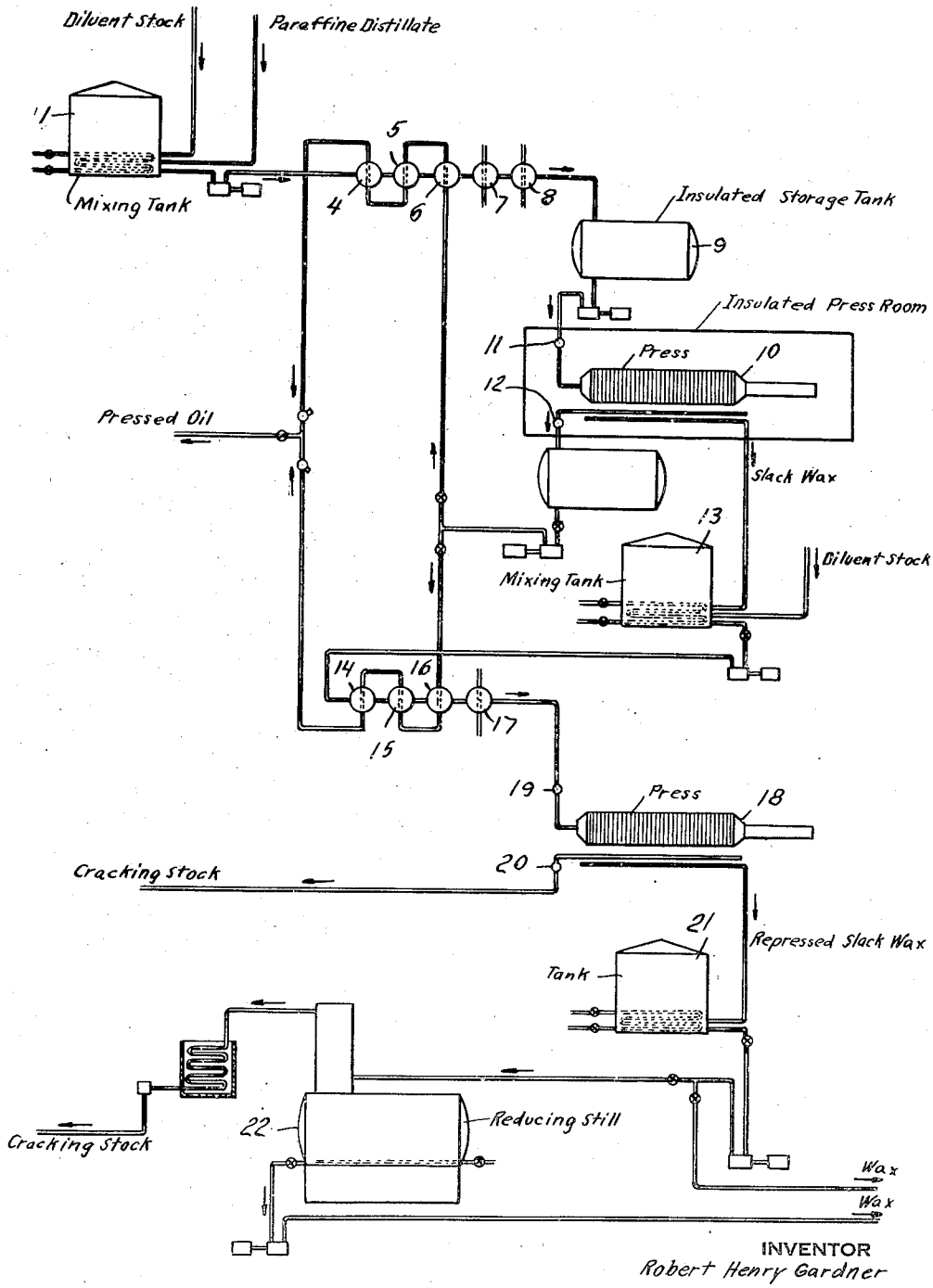
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ART OF DEWAXING HYDROCARBON OILS

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## ART OF DEWAXING HYDROCARBON OILS

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5 Claims. (Cl. 196—19)

This invention relates to improvements in the production of neutral oils and crystalline wax from paraffin distillates. In referring to "paraffin distillates" reference is intended to fractions including a major portion of the crystalline wax such as those distilled from crude petroleum stocks derived from paraffin base or mixed base crude petroleums. In referring to "neutral oils" reference is intended to lubricating oil stocks produced from paraffin distillates by a separation of all or part of the contained wax.

In carrying out the present invention, a chilled stock mixture including paraffin distillate and a diluent oil of lower boiling range is pressed to separate crystalline wax from the mixture, the diluent oil is distilled from the pressed stock mixture to separate a neutral oil, or several neutral oils of varying characteristics, therefrom, and a chilled stock mixture including the separated wax and a diluent oil of boiling range lower than the wax and not lower, advantageously higher, than the first-mentioned diluent oil is pressed to separate crystalline wax from the mixture. Any included diluent oil may be distilled from the separated crystalline wax.

The diluent oils which may be used with advantage in the first pressing operation include naphtha, kerosene and gas oil. In referring to "naphtha", reference is intended to low boiling distillate petroleum fractions such as, for example, distillate fractions having a boiling range of 200–300° F. or 300–400° F. The use of naphtha diluents affords some advantages over the use of higher boiling kerosene and gas oil diluents in that equivalent viscosities can be obtained with less dilution. In referring to "gas oil" reference is intended to distillate petroleum fractions having a viscosity, for example, lower than about 50 seconds (Saybolt-universal) and boiling generally upwards of 500° F. The use of gas oil diluents affords some advantages where extreme freedom from odor of the crystalline wax produced is important.

The diluent oils which may be used with advantage in the second pressing operation include gas oil and pressed paraffin distillate. The use of a diluent oil, particularly lower boiling diluent oils, in the first pressing operation apparently involves, at least in some cases, the separation of wax of unsatisfactory crystalline structure but, in the combined operation of the invention, the use of a diluent oil, particularly a higher boiling diluent oil, in the second pressing operation apparently corrects this tendency.

Among the advantages of the invention, the increase in capacity to be obtained with any given pressing plant is particularly important. This increase in capacity appears in at least two aspects. First, the net capacity per press per day in terms of paraffin distillate pressed is substantially increased, in some cases as much as two-fold or three-fold or more. Second, the invention makes it possible to handle with economic advantage higher viscosity paraffin distillates, paraffin distillates having a viscosity of 150 seconds at 100° F. as compared to paraffin distillates having a viscosity of 120 seconds at 100° F. for example.

The following example of an operation embodying the invention, in connection with which the accompanying drawing may be regarded as a diagrammatic flow sheet, will further illustrate the invention.

Paraffin distillate having a viscosity, for example, in the range of 100–150 seconds at 100° F. is mixed in tank 1 with an amount of diluent oil sufficient to bring the viscosity of the mixture within the range, for example, of 50–80 seconds at 100° F., this mixture being effected at a temperature, for example, of 80–100° F. A 48–50 API gravity, 300–400° F. boiling range naphtha, or a 42–43 API gravity kerosene, or a 36–38 API gravity 0–15° F. pour test gas oil, for example, is used as the diluent oil. The mixture from tank 1 is pumped through a series of heat exchangers 4, 5 and 6 and a pair of direct expansion ammonia chillers 7 and 8 to an insulated storage tank 9. The mixture is cooled to a temperature, for example, of 50–70° F. as it leaves the heat exchanger 6 and in the chillers 7 and 8 is brought to a temperature such that a temperature of −13° F. to +7° F. is maintained in the tank 9. From the tank 9, the chilled mixture is pumped through a press 10, one of a series connected by headers 11 and 12. This series of presses is arranged in insulated rooms in which the temperature is maintained, for example, in the range 5–30° F. The temperature of the pressed oil approximates, for example, 5–30° F. As each press run is completed, the press is unracked and the separated slack wax, having a melting point of 92–105° F. for example, is spudded from the press, melted, and discharged to a mixing tank 13. In the mixing tank 13 a diluent oil, 36–38 API gravity, 0–15° F. pour test gas oil for example, is mixed with the slack wax, a temperature of 100–115° F. for example being maintained in the mixing tank. This mixture is pumped through a series of heat exchangers 14, 15 and 16 and a direct expansion

ammonia chiller 17 to a press 18, one of a series connected by headers 19 and 20. The mixture is cooled to a temperature, for example, of 80–90° F. as it leaves the heat exchanger 16 and in the chiller 17 is brought to a temperature, for example, approximating 40–50° F. The pressed diluent oil separated from the crystalline wax in press 18 may be used as charging stock in a cracking operation to produce gasoline. At the end of each press run, the crystalline wax is spudded from the press, melted and discharged to tank 21 in which it is maintained at a temperature, for example, of 115–120° F. This wax may be discharged directly from the tank 21 to a sweating operation for the production of finished wax or it may be discharged to a reducing still 22 for the distillation from the wax of any included diluent oil and from the reducing still discharged to a sweating operation for the production of finished wax. The reducing still, for example, may be a steam still or a fire and steam still. Any diluent oil separated from the wax in the reducing still 22 may be utilized as charging stock in a cracking operation for the production of gasoline. The repressed slack wax collected in the tank 21 may have a melting point, for example, of 105–115° F. and may comprise, for example, from 50–80% of the single pressed slack wax collected in the tank 13. The repressed slack wax discharged from the reducing still 22 may have a melting point, for example, of 107–120° F. The pressing operation carried out in the press 10 may be carried out for the production, for example, of 0° F. pour test or 15° F. pour test neutral oils. Due to a limited solubility of wax in the diluent oils, it is usually advantageous to carry out the first pressing operation at temperatures somewhat lower than that usually used. The pressed stock mixture separated in the press 18 is pumped in part through the heat exchangers 6, 5 and 4 and in part through the heat exchangers 16, 15 and 14, being brought to a temperature, for example, of 80–90° F. by this heat exchange. The division of this stock between the two series of heat exchangers may vary widely; three-fourths of it may be passed through the heat exchangers 6, 5 and 4 and one-fourth of it may be passed through the heat exchangers 16, 15 and 14 for example. Following this heat exchange, this pressed stock mixture is supplied to a reducing still (not shown) in which the diluent oil component of the stock mixture is separated from one or more neutral oils. Any appropriate conventional reducing still may be used to carry out this part of the operation; a pipe still-tower fractionating system for example may be used with advantage.

I claim:

1. In the production of neutral oils and crystalline wax from paraffin distillates, the improvement which comprises pressing a chilled stock mixture including paraffin distillate and a diluent oil of lower boiling range to separate wax from the mixture, distilling the diluent oil from the pressed stock mixture to separate a neutral oil therefrom, and pressing a chilled stock mixture including the separated wax and a diluent oil of boiling range lower than the wax and higher than the first-mentioned diluent oil to separate crystalline wax from the mixture.

2. In the production of neutral oils and crystalline wax from paraffin distillates, the improvement which comprises pressing a chilled stock mixture including paraffin distillate and a diluent oil of lower boiling range to separate wax from the mixture, distilling the diluent oil from the pressed stock mixture to separate a neutral oil therefrom, pressing a chilled stock mixture including the separated wax and a diluent oil of boiling range lower than the wax and higher than the first-mentioned diluent oil to separate crystalline wax from the mixture, and distilling any included diluent oil from the separated crystalline wax.

3. In the production of neutral oils and crystalline wax from paraffin distillates, the improvement which comprises pressing a chilled stock mixture including paraffin distillate and a kerosene diluent to separate wax from the mixture, distilling the kerosene diluent from the pressed stock mixture to separate a neutral oil therefrom, and pressing a chilled stock mixture including the separated wax and a gas oil diluent to separate crystalline wax from the mixture.

4. In the production of neutral oils and crystalline wax from paraffin distillates, the improvement which comprises pressing a chilled stock mixture including paraffin distillate and a naphtha diluent to separate wax from the mixture, distilling the naphtha diluent from the pressed stock mixture to separate a neutral oil therefrom, and pressing a chilled stock mixture including the separated wax and a gas oil diluent to separate crystalline wax from the mixture.

5. In the production of neutral oils and crystalline wax from paraffin distillates, the improvement which comprises pressing a chilled stock mixture including paraffin distillate and a diluent oil of lower boiling range to separate wax from the mixture, distilling the diluent oil from the pressed stock mixture to separate a neutral oil therefrom, and pressing a chilled stock mixture including the separated wax and a pressed paraffin distillate diluent having a boiling range lower than the wax and higher than the first-mentioned diluent oil to separate crystalline wax from the mixture.

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