

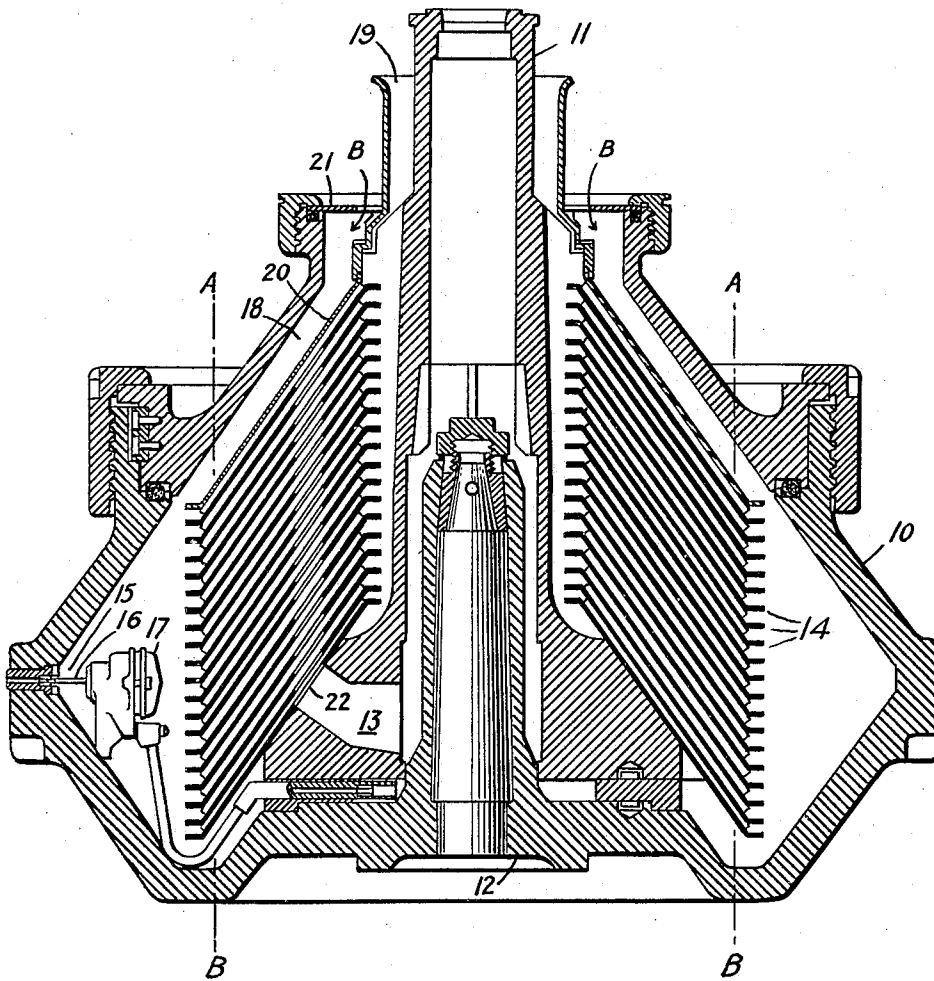
Nov. 17, 1942.

A. T. SCOTT

2,302,382

REMOVAL OF IMPURITIES FROM SOAP NIGRE

Filed April 23, 1941



INVENTOR
Ashton T. Scott
BY
Maurice A. Crews
ATTORNEY

UNITED STATES PATENT OFFICE

2,302,382

REMOVAL OF IMPURITIES FROM SOAP
NIGREAshton T. Scott, Ardmore, Pa., assignor to The
Sharples Corporation, Philadelphia, Pa., a cor-
poration of Delaware

Application April 23, 1941, Serial No. 389,849

12 Claims. (Cl. 233-14)

The present invention pertains to treatment of soap nigras to purify them by removal of dirt and other insoluble impurities. In the soap-making art, it is desirable, in the interest of economy, to return the nigre, after separation from the neat soap, to an earlier stage of the soap-making operation in order to utilize the soap values contained in the nigre in the making of a subsequent batch of soap. The accumulation of dirt and other impurities in the nigre, however, imposes a serious limitation on the performance of this economy, since nigre obtained by a soap-making operation in which a relatively dirty nigre from a prior operation has been passed to one of the saponification steps becomes so dirty that it can no longer be recycled.

The present invention relates to a centrifugal method of clarifying the soap nigre to remove insoluble impurities. The practice of the invention involves use of the familiar type of centrifugal separator in which an impurity is discharged, either intermittently or continuously, from the periphery of the rotor. In the preferred form of the invention, the clarification operation is accomplished in a centrifugal rotor provided with a plurality of valves which co-act with valve seats in the periphery of the rotor to effect intermittent discharge of solids accumulating adjacent these seats as sedimented from the nigre.

In the performance of a clarifying operation in a machine of the type described above, in which the impurities are removed through peripheral outlets from the rotor, an objectionable feature is encountered, in that a part of the valuable soap nigre is inevitably discharged with the impurities removed from the nigre. An important feature of the present invention consists in the fact that it provides a method by which this objectionable feature of operation may be avoided.

In the practice of the invention, a stratum of aqueous electrolyte solution is maintained in the zone of the centrifugal rotor adjacent the point of peripheral discharge of impurities therefrom, this stratum of electrolyte solution being of lower specific gravity than the impurities to be removed, but of higher specific gravity than the main body of the soap nigre. As a consequence of this specific gravity relationship, the stratum of electrolyte solution will occupy a zone of the centrifugal rotor intermediate between the soap nigre and the stratified solids. By reason of this relationship, when dirt or other impurities move outwardly into the stratum of electrolyte

solution accompanied by soap from the nigre stratum, the soap will be washed free of the impurities by the action of the electrolyte solution and returned to the nigre stratum because of its low specific gravity, while the heavier impurities will pass to the circumference of the rotor and ultimately be discharged.

The advantages of the invention, and the manner in which these advantages are attained, will be better understood by reference to the attached drawing, in which the single figure illustrates a centrifugal separator of the preferred type employed in the practice of the invention.

The centrifugal separator illustrated in the drawing includes a centrifugal rotor 10 provided with a central feed tube 11 and with a boss 12 for securement to the rotor-driving shaft. Liquid is passed from the lower end of the feed tube 11 through a plurality of radial channels 13 into the space between successive pairs of a stack of stratifying discs 14, as will be well understood by those skilled in the art. Heavy impurities pass outwardly through the disc stack into zones 15 of accumulation of solids, and the solids are periodically discharged from these zones 15 by actuation of valves 16 under the power of individual hydraulic motors 17 secured to the respective valves. In case the mixture in the rotor consists of two immiscible liquids, subsidence of these liquids will also occur in the rotor, the lighter liquid being discharged inwardly from the disc stack and over the extension 19 of the dividing cone 20, while the heavier liquid is discharged around the outer edges of the discs, and through the passages 18 over ring dam 21.

In the use of the above-described centrifugal rotor in the practice of the invention, an aqueous electrolyte solution which is immiscible with the nigre to be clarified is first fed to the centrifugal rotor in sufficient quantity to fill that rotor from the periphery thereof inwardly to an annular zone at about the line A-B, upon rotation of the rotor. After the rotor contains aqueous electrolyte solution to about the indicated depth, nigre to be clarified is introduced into the feed tube 11 during the continued rotation of the rotor. After passage of the nigre through the radial channels 13 and holes 22 into the parallel spaces between successive pairs of discs, sedimentation of solids from the nigre will occur because of the centrifugal force applied to the nigre in the spaces between the successive discs. The solid impurities, such as dirt, will pass outwardly until they reach the stratum of electro-

lyte solution, whose inner annular surface is defined by the line A—B. The solids must pass through this heavier aqueous solution stratum in passing to the zone 15 from which they are periodically discharged from the rotor by actuation of the valve 16. This passage of the solids through the electrolyte solution washes from the solids any soap which may adhere thereto, and this soap, being of lower specific gravity than the electrolyte solution, is returned to the nigre layer and ultimately discharged with the nigre over the extension 19.

In the practice of the invention, it is preferable to choose a ring dam 21 of such size that the aqueous electrolyte solution will be continuously discharged across this ring dam by the centrifugal force applied to the nigre and the solution in the rotor. In other words, it is preferable to operate the rotor as a so-called "separator" bowl, balancing the electrolyte solution layer in discharge passage 18 against the electrolyte solution and nigre layers in the main body of the rotor. The electrolyte solution will be removed from the rotor from time to time, both by discharge with the dirt through the valve 16, and also by discharge across the ring dam 21. It will accordingly be desirable to replace the electrolyte solution from time to time in order to maintain a stratum of that solution of substantial depth within the rotor. This is preferably accomplished by feeding the electrolyte solution to the discharge space for said solution from the rotor, as indicated by the arrow B on the drawing. It may, however, be accomplished by an alternative operation involving mixing electrolyte solution with the nigre to be fed to the rotor.

The advantages attained by practice of the invention will now be evident. By maintaining a stratum of electrolyte solution between the solids and the zone from which the solids are discharged peripherally from the rotor, the solids are made to pass through this aqueous stratum and thus washed free of valuable soap which might otherwise adhere to the solids and be discharged therewith. Furthermore, the inevitable discharge of some liquid with the solids peripherally from the rotor in the practice of the present invention involves discharge of the relatively worthless, and recoverable, electrolyte solution, instead of involving discharge of nigre with these solids, as would be the case if no immiscible electrolyte solution stratum were provided.

Various electrolyte solutions may be employed in the practice of the invention. Solutions of salts or alkalis are preferred. Care should be exercised in the choice of the electrolyte to be used in the solution, and also in the determination of the exact concentration of electrolyte to be used, for it is desirable that the electrolyte be of such character and concentration that it is substantially immiscible with the nigre. The concentration of a particular electrolyte to be used in solution in the practice of the invention may be determined by a few simple experiments. One excellent solution for use in this connection consists of sodium chloride brine of between 8 and 10% concentration. It is desirable that the brine be of at least 8% concentration in case sodium chloride is used, since brines of lower concentration are to some extent miscible with the nigre, and this is undesirable. On the other hand, it is preferable to use brines which do not substantially exceed 10% in sodium chloride con-

tent, since brines of high concentration tend to dissolve water from the nigre, and to cause precipitation of soap from the nigre.

While the invention has been described in connection with use of a centrifugal rotor of the so-called "separator" type, it will be understood that a bowl of the "clarifier" type may also be used in the practice of the invention. If a clarifier bowl is used, the invention will be practiced in such a manner that the only discharge of brine from the rotor occurs through the valve for discharge of the solids. In case of practice of the invention with a clarifier bowl, it will be desirable to add a small amount of brine or other electrolyte used, periodically through the feed tube 11 along with nigre under treatment.

While the invention may be practiced by the use of either a "separator" or "clarifier" type of bowl, as discussed above, it will be noted that the use of the separator type of bowl has the advantage that it permits of maintenance of the layer of brine fairly accurately at some chosen depth such as that indicated by the line A—B of the drawing, since the use of the separator bowl permits of accurate determination of this line by choice of a ring dam 21 of the proper inner circumference. The use of the separator bowl also has the advantage that it permits of addition of supplemental electrolyte solution to the rotor across the ring dam for discharge of electrolyte solution, as indicated by the arrow B, thus avoiding the necessity for mixing electrolyte solution with the nigre to be passed to the rotor for purification. Electrolyte solution may be passed to the rotor separately from the nigre under treatment even in the use of a clarifier bowl, however, by passage of the electrolyte solution to the stratum of such solution through passages extending from the outer zone of that stratum inwardly through the rotor wall to a zone on a sufficiently small circumference of the rotor to avoid discharge of this electrolyte solution from the zone of introduction thereof, as will be well understood by those skilled in the art.

Modifications will be obvious to those skilled in the art, and I do not therefore wish to be limited except by the scope of the following claims.

I claim:

1. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising sedimenting heavy insoluble impurities from said nigre by rotation thereof in a centrifugal rotor, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution, and ejecting said solids circumferentially from said rotor under the influence of centrifugal force.

2. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising passing said nigre continuously through a centrifugal rotor, sedimenting heavy insoluble impurities from said nigre by rotation thereof in said centrifugal rotor, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor sur-

rounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution, and ejecting said solids circumferentially from said rotor under the influence of centrifugal force.

3. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising sedimenting heavy insoluble impurities from said nigre by rotation thereof in a centrifugal rotor, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution to the circumferential wall of the rotor, and intermittently ejecting said solids circumferentially from said rotor under the influence of centrifugal force.

4. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising sedimenting heavy insoluble impurities from said nigre by rotation thereof in a centrifugal rotor, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution to the circumferential wall of the rotor, and intermittently ejecting said solids circumferentially from said rotor through valves in the circumferential wall of said rotor under the influence of centrifugal force.

5. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising sedimenting heavy insoluble impurities from said nigre by rotation thereof in a centrifugal rotor, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution, and ejecting said solids circumferentially from said rotor through restricted discharge outlets in the circumferential wall of said rotor under the influence of centrifugal force.

6. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising sedimenting heavy insoluble impurities from said nigre by rotation thereof in a centrifugal rotor, maintaining a stratum of

aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution, ejecting said solids circumferentially from said rotor under the influence of centrifugal force, and passing electrolyte solution to said stratum of electrolyte solution in said rotor during the operation of centrifugation of said nigre, in order to replace electrolyte solution discharged from said rotor with said solids.

7. In the purification of soap nigre by removal of heavy insoluble impurities therefrom, the steps comprising continuously passing said nigre through a centrifugal rotor of the separator type, sedimenting heavy insoluble impurities from said nigre by rotation of said rotor during passage of said nigre therethrough, maintaining a stratum of aqueous electrolyte solution adjusted to a concentration which is substantially immiscible with said nigre and of higher specific gravity than said nigre in the portion of the separating chamber of said centrifugal rotor surrounding said rotating nigre, discharging said solids sedimented from said nigre outwardly through said aqueous electrolyte solution, ejecting said solids circumferentially from said rotor under the influence of centrifugal force, continuously discharging the clarified nigre from said rotor, and continuously discharging aqueous electrolyte solution from said stratum of electrolyte solution from said rotor under liquid balance against said nigre discharged from said rotor.

8. A process as defined in claim 7, in which electrolyte solution is fed to said centrifugal rotor during the centrifugal purifying operation in replacement of electrolyte solution discharged from the rotor.

9. A process as defined in claim 7, in which electrolyte solution is fed to said centrifugal rotor during the centrifugal purifying operation in replacement of electrolyte solution discharged from the rotor, said electrolyte solution being passed to the rotor at the normal zone of discharge of electrolyte solution from the rotor.

10. A process as defined in claim 1, in which the electrolyte solution is a solution of a compound chosen from the class consisting of salts and bases.

11. A process as defined in claim 1, in which said electrolyte solution is a salt solution.

12. A process as defined in claim 1, in which said electrolyte solution is a sodium chloride solution of between 8 and 10% sodium chloride content.

ASHTON T. SCOTT.