Patented Nov. 6, 1945

2,388,412

UNITED STATES PATENT OFFICE

2,388,412

FRACTIONATION OF TALL OIL

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No Drawing. Application April 25, 1940, Serial No. 331,602

5 Claims. (Cl. 260—97.5)

This invention is concerned with the fractionation of tall oil.

Tall oil is composed principally of rosin acids and fatty acids. The most valuable part of tall oil is its fatty acid content. In our copending application Serial No. 264,780, filed March 29, 1939, U. S. Patent 2,247,496, a process of refining and fractionation of tall oil has been described. The method outlined therein is particularly applicable to a batch process. We have discovered that the fatty acid content of tall oil can be separated from the other constituents in a continuous process using liquefied, normally gaseous, hydrocarbons. The advantages of the present process are that it makes possible economies in heat and equipment as well as increasing the yield of substantially pure fatty acids.

The fatty acids are extracted from crude tall oil by liquefied, normally gaseous, hydrocarbons at temperatures such that only fatty acids are soluble in the hydrocarbon solvent. The extraction is most economically carried out in a continuous counter-current manner. Crude tall oil is introduced at one end of the extraction system and a liquefied, normally gaseous, hydrocarbon introduced at the other end of the extraction system. A solution of fatty acid dissolved in the liquefied, normally gaseous, hydrocarbon is withdrawn from one end of the system and a liquid composed primarily of rosin, in which some of the liquefied, normally gaseous, hydrocarbon is dissolved, is withdrawn from the other end. The simplest type of contacting equipment such as a packed tower can be employed. Crude tall oil which has been preheated to the proper temperature is introduced close to the top of the tower. A liquefied, normally gaseous, hydrocarbon is introduced close to the bottom of the tower. The hydrocarbon solution of fatty acids is withdrawn from the top of the tower while a liquid composed principally of rosin, in which a small percentage of the liquefied, normally gaseous, hydrocarbon is dissolved, is withdrawn from the base of the tower.

The temperature at which the extraction is carried out is a function of the composition of the solvent employed and the ratio of volume of tall oil treated to volume of solvent used. If it is desirable, a temperature gradient can be maintained between the two ends of the extraction system. In counter-current processes of this type, it is desirable that the two immiscible liquids be as fluid as possible and differ widely in density. As the tall oil is a very viscous material at room temperature, it is desirable to operate at elevated temperatures. For this reason, propane is the preferred solvent. When propane is employed, a temperature of about 90° C. is used. Rosin is substantially insoluble in liquid propane at 90° C., while the fatty acids present in tall oil are completely miscible with propane at 90° C. If a mixture of hydrocarbons is employed, the best temperature will be a function of the composition of the solvent. If a mixture of propane and ethane is used, a lower temperature is maintained during the extraction than is used when propane is employed alone. If butane or isobutane is employed, the temperature must be raised for optimum results. Any combination of liquefied, normally gaseous, hydrocarbons can be used.

If a temperature gradient is maintained, the high temperature end of the system is that at which the fatty acid solution leaves the system. When a temperature gradient is employed, a condition exists that is similar to reflux in a distillation. The same advantages that accrue from the use of reflux in a distillation can be obtained by use of a temperature gradient. Any undesirable material that dissolves in the hydrocarbon phase at the cold end of the system precipitates at the hot end of the system. This permits the amount of solvent that must be circulated to fractionate a given quantity of tall oil to be reduced.

Because of the enormous difference in volatility between the solvents employed and tall oil, the solvent present in each phase is conveniently, readily and inexpensively separated from each phase by distillation. The solvent is then returned to the extraction step. Because the solvent is so easily recovered, the process is operated with very low solvent losses.

The products of this process are substantially pure fatty acids, secured in yields that are almost quantitative, and rosin containing all the other constituents of tall oil except the fatty acids.

We claim:

1. The process of extracting fatty acids from tall oil by contacting same with a liquefied, normally gaseous, hydrocarbon at elevated temperatures at which the rosin is insoluble in the liquefied hydrocarbons in a continuous counter-current system, continuously withdrawing from said system one liquid phase consisting essentially of fatty acids dissolved in the liquefied hydrocarbon and a second phase consisting essentially of liquid rosin containing some dissolved hydrocarbon.

2. The process of extracting fatty acids from tall oil comprising subjecting said oil to a mixture of liquefied, normally gaseous, hydrocarbons at

elevated temperatures of the order of 90° C. sufficiently high to distribute the fatty acids and the rosin respectively into two liquid phases in a continuous counter-current relation.

3. A process in accordance with claim 1 in which the solvent is propane and in which the temperature in the system is maintained about 90° C.

4. A process of treating tall oil and recovering a fatty acid fraction and a rosin fraction therefrom which comprises passing preheated tall oil to the upper section of a continuous counter-current extraction tower, counter-currently passing liquid propane at a temperature of substantially 90° C. into the lower section of said tower; continuously withdrawing from the upper portion of the tower a liquid fraction consisting of fatty acids dissolved in propane and continuously withdrawing from the lower end of the system a liquid rosin fraction containing some dissolved propane.

5. A process in accordance with claim 4 in which the two withdrawn fractions are separately treated to recover the contained propane and recycling the recovered propane for further extraction of tall oil.

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