A. SCHWARCMAN.

TREATMENT OF CASTOR OIL.

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1,372,632. Patented Mar. 22, 1921.

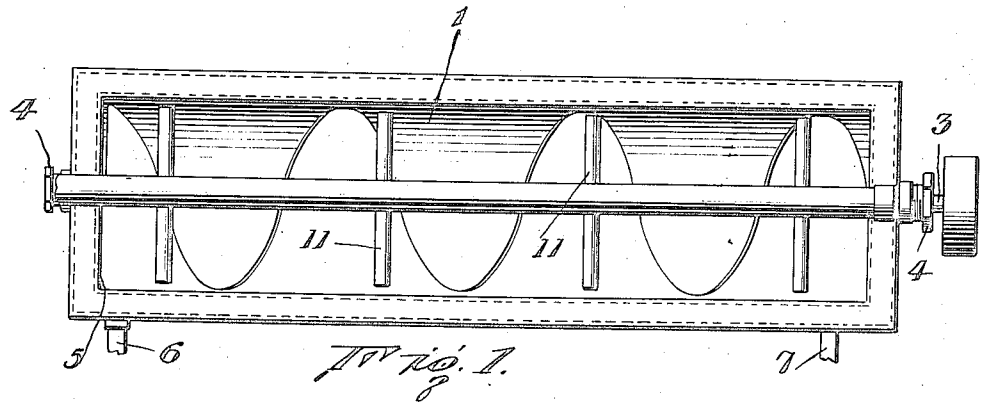


Fig. 1.

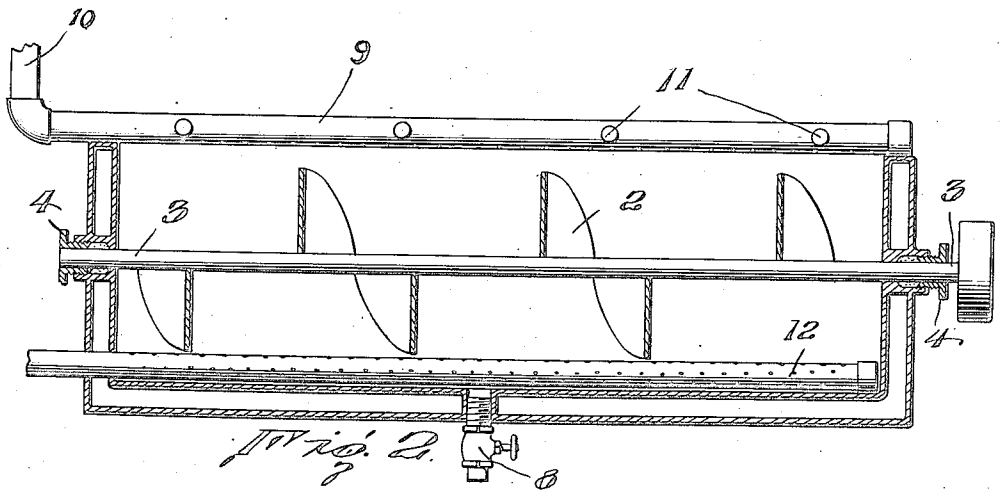


Fig. 2.

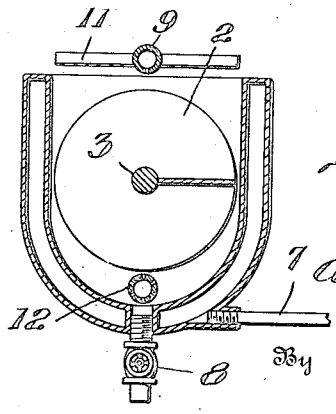


Fig. 3.

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TREATMENT OF CASTOR-OIL.

1,372,632. Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed April 20, 1920. Serial No. 375,318.

To all whom it may concern:

Be it known that I, ALEXANDER SCHWARCMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in the Treatment of Castor-Oil, of which the following is a specification.

This invention relates to the treatment of castor oil; and it comprises a process of refining castor oil and rendering the same neutral wherein such castor oil is treated with about the amount of caustic soda solution necessary to combine with the free acids present and thoroughly agitated, and the oil is thereafter washed with a spray of water at or about the boiling temperature until soluble soda soaps are removed, the washed oil being thereafter dried or freed of water; all as more fully hereinafter set forth and as claimed.

In the treatment of vegetable oils for refining the same it is a customary practice to add caustic soda solution and agitate, thereafter allowing the mixture to settle to deposit the soda salts or soaps as "foots." This treatment renders the oil neutral and carries down most of the dissolved or suspended impurities. The process is however not applicable to castor oil, since the bodies produced by reaction of caustic soda with the free fatty acids of castor oil are soluble in the oil itself. On adding a caustic soda lye to castor oil in about the amount required for neutralization, therefore, there is no separation; the mass is simply rendered somewhat thicker but no separation of impurities occurs. For this reason in the art refining of castor oil is generally done by more complicated, less effective methods. It is, for example, quite difficult by known methods to remove the acidity of low grade castor oil to render it better adapted for use as a cylinder lubricant in gas engines. It is also difficult, even with the best grade of castor oil, to produce a tasteless and odorless article.

It is the object of the present invention to provide a simple, ready, economical method of refining castor oil whereby it may be completely freed of acidity, taste and odor. To this end I treat the castor oil with about the amount of caustic soda solution necessary to neutralize the free fatty acids as determined by analysis. It is better to do this without heating to avoid action of the soda on the neutral oils. A solution of 14° to 25° Baumé caustic soda may be used. The caustic soda solution and the oil are thoroughly agitated together until uniform admixture is obtained. It is desirable to use the exact amount of soda necessary since if too little be used some of the acids will be left while if too much is used some oil will be saponified or decomposed, castor oil being quite sensitive to the saponifying action of alkaline solutions, even in the cold. Because of this sensitive character it is desirable that agitation or incorporation be as rapid as possible. No separation of soaps or impurities occurs at this stage of the operation; the mixture will give no substantial deposit on being allowed to stand.

I have found, however, that if the oil be now somewhat raised in temperature, say to about 180° F, and then sprayed with finely divided hot water somewhere near the boiling point, the soaps and soda compounds can be thoroughly washed out of the oil with the production of a pure neutral oil. With the water go many of the impurities to which the taste and odor of crude castor oil are due. Heating the oil after the incorporation of alkali with the oil is not harmful where the right amount of soda has been used. If more than the right amount has been used, there will be a concomitant loss of oil. With less than the right amount, or without thorough agitation in the mixing step some acid may remain.

I find it is best during this washing operation to place the oil in a long narrow tank and introduce water at just below the boiling temperature in the form of a very fine rain or spray falling through the oil. The falling drops of water very effectually clean the oil of the dissolved soda soaps and other impurities. Ordinarily I wash a number of times, using about 5 per cent. of water by volume each time. Each portion of wash water as it reaches the bottom of the column of oil separates cleanly and perfectly; there is very little loss of oil, if any, as foots. Usually 5 or 6 washings are sufficient except with unusually low grade oils.

The watery liquid collecting at the bottom of the body of oil is essentially a water solution of the soda soaps of the free acids of

the castor oil, carrying more or less suspended coagulated albuminoids, dirt, etc. The solution may be readily clarified or separated from solid matter by filtration or decantation. The solution so obtained is a neutral soap solution which may be used for various purposes; or it may be broken up by the addition of a little acid to set free the fatty acids, (ricinoleic acid, etc.). With proper operation very little neutral oil is taken away with the water solution.

After the described operation the oil is left in a wet state and it is necessary to remove the contained water. This water I may remove by blowing with air while still hot. This treatment has the additional advantage that any residual volatile constituents not taken out by the soda are thoroughly removed from the oil. Much of the taste and odor of castor oil are due to such volatile bodies. After drying, the material left is, even in the case of rather low grade oil, a high grade preparation as regards odor and taste; and it is perfectly free of acidity.

After drying or dehydration, the oil may next be agitated with a little fullers' earth, boneblack or other suitable decolorant or purifying agent. It is now a clean, permanent and neutral oil.

In the accompanying drawings I have shown one form of an apparatus suitable for the performance of my process.

Figure 1 is a top plan view;

Fig. 2 is a vertical longitudinal section; and

Fig. 3 is a transverse section.

In the drawings element 1 represents a tank, advantageously U-shaped in construction, provided with spiral stirrer or agitating device 2, having the shaft 3 journaled through stuffing box 4 at each end with pulley and belt from a source of power (not shown). The tank is provided with a jacket 5 in order that the contents may be heated by means of steam introduced into the jacket through inlet 6 with outlet at 7. The contents of the tank after treatment may be removed through the valved outlet 8. Above the spiral conveyer, the tank is provided with the spray pipe 9 having the inlet 10 connected to a source of supply (not shown). Lateral pipes 11 are attached to the main pipe and the main and lateral pipes are provided with perforations in order that the contents of the main tank may be sprayed with water.

The tank is provided at the bottom with the perforated pipe 12 for introduction of air.

In operating the apparatus, the castor oil is placed in the tank and then substantially the amount of caustic soda solution necessary to combine with the free acid present is added as a spray, that is in finely divided form. The solution of caustic soda may be of about 14° to 25° Baumé. The stirrer is started and revolved at a rapid rate. After the mixture of oil and caustic soda has been thoroughly agitated, its temperature is raised to about 180° F. by admitting steam to the jacket through inlet 6, and it is then sprayed with hot water from the pipes 9 and 11. This causes a thorough washing out of the soaps and soda compounds. This spraying operation may be repeated as many times as may be desired. The watery liquid collecting at the bottom is drawn off through valved outlet 8 after each such washing, the stirrer being stopped for the purpose of allowing the liquid to settle. In order to remove the last traces of water and dry the oil, air is then admitted through pipe 12, during agitation and the maintenance of the temperature of the oil, heat being supplied by the steam jacket.

The effect of adding a little soda solution of moderate strength and thoroughly agitating is to produce a more or less homogeneous blend or solution of the two liquids; thereby neutralizing free fatty acids present and forming corresponding dissolved soda soaps. In the described process this blended more or less homogeneous product is first treated with a limited amount of hot water to produce a readily settling material. After separating this from the body of the oil, further successive small portions of water are added and separated in the same way; the later portions added having an ordinary washing function. This leaves the oil, of course, more or less moist and it is necessary to separate this moisture. The described use of dry air blown through the oil is an advantageous method of removing this residual moisture; but other methods of drying may be used.

What I claim is:—

1. The process of refining castor oil which comprises agitating it with about the amount of caustic soda solution necessary to neutralize the free fatty acids present, raising its temperature and then spraying with a little hot water in such manner as to produce a descent of said water in a finely divided state through the oil body.

2. The process of refining castor oil which comprises agitating it with about the amount of caustic soda solution necessary to neutralize the free fatty acids present, raising its temperature, then spraying with a little hot water in such manner as to produce a descent of said water in a finely divided state through the oil body and thereafter drying the washed oil.

3. The process of refining castor oil which comprises agitating it with about the amount of caustic soda solution necessary to neutralize the free fatty acids present, raising its temperature, then spraying with a little hot water in such manner as to produce a descent

of said water in a finely divided state through the oil body and thereafter drying the washed oil with air.

4. The process of refining castor oil which comprises blending such castor oil with a limited amount of soda solution of moderate strength, thereby neutralizing free fatty acids present and forming corresponding dissolved soda soaps, treating the blended material with a limited amount of hot water with thorough agitation and settling out the produced aqueous material containing soda soaps.

5. The process of refining castor oil which comprises blending such castor oil with a limited amount of soda solution of moderate strength, thereby neutralizing free fatty acids present and forming corresponding dissolved soda soaps, treating the blended material with a limited amount of hot water with thorough agitation, settling out the produced aqueous material containing soda soaps, washing the oil with hot water and finally drying.

In testimony whereof, I affix my signature.

ALEXANDER SCHWARCMAN.