

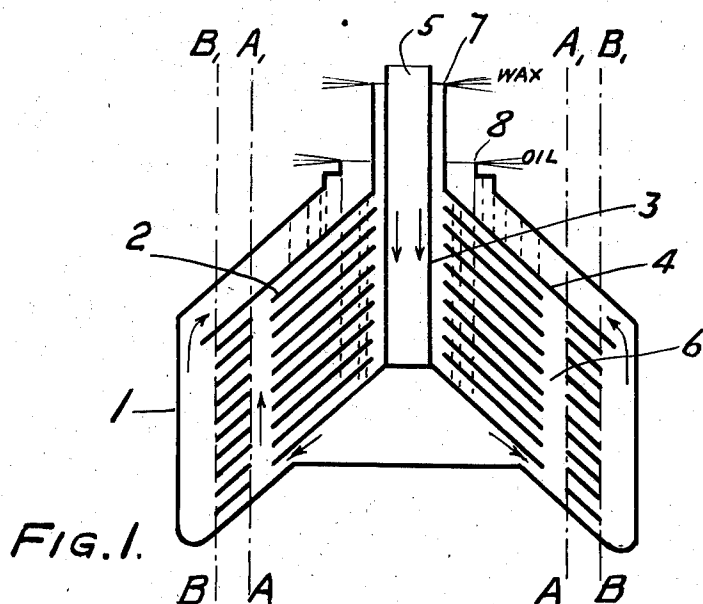
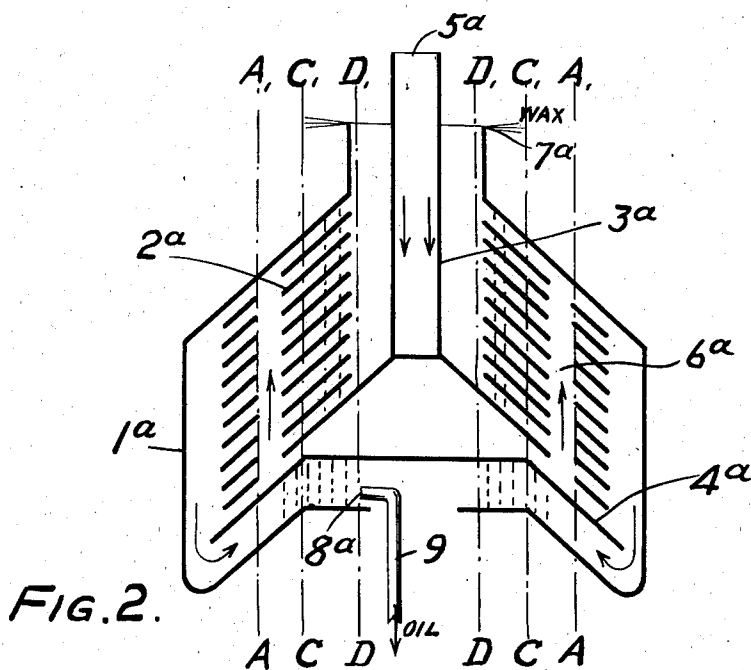
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PROCESS OF CENTRIFUGALLY DEWAXING OILS

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WITNESS:

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PROCESS OF CENTRIFUGALLY DEWAX-
ING OILS

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In centrifugal dewaxing of mineral oils, hydrogenated oils, etc., by aid of a solvent added in order to make the oil sufficiently fluid at low temperature, the precipitated wax moves either inward or outward depending on whether the oil solution is heavier or lighter than the precipitated wax. In dewaxing with heavy solvents, the heavy solvents most commonly used are trichlor ethylene, dichlor ethane and carbon tetrachloride, with or without addition of other liquids such as acetone, methylethyl ketone, methyl acetate or methyl formate. In the case of dewaxing with light solvents, naphtha or benzene are generally used, with or without similar additions. In both cases the wax is discharged from the centrifuge bowl as a more or less viscous mass.

It is very important that as small an amount of oil as possible be discharged with the wax, as the escape of any oil with the wax involves substantial loss, owing to the great difference between the prices of a high quality oil and wax. Consequently the centrifugal bowls are adjusted to produce as hard and dry a wax as possible. Consequently the pressure required for discharging the wax becomes very high. In ordinary centrifugal bowls this pressure can be generated only by displacing the boundary surface between wax and oil from its natural position with regard to the specific gravities of the various media, the rate of throughput, etc. By so doing, however, the separating chamber of the bowl is not utilized in the best way; that is, the amount of oil which can be treated per time unit in the bowl becomes inferior to what it would be if the said boundary surface were correctly located.

It has therefore been suggested to discharge the wax by means of a skimming or paring device. By changing the position of the orifice of this device in radial direction in relation to the rotation axis of the centrifugal bowl it is possible to obtain wax of varying consistency. Experience has shown, however, that arrangements of this type can be used only if the wax mass be comparatively fluid. Otherwise the resistance to movement and deformation in the tube or channel system of the skimming device become too great.

In the process embodying the present invention, the radial distance from the rotation axis of the centrifugal bowl to the boundary surface between wax and oil is so adjusted as to permit separation at high capacity, while at the same time it is possible to force out a very viscous wax. This result is attained by discharging the dewaxed oil through a skimming tube, the opening

of which is movable radially in relation to the rotation axis of the bowl, as hereinafter more particularly described.

In the accompanying drawing: Fig. 1 shows diagrammatically a vertical cross-sectional view of an ordinary centrifugal bowl wherein the ordinary process is practiced. Fig. 2 is a similar view of a centrifugal bowl equipped with a radially movable skimming tube adapted to carry out the process embodying my invention.

Referring first to Fig. 1: The centrifugal bowl 1 is provided with a distributor 3, conical intermediate discs 2 and a top disc 4. The mixture of oil solution and precipitated wax is fed into the bowl 1 at 5, whence it proceeds through the cylindrical portion of the distributor 3 and through the holes 6 provided in the intermediate discs 2. Between the latter a separation is effected. Assuming that a heavy solvent is used, the oil solution is then displaced outwardly and the wax inwardly, the wax being discharged at 7 and the oil at 8. If now the wax were a liquid which could be discharged without too great resistance due to friction and change of shape, it would be possible to adjust the boundary surface between wax and oil solution to a position A—A₁, which would enable a sufficient separation at the highest possible capacity to be attained. In other words, the zone between the discs 2 outside line A—A₁ would have a sufficient radial extension to enable the wax particles to be separated from the oil, and the zone inside the said line would be large enough to enable the wax to be sufficiently liberated from oil.

However, particularly if the wax is to be discharged in a fairly dry state, the resistance to the movement of the wax is great, and the said boundary surface is therefore displaced from the position A—A₁ to the position B—B₁, in order that the force required for pressing out the wax at the given capacity shall be generated. In this case, however, the separation of the wax from the oil becomes incomplete, because the boundary surface B—B₁ is situated too far out, possibly outside the intermediate discs 2.

In my invention a pressure is created in opposition to the force tending to displace the boundary surface between the wax and oil solution in the separating bowl and this pressure is so adjusted or regulated as to maintain said boundary surface in such position as to enable the separator to function at highest capacity. Fig. 2 shows a preferred means of creating and adjusting said pressure. In this figure the parts corresponding to those of Fig. 1 are similarly

numbered but with the addition to the numbers of the reference letter "a." The oil outlet 8^a is located in the lower part of the bowl and the discharge 7^a of the wax takes place at a greater radial distance from the axis of the bowl. From the outlet 8^a the oil is discharged through a skimming tube or disc 9, the orifice of which can be displaced radially in relation to the axis of the bowl. At a position A—A₁ of the boundary surface between oil and wax, an oil outlet at the level C—C₁ corresponds to a position of the wax outlet at 7^a, and the orifice of the skimming device must be located at the said level when the bowl starts working, before the wax has filled the intermediate space between the discs as well as the channels leading to the outlet 7^a. When the said spaces have become filled, the resistance to the sliding movement of the wax is increased, and the orifice of the skimming device 9 must be gradually displaced to the position D—D₁, in order to counterbalance the increased pressure on the wax side.

In the preceding description it has been assumed that heavy solvents are used. This is not necessary, as dewaxing with light solvents may as well be carried out according to the same principles. In such case the method of operation of the bowls is of course changed insofar as the wax is displaced outwardly and the oil solution inwardly.

This application is a division of an application filed by me February 9, 1938, Serial No. 189,546.

What I claim and desire to protect by Letters Patent is:

1. In the separation of an oil diluent solution and a precipitated wax of a specific gravity different from that of the solution in which the mixture is subjected to centrifugal force and the two specified constituents are thereby so separated that they occupy inner and outer concentric zones in the locus of centrifugation and are separately discharged from said zones and the wax has a relatively low viscosity at the start of centrifugation and a progressively increasing viscosity for some time after the start, thereby offering an increasing resistance to its discharge and tending to force the boundary surface between said zones away from its correct location, the process of separating the wax in a comparatively hard and dry state while permitting separation at high capacity which comprises providing a free wax discharge and a column of separated dewaxed oil diluent solution, resistant to its own outflow, the inner level of which at the start of separation extends to such distance toward the axis of the bowl that the centrifugal force thereon equals the sum of the centrifugal force on the wax and the resistance due to its viscosity at that time and, as the viscosity of the wax increases, so progressively increasing the distance that the oil diluent solution extends toward the center of rotation as to provide the increased pressure required to maintain said boundary surface at approximately the best location.

2. In the separation of an oil-diluent solution and a precipitated wax of a specific gravity different from that of the solution in which the mixture is subjected to centrifugal force and the two specified constituents are thereby so separated

that they occupy inner and outer concentric zones in the locus of separation and are separately discharged from said zones, the process of separating the wax in a comparatively hard and dry state while permitting separation at high capacity which comprises providing at the start of the separation a free wax discharge and a static column of separated oil-diluent solution, resistant to its own outflow, at such distance from the axis of rotation as to generate relatively little force to cause outflow of wax and thereafter, as increasing viscosity causes greater resistance to outflow of wax, radially displacing the inner level of said static column so that it extends so substantially nearer the axis of rotation as to cause an increased resistance to its own outflow that will counteract the increase of resistance to wax outflow and thereby maintain said boundary surface at the correct location and effect separation of a highly viscous wax from the solution at high capacity.

3. In the separation of a heavier oil-diluent solution from a lighter precipitated wax in which the mixture is subjected to centrifugal force and the constituents so separated that they occupy inner and outer concentric zones in the locus of separation and are separately discharged from said zones, the process of separating the wax in a comparatively hard and dry state while permitting separation at high capacity which comprises providing at the start of the feed outlets for the separated, rotating wax and solution respectively nearer to and further from the axis of rotation and after the wax has filled an inner zone and is discharging therefrom creating a static column of separated outflowing solution resistant to its own outflow and extending inward an increasing distance toward the axis of the bowl, thereby maintaining the boundary surface between the said zones at such radial distance from the axis of rotation as to effect separation of a highly viscous wax from the oil-diluent at high capacity.

4. The process set forth in claim 3 in which, after the wax has filled an inner zone and is discharging therefrom in the desired highly viscous state the created static column of separated outflowing solution extends inward to nearer the axis of the bowl than the wax discharge.

5. In the separation of a heavier oil-diluent solution from a lighter precipitated wax in which the mixture is subjected to centrifugal force and the constituents so separated that they occupy inner and outer concentric zones in the locus of separation and are separately discharged from said zones, the process of separating the wax in a comparatively hard and dry state while permitting separation at high capacity which comprises creating a free outlet for the wax and a static column of separated dewaxed oil-diluent extending inward toward the axis of the bowl a distance varying with the total resistance to outflow of wax and nearer the axis of the bowl than the wax discharge, so as to generate a varying pressure that will maintain said boundary surface at the correct location to effect separation of a highly viscous wax from the oil-diluent solution at high capacity.

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