July 15, 1941. B. CLAYTON 2,249,700

REFINING OF VEGETABLE OILS

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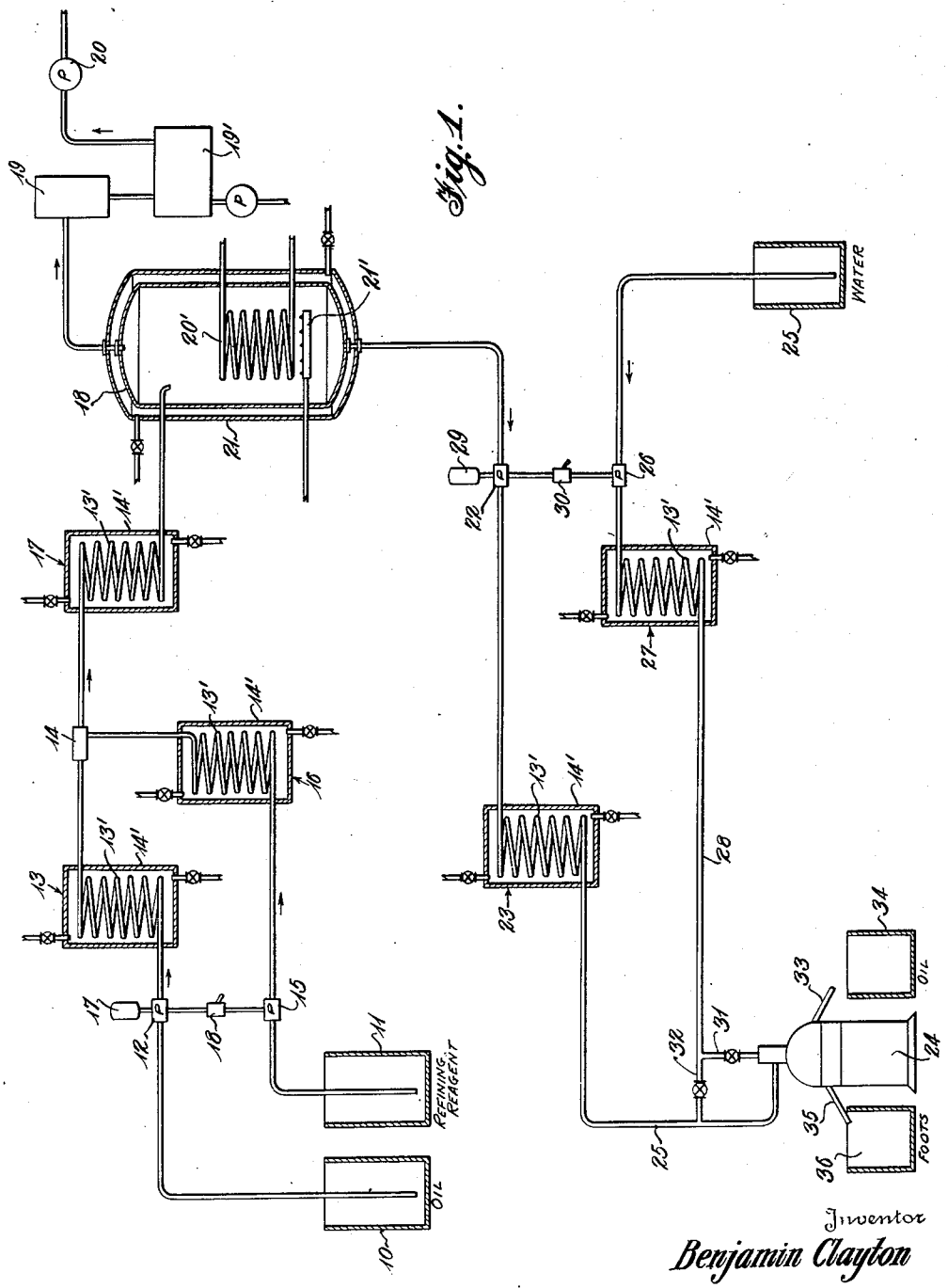


Fig. 1.

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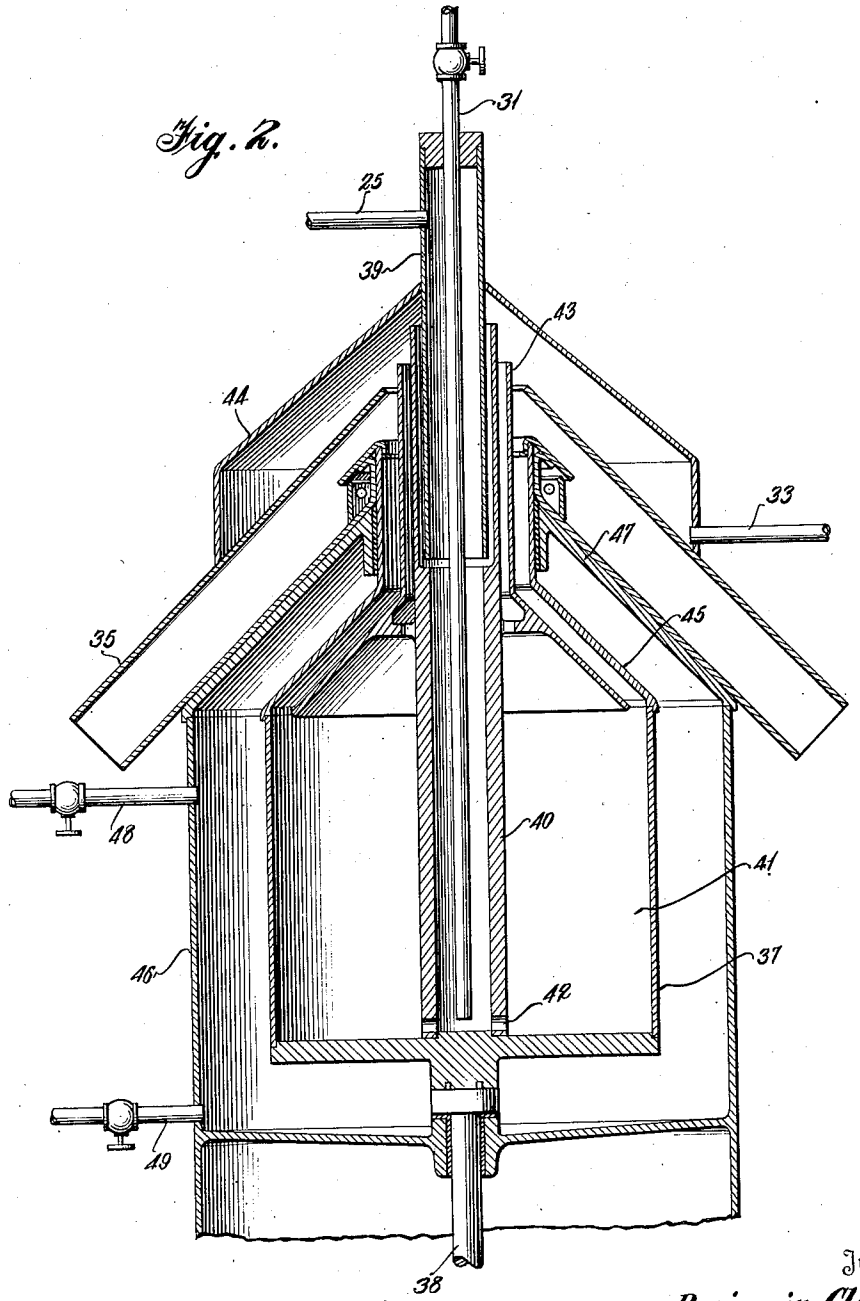
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Fig. 2.



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UNITED STATES PATENT OFFICE

2,249,700

REFINING OF VEGETABLE OILS

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Application October 31, 1938, Serial No. 237,999

9 Claims. (Cl. 260—425)

This invention relates to a process of refining animal and vegetable oils and more particularly to a process in which the mixture of oil and foots, produced by adding a refining reagent to the oil, is treated to remove volatile and gaseous materials prior to separating the foots from the oil.

The process of the present invention is particularly applicable to the alkali refining of so-called "degummed" vegetable oils, which oils have largely been denuded of resinous, proteinaceous and other gummy material by previous partial refining steps. When an aqueous alkaline refining agent is added to such oils, a viscous substantially inseparable emulsion frequently results so that known separation steps, for example, centrifugal separation, do not produce effective separation of the soap stock from the oil. Also, there is a fractionation of the soap stock into heavier and lighter components, the latter separating with the oil.

In accordance with the present invention, the mixture of oil and soap stock is subjected to vacuum treatment at elevated temperatures so that water along with other volatile materials as well as any air or other gases occluded in the mixture is removed therefrom. The difficultly separable emulsions referred to are thereby eliminated and dehydrated oil and soap stock produced. The dehydrated soap stock is not readily separable from the oil even in a continuous centrifugal separator as it does not flow from the separator but remains in the centrifugal bowl. The soap stock can, however, be rendered flowable by adding a controlled amount of water to the dehydrated mixture prior to separation, and preferably within the centrifugal bowl itself. When water is added after the dehydration step, the soap stock continuously discharges from the bowl but the emulsion difficulties referred to are not encountered.

Other important advantages accrue from the present process, among which are: better quality refined oils, lighter in color, containing less impurities such as soap and proteinaceous matter and more readily deodorized and bleached; lower refining losses due to saponification of neutral oil, and entrainment of neutral oil in the separated soap stock; better quality soap stock; and substantial elimination of emulsion difficulties in subsequent oil washing steps. These advantages are also obtained in the refining of crude vegetable or animal oils and the process is, therefore, also applicable to such oils.

It is therefore an object of the invention to provide an improved process of refining vegetable and animal oils in which the mixture resulting from treating the oils with a refining agent is treated to remove volatile and gaseous materials as an intermediate step in the process.

Another object of the invention is to provide a process of refining vegetable or animal oils in which the color of the oil is improved and refining losses decreased by subjecting the mixture of oil and foots to vacuum treatment in order to remove water, other vaporizable materials and gases from the mixture prior to separation.

A further object of the invention is to provide a process of alkali refining vegetable oils which are substantially free of gummy materials so as to provide effective separation of soap stock from the oil.

A still further object of the invention is to provide a process of alkali refining degummed vegetable oils in which water and other vaporizable and gaseous materials are removed from the mixture, resulting from adding an aqueous alkaline refining reagent to the oil, and controlled amounts of water then reintroduced into the mixture to provide for effective separation of soap stock from the oil.

Other objects and advantages of the invention will appear in the following description of preferred embodiments of the invention given in connection with the attached drawings, in which:

Figure 1 is a schematic diagram of the system suitable for carrying out the process of the present invention, and

Figure 2 is a diagrammatic vertical section of a preferred type of centrifugal separator for separating the foots from the oil.

The process of the present invention is preferably carried out in a continuous manner by an apparatus similar to that shown diagrammatically in Figure 1. In this figure a source of supply for the oil to be refined is shown as a tank 10 and a source of supply for the refining reagent is shown as a tank 11. Oil may be withdrawn from the tank 10 by a proportioning pump 12 and delivered through a heat exchanging device 13 to a mixer 14. The heat exchange device 13 preferably includes a coil 13' positioned in a casing 14' through which any desired heating medium may be circulated. Refining reagent may be withdrawn from the tank 11 to a proportioning pump 15 and delivered through a similar heat exchange device 16 to the mixer 14. The proportioning pumps 12 and 15 may be driven by a variable speed electric motor 17 with a variable speed device 18 positioned between the pumps so that any desired amounts or proportions of oil and reagent may be delivered to the mixer 14. Any other suitable type of proportioning device capable of delivering accurate proportions of oil and reagent to the mixer 14 may, however, be employed. The mixer 14 is preferably of the continuous flow type closed from the

atmosphere. This mixer is also preferably of the type in which a stream of refining reagent is injected at right angles into a flowing stream of oil but may be any suitable type of agitator such as a closed mechanical agitator.

The resulting mixture may then be passed through the heat exchange device 17 and delivered to a vapor separating chamber 18 in which water and other vaporizable or gaseous material are separated from the mixture. The mixture is preferably sprayed into the vapor separating chamber 18. This chamber is preferably operated under vacuum conditions and is therefore provided with a condenser 19 having a receiver 19' for condensed material and a vacuum pump 20 connected to the receiver 19' for maintaining a vacuum in the vapor separating chamber 18, condenser 19 and receiver 19'. The chamber 18 may also be provided with a suitable heating means such as a coil 20', through which any desired heating medium may be circulated to supply additional heat to the mixture. The chamber 18 may be additionally provided with a heating jacket 21 through which any desired heating medium may be circulated. In certain operations both the coil 20' and the heating jacket 21 are desirably employed while in other operations only the coil 20' or the heating jacket 21 is employed. The chamber 18 may also be provided with a steam distributor 21' in the lower portion thereof through which steam, preferably superheated, is introduced to heat and agitates the oil and assists in carrying off vapors of volatile material contained in the oil. The introduction of superheated steam is of particular value for deodorizing the oil.

The mixture of oil and foots, from which the vaporizable material and gases have been removed, is withdrawn from the vapor separating chamber 18 by means of a proportioning pump 22, passed through a heat exchange device 23 and delivered into a centrifugal separator 24 through a pipe 25. Water is withdrawn from any suitable source of supply such as a tank 25 by a proportioning pump 26 and delivered through a heat exchange device 27 and pipe 28 to the mixture entering the centrifugal separator 24. The proportioning pumps 22 and 26 may be similar to the proportioning pumps 12 and 15 and be driven by a variable speed electric motor 29 with a variable speed device 30 positioned between the pumps. The water is preferably delivered directly into the bottom of the bowl of a centrifugal separator such as that shown in Figure 2 by a pipe 31, but if such an arrangement is not practical, it is possible to deliver the water into the mixture between the vapor separating chamber 18 and the separator 24, for example, into the pipe 25 by a pipe 32. In the preferred process the water is added to the mixture as near the separation zone as practicable. The refined oil is discharged from the centrifugal separator as the lighter effluent through a spout 33 into any suitable receiver 34 and the rehydrated soap stock is delivered as the heavier effluent through a spout 35 into any suitable receiver 36.

The preferred type of centrifugal separator is shown diagrammatically in Figure 2 and includes a rotatable bowl 37 mounted upon and driven through a shaft 38 from any suitable source of power. The mixture of oil and foots enters the centrifugal bowl through the pipe 25 connected to a stationary inlet member 39 telescoping with a rotating inlet member 40 forming part of the bowl. The inlet member 40 carries the mixture to the lower portion of the centrifugal bowl 37. Water is delivered into the lower portion of the bowl by means of the stationary pipe 31 which extends downwardly through the inlet members 39 and 40. The water is thus added to the mixture as it enters the separation zone of the bowl so that the foots are rehydrated to render the same capable of flowing from the bowl without prolonged contact between the hydrated foots and the oil. The mixture of oil and rehydrated foots enters the separation zone 41 through apertures 42 in the oil inlet member 40 and the separation zone 41 may be provided with suitable partitions (not shown) for increasing the distance of flow of the materials therethrough, such for example as those shown in the centrifugal separator illustrated in the patent to Clayton No. 2,100,277, granted Nov. 23, 1937. The oil is separated from the foots in the separation zone 41 and passes upwardly adjacent the oil inlet member 40 and over the top of a partition 43 into an upper pan 44 from which it is discharged through the spout 33. The heavier foots slide upwardly along the outer wall of the bowl 37, between the partition 43 and the bowl cover 45 over which they are discharged into a lower pan terminating in the spout 35. Provision is preferably made for heating the rotating bowl by providing an enclosed casing 46 having a cover 47 so as to substantially completely surround the bowl 37. A heating medium, for example, steam or other heated vaporous or gaseous material, may be introduced through a pipe 48 and cooled or condensed heating medium may be withdrawn through a pipe 49.

As stated above, the invention is particularly adaptable to the alkali refining of degummed vegetable oils and will be more specifically described with reference thereto. Such degummed oils may be refined by a process in which the oil or reagent or both are heated prior to mixing; by a process in which the mixture is heated subsequent to the mixing step; or by a combination of both. Thus, the oil and reagent, which may be an aqueous solution of caustic soda in sufficient amount and concentration to neutralize the free fatty acids and provide an excess for color reduction, may be heated in the heat exchange devices 13 and 16, respectively, to a temperature which will enable volatile materials to be withdrawn from the vapor separating chamber 18, or the heat exchange devices 13 and 16 may be eliminated and the mixture heated in the heat exchange device 17 to the requisite temperature. With certain oils refining is most satisfactory by employing preheating steps and with other oils subsequent heating or a combination of the two is found preferable. Thus, with some oils, lower refining losses and better color are secured from the process of preheating, while the reverse is true with other oils. In either case, neutralization of the free fatty acids is substantially instantaneous upon contact between the oil and reagent. It is important that the mixture be at a sufficiently high temperature in the vapor separating chamber 18 to enable at least a portion and preferably substantially all of the water to be separated therefrom in vapor form. On the other hand, this temperature should be as low as practicable, as the higher the temperature the greater the losses due to saponification of neutral oil by excess alkali. Thus, depending upon the oil being treated and the pressure in the vapor separating chamber, the temperature of the mixture entering the vapor separating chamber may

vary between 120 and 200° F. for ordinary operations. It is preferred to employ as high vacuum as commercially practicable in the vapor separating zone, for example 27 to 30 inches of mercury, although higher pressures may be employed, particularly at the higher temperatures. With some oils, it is found that a higher temperature, for example, temperatures of 220° F. and higher and in some cases even as high as 500° F., markedly reduces the color of the oil, so that such temperatures may sometimes be employed at the expense of somewhat increased refining losses due to saponification of the neutral oil. When such high temperatures are employed, the excess refining reagent is maintained at the minimum which will provide the color reduction mentioned.

Even if the preheating of the oil or oil and reagent prior to mixing is employed, it is frequently advantageous to flow the heated mixture through the heat exchange device 17 to provide additional time of contact between the oil and aqueous alkali at the high temperature, as this operation results in better color reduction with certain oils. The time of contact should, however, be relatively short, for example not greater than five minutes and the water should then be promptly removed in the vapor separating chamber 18, as saponification of neutral oil, with consequent increased refining losses, proceeds until the water is removed. With substantially complete removal of water in the vapor separating chamber, continued saponification of neutral oil by excess alkali is prevented. Thus, by promptly dehydrating the mixture of oil and foots containing excess reagent, after the mixing step, refining losses due to saponification of neutral oil are minimized.

Refining losses due to attack of refining reagent upon the oil may, in many cases, be still further reduced by supplying all of the heat, necessary for dehydration of the mixture of oil and foots, in the vapor separation chamber 18. Thus the oil may be mixed with the refining reagent at the lowest temperature at which the oil is readily flowable and the heat exchangers 13, 16 and 17 omitted or at least not employed to add heat to the oil or mixture. Such temperatures may be as low as ordinary room temperatures, for example 70° to 80° F., or may be even lower by employing the heat exchangers 13 and 16 to cool the oil or reagent or both. At the low temperature of mixing and treatment in the coil 13' of the heat exchanger 17, if employed, the attack on the oil by the refining reagent is markedly retarded. The mixture may then be heated in the vapor separation chamber 18 by the coil 20', the heating jacket 21, or by steam from the distributor 21' or by any combination or all of these heating devices, depending upon the nature of the oil and the amount of heat necessary to secure dehydration and deodorization thereof. The temperature necessary to be reached will vary with different oils but will ordinarily range between 120 and 220° F. However, with certain oils temperatures as high as 400° F. may be found desirable. As the mixture will be promptly dehydrated during increase of temperature thereof, the time during which the oil is in contact with the refining reagent while water is present is markedly reduced and refining losses due to destruction of the oil correspondingly reduced.

In all of the modifications of the process above described, it is advantageous to introduce steam into the vapor separating chamber to assist in reducing the odor and color of the oil and to act as a carrier for vaporizable impurities. Since it is desired to dehydrate the mixture, the steam is preferably superheated. It may be of approximately the same temperature as the mixture entering the vapor separating chamber but particularly in modifications of the process in which the mixture is heated in the vapor separating chamber, the steam is preferably at a higher temperature than the entering mixture in order to supply heat thereto and compensate for a drop in temperature due to any expansion of the steam. Thus, steam from temperatures ranging from slightly above 212° F. to 500° F. or higher may be employed.

Not only is the water removed in the vapor separating chamber 18 to leave a mixture of neutral oil and dehydrated foots, but other vaporizable impurities are withdrawn from the oil and foots. For example, in alkali refining any decomposed proteinaceous matter liberates ammonia and amines. These materials, as well as other odorous and rancidity causing materials are removed in volatile form and the soap stock as well as the oil is thereby stabilized and deodorized. At the same time any air or other gases occluded in the oil or soap stock is removed. This is important, as such air or gases contribute to the formation of stable emulsions or foams when water is again added to the mixture to render the soap stock flowable from the centrifuge or in subsequent washing steps of the oil. Also, the dehydration under heat denatures or renders insoluble proteinaceous matter in the oil such that increased amounts of impurities are separated with the foots in the separation step.

The dehydrated soap stock, particularly in the case of previously degummed oils, appears to act as an adsorption agent for reducing color in the oil in a manner similar to bleaching earths. Prolonged contact of refined oil and hydrated soap stock will darken the oil, but when dehydration is rapid and performed promptly after the formation of the soap stock, color of the oil is in most instances markedly reduced. Also, no substantial solution of the dehydrated soap stock in the oil takes place, if the soap stock is promptly separated from the oil.

The mixture of oil and dehydrated foots is, therefore, promptly removed from the vapor separating chamber and delivered to the centrifugal separator 24. Depending upon the conditions of operation in the vapor separating chamber, this mixture may be at a temperature above or below the most effective separation temperature. Thus, the heat exchanger 23 may be employed to adjust the temperature of the mixture for separation. While at least a part of the dehydrated foots can be separated from the oil by centrifugal force, they will not flow continuously from the centrifugal. Sufficient water is therefore added to the mixture at the bottom of the centrifugal bowl or just before he mixture enters the centrifugal to render the soap stock flowable. Preferably, this water is raised to approximately the same temperature as the mixture of oil and soap stock by passing the water through the heat exchanger 27 or otherwise heating the same. Alternatively, the water may be heated to a somewhat higher temperature or added at a somewhat lower temperature to adjust the temperature of the resulting mixture of water and soap stock to the desired separation temperature such that the heat exchanger 23 may be eliminated. The amount of

water will vary widely with different oils and amount of soap stock produced but should be just sufficient to cause clean separation. Thus this amount will vary from as low as 1% for extremely high quality oils up to 20% or more for extremely poor quality oils. The water separates as part of the soap stock and excess water will increase the amount of soap stock and therefore the amount of neutral oil entrained in the soap stock. It will be seen that the amount of water present during separation is independent of the amount of water present during neutralization. Thus, in many cases, the amount of water present during separation may be made materially less than that found desirable during neutralization, so that lower refining losses are produced. That is, the amount of water present during neutralization may be adjusted to that which produces maximum color reduction and minimum saponification of neutral oil and the amount of water present during separation to that which produces minimum entrainment of neutral oil with effective separation. Very dilute refining reagents or a large excess thereof may therefore be employed, if found desirable for a particular oil, without increasing entrainment of neutral oil. On the other hand, highly concentrated solutions of caustic may be employed in alkali refining to insure color reduction with certain oils, particularly under the low temperature treatment prior to dehydrating as hereinbefore described, since the stiff soap stock thereby produced does not render separation impracticable as in prior processes. The water employed during separation is preferably substantially pure but may contain separation promoting agents such as neutral, or weak acidic or basic salts which have no deleterious reaction with the oil, for example. Alkaline metal salts such as sodium chloride, sodium or potassium sulfate, tri-sodium phosphate, sodium carbonate, or sodium silicate can thus be employed in dilute or concentrated solutions depending upon the nature of the oil and foots being separated. While water or aqueous salt solutions are preferred, other liquids having a greater specific gravity than the oil and substantially inert thereto can be employed particularly if such liquids are at least partly miscible with the soap stock or other foots being separated.

Since air and other gases have been removed from the soap stock in the vapor separating chamber 18, no complex emulsion of air, oil, soap stock and water is formed and a clean separation can be effected. The temperature of separation will vary with different oils but will usually fall between 120 and 180° F. The centrifugal of Figure 2, in which the water is added at the bottom of the centrifugal bowl and also heat applied to the layer of soap stock in contact with the walls of the bowl, is preferred. Additional heat around the walls of the bowl prevents any gummy material from adhering to the bowl and forming a sticky layer thereon such that the soap stock slides continuously up the outer walls of the bowl and is continuously discharged. By a suitable centrifugal separator structure, it is possible to mix the water or other liquid with the soap stock in the separator after it has been separated from the oil so that such liquid has no substantial contact with the separated oil. It has been found, however, that a much more effective separation and reduction of the color of the refined oil is obtained if water prior to its entrance into the separation zone. While the exact reasons for this are unknown, it appears probable that the adding of the water to the mixture before separation not only wets the soap stock but has a tendency to drive color impurities into the soap stock so that they separate therewith. Adding the water in the centrifugal before the separation zone is reached ordinarily provides sufficient time of contact with the mixture but the water may be added at the entrance of the separator or prior thereto, if found necessary to provide optimum separation. Although continuous mixing, dehydration and separation steps are preferred along with continuous heating or cooling steps, because of lower refining losses, it will be appreciated that the dehydration step between mixing and separation may be employed in processes wherein some or all of these steps are carried out as batch operations. For example, an effective separation of soap stock from the oil with lessened refining loss and improved color reduction can be secured in either continuous or batch settling steps by adding water or an aqueous solution to the mixture after either batch or continuous mixing and dehydration steps. Since the complex emulsion of air, oil, foots and water is completely broken in the dehydration step and does not again form when water is again admixed with the dehydrated mixture it is many times possible to perform effective separation of the foots from the oil at temperatures below the range above given. This temperature is desirably as low as possible in order to still further reduce refining losses due to attack on the oil after water has been again admixed with the dehydrated mixture and in some cases effective separation can be effected with oil temperatures as low as 70 to 80° F., particularly when heat is applied through the wall of the centrifugal bowl to heat the layer of separated foots thereagainst.

As a specific example, a degummed cottonseed oil containing 0.67% free fatty acids was delivered to the mixing zone at a temperature of approximately 80° F. A stream of 14° Bé. caustic soda solution in 0.2 NaOH excess and at approximately the same temperature was injected into a flowing stream of oil. The mixture was then sent through the coil of the heat exchanger 17 where it was heated to approximately 180° F. The time of passage through this coil was approximately 2½ minutes. The heated mixture of oil and soap stock was then directly delivered to the vapor separating chamber which was maintained at a temperature of 185° F. and under a vacuum of 30.0 inches. The mixture of dried soap stock and refined oil was then pumped from the vapor separating chamber and delivered to a centrifuge of the general type shown in Figure 2 at a temperature of approximately 168° F. This mixture contained approximately 0.1% moisture. A proportioned stream of hot water in an amount approximating 3% of the oil was fed into the bottom of the centrifugal separator. A clear effluent of refined oil and a continuous soap stock discharge was produced. The color of the oil coming out of the vapor separating chamber was 35 Y.—5.5 R. while that of the oil delivered from the centrifugal separator was 35 Y.—4.6 R. The color of the refined oil from the standard cup test was 35 Y.—5.5 R. This refined oil contained only

loss based on the weight of the refined oil was 3.63%.

While the invention is particularly applicable to the refining of degummed vegetable oils, in which difficulty is frequently encountered in securing an adequate separation of the soap stock from the oil, it may be employed with crude vegetable or animal oils with marked decrease in refining losses over prior processes and is particularly adaptable to processes in which volatile organic compounds such as the lower aliphatic alcohols, for example ethyl or isopropyl alcohols or oil solvents such as benzine, gasoline or dichloroethylene are employed during the neutralization step in order to inhibit the saponification of neutral oil. Such volatile compounds are removed from the mixture of oil and soap stock in the vapor separating chamber and may be condensed and reused in the process. In any refining process, the amount of oil destroyed by attack upon the oil by refining reagents as well as the amount of entrained oil in the foots separated in the centrifugal separator is reduced. For example, the total amount of foots separated may be made much less than in ordinary processes because of the less amount of water separated with the foots. There is, then, less separated material to entrain neutral oil. These advantages apply even to acid refining wherein strong mineral acids are employed instead of alkalies to precipitate acid foots by carbonizing or decomposing impurities in the oil.

While I have described the preferred embodiments of my invention, it is understood that the details thereof may be varied within the scope of the following claims:

What I claim is:

1. The process of refining glyceride oils and fats, which comprises, mixing an aqueous refining reagent with said oils to form a mixture of oil and foots containing water, subjecting said mixture to a dehydration treatment at a temperature between approximately 220° and 500° F. to remove the major portion of said water, and thereafter rehydrating said mixture and separating said foots from said oil.

2. The process of refining glyceride oils and fats, which comprises, mixing an aqueous refining reagent with said oils to form a mixture of oil and foots containing water, subjecting said mixture to a dehydration treatment at a temperature between approximately 220° and 500° F. to remove the major portion of said water, and thereafter rehydrating said mixture and continuously centrifugally separating said foots from said oil by delivering the dehydrated mixture to a centrifugal separator and adding a rehydrating agent thereto within said centrifugal separator.

3. The process of refining glyceride oils and fats, which comprises, mixing an aqueous refining reagent with said oils to form a mixture of oil and foots containing water, subjecting said mixture to a dehydration treatment to remove the major portion of said water, and thereafter rehydrating said mixture and continuously centrifugally separating said foots from said oil by delivering the dehydrated mixture to a centrifugal separator and adding a rehydrating agent to said dehydrated mixture within said centrifugal separator.

4. The process of refining glyceride oils and fats, which comprises, mixing an aqueous refining reagent with said oils to form a mixture of oil and foots containing water, subjecting said mixture to a dehydration treatment by delivering a heated stream of the same to a dehydrating zone maintained at a temperature between approximately 220° and 500° F. to remove the major portion of said water, passing superheated steam through said dehydrating zone, and thereafter rehydrating said mixture and separating said foots from said oil.

5. The process of refining glyceride oils and fats, which comprises, mixing an aqueous refining reagent with said oils to form a mixture of oils and foots containing water, subjecting said mixture to a dehydration treatment by delivering a stream of said mixture into a dehydrating zone to remove the major portion of said water, passing superheated steam through said dehydrating zone, and thereafter rehydrating said mixture and separating said foots from said oil.

6. The process of refining degummed glyceride oils and fats containing free fatty acids, which comprises, mixing an alkaline neutralizing agent with said oil to neutralize said free fatty acids in the presence of moisture to form a mixture of oil and soap stock, subjecting said mixture to a vacuum treatment at a temperature between 220° and 500° F. to remove a substantial portion of said moisture, and thereafter adding to said mixture a rehydrating agent to condition the soap stock for separation and separating the thus conditioned soap stock from said oil.

7. The process of refining degummed glyceride oils and fats containing free fatty acids, which comprises, mixing an alkaline neutralizing agent with said oil to neutralize said free fatty acids in the presence of moisture to form a mixture of oil and soap stock, subjecting said mixture to a vacuum treatment at a temperature between approximately 220° to 500° F. in a dehydrating zone to remove a substantial portion of soid moisture, passing superheated steam through said dehydrating zone, and thereafter adding to said mixture a rehydrating agent to condition the soap stock for separation and separating the thus conditioned soap stock from said oil.

8. The process of refining degummed glyceride oils and fats containing free fatty acids, which comprises, mixing an alkaline neutralizing agent with said oil to neutralize said free fatty acids in the presence of moisture to form a mixture of oil and soap stock, subjecting said mixture to a vacuum treatment at a temperature between approximately 220° and 500° F. to remove a substantial portion of said moisture, and thereafter adding to said mixture a rehydrating agent to condition the soap stock for separation and continuously centrifugally separating the thus conditioned soap stock from said oil in a centrifugal separator, said rehydrating agent being added to said mixture within said centrifugal separator.

9. The process of refining glyceride oils and fats containing free fatty acids, which comprises, mixing an alkaline neutralizing agent with said oil to neutralize said free fatty acids in the presence of moisture to form a mixture of oil and soap stock, subjecting said mixture to a vacuum treatment to remove a substantial portion of said moisture, and thereafter adding to said mixture a rehydrating agent to condition the soap stock for separation and continuously centrifugally separating the thus conditioned soap stock from said oil in a centrifugal separator, said rehydrating agent being added to said mixture within said centrifugal separator.

BENJAMIN CLAYTON.

6

CERTIFICATE OF CORRECTION.

Patent No. 2,249,700. July 15, 1941.

BENJAMIN CLAYTON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 63, for the word "he" read --the--; page 5, second column, line 38, claim 7, for "soid" read --said--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of September, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)