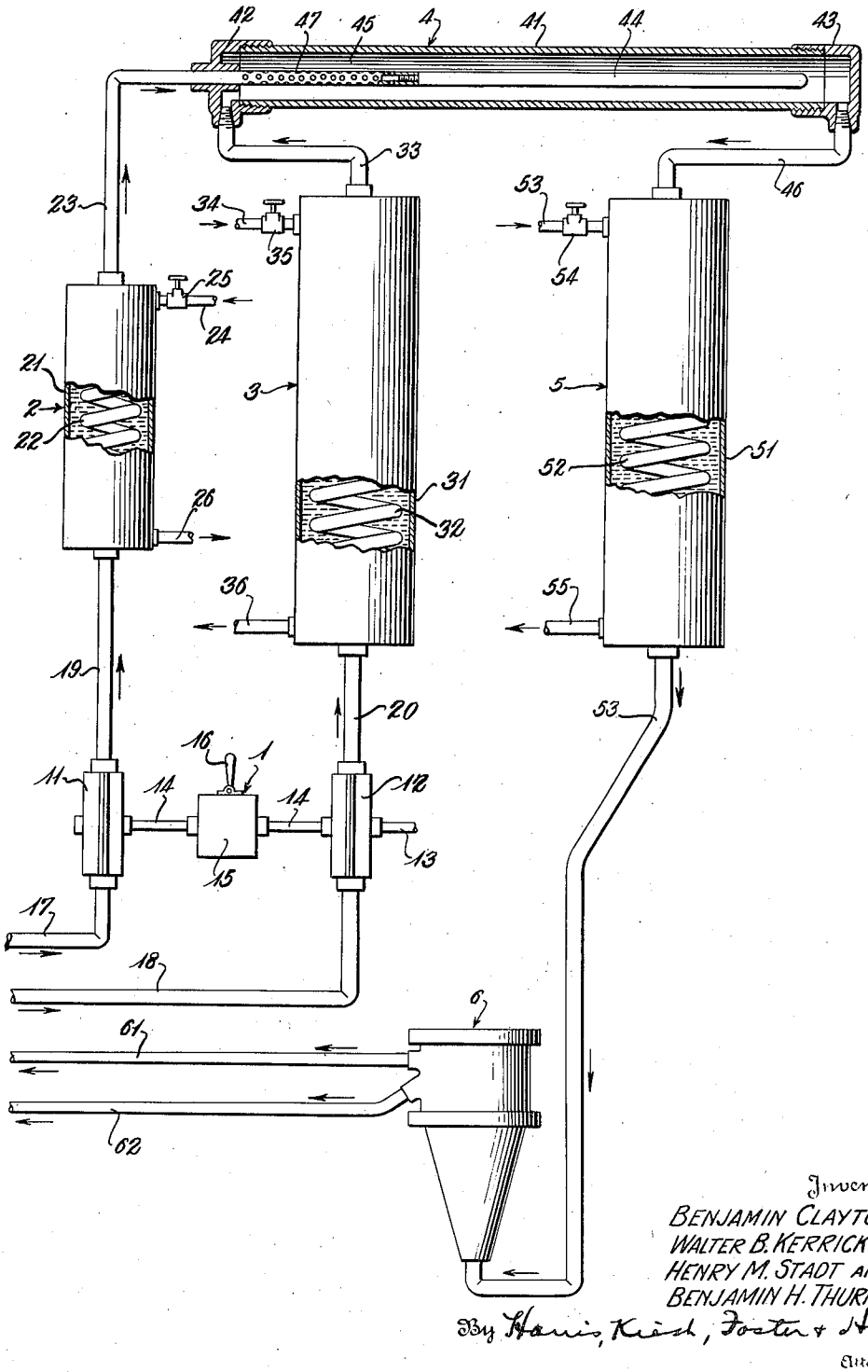
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REFINING APPARATUS

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REFINING APPARATUS

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The invention relates to the refining of glyceride oils. The term "glyceride oils" is used in a general sense to include oils of vegetable or animal origin, including the fish oils.

The term "raw oil" as used hereinafter is intended to mean a glyceride oil containing impurities. In general the word "impurities" as used hereinafter is intended to include not only fatty acids (having the general chemical formula $C_nH_{2n}COOH$), but also other suspended or dissolved impurities that can be acted upon by a suitable reagent.

It is well known that raw oil may be treated with various alkaline reagents to produce neutralization. For example, aqueous solutions of caustic soda, sodium carbonate, and other substances are well known to be useful for this purpose and the word "reagent" when used hereinafter is intended to include all substances which have been so used for the refining of raw oil.

The word "refining" is intended to mean the process of neutralization of raw oils to produce a commercial oil. A "commercial oil" is one that is sufficiently free from fatty acids or other impurities to be readily marketable. Such commercial oils are not necessarily "water white" and after being treated as described herein may be subjected to additional treatment to improve their color.

In the refining of raw oils certain reaction products, including, for example, soap stock, are produced, the reaction products being hereinafter called "foots", this term at the present time being commonly used in the art.

It is old in the art to refine raw oils with reagents to produce foots and to remove the foots from the oils to produce commercial oils. This is commonly done at the present time by "kettle refining". In kettle refining a batch of raw oil is placed in a suitable container or "kettle", this oil being usually at a temperature not greater than that of the room in which the refining is conducted. Reagent is then added to the kettle, the contents thereof being vigorously agitated during this addition so that the reagent is mixed with the raw oil. Subsequent to this addition of reagent heat is applied to the kettle, the agitation being continued until the surface of the liquid shows a "break", the appearance of which is readily detected by the skilled refiner. This break indicates to the refiner that refining is substantially complete. If the oil is now allowed to stand quiescent in the kettle or in some other container to which the oil has been transferred, the foots settle out of the oil.

Refiners operating the kettle method of refining have found it advisable to use considerably more reagent than is theoretically necessary to neutralize the free fatty acid in a certain batch of raw oil. It might be explained that, using methods well known in the art, the refiner can determine from a small sample of raw oil the amount of impurities in the oil and can determine prior to starting the refining the amount of reagent theoretically necessary to neutralize the free fatty acid. In practice if the refiner merely adds the exact theoretical amount of reagent, he finds that all the impurities are not completely removed or the oil is "under refined". This is due to the fact that while the reagent has a preferential affinity for the impurities, it will also react with the oil itself to a certain extent causing a refining loss due to reaction with neutral oil. Considerable refining loss due to reaction with neutral oil is inevitable in kettle refining and it represents a real monetary loss to the refiner since the foots produced by the action of the reagent on the oil itself are worth less than the oil so destroyed.

It is an object of the invention to provide an apparatus for refining raw oils by which the refining loss is less than that produced by the usual kettle refining.

In kettle refining the surface of the oil is ordinarily exposed to the air and during the agitation of the hot oil some oxidation takes place, causing oxidation losses.

It is an object of the invention to provide an apparatus for refining raw oil in which oxidation losses are prevented.

It is at present common practice to refine raw oil in batches; that is, a body of oil is placed in a container and subjected while in the container or in other containers to which the batch is transferred to various successive steps of refining.

It is an object of the invention to provide an apparatus for refining raw oil in which the oil flows continuously through different chambers in each of which one or more operations are performed.

By the use of the present apparatus certain advantages are secured, such as, a uniform product, ease of regulation and control, and large capacity.

In the kettle refining of oils the refiner is obliged to use relatively low temperatures. For example, in the refining of cottonseed oil it is the usual practice not to heat the oil in the kettle much above 100 degrees Fahrenheit (38 degrees

centigrade). If the oil is heated much above this temperature, the refined oil is dark in color. This darkness may be due in part to a "setting" of the color already in the oil; that is, to some action on the coloring matter in the oil which renders it resistant to removal. The darkness in the refined oil may also be due to the production of oxidation or decomposition products in the body of the oil. Any such darkening of the refined oil reduces its value.

In kettle refining the refiner finds it necessary to continue the agitation and heating for a considerable period. In refining cottonseed oil, for example, a period as long as three hours may be required before the "break" occurs, which indicates that the refining is substantially complete. Tests on actual apparatus in accordance with the present invention indicate that the refining is extremely rapid, the refining being complete in less than one minute after the reagent is added to the oil.

It is an object of the invention to provide process for refining raw oil in which said refining is very rapidly effected.

Due to the fact that oxidation is prevented and the neutralization is very rapid, it is possible to use temperatures much higher than those previously employed and in fact no injury to the oil results even though the temperature employed is far in excess of that previously considered desirable. In actual tests on cottonseed oil, which if kettle refined at temperatures above 100 degrees Fahrenheit or 38 degrees centigrade would produce a dark refined oil, it is found possible to use temperatures at least twice those indicated by ordinary kettle refining practice.

It is an object of the invention to provide an apparatus for refining raw oils in which the oil may be subjected to temperatures considerably in excess of those now used in the art.

Contrary to all the teachings of the art, it is possible by the apparatus disclosed herein, using high temperatures, to reduce the color of the refined oil below the color produced in the refined oil by the best standard practice. In other words, for some reason in operating in accordance with the disclosure herein, the use of high temperatures in place of darkening the refined oil actually tends to decolorize it. This may be due to the very rapid rate at which the refining takes place or to other causes.

It is an object of the invention to provide an apparatus for refining raw oils in which the oil is so treated as to improve the color of the refined oil over that produced by the processes now in use in the art.

In kettle refining the foots are ordinarily separated from the raw oils by gravitational settling. The break relied upon by the refiner to indicate complete refining is merely an indication that the particles of foots previously dispersed in the body of the oil have started to agglomerate into masses visible to the eye of the refiner. These visible masses are somewhat heavier than the refined oil and if the mixture is allowed to stand in a container they settle to the bottom, carrying some entrained oil with them.

Many attempts have been made to separate the foots from the refined oil in a centrifuge, which is a device having a bowl rotating usually about a vertical axis and into which the mixture of refined oil and foots is passed. In the centrifuge, due to the centrifugal force produced by the rotation of the bowl, the liquid carried therein tends to stratify, the foots being thrown to the outside, forming an outer layer of foots, and the refined oil being forced inwardly toward the axis of the bowl, forming an inner layer of refined oil. Separate outlets are provided for these two layers and when the centrifuge is adjusted to suit the character of liquid fed thereto refined oil substantially free from foots is discharged from one outlet and foots substantially free from refined oil are discharged from the other outlet.

Due to the fact that when the break occurs in kettle refining the foots are distributed in the mixture of refined oil and foots in the form of visible masses, it has been found difficult to separate the foots from the oil by centrifugal separation due to the variable nature of the liquid delivered to the centrifuge. This is, of course, due to the fact that whenever a large mass of foots flows into the centrifuge, it fills the centrifuge, displacing the inner layer of refined oil so that foots pass out through the refined oil outlet.

It is an object of the invention to provide an apparatus in which the refined oil and foots are separated by centrifuging.

When operating upon certain oils it is desirable to provide for heating the reagent and oil before combining them. Like most chemical reactions, the action of the reagent on the impurities is rendered more rapid at higher temperatures and due to the manner in which the process is conducted, it is possible to preheat the oil and reagent before mixing them, thus intensifying the reaction after the mixing has taken place. This preheating of the oil and reagent before mixing is contrary to the teachings of the art, the kettle refiner usually starting with a cold mixture of raw oil and reagent and gradually heating the mixture while maintaining a mild agitation.

It is an object of the invention to provide an apparatus for treating raw oil in which the oil and reagent may be heated before being mixed.

The actual operation of the apparatus will be better understood if we consider a specific example such as the refining of raw cottonseed oil. Such oil can be conveniently refined in the apparatus shown diagrammatically in the annexed drawing.

The apparatus consists of a proportioning device 1, a reagent heater 2, a raw oil heater 3, a mixer 4, an agglomerator 5, and a separator 6.

The function of the proportioning device is to feed the raw oil and reagent to the other apparatus at constant rates which bear a definite proportion to each other. For example, operating on a raw oil containing by test about 2% of free fatty acids and using a solution of caustic soda in water having a specific gravity of 16 degrees Baumé, this caustic soda solution may be fed into the apparatus at about 8% the rate the oil is fed. In general it may be said, the raw oil being fed into the apparatus at a definite rate, that the caustic should be simultaneously fed at a rate somewhat higher than that necessary to theoretically neutralize the impurities in the oil.

The rates at which the oil and reagent are fed should each be under the control of the operator and any apparatus which will enable the operator to control the proportions of flow will be satisfactory. In the drawing the proportioning device 1 is shown as consisting of a reagent pump 11 and a raw oil pump 12. The raw oil pump 12 is driven by a shaft 13 from any convenient source of power, not shown, and the reagent pump 11 is driven by a shaft 14 connected to the

shaft 13 through a variable speed gear 15 the ratio of which can be varied by a lever 16.

Reagent is drawn into the reagent pump 11 from any convenient source of supply, not shown, through a pipe 17 and raw oil is drawn into the raw oil pump 12 from any convenient source of supply, not shown, through a pipe 18. The reagent is delivered by the reagent pump 11 to a pipe 19 and the raw oil is delivered to a pipe 20.

While the drawing shows the reagent heater 2 and the oil heater 3 placed in such a position that the proportioning device 1 feeds cold oil to them, as far as the operation of the apparatus is concerned the reagent and oil might be heated prior to passing to the proportioning device. As a matter of convenience in operation it is perhaps better to arrange the apparatus as shown in the drawing.

The function of the reagent heater 2 is to supply heat to the reagent and the construction shown is merely a convenient form. As shown the reagent heater 2 consists of an outer shell 21 inside which is placed a coil 22, this coil receiving reagent from the pipe 19 and delivering it to a pipe 23. A heating medium such as hot oil, hot water, or steam is delivered to the interior of the shell 21 to the space surrounding the coil 22 through a pipe 24 having a valve 25, the cooled heating medium being withdrawn through a pipe 26. A direct flame heater, in which a gas flame is used to provide hot combustion gases which pass upwardly around the coil 22 and to heat the reagent therein, may be substituted if desired, or some other form of liquid heater may be used. All that is necessary is that the reagent be delivered through the pipe 23 at a constant and controlled temperature.

The oil heater 3 may be similar to the reagent heater 2 consisting of an outer shell 31 inside which is placed a coil 32, this coil receiving raw oil from the pipe 20 and delivering it to a pipe 33. A heating medium such as hot oil, water, or steam is delivered to the interior of the shell 31 to the space surrounding the coil 32 through a pipe 34 having a valve 35, the cooled heating medium being withdrawn through a pipe 36. A direct flame heater may be substituted if desired for the specific form of reagent heater 3 shown in the drawing.

The function of the mixer 4 is to produce an intimate mixture of reagent with the oil in which the reagent is uniformly distributed in the form of fine drops as the dispersed phase of a mixture in which the raw oil is the continuous phase.

The form shown in the drawing consists of an outer cylindrical shell or pipe 41 secured in gas-tight relationship (by screw threads, for example) in a fitting 42 at one end of the shell and in a fitting 43 at the other end of the pipe. The reagent inlet pipe 23 extends through the fitting 42 in gas-tight relationship therewith and into the space inside the shell 41 concentric with the interior thereof.

The inner end of the pipe 23 is threaded on a rod 44 which closes the end thereof. The annular space 45 between the outside of the pipe 23 and rod 44 and the inside of the shell 41 is called the mixing space. Mixtures produced in this space are delivered to a pipe 46 threaded in the fitting 43. The pipe 23 is provided with one or more small holes 47 through which reagent is ejected from the interior of the pipe 23 into the mixing space 45. Since the oil is constantly being forced through this mixing space, the stream of reagent breaks up as it leaves the holes 47 into fine drops which are carried in the body of raw oil. The reagent in each drop is, of course, in contact at its outer surface with the oil and the reagent acts on the oil, neutralizing the impurities therein. By breaking up the reagent into a multiplicity of small drops the total interfacial contact between the outer surface of these drops and the oil is very large and rapid refining of the oil is therefore accomplished regardless of the temperature of the oil and reagent. It may, however, be said that the reaction is apparently quicker with hot oil and reagent than with cold.

By uniformly dispersing small drops of reagent in oil the reagent is brought into intimate contact with the oil without the concentration of the larger masses of reagent inherent to kettle refining in which the oil is run into the kettle in a stream and tends to settle in the bottom of the kettle until picked up and broken into small masses by the agitator. The drops of reagent also have an initial movement as they leave the holes 47 and the oil itself is in motion so that each drop of reagent moves about in the body of the oil and the oil at the interfacial surface of each drop is constantly changing. As a result, the refining is not only rapid and complete, but refining losses are greatly reduced, the reagent being able to quickly find impurities upon which it can act so that the relatively slow action of reagent on the oil itself is very small. By using the type of mixer shown, the refiner is able to completely refine the oil using only slightly more reagent than would be theoretically necessary and with very low refining losses.

While the specific form of mixer 4 shown in the drawing and described herein has certain marked advantages as previously pointed out, if these advantages are not desired, the functions of the mixer may be performed by any form of mechanical mixer through which the oil and reagent are passed and in which the reagent is mechanically broken up into small drops.

While the holes 47 are preferably distributed uniformly in a spiral path about the pipe 23, this is probably not essential, a single hole being sufficient provided it is so placed as to produce a uniform dispersion of the reagent in the raw oil.

The purpose of heating the raw oil prior to the introduction of the caustic therein is to promote the reaction between the reagent and the impurities and to reduce the viscosity of the oil so that the drops of reagent produced in the mixer 4 have a greater freedom of movement in the body of the oil during the reaction and agglomeration periods and the centrifuging is facilitated. It is a well known fact that the viscosity of glyceride oils is reduced by heating and the degree of heat used is dependent upon the viscosity-temperature characteristics of the oil. The oil should be sufficiently hot when delivered to the centrifuge 6 to permit of efficient separation.

In some cases it may be convenient to dispense with the reagent heater 2 and connect the pipe 19 directly to the pipe 23. Since the reagent is finely divided in the mixer 4 and introduced into the body of the oil in fine drops, the conditions for heat transfer are very good and the reagent if cold is very rapidly heated by the surrounding oil, especially if the volume of reagent is small as compared to the volume of the oil.

The primary function of the agglomerator 5 is to provide means for permitting the small drops of reagent or foots to coalesce and com-

bine with color impurities to assist in centrifuging, to which the oil is later subjected. If the function of agglomerator is unnecessary in certain cases it may be omitted.

The agglomerator 5 shown in the drawing consists of an outer shell 51 in which is placed a helical coil 52 of pipe, one end of this coil 52 being connected to the pipe 46 and the other end being connected to a pipe 53. In refining certain oils it is desirable to control the temperature of the mixture while it is in the agglomerator.

A pipe 53 having a valve 54 delivers liquid into the space inside the shell 51 around the coil 52, this liquid being withdrawn through a pipe 55.

The liquid delivered through the pipe 53 may be either a heating or cooling medium, depending upon the temperature of the oil flowing through the pipe 46. In some cases it may be unnecessary to use either a heating or cooling medium on the coil 52, in which case the interior of the shell may be lined or filled with heat insulating material such as loose asbestos fibers.

In the refining of cottonseed oil having from 2% to 3% of free fatty acid excellent results are obtained if the oil is pumped through the apparatus at the rate of about sixteen pounds per minute and the agglomerator consists of from 250 to 500 feet of pipe one-half to three-fourths inch inside diameter.

If the mixing space 45 is sufficiently long, neutralization is almost wholly completed when the oil enters the coil 52. This is not important since if it is not complete it proceeds to completion in the upper part of the coil 52. In any event the neutralization is completed either before the oil enters the coil 52 or soon thereafter.

As soon as the neutralization is complete, the drops of reagent have been converted into small particles of foots, which in the refining of cottonseed oil appear as loose masses of microscopic size. Some of these masses are so small that their separation from the oil is difficult.

The agglomerator tends to coalesce these masses of foots into larger masses which is accomplished by allowing the oil to flow with only a mild agitation through the coil 52. By making this coil of pipe bent into a continuous helix or spiral this mild agitation is produced due to the uniform and gradual change in direction of the coil. In their travel the larger masses of foots capture and agglomerate with the smaller, producing a mixture in which the foots appear as masses which are larger than the masses originally produced during neutralization, but which due to the constant motion of the oil have not been allowed to stratify or agglomerate into large masses like those seen by the kettle refiner after the break.

It is highly desirable to prevent agitation or turbulence in the agglomerator such as would tend to break up the small masses of foots as produced by neutralization, and it is also desirable to keep the oil in motion to prevent the foots from stratifying into masses of such size that they would interfere with centrifugal separation.

The mixture of oil and foots delivered to the pipe 53 should be in condition to be easily centrifuged. If the oil is naturally viscous at atmospheric temperatures, it should be hot enough to reduce its viscosity, and the foots should be uniformly distributed in the oil in masses of fairly uniform size, which size should be such that the masses separate readily from the oil during the centrifuging operation.

The function of the centrifuge 6 is to separate the foots from the oil and deliver them through a pipe 61 to suitable storage, not shown, the oil being delivered through a pipe 62 to suitable storage, not shown. Centrifuges for performing this operation are readily available, containing usually a bowl mounted on a vertical shaft which is rotated at a high speed by an electric motor. Since such separators are old and well known, their construction need not be described herein.

It is understood that thermometers, gauges, and other indicating devices, not shown, are supplied to enable the operator to fully determine at all times the conditions in the various pieces of apparatus, and valves and other control devices, not shown, are supplied to enable the operator to control said conditions.

The operation of the apparatus will be better understood by considering it applied to the refining of a cottonseed oil containing about 2% of free fatty acid. This oil was pumped through the apparatus at the rate of about sixteen pounds a minute. A reagent consisting of a solution of caustic soda in water was used, this reagent having a specific gravity of sixteen degrees Baumé. Reagent was pumped into the mixer at the rate of about one and one-fourth pounds per minute. The coil 52 consisted of about 250 feet of three-fourths inch (inside diameter) pipe and the pumps 11 and 12 built up a pressure of about 80 pounds per square inch. The oil and caustic were heated to about 160° F. before being delivered to the mixer 4. Experiments indicate that considerably higher temperatures might be used to advantage. Operating on this particular oil it was proved unnecessary to supply heat to the agglomerator 5 although centrifuging was facilitated if some heat was applied to the coil 52 so that the oil in the pipe 53 had a temperature of about 170° F.

The oil delivered through the pipe 62 was a good commercial oil and in spite of the high temperatures used had a better color and clarity than the oil produced by refining the same raw oil by the best kettle refining.

This application is a division of our copending application, Serial No. 685,130, filed August 14, 1933.

By the employment of the expressions to "quickly preheat the oil in relatively small quantities to an emulsion breaking temperature" and "quickly preheat relatively small quantities of the oil" in certain of the claims, we mean to define, embrace and be restricted to an apparatus wherein small quantities of the oil are quickly preheated to an emulsion breaking temperature as contra-distinguished from the heating of the conventional tank of upwards to 60,000 pounds to merely a flow and not an "emulsion breaking" temperature as distinguished from the disclosure contained in the Sharples French Patent No. 743,449; but such expressions are not restricted necessarily to heating a stream of oil as it advances through a conduit.

And, by the use of the expressions "agglomerating member is constructed and arranged to prevent a rise in temperature" or "said heating means being isolated from said agglomerator member" as employed in certain of the claims we mean to contra-distinguish the invention from apparatus wherein the agglomerator is heated

after the emulsion has been broken as exemplified in the Sharples French Patent No. 743,449.

What we claim is:

1. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to discharge a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure; a conduit for supplying a stream of oil to said receptacle for admixture with said refining reagent; heating means, said heating means being constructed and arranged to heat the last-named conduit whereby to preheat the stream of oil passing through said last-named conduit before the same is admixed with said refining reagent to a temperature sufficiently high to break any emulsion which may exist as a result of said admixture, whereby to condition the admixture for the act of centrifugal separation.

2. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to discharge a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure; a plurality of conduits connected with said receptacle for continuously introducing the oil and refining reagent thereto; heating means, said heating means being constructed and arranged to apply heat to at least one of said last-named conduits whereby to preheat the stream flowing therethrough sufficiently high to break any emulsion which may exist as a result of the said admixture of said streams, whereby to immediately condition the admixture for the act of centrifugal separation.

3. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to discharge a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure; a conduit of restricted cross sectional dimensions connected with said receptacle; pumping means adapted to rapidly force a small stream of oil through said last-named conduit and introduce the same to said receptacle; heating means, said heating means being constructed and arranged to apply heat to said last-named conduit sufficient to elevate the temperature of the oil passing therethrough to break any emulsion which may exist as the result of the admixture of the refining reagent and said oil, whereby to condition the admixture for the act of centrifugal separation.

4. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a mechanical agitator disposed therein; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to discharge a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure; a conduit for continuously advancing a stream of oil to said receptacle; heating means, said heating means being constructed and arranged to apply heat to said last-named conduit sufficient to elevate the temperature of the oil passing therethrough to break any emulsion which may exist as a result of said admixture of the refining reagent and said oil, whereby to condition the admixture for the act of centrifugal separation.

5. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to discharge a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure; pipes connected to said receptacle; metering pumps for forcing, under super-atmospheric pressure, streams of oil and a refining reagent respectively through said pipes to said receptacles, heating means adjacent at least one of said pipes, said heating means being constructed and arranged to apply heat to at least one of said pipes whereby to raise the temperature of the stream rapidly advanced therethrough to a degree which, when the streams are admixed will break any emulsion which will exist as the result of said admixture.

6. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit constituting an agglomerator connecting said receptacle to said centrifugal separator; pumping means adapted to advance a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure, said conduit being of sufficient length to provide for the agglomeration of color impurities and foots therein; means for continuously advancing a stream of oil to said receptacle; heating means, said heating means being constructed and arranged to apply heat to the last mentioned means sufficient to elevate the temperature of the oil flowing therethrough to break any emulsion which may exist as a result of admixture of the thus preheated oil with the refining reagent, whereby to condition the admixture for the act of centrifugal separation.

7. An apparatus for the refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit constituting an agglomerator connecting said receptacle to said centrifugal separator; pumping means adapted to advance a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure, said conduit being of sufficient length to provide for the agglomeration of color impurities and foots therein; means for adjusting the temperature of the admixture passing through said conduit; means for continuously advancing a stream of oil to said receptacle; heating means, said heating means being constructed and arranged to apply heat to the last mentioned means sufficient to elevate the temperature of the oil flowing therethrough to break any emulsion which may exist as a result of admixture of the thus preheated oil with the refining reagent, whereby to condition the admixture for the act of centrifugal separation.

8. An apparatus for the refining of animal and vegetable oils comprising, in combination, a

receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit constituting an agglomerator connecting said receptacle to said centrifugal separator; pumping means adapted to advance a stream of said admixture through said conduit to said centrifugal separator under super-atmospheric pressure, said conduit being of sufficient length to provide for the agglomeration of color impurities and foots therein; means for adjusting the temperature of the admixture passing through said conduit by cooling said conduit; means for continuously advancing a stream of oil to said receptacle; heating means, said heating means being constructed and arranged to apply heat to the last mentioned means sufficient to elevate the temperature of the oil flowing therethrough to break any emulsion which may exist as a result of admixture of the thus preheated oil with the refining reagent, whereby to condition the admixture for the act of centrifugal separation.

9. An apparatus for the continuous refining of animal and vegetable oils comprising, in combination, a receptacle for containing an admixture of a refining reagent and said oils; a centrifugal separator; a conduit connecting the receptacle with the centrifugal separator; pumping means adapted to advance a stream of the admixture through the conduit to said centrifugal separator under super-atmospheric pressure sufficient to avoid stratification; a conduit for supplying a stream of oil to said receptacle for admixture with said refining reagent; heating means, said heating means being constructed and arranged to quickly preheat the oil in relatively small quantities to an emulsion breaking temperature, without setting the color thereof, prior to the admixture of the preheated oil with the refining reagent whereby to oppose the formation of an inseparable water-in-oil emulsion during said admixing and to condition the admixture for the subsequent act of centrifugal separation.

10. An apparatus for the continuous refining of animal and vegetable oils comprising, in combination, mixing means for forming an admixture of a refining reagent and said oils; a centrifugal separator; an agglomerating member interposed between the mixing means and the centrifugal separator for agglomerating the foots resulting from said admixing; a conduit for supplying a stream of oil to said mixing means and a conduit for supplying a stream of the refining reagent to the mixing means; pumps for advancing properly proportioned predetermined and metered quantities of the oil and refining reagent to said mixing means through said conduits; heating means, said heating means being constructed and arranged to quickly preheat relatively small quantities of the oil before the same is admixed with said refining reagent to a temperature sufficiently high to oppose the formation of a centrifugally inseparable, water-in-oil emulsion during said admixing, whereby to condition the admixture for the act of centrifugal separation.

11. The combination as expressed in claim 10 in which the agglomerating member is constructed and arranged to prevent a rise in temperature as the admixture passes therethrough in its transit to the centrifugal separator.

12. An apparatus for the refining of animal and vegetable oils comprising, in combination, means for receiving streams of oil and a refining reagent; a centrifugal separator; an agglomerating member interposed between said means and said centrifugal separator; conduits for supplying streams of oil and refining reagent to said means in metered, predetermined and constant ratios; heating means, said heating means being constructed and arranged to preheat the oil before admixture with the refining reagent to a temperature at least sufficient to permit said oil to flow through said conduit for admixture with said refining reagent, said heating means being isolated from said agglomerating member whereby to prevent the application of heat to the admixture as the same passes through said agglomerating member and is conditioned for centrifugal separation.

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