

Oct. 10, 1961

A. U. AYRES

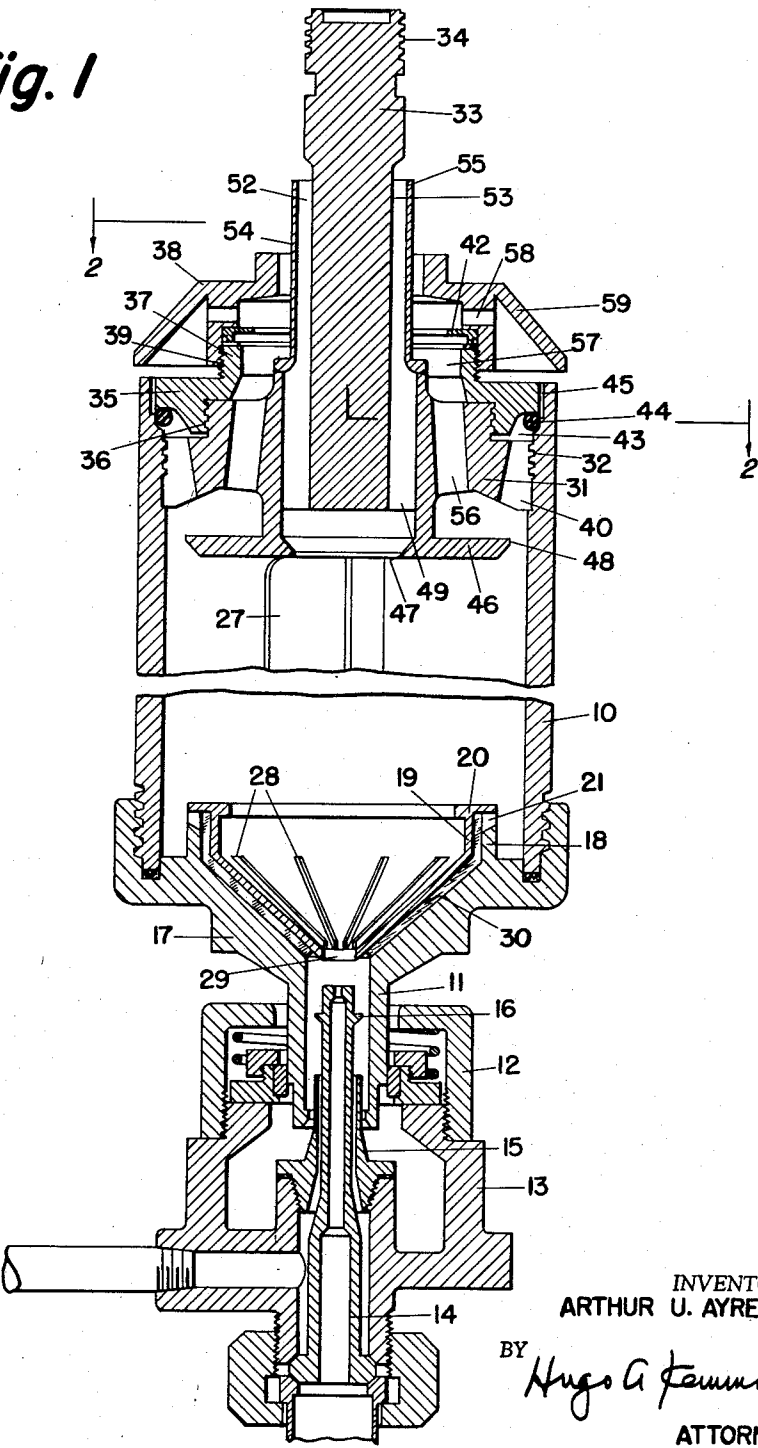
3,004,050

REFINING OF FATTY OILS

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Fig. 1



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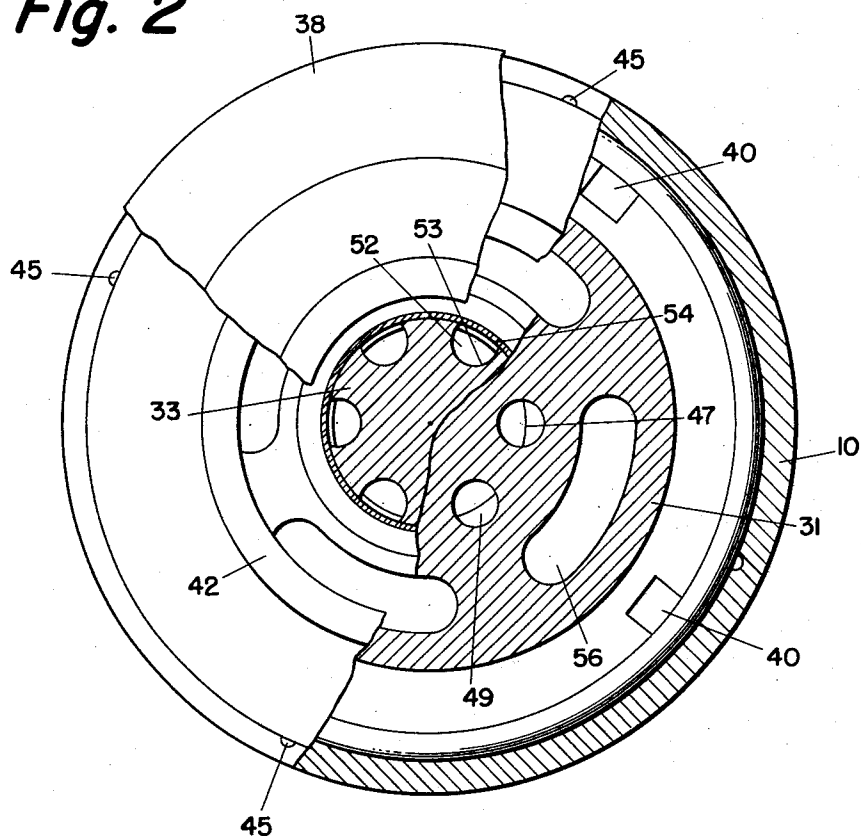
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**Fig. 2**



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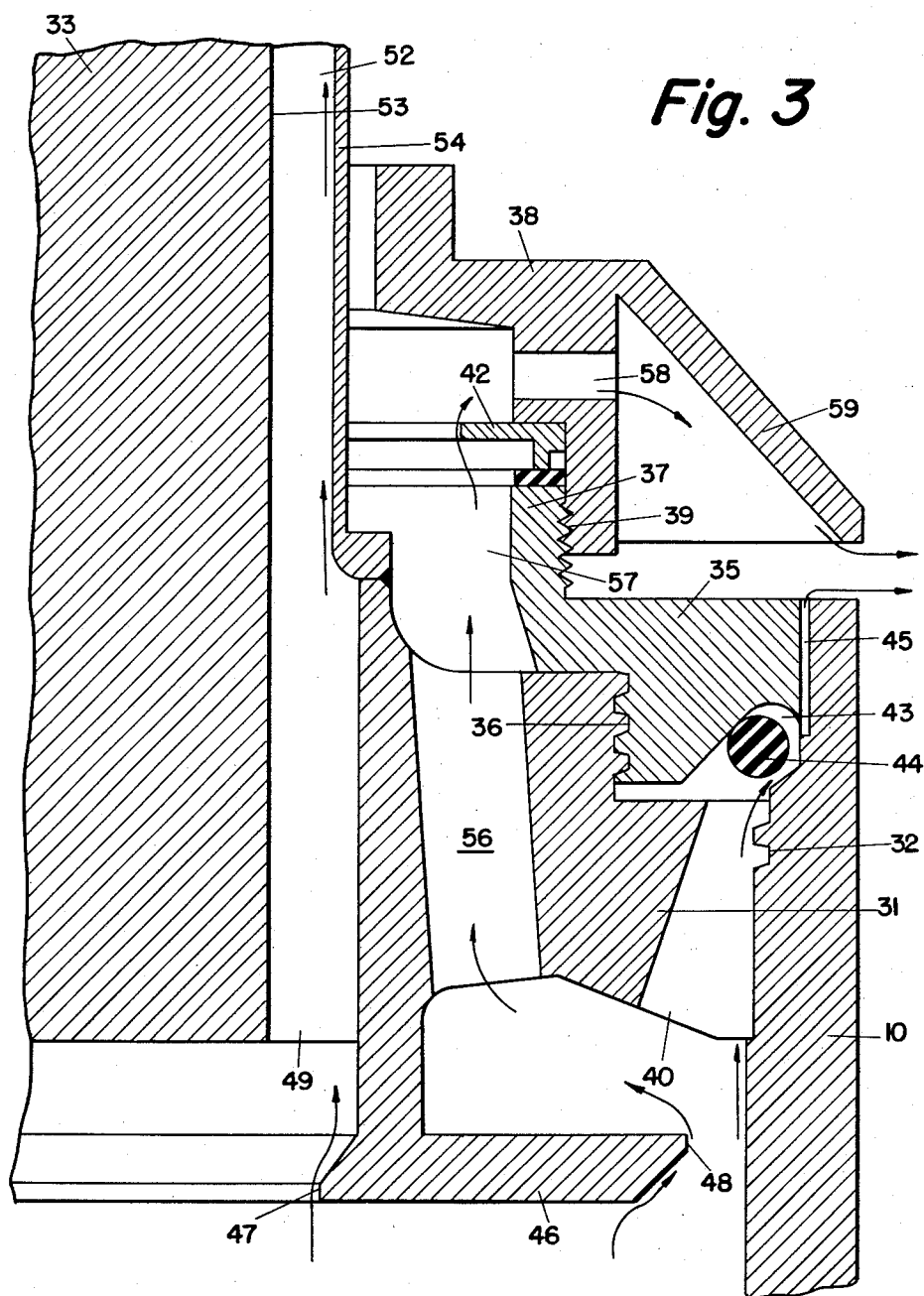
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3,004,050

## REFINING OF FATTY OILS

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This invention pertains to the refining of fatty oils (e.g. glyceride oils), and more particularly to the refining of vegetable and animal oils, such as cottonseed oil, soya bean oil, peanut oil, corn oil, sunflower seed oil, sesame oil, rape seed oil, coconut oil, babassu oil, palm oil, palm kernel oil, linseed oil, tallow, lard, grease, fish oil, whale oil, etc.

Fatty oils are ordinarily refined by treating the same with an aqueous alkaline reagent, such as sodium carbonate and/or sodium hydroxide. This is followed by the separation of the refined oil from the aqueous phase, the latter containing reaction products and/or impurities such as soapstock, gums, and/or color bodies. The purpose of such refining is to neutralize and remove free fatty acids, to remove gums, to remove color bodies and/or to otherwise improve the quality of the oil.

Such refining, particularly when the purpose is to remove free fatty acids, is frequently followed by a second refining known in the art as rerefining. The purpose of rerefining is to further improve the quality of the oil, largely by way of removal of color bodies, for which a reagent comprised of aqueous caustic soda is well suited.

The use of a rerefining step is generally accepted practice when aqueous sodium carbonate is employed as the reagent for neutralizing free fatty acids in the initial refining, for sodium carbonate is rather deficient as a reagent for removing color bodies. The use of a rerefining step is also beneficial in many instances, depending on the source and/or type of the crude oil, when the initial refining is conducted with stoichiometric or near stoichiometric proportions, based on free fatty acid present, of caustic soda as the refining reagent.

In any event, the residue of free fatty acids remaining in the fatty oil after initial refining with an alkaline reagent to remove free fatty acids is very low, e.g. below .25%. Fatty oils so refined also are low in materials commonly referred to as gums, e.g. phosphatides, proteinaceous materials, resins, etc. Fatty oils which have been degummed otherwise than by treatment with a reagent to remove free fatty acids also are low in gums. Also certain fatty oils are initially low in free fatty acids, e.g. below 1%.

In the treatment of such fatty oils which are low in free fatty acids and/or gums, whether in such state naturally or as a result of prior processing, it is common practice to employ a reagent, such as aqueous caustic soda, to improve the quality of the oil, e.g. by reduction in free fatty acids and/or color or otherwise. In such practice a small amount of soapstock is usually formed, whether by reduction in free fatty acids, or by saponification of a small amount of neutral oil, or both, and the aqueous caustic soda reagent solutions employed are frequently of such concentration as to cause the soapstock formed to be "salted out" from the aqueous reagent phase, or to otherwise appear in whole or in part in the form of a third phase separate from the oil and the aqueous reagent phase. The result is that the soapstock, being of a density intermediate that of the fatty oil and that of the aqueous phase, tends to be discharged from the centrifuge along with the fatty oil. This is because the aqueous phase, being of a density greater than that of the soapstock phase, forms a layer in the bowl in a position radially outwardly from the soapstock layer, and thus interferes with the proper discharge of the soapstock layer from the bowl as a heavier phase. As a result,

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at least a part of the soapstock is forced to discharge from the bowl as a lighter phase, i.e. along with the oil, thus defeating the purpose of the operation, which is to separate both soapstock and aqueous reagent phase from the oil.

This condition may be alleviated, at least to some extent, by the separate feed of water into the peripheral zone of the bowl to reduce the concentration of caustic soda in the aqueous phase, with consequent reduction in its density, ideally to a point where the density of the aqueous phase becomes the same as that of the soapstock phase. Under ideal or near ideal conditions, both phases then are discharged from the bowl together, and separately from the oil. The dilution of the aqueous phase, however, results in the formation of a certain amount of oil-containing aqueous emulsion which is discharged from the bowl along with the soapstock and aqueous phases, with consequent loss in oil.

Another source of difficulty resides in the fact that the capacity of the soapstock phase to retain aqueous reagent phase, either by solution or entrainment, varies not only between different oils, but also for any given individual oil depending in large measure on its gum content. Even during a given run there may be variations to the extent that a separate aqueous layer may form only sporadically, or may disappear sporadically. In any event, it is difficult to continuously centrifugally separate by liquid balance an aqueous reagent phase as a layer separate from the soapstock layer, and to continuously discharge the same from the bowl, e.g. over a weir.

After extensive experimentation, I have discovered and perfected a method for the refining of fatty oils wherein the aqueous phase, if, when and to the extent occurring as a layer separate from the soapstock layer, is separated and separately discharged from the centrifugal bowl, while leaving the oil and soapstock layers in desired hydrostatic balance.

Further features of the invention will become apparent to persons skilled in the art upon becoming familiar herewith, and as the specification proceeds, and upon reference to the drawings in which:

FIGURE 1 is a vertical section, shown broken, illustrating apparatus embodying and useful in the practice of the invention;

FIGURE 2 is a section taken generally on line 2—2 of FIGURE 1, with portions removed for better illustration; and

FIGURE 3 is an enlargement of a portion of FIGURE 1.

Referring now more particularly to the drawings, the centrifuge rotor 10 is shown provided with an inlet feed boss 11 which is surrounded by a guide bushing assembly or drag 12. The guide bushing assembly 12 is secured in position on a base 13 which also carries a feed nozzle 14 through which the reaction mass is continuously fed into the centrifuge rotor 10.

In the apparatus as illustrated, an auxiliary feed nozzle 15 also is secured to the base 13, and surrounds the feed nozzle 14, and feed nozzle 14 is shown provided with a circumferential bead 16, the purpose of which is to deflect outwardly against the inner wall of boss 11 any liquid fed into the bowl through the nozzle 15 in the practice of a modification of the invention to be herein-after more particularly described.

The lower end 17 of rotor 10 is provided with a cylindrical flange 18 positioned interiorly of the rotor. The upper end of flange 18 forms a seat for a flange 20 of a feed directing member 19 shown with a conical base portion. Member 19 may be secured in position on flange 18 by any suitable means, such as welding. Flange 18 is provided with a plurality of circumferentially spaced slots illustrated at 21, in order to afford outlets from the

space between the member 19 and the inner peripheral bottom portion of the rotor for liquid fed into and passing upwardly and outwardly through such space.

Member 19, as shown, is provided on its inner conical surface with a plurality of circumferentially spaced radially extending vanes or fins 28, and similarly on its outer conical surface with a plurality of circumferentially spaced radially extending vanes or fins 30. The fins 28 extend inwardly toward feed opening 29 in the lowermost part of the member 19. Fins 30 extend from the outer surface of the member 19 to the inner surface of the lower end 17 of the rotor.

The construction so far particularly described may be regarded as more or less conventional, and well-known.

Referring now to the upper part of rotor 10, at 31 is shown a rotor top which threadedly engages the upper interior of rotor 10 as illustrated at 32. Rotor top 31 includes an upwardly extending center portion 33 shown provided with threads 34 for engagement by a nut on an overhead driving spindle, not shown.

An annular member 35 threadedly engages rotor top 31 as illustrated at 36, and is provided with an upwardly extending cylindrical portion 37 which is threadedly engaged by a ring dam nut 38 as illustrated at 39, ring dam 42 being secured in position between cylindrical portion 37 and ring dam nut 38.

Member 35 also is provided with an annular recessed portion 43 in which is positioned an annular resilient valve member 44 shown associated with a plurality of circumferentially spaced vertical outlet channels 45 milled into the interior wall of rotor 10.

In the operation of the apparatus shown in the drawings, a stream of the reaction mass is projected through nozzle 14 up into rotor 10 through feed opening 29, and is brought up to rotational speed with the assistance of fins 28, and circumferentially spaced radially extending vanes 27. By virtue of centrifugal force, the reaction mass is separated into layers arranged in order of decreasing density in a radially inward direction from the interior peripheral wall of rotor 10.

In the following particular description which is by way of example, it will be assumed that the reaction mixture is comprised of fatty oil, soapstock and aqueous caustic soda having a density greater than that of the soapstock.

Under the influence of centrifugal force, the aqueous electrolyte phase, being the heaviest phase, builds up on the interior wall of rotor 10, and flows toward annular recess 43, through a plurality of circumferentially spaced channels 40 in rotor top 31.

Annular valve member 44 is so chosen as to have a density intermediate that of the soapstock phase and the aqueous electrolyte phase, and may be of any suitable resilient material, such as rubber, natural or synthetic, capable of increasing and decreasing in diameter, i.e. in radial distance from the axis of rotation, under the applied conditions present.

Valve member 44 is conveniently, though not necessarily, circular in cross section, and its density may be varied to suit requirements by any means known in the art, e.g. ranging all the way from being made hollow to being loaded with various powdered substances, including metals, which may be incorporated in the rubber itself, or placed in a hollow interior, or built in as a core, as will be readily understood by persons skilled in the art.

It will be understood that when rotor 10 is empty, or when the aqueous electrolyte phase does not form a layer separate from the soapstock, annular valve member 44 is expanded in radius, i.e. increased in circumference, by the applied centrifugal force so as to close vertical outlet channels 45, for the density of member 44 is so chosen as to be greater than that of the soapstock layer.

Upon the appearance, however, of a third layer comprised of aqueous electrolyte which, under the conditions assumed above, is of greater density than the valve mem-

ber 44, such aqueous electrolyte layer will flow upwardly along the interior wall of rotor 10 into annular recess 43, whereupon annular valve member 44 will decrease in radius (i.e. in circumference) by virtue of floating in, or, in other words, being displaced inwardly by, the heavier aqueous electrolyte layer which escapes from the bowl through outlet channels 45.

Thus as long as an aqueous electrolyte layer is present in the rotor, it will be discharged from the rotor through channels 45. Soapstock, on the other hand, will not be discharged through channels 45, for when an aqueous electrolyte layer is not present, channels 45 are closed by virtue of the radial expansion of circumferential valve member 44 due to centrifugal force, such expansion being possible in the presence of soapstock only, for valve member 44 is of greater density than the soapstock.

From the foregoing it will be seen that when an aqueous electrolyte layer is present in rotor 10, irrespective of the manner in which it may occur, e.g. intermittently and/or varying in volume, it is carried off from the rotor 10 without interfering with the separation of soapstock from oil.

Oil and soapstock are separated from each other in rotor 10, and are discharged therefrom, in any desired manner.

As illustrated, rotor top 31 is provided with a conventional dividing disc 46, around the inner circumferential edge 47 of which the separated oil escapes upwardly, and around the outer circumferential edge 48 of which the soapstock escapes upwardly.

The oil flows upwardly through a plurality of circumferentially spaced circular channels 49 in rotor top 31, and into a plurality of circumferentially spaced channels 52 formed between longitudinal grooves 53 in portion 33 and a sleeve 54 surrounding portion 33. The oil escapes over upper edge 55 of sleeve 54, and is collected in any convenient manner such as by use of a rotor cover, not shown. Sleeve 54 may be attached to rotor top 31 in any desired manner, such as by welding.

Separated soapstock escapes upwardly around the circumferential edge 48 of disc 46, and passes upwardly through circumferentially spaced channels 56, area 57, and over the inner circumferential edge of ring dam 42, escaping outwardly through a plurality of circumferentially spaced outlet ports 58. As shown, the soapstock, on escaping from ports 58, is deflected downwardly by hood 59, and may be collected along with aqueous electrolyte escaping through channels 45, in any suitable manner such as by the use of a rotor cover, not shown.

On the other hand, soapstock and aqueous electrolyte may be collected separately, if desired, as will be obvious.

From the foregoing particular description it will be seen that, in the practice of the invention, disturbances in the separation of soapstock from the oil due to the formation of a third layer comprised of aqueous electrolyte, are eliminated, for if, when and as such aqueous electrolyte layer forms, it is automatically and selectively removed from the zone of centrifugal separation through outlets separate from those for the discharge of oil and soapstock, thus permitting the separation of soapstock from the oil to proceed in a normal way.

Priming of the centrifuge bowl upon start-up may be effected in any desired or customary manner, in the present instance, preferably with a liquid of lower specific gravity than valve member 44, so as to keep channels 45 closed during priming and to cause priming liquid to discharge over ring dam 42, as will be well understood by persons skilled in the art. Any suitable priming liquid may be employed, e.g. water, or an aqueous solution of electrolyte, such as of caustic soda or sodium carbonate.

As is well known in the art, the ease with which soapstock may be discharged from a centrifugal rotor may

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vary widely from oil to oil and with the conditions under which the oil is refined. Certain conditions of refining, for instance, may reduce the fluidity of the soapstock quite materially. Moreover, the tendency of soapstock to stick to the rotor wall also may vary from oil to oil and with the conditions of refining. In overcoming such difficulties, the present invention lends itself ideally to the floating of the soapstock layer through the rotor on the surface of a heavier aqueous electrolyte layer, without interfering with the separation of the soapstock from the oil by liquid balance under the conditions employed in the zone of centrifugation, or the discharge of the separated oil and soapstock layers from the rotor. Such floating of the soapstock layer on a heaviest aqueous electrolyte layer takes place in the practice of the invention whenever such heaviest layer appears.

To assist in such discharge of soapstock from the rotor, a suitable auxiliary liquid of higher density than the soapstock, such as aqueous electrolyte, may be passed upwardly through the annular space afforded between the nozzle 15 and the nozzle 14 shown in FIGURE 1 of the drawings. This liquid impinges against the bead 16 formed on the nozzle 14 and is deflected into contact with the inner wall of the boss 11 of the rotor 10. The centrifugal force generated by the rotation of the rotor 10 causes the liquid to cling to this surface and to flow upwardly into the space occupied by the radially extending fins 30. Fins 30 bring the liquid up to the speed of the rotor, and the liquid is impelled outwardly through openings 21 under the influence of centrifugal force. Liquid impelled through the opening 21 flows upwardly along the inner wall of the rotor 10, thus forming a continuously moving liquid layer upon which the soapstock floats as it passes upwardly through the rotor. Sticking of the soapstock to the interior wall of the bowl and/or packing of the soapstock thereon are thus avoided.

The flotation liquid, being of higher density than the soapstock, is discharged from the rotor through channels 45, the same as the aqueous electrolyte layer is discharged when formed in the rotor as above particularly described. Rubber ring or valve member 44 is, of course, chosen as to density to permit the discharge of the flotation liquid, but not of soapstock.

When the refining or rerefining is under conditions, e.g. including the source of the oil, such that a third layer comprised of aqueous electrolyte is formed, or is likely to form, in the rotor, such as intermittently or continuously, the flotation liquid, if employed, is preferably though not necessarily of the same or similar density as such aqueous electrolyte layer, and preferably though not necessarily also is miscible therewith.

However, it is conceivable that, even though water has a density slightly less than that of the usual soapstock, it might be fed into the rotor as a flotation liquid when the formation of a separate layer of aqueous electrolyte phase is assured, whereupon the water may merely mix with the latter layer to increase its volume with some decrease in density, but preferably not closely approaching that of the soapstock, in order that valve member 44 may function in its intended manner.

On the other hand, aqueous caustic soda and/or aqueous solutions of its salts, such as of sodium carbonate or of sodium sulfate, or aqueous solutions of any other suitable electrolyte, may be employed as the flotation liquid, if of higher density than soapstock, or if capable of mixing with separated aqueous electrolyte to form a final flotation liquid of higher density than the soapstock, so as to make possible its selective discharge from the rotor through the channels 45.

The following examples are given by way of illustration and not of limitation.

#### Example 1

Degummed soya bean oil having a free fatty acid content of 0.25% by weight was continuously mixed at a

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rate of 2500 pounds per hour with 1.42% of its volume of aqueous caustic soda of 14° Bé. at a temperature of 80° F. The stream of mixed oil and aqueous caustic soda was then heated to 140° F. and the stream was then centrifugally separated in a centrifuge having a rotor of the type shown in the drawings. A separate layer of aqueous caustic soda began to form immediately in the rotor, and it was discharged peripherally therefrom, that is through channels similar to the channels 45. The soapstock was discharged over a ring dam corresponding to ring dam 42. A composite sample of the soapstock upon analysis showed that it was of very low oil content, namely 2.04% by weight on a dry basis. The separated oil was bright throughout the run showing that it was extremely low in soap content.

#### Example 2

Degummed soya bean oil having a free fatty acid content of 0.45% by weight was continuously mixed at a rate of 2500 pounds per hour with 2.68% of its volume of aqueous caustic soda of 12° Bé. at a temperature of 80° F. The stream of mixed oil and aqueous caustic soda was then heated to 140° F., and the stream was then subjected to centrifugal separation in a centrifuge having a rotor similar to the rotor shown in the drawings, but with valve member 44 and channels 45 omitted. There was no discharge of separated heavy component for about 20 minutes, whereupon soapstock (a composite heavy layer) began to be discharged. The separated oil was bright initially and relatively soap free, but gradually became more and more muddy with entrained soap. In about 35 minutes after the run started there was a sudden heavy discharge of soapstock, whereupon the discharged oil cleared up and became bright again. A number of such surges or sudden heavy discharges of soapstock occurred with similar variations in the character of the separated oil. A composite sample of the soapstock was analyzed, and showed an oil content of 10.6% by weight on a dry basis. A composite sample of the refined oil showed that it was relatively high in soap content.

#### Example 3

In an effort to rectify the unsatisfactory refining conditions exemplified in Example 2, degummed soya bean oil having a free fatty acid content of 0.66% by weight was continuously mixed at a rate of 2500 pounds per hour with 0.72% of its volume of aqueous caustic soda of 22° Bé. at a temperature of 80° F. The stream of mixed oil and reagent was then heated to 140° F., and the stream was then continuously separated in a centrifuge having a rotor similar to the rotor shown in the drawings, except that the valve member 44 and the channels 45 were omitted. 7.5% by volume of water, based on the total volume of the reaction mass, was fed into the rotor of the centrifuge through a feed nozzle having a construction and arrangement similar to that disclosed at 15 in FIGURE 1 of the drawings, the water being continuously deposited on the inner peripheral surface of the rotor through discharge orifices similar to slots 21. The action of the water, either by dilution of separated aqueous electrolyte and/or solution of soapstock, caused a uniform discharge of soapstock (composite heavy component) from the rotor, and the discharged oil was continuously relatively soap free. Analysis of a composite sample of the soapstock, however, showed that it contained 29.4% of oil on a dry basis, which represents a rather high loss in oil.

From the foregoing description it will be seen that the annular edge 47 operates as a weir over which the lightest layer, e.g. refined vegetable oil, is discharged. It also will be seen that annular edge 47 controls the depth of liquid in the bowl, for it is not possible for liquid to build up in the bowl between the axis of rotation and the annular edge 47.

The annular inner edge of ring dam 42 also operates as a weir over which the next heavier layer, i.e. the layer of intermediate specific gravity or density, e.g. soapstock, is discharged from the bowl. The radial distance from the axis of rotation to the annular inner edge of ring dam 42 controls the radial position of the dividing line or interface in the bowl's separatory space between the lightest layer and the next heavier layer. The radial position of such interface is made adjustable by making ring dam 42 interchangeable, and providing a variety of ring dams with annular inner edges of different radial distances from the axis of rotation. In any event, such interface is made to fall between annular edge 47 and annular edge 48 when the bowl is in operation. For any given size of ring dam 42, the radial position of the interface or dividing line between the lightest layer and the next heavier layer is dependent upon their relative specific gravities.

In the case of the refining or rerefining of fatty oils, it is customary to select a ring dam 42 with the radial distance from the axis of rotation to its inner operative edge such as to bring the interface or dividing line between the lightest and next heavier layers as close to annular edge 48 as is practicable, without possible loss of oil over weir 48 due to possible variations in conditions within the bowl. The purpose is to keep as large a volume of oil in the bowl as is reasonably possible during separation, thus increasing the resident time during which any portion of the oil is undergoing treatment for the separation of reaction products and reagent therefrom. The dividing line or interface, however, may occupy any other position between annular edges 47 and 48, as desired.

It is the disturbance of the hydrostatic balance between the lighter and next heavier layers due to the appearance of a third layer, whether intermittent or continual, that has heretofore presented a major problem in the refining of fatty oils, and particularly fatty oils of low free fatty acid and/or gum content, whether previously refined or not.

It is the removal of the heaviest layer from the bowl, as, if and when it appears, that produces the new and unexpected results which flow from the practice of the invention, for it is by effecting such removal of the heaviest layer that the desired hydrostatic balance between the lighter and the next heavier layers is maintained in undisturbed condition. Since the heaviest layer may appear only intermittently, and may vary considerably in volume, or if appearing continuously, may still vary in volume during the separation, it is by the discharge of this heaviest layer from the periphery of the bowl under control of difference in specific gravities, that makes possible the desired highly efficient separation of refined oil from reaction products and reagent.

While the invention has been described more particularly in connection with the rerefining of fatty oils, it is to be understood that it is applicable to the initial refining of fatty oils under conditions such that a third layer of aqueous electrolyte is likely to appear. Also while the appearance of a third layer comprised of aqueous electrolyte occurs more often when caustic soda is employed as the alkaline refining agent, the same situation is capable of occurring when other alkaline refining reagents, such as sodium carbonate, are employed in excess.

In the practice of the invention, the concentration of alkaline refining reagent in the aqueous solution employed for refining is not critical, for the concentrations normally employed vary widely from plant to plant and are such as to cause the appearance of a third layer in the bowl, if the aqueous reagent solution is employed in sufficient excess to create this condition. It may be expected, however, that with the same percentage excess of aqueous refining solution over that required to neutralize free fatty acids, the appearance during the separation of a third layer is more likely to occur with aqueous

solutions of higher Baumé. Generally speaking, such third layer does not appear when the alkaline refining agent is substantially depleted during the treatment, e.g. in the case of aqueous caustic soda, to below a specific gravity equivalent to that of 12° Baumé.

The temperature at which the process is practiced also is not critical, for the invention is operable irrespective of the temperature conditions employed, the latter being a matter of choice and judgment of the operator. Temperature conditions employed in refining fatty oils cover a wide range as shown by the literature. Usually, however, they fall between 100° C. and 200° C.

It will be understood that the invention provides a safety measure guarding against disturbing the hydrostatic balance between the fatty oil and soapstock or other reaction products by the possible appearance of a third layer comprised of aqueous electrolyte.

While the valve member 44 has been more particularly described as a rubber ring, this is by way of illustration, for it will be understood that valve member 44 may have any other suitable configuration or shape, for example, that of a sphere movable in a correspondingly shaped socket, or otherwise. Also valve member 44 may be of any other suitable material of appropriate specific gravity intermediate that of the heavier and heaviest layers.

Moreover, while the centrifuge bowl has been illustrated for convenience in the drawings as being of tubular shape, and as having wings serving as an accelerating-decelerating device, it is to be understood that the centrifuge bowl may have any other configuration and construction without departing from the spirit of the invention. Thus the invention is equally adaptable to what is known as the disc-type bowl, and to bowls of any other type.

Having described my invention, it is to be understood that this is by way of illustration, and that changes, omissions, additions, substitutions and/or other modifications may be made without departing from the spirit thereof. Accordingly it is intended that the patent shall cover by suitable expression in the claims the various features of patentable novelty that reside in the invention.

I claim:

1. In the refining of fatty oil wherein aqueous alkaline reagent is admixed with the oil in concentration and quantity such that upon subjecting the reaction mass to centrifugation for the separation of reaction products and reagent from the refined oil three layers are formed, the lightest layer being of oil, the next heavier layer being of reaction products admixed with reagent, and the heaviest layer being of reagent, the steps which comprise maintaining in the zone of centrifugation a balanced relationship between the oil layer and the reaction product layer dependent upon their specific gravities, and separately discharging outwardly from the periphery of said zone of centrifugation the reagent layer as rapidly as it is formed.

2. The process of claim 1 wherein the alkaline reagent is caustic soda.

3. The process of claim 2 wherein the reaction products comprise soapstock.

4. The process of claim 3 wherein the fatty oil is vegetable oil.

5. In a process for the refining of vegetable oil which comprises admixing aqueous caustic soda with the oil in concentration and quantity such that upon subjecting the reaction mass to centrifugation for the separation of the refined oil from reaction products and reagent there is a tendency for the reagent to separate from the reaction products to form a third and heaviest layer in the zone of centrifugation, the step of maintaining a balanced hydrostatic relationship between the oil layer and the reaction products layer in the zone of centrifugation including the discharge of said last-mentioned layers from loci at different distances radially inward from the periphery

of said zone; while discharging outwardly from the periphery of the zone of centrifugation and apart from said other layers a reagent layer as and when it forms.

6. The process of claim 5 in which auxiliary liquid is fed into the zone of centrifugation.

7. The process of claim 6 in which the auxiliary liquid is of higher specific gravity than the reaction products layer.

8. In the refining of fatty oil wherein aqueous alkaline reagent is admixed with the oil for reaction with impurities contained therein and wherein the oil is thereafter centrifugally separated from the reaction mass in the presence of three layers in the zone of centrifugation, the layer of lowest specific gravity comprising said oil, the layer of next higher specific gravity comprising reaction products, and the layer of highest specific gravity comprising aqueous electrolyte, the step of facilitating the maintenance of a desired hydrostatic balance between said first-mentioned and second-mentioned layers in the zone of centrifugation by discharging said first-mentioned layer from said zone at a locus positioned radially inwardly from the loci of discharge of the other two layers, discharging said second-mentioned layer from said zone at a locus positioned radially inwardly of the periphery of said zone, and discharging said third-mentioned layer from the zone of centrifugation at the periphery thereof and apart from said first-mentioned and said second-mentioned layers.

9. The process of claim 8 wherein the layer of highest specific gravity is present in the zone of centrifugation continuously during the centrifugal separation of the oil.

10. The process of claim 8 wherein the layer of highest specific gravity is present in the zone of centrifugation intermittently during the centrifugal separation of the oil.

11. The process of claim 8 wherein the fatty oil is vegetable oil and is relatively low in gum content.

12. The process of claim 11 wherein the oil is relatively low in free fatty acid content.

13. The process of claim 12 wherein the alkaline reagent is sodium hydroxide.

14. The process of claim 13 wherein the oil under treatment has been previously refined with an alkaline reagent.

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