connection with the accompanying drawing which illustrates the preferred embodiment of the apparatus.

The apparatus consists of a tank 1 having a conical top 2 and a conical bottom 3 adapted to receive a charge of oil thru the connection 4 which, as shown in the drawing, enters the tank at the apex of the bottom 3. At its lower end the connection 4 communicates with the union 5 through which the oil may be introduced or withdrawn by means of the associated pipes 6 and 7, respectively. Valves 8 and 9 are provided in the pipes 6 and 7, respectively to control the flow. A drain pipe 10 also communicates with the union or connecting member 5.

An air jet 11 extending inwardly into the member 5 and upwardly through the connection 4 to the lower apex of the tank may also be provided as will appear more fully hereinafter.

The tank 1 with its conical top and bottom is preferably surrounded by means of the jacket 12 through which steam may be circulated by means of the inlet and outlet pipes 13 and 14.

A pipe 15 communicates with the tank 1 at the apex of its top 2 just below which is arranged a baffle plate 16. At its other end the pipe 15 communicates with the chamber 17 of the condenser indicated as a whole by the reference character 18. The condenser 18 is preferably provided with two sets of tubes 19 and 20, the former serving to establish communication between the chamber 17 and the sump 21 and the latter providing suitable communication between the sump 21 and the chamber 22. A vacuum pump 23 communicating with the chamber 22 thru the connection 24 operates to withdraw vapor from the tank 1 serially thru the pipe 15, chamber 17, pipes 19, sump 21, tubes 20 and the chamber 22.

The tubes 19 and 20 are preferably secured in sheets 25 and 26 which cooperate in forming a chamber within the condenser 18 thru which water or any other suitable cooling medium may be circulated, an inlet 27 and an outlet 28 being provided for that purpose. A drain pipe 29 serves to remove the condensate from the sump 21.

The apparatus and method of the present invention is particularly adapted to treat oil which is in a "damp" condition in contradistinction to oil in an emulsified condition or oil carrying entrained drops of water although the method and apparatus will also effectively remove a substantial quantity of entrained water. As already pointed out the invention is primarily useful in the treatment of oil which has previously been treated and washed to clarify it after use, the method serving to remove the dampness or moisture which the oil has picked up from the previous treatment and washing. A method for accomplishing such treating and washing steps is disclosed in my copending application, Serial Number 210,545.

In carrying out the process of the present invention a bath of oil is admitted to the tank 1 thru the connection 4, valve 8 and pipe 6. I prefer to position the tank 1 at a level with respect to the source of oil supply such that the oil will flow thereinto by gravity, the pipe 6 being suitably extended upwardly to the source of supply for that purpose. A normal batch of oil will fill the tank to about the bottom of its conical top 2.

When a batch is delivered to the tank the valve 8 is closed and steam at about 15 lbs. pressure is circulated thru the jacket 12 by means of the connections 13 and 14. The oil is now heated to a temperature which corresponds to about 15 lbs. steam pressure (about 240 degrees Fahrenheit) and the vacuum pump 23 is started. The action of the pump

reduces the pressure in the tank above the oil to that which would be equal to about 20 or 25 inches of mercury. At this point any suitable gaseous medium such as air is introduced at the bottom of the tank. This may be accomplished either by the admission of air at atmospheric pressure thru the pipe 6 preferably from a point above the level of the oil in the tank or by the admission of air at pressures greater than atmospheric thru the jet 11.

The admission of the air causes an extremely violent agitation of the oil in the tank somewhat after the manner of an explosion. In some instances I find it more advantageous to admit the air at atmospheric pressure thru the pipe 6 rather than under greater pressure thru the pipe 11 on account of the fact that a larger volume or column of air may be introduced thru the relatively large connection 4 with the result that the agitation and breaking of the vacuum are more sudden and violent.

The effect of the introduction of the gaseous medium will be apparent from the following:

Before such introduction takes place, the moisture in the oil has been vaporized on account of the temperature to which it has been heated and some of this moisture will rise out of the body of oil in the form of vapor and be drawn by the vacuum pump thru the connection 15 and into the tubes 19 and 20 of the condenser where it is again transformed to a liquid state and accumulates in the sump 21. However, the frictional resistance of the oil on the vapor is so great as to materially hinder the separation of the vapor. When the air is introduced at the bottom of the tank and the incident "explosion" occurs, the vaporal friction is greatly reduced and with the aid of the air moving upwardly thru the oil, the vapor rises and separates very readily. The facility of the separation is probably enhanced both by the action of the air in actually breaking up the body of the oil and also the action of the air in combining with or absorbing the vapor during its ascent in the tank.

In any case, immediately after the introduction of the air several inches of condensate may be observed in the sump 21 of the condenser.

To remove the average moisture content in oil of the character above noted, it is usually advantageous to repeat the above operation five or six times after which practically no moisture at all will remain in the batch in the tank. The number of times which it is necessary to repeat the action will, of course, vary according to the moisture content of the particular oil being treated. An operator may be advised as to when a particular oil is thoroughly dried by examining the accumulation of condensate in the sump 21 following each "explosion".

My invention, therefore, contemplates a method of dehydration which may be accomplished much more expeditiously and effectively than was possible heretofore, by reducing or breaking down the friction of the vapor on the oil.

I claim:—

1. The method of dehydrating lubricating oil which includes heating a body of the oil to a temperature preferably above the boiling point of water but below the distillation point of the oil under treatment, creating a vacuum at the surface of said body by reducing the pressure to a point materially below atmospheric, subsequently at least materially increasing the pressure by admitting air into the body of oil below said surface, the air admitted being at a pressure so related to the originally reduced pressure at the surface to cause violent agitation of the oil during the pressure increasing step and thus release water or moisture vapor present in the body by virtue of the temperature and pressure conditions, and separating the vapor from said body of oil.

2. The method of dehydrating lubricating oil which includes heating a body of the oil to a temperature preferably above the boiling point of water but below the distillation point of the oil under treatment, creating a vacuum at the surface of said body by reducing the pressure to a point materially below atmospheric, subsequently at least materially increasing the pressure by admitting a gas into the body of oil below said surface, the gas being substantially inert under the conditions used and being admitted at a pressure so related to the originally reduced pressure at the surface to cause violent agitation of the oil during the pressure increasing step and thus release water or moisture vapor present in the body by virtue of the temperature and pressure conditions, and separating the vapor from said body of oil.

In testimony whereof I have hereunto signed my name.

LEONARD D. GRISBAUM.