Aug. 28, 1934. E. S. PEARCE 1,971,379

METHOD OF AND APPARATUS FOR MIXING OILS

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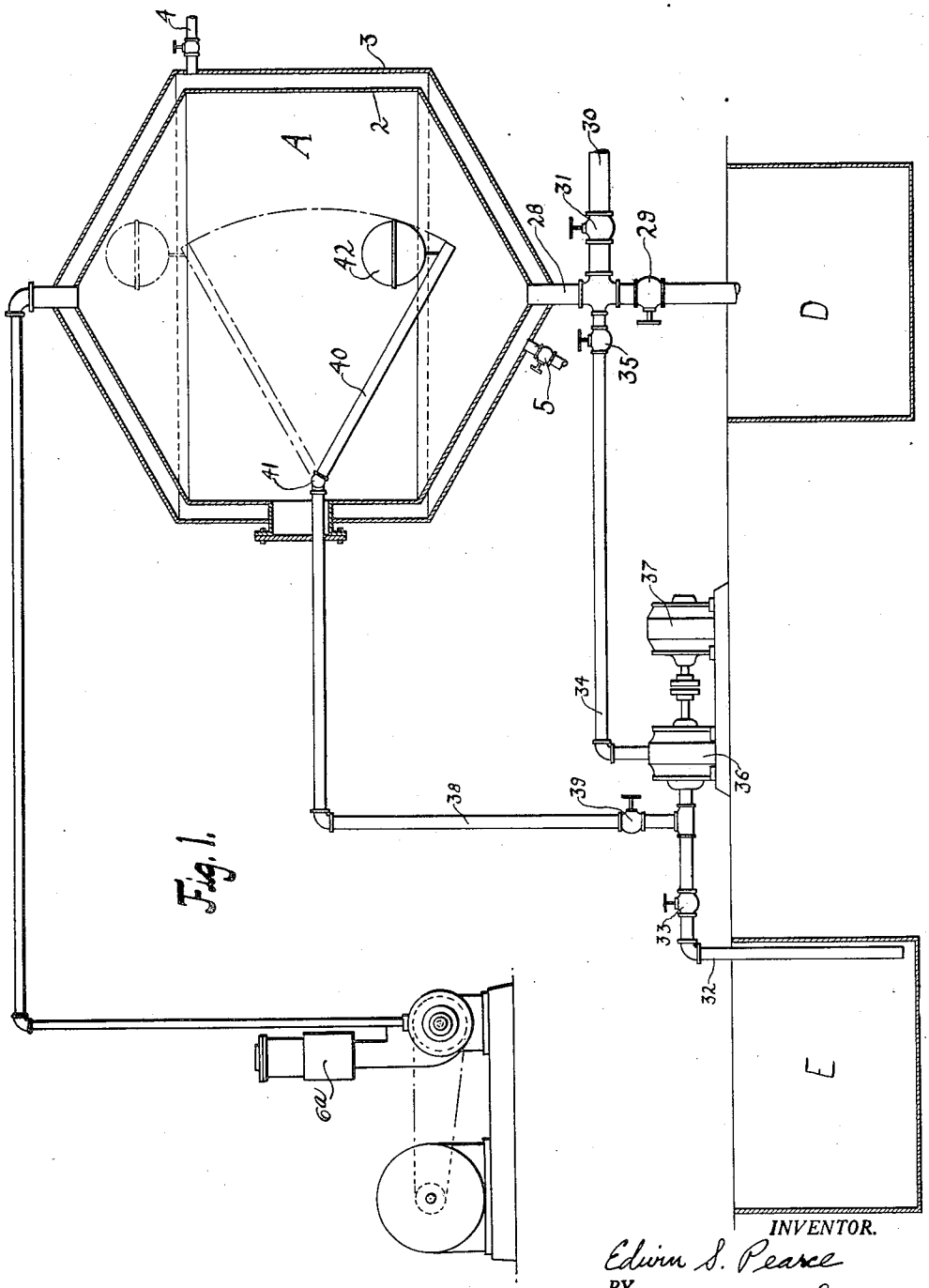


Fig. 1.

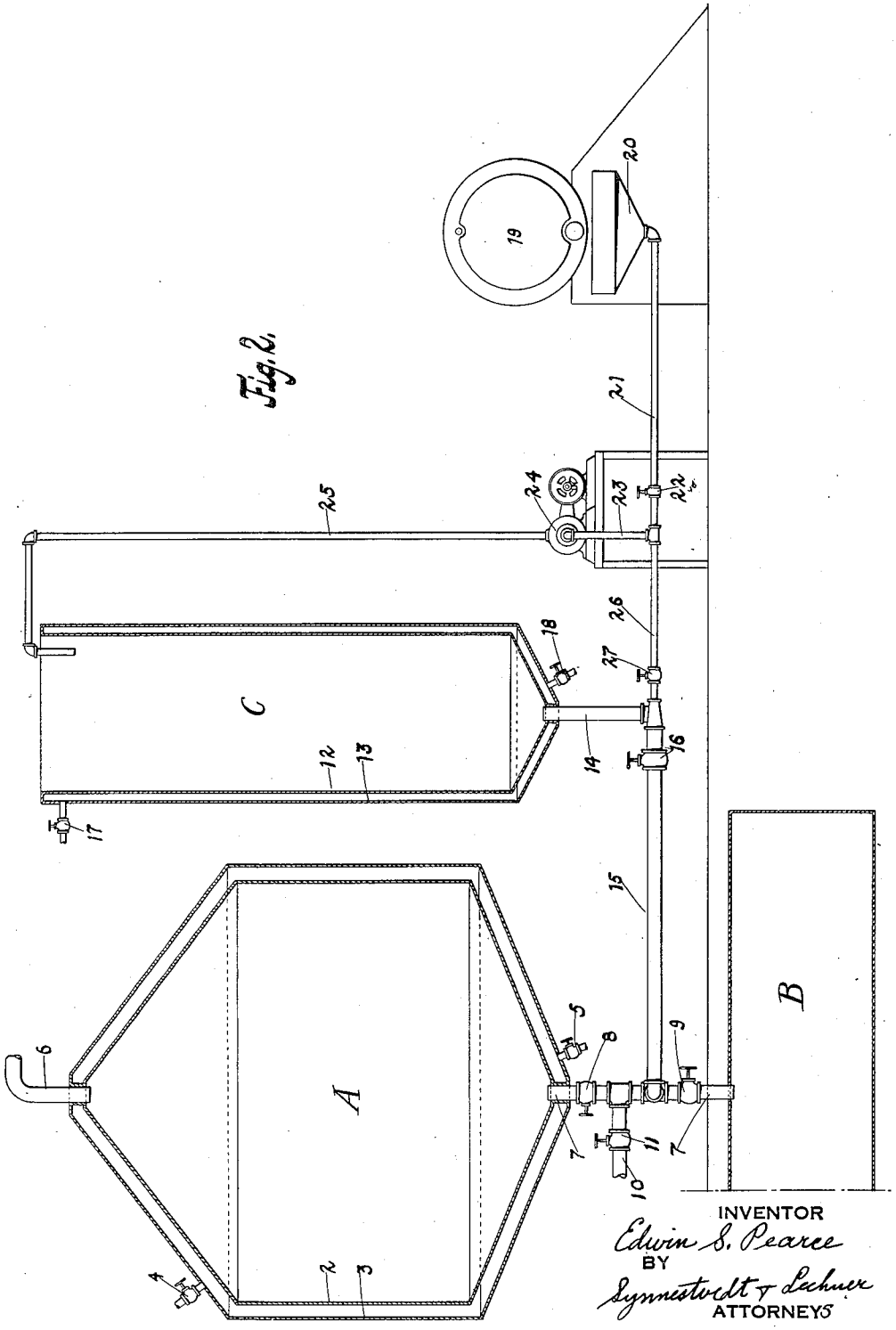
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Fig. 2.



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METHOD OF AND APPARATUS FOR MIXING OILS

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Application April 24, 1930, Serial No. 446,886

7 Claims. (Cl. 196—16)

This invention relates to a method of and apparatus for mixing oils, particularly such oils as are employed in the lubrication of railway journal boxes.

The nature, objects and advantages can best be understood from a consideration of the following remarks:

In the upkeep of the journal boxes of railway vehicles, it is advantageous, in order to maintain the best possible lubrication at all seasons of the year, to employ oils having different characteristics with respect to viscosity, "cold test" and "pour test" according to the particular season of the year at which the oil is used. To this end, it has become customary with a great many railroads to use what might be termed "light" oil in the winter time and "heavy" oil in the summer time. For example, oil to be used in the summer season might have a viscosity in the neighborhood of 60 at 212 degrees F. while the viscosity of oil for winter use might range between about 35 to 40 at 212 degrees F.

When oils of this character are renovated for reuse, say, for example, at the end of a summer season or "shift" they do not have the characteristics most desirable in an oil adapted for use during the immediately succeeding season. As a result, in order to obtain the most efficient lubrication, after renovation at the end of a season, the characteristics of the oil should be altered to suit the succeeding season or else such oil must be stored away for the following one-half year, such storage being undesirable and inconvenient.

Furthermore, journal lubricating oils, particularly those which are adapted to winter service, contain certain volatile components which are driven off in service as a result of the heat produced by the rubbing of the journal in its bearing. The driving off of the more volatile components from "winter" oil tends, at least in certain respects, to bring the characteristics of the oil nearer to those which are desirable in a "summer" oil. However, in spite of the fact that "summer" oil is not very greatly changed in character during its period of use, if such summer oil is renovated at the end of the season, it is necessary to alter its character quite materially in order that it may afford truly efficient lubrication during the winter season.

The most important time, therefore, at which the character of a journal box lubricating oil should be changed in order to avoid storage over long periods of time, is when such oil is renovated for re-use at the end of a summer season. To this end "cut-back" or relatively light oils are mixed with renovated oils at the end of the summer season in order to fit them for winter use.

The present invention provides a novel and advantageous method and apparatus for affecting suitable mixture of various oils in order to alter their characteristics and it should be noted that although the mixing apparatus of the present invention is shown and described as being associated with a portion of an oil renovating plant, not all of the features of the invention are limited in their application or utility to association with oil renovating apparatus.

The drawings illustrate two forms of apparatus adapted for operation after the manner of the method of the present invention, Fig. 1 being a somewhat diagrammatic showing of the preferred form of apparatus, the lay-out being viewed from one side, with certain of the tanks employed shown in vertical section.

Fig. 2 is a view similar to Fig. 1 illustrating a modified form of apparatus.

In both of the figures, the reference character A designates a mixing tank which, in all essential respects, is similar to the dehydrating tank illustrated in the copending applications of Leonard D. Grisbaum, Serial Nos. 210,545 and 340,693, filed August 4th, 1927 and February 18th, 1929, respectively, issued as Patents Nos. 1,791,473 and 1,848,125 under dates of February 3, 1931 and March 8, 1932, respectively. This tank includes an inner shell 2 and an outer shell or wall 3 spaced apart to provide a heating jacket for the contents of the tank. The heating is effected by the introduction of steam thru the inlet 4 and the circulation thereof within the space between the tank walls 2, 3. An exhaust or outlet 5 is also provided.

This tank is preferably conical in configuration both at its bottom and at its top and at the apex of the upper conical portion a connection 6 is provided by means of which air may be withdrawn from the tank and the pressure therein reduced. This is preferably done by means of a vacuum pump 6a (shown somewhat diagrammatically in Figure 1) which is suitably connected, at its intake side, with the pipe 6.

In accordance with the preferred embodiment of the invention (see Fig. 1), a connection 28 is provided at the apex of the bottom of tank A and extends downwardly therefrom thru the valve 29 to the storage tank D or to some other suitable point of use. In addition a connection

30, valved at 31 is tapped into the pipe 28 and serves to admit oil to the tank A.

A tank E serves a source of supply of the oil which it is desired to mix with the oil undergoing renovation in tank A. Oil may be withdrawn from tank E and discharged into the tank A by means of the connections and valves 32, 33, 34 and 35, the connection 34 being tapped into the pipe or conduit 28. A pump 36, operated by motor 37 is preferably interposed between the connections 32 and 34 in such manner as to lift oil thru the former and discharge the same into the tank A thru the latter.

In addition to the foregoing, a connection 38 is preferably tapped into the connection 32 at a point between the valve 33 and the intake side of the pump 36. This connection 38 is preferably valved at 39 and communicates with the swivel or swing pipe 40 in the tank A, the said swivel pipe being pivoted on a horizontally disposed axis as indicated at 41. A float device 42 is attached to the free end of the pipe 40 and serves to maintain the inlet opening thereof adjacent to the upper surface of the oil in tank A.

In considering the operation of the form of apparatus illustrated in Figure 1, it should be borne in mind that the oil being treated in tank A in accordance with the disclosures of the copending applications above referred to, is introduced into the tank thru the connection 30, valve 31 and connection 28. After introduction in this manner, the oil is given a dehydrating treatment which includes the application of heat (produced by the circulation of steam thru the connections 4 and 5) and the reduction of the pressure in the tank by operation of the vacuum pump communicating with the connection 6. Before the oil in tank A has cooled substantially from the dehydrating temperature and, preferably, while the pressure in the tank is low relative to atmospheric pressures, the pump 36 is operated and the valves 33 and 35 suitably set to provide discharge of oil from the tank E into the tank A until the desired relative quantities of each are present in such tank.

At this time the valve 33 is closed and the valve 39 opened with the result that the oils in tank A are circulated by the pump 36, the withdrawal of the oil being effected at the upper surface of the batch in the tank A and the return thereof being had at the apex of the conical bottom.

The withdrawal and return of the oil at the points specified above result in thorough admixture of the oils in the tank. In addition it should be noted that the conical formation of the tank at the bottom with the return pipe communicating at the apex or lowest point promotes thorough admixture by causing an agitation or circulation of the oil within the tank A itself with the point of initiation of the agitation so positioned as to cause movement or circulation of the entire charge of oil in the tank.

After a suitable period of treatment in the apparatus of Figure 1, the mixed oils may be discharged into the tank B by opening the valve 29.

Referring now to the modification of Fig. 2 it should be noted that at the bottom of the tank A a connection 7 is provided and preferably valved as indicated at 8 and 9. The connection 7 terminates in any suitable reservoir or storage tank B. A pipe 10, valved at 11, is tapped into the connection 7 between the valves 8 and 9 and serves to introduce the oil undergoing renovation into the tank A.

According to this form of the apparatus, a tank C having inner and outer walls 12 and 13 is provided and is connected to the tank A by means of the pipe 14, pipe 15 and the valve 16, the pipe 15 being tapped into the connection 7 between the valves 8 and 9. Inlet and outlet connections 17 and 18 serve to circulate steam within the space between the walls 12 and 13 of tank C and thus to heat its contents.

The cut-back or other oils which are to be mixed with the renovated oil may be delivered from suitable drums or containers, such as that indicated at 19, into a receiving funnel 20 from where the oil is conducted by means of the pipe 21, valved at 22, to the connection 23 communicating with the intake side of a pump 24. The discharge side of the pump communicates with the pipe 25 which delivers the oil into the tank C at the top thereof. For reasons which will appear more fully hereinafter a connection 26 which is valved at 27 is provided between the pipe 14 and the intake connection 23 to the pump 24.

In considering the operation of the form of apparatus illustrated in Fig. 2, it should be noted that the oil being renovated is delivered to the tank A thru the connections and valves 10, 11, 8 and 7. In this connection it should also be noted that the function of the tank A in the renovation process of the applications above referred to is to dehydrate or remove dampness or moisture from previously cleaned oil. This is accomplished by heating a batch of such oil in the tank A by the circulation of steam thru its jacket. In addition the pressure on the upper surface of the batch is reduced by means of the vacuum pump (not shown) which communicates with the pipe 6, preferably thru the intermediation of a suitable condenser (not shown). When the pressure in the tank A above the batch of oil therein is reduced to a point which would equal about 20 or 25 inches of mercury, air, preferably at atmospheric pressure, is admitted to the tank A thru the connection 10. This admission of air results in extremely violent agitation of the oil in tank A with the result that the moisture contained therein, now in the form of vapor by virtue of the heating, is very quickly and effectively drawn out through the connection 6 from where it may be disposed of in any suitable manner as, for example, by means of a condenser. This operation may be repeated five or six times in order to remove all traces of moisture in the oil. The foregoing operation of the tank A is that which is preferably carried out when this portion of the apparatus is employed as a part of an oil renovation plant. Furthermore, it should be noted that this operation is not a part of the present invention per se but is briefly described herein in order to aid in a complete understanding of the cooperation of all the various parts of the apparatus and steps of the method to which the appended claims are directed.

According to the showing of Fig. 2 when it is desired to mix the renovated oil with a cut-back oil, a batch of the latter is delivered from the drum 19 into the funnel 20 and by suitable manipulation of the valves 22 and 27 is pumped into the tank C thru the pipes 21, 23 and 25. The batch now in tank C is heated preferably to about the temperature of the oil in tank A,

by circulating steam thru the connections 17 and 18. At the same time the batch of dehydrated oil is retained in the tank A and the pressure on the upper surface thereof is again reduced or lowered. At this time and with both batches of oil in a heated condition, the valves 8 and 16 are opened with the result that the atmospheric pressure on the top of the batch in tank C forces such batch thru the connections 14, 15 and 7 into the tank A. The introduction of the oil from tank C into tank A is accompanied by violent agitation and, as a result, thorough and complete admixture of the oils is effected. After this operation the oils may be withdrawn from the tank A to any suitable point of use or to the storage tank B.

When it is desired to mix the renovated oil with several other oils, such other oils are preferably introduced into the tank C thru the funnel 20 and connections 21, 23 and 25. These oils in the tank C may be thoroughly mixed by closing the valve 22, opening the valve 27 and utilizing the pump 24 to agitate or circulate the contents of the tank C by withdrawing the oil at the bottom thereof and delivering it to the top thru the pipe 25. It is particularly desirable to effect this preliminary mixing when, in addition to the cutback oil, it is desired to introduce gurry fish oil or some oil of like character. A small quantity of oil of this latter type is sometimes introduced in order to give warning when a hot box develops in one of the journals in which the oil is used. Oils which are added for this purpose produce large quantities of smoke or else a strong or pungent odor. In either event the attention of a trail crew is attracted very quickly to the source of the trouble.

It is obvious that any number of oils desired may be preliminarily admixed in the tank C and when such admixture is completed and the resultant oil brought to a suitable temperature, the contents of tank C may be transferred to the tank A and mixed with the renovated oil therein in the manner already described.

In conclusion, attention is called to the fact that the mixture of the various oils is carried out under the most favorable conditions possible. The relatively high temperatures maintained are advantageous because oils may be mixed more effectively and readily when they are in a relatively fluid state. In this connection, it should also be observed that the association of the mixing apparatus with an oil renovation plant is particularly advantageous in view of the fact that effective renovation requires the use of relatively high temperatures. The carrying out of the mixing operation, therefore, before the renovated oil loses its heat makes for the greatest possible efficiency. The association of the renovation and mixing apparatus is also advantageous because it makes for simplicity and convenience of construction and operation.

Finally, it might be noted that, particularly with the type of apparatus illustrated in Fig. 1, mixing is effected under conditions which reduce the effects of oxidation by air to a minimum.

I claim:—

1. Apparatus for mixing oils including a vessel having a conical bottom, means for introducing a plurality of oils to be mixed into said vessel and circulating means for withdrawing oil from a point above the bottom of said vessel and returning the oil withdrawn to the vessel through the apex of the bottom thereof.

2. Apparatus for mixing oils including a vessel having a conical bottom, means for introducing a plurality of oils to be mixed into said vessel and circulating means for withdrawing oil from a point above the bottom of said vessel and returning the oil withdrawn to the vessel through the apex of the bottom thereof, together with means for removing air from said vessel.

3. Apparatus for mixing oils including a vessel adapted to receive a charge of oil, a source of supply of another oil, a pump, a communication between said source and the intake side of said pump, a communication between an upper part of said vessel and the intake side of said pump and a communication between a lower part of said vessel and the discharge side of said pump, together with means for removing air from said vessel.

4. Apparatus for mixing oils including a vessel, circulating means having an outlet adapted to discharge oil into the vessel at the bottom thereof and an inlet adapted to receive oil from the upper portion of the vessel and means for maintaining said inlet at the upper surface of the oils being mixed in the vessel, together with means for removing air from said vessel.

5. Apparatus for treating oils including a vessel with means for heating its contents, a second vessel with means for heating its contents, separate means for introducing oil into the vessels and a communication therebetween, together with means for causing a circulation of the contents of the second mentioned vessel and means for transferring the contents of the second mentioned vessel to the first mentioned vessel and for mixing the transferred oil with the contents of the first mentioned vessel.

6. Apparatus for mixing oils including a vessel having a conical bottom, means for introducing a plurality of oils to be mixed into said vessel, and circulating mechanism including a pump having a communication for discharging oil into the apex of the bottom of said vessel, a communication extended between the intake side of the pump and an upper portion of the vessel, and float means associated with the communication last mentioned for maintaining its inlet end substantially at the surface of the oil in the vessel.

7. In the art of treating and handling oils, the steps of introducing a batch of one oil into a substantially closed vessel, heating said batch to dehydrate it, the temperature of the heating being sufficient to vaporize moisture but materially below distilling temperature of the particular oil, reducing the pressure in the vessel above the surface of the batch therein to a point materially below atmospheric, thereafter admitting air into the vessel below the surface of the batch to pass upwardly therethrough and at least partially satisfy the reduced pressure, again reducing the pressure in the vessel above the surface of the batch therein to a point materially below atmospheric and thereafter introducing a batch of another oil into the vessel below the surface of the first batch to pass upwardly therethrough and effect mixture of the two batches.

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