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L. D. JONES

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CENTRIFUGAL SEPARATOR

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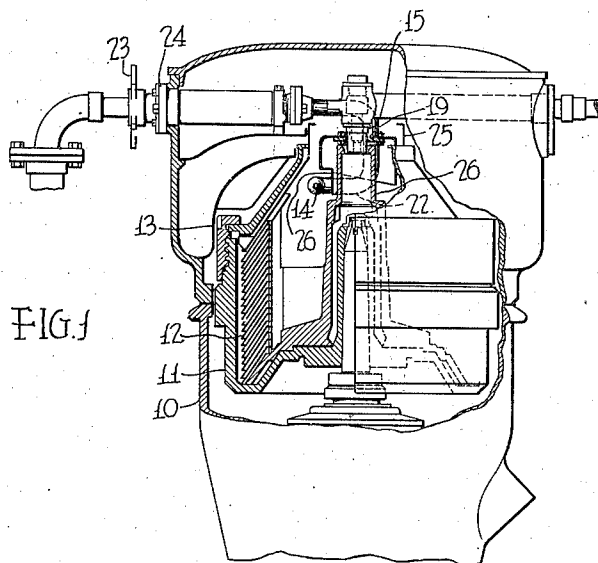


FIG. 1

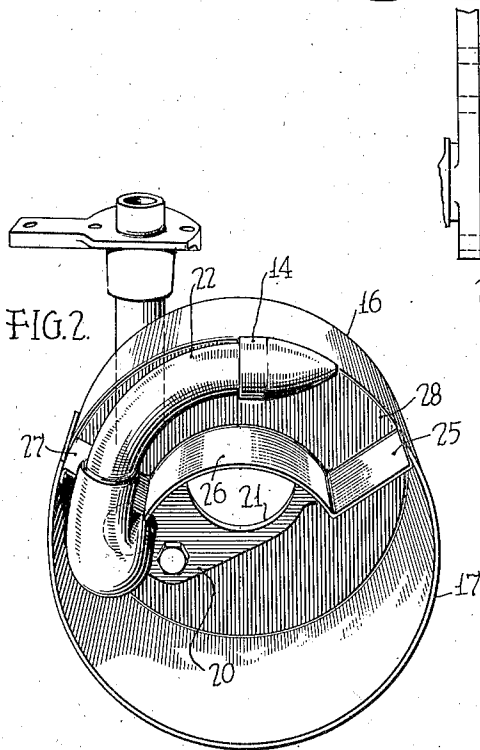


FIG. 2

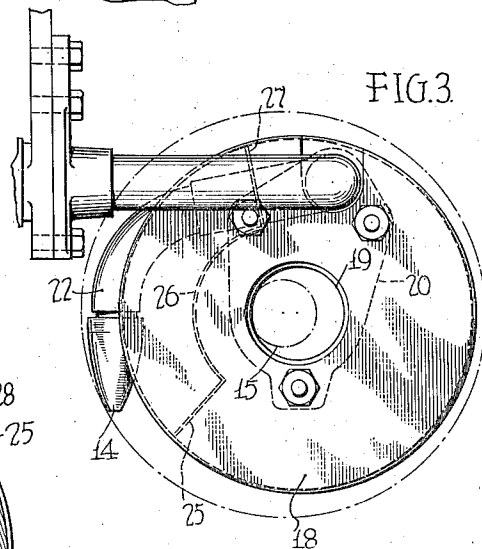


FIG. 3

INVENTOR.

LEO D. JONES

BY *Maurice A. Clem*

ATTORNEY.

UNITED STATES PATENT OFFICE

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CENTRIFUGAL SEPARATOR

Leo D. Jones, Philadelphia, Pa., assignor to The Sharples Corporation, Philadelphia, Pa., a corporation of Delaware

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7 Claims. (Cl. 233—22)

The present invention pertains to the art of centrifugal separators and is particularly concerned with the design of a centrifugal separator adapted to effect continuous discharge from a heavier subsided component of a lighter and viscous component of the centrifugal separating operation through a skimming nozzle. The particular problem which resulted in the conception of the present invention was the continuous separation of wax from a petroleum oil solution of higher specific gravity than the wax, and the invention will be hereinafter described with respect to the continuous separation of these materials from each other. The present invention was conceived in connection with the separation of these materials by means of the centrifugal separator described and claimed in my prior co-pending application Serial No. 751,336 filed November 3, 1934 for Method and apparatus for separating wax from oil. In that application a machine is illustrated which is designed and adapted to discharge wax of a highly viscous nature continuously from the inner subsided wax stratum of a centrifugal separator. In that application no special provision is made to prevent the discharge of the wax by splashing from the rotor. As a consequence of this fact, a certain amount of wax splashes from the skimming nozzle of that application and is discharged into the upper cover which lies above the oil receiving cover of the centrifuge.

A primary object of the invention has been to prevent discharge of wax which splashes from the skimming nozzle as described above from the centrifugal rotor and to minimize turbulence within the centrifugal rotor by deflecting wax splashing from the skimming nozzle as promptly as feasible after it leaves the skimming nozzle, and hence minimizing impact of the wax splashing from the skimming nozzle at high velocity against the rotating body of wax within the centrifugal rotor.

The manner in which the objects of the invention have been attained will be best understood by reference to the following specification in conjunction with the attached drawing, in which,

Fig. 1 is a cross-sectional view through parts of a centrifugal separator illustrating the details of the invention.

Fig. 2 is a detailed bottom perspective view of a skimming nozzle and splash guard assembly constituting the novel unit of the invention, and

Fig. 3 is a plan view of the skimming nozzle and splash guard assembly.

Referring to the drawing by reference characters, the centrifugal separator of the invention embodies a frame 10 which encloses a rotor 11 provided with a plurality of parallel conical discs 12 defining parallel subsidence separating zones. Liquid continuously discharged from the rotor 11 is collected in a receiving cover 13. The lighter subsided material in the rotor is discharged from the rotor continuously through a stationary dislodging tool in the form of a skimming nozzle 14. In the operation of a centrifugal separator of this type, in the separation of wax from a heavier oil solution, the suspension of wax in oil solution is fed to the rotor through a feed nozzle 15 and the oil is continuously discharged into cover 13 while wax is continuously discharged through the skimming nozzle 14.

The present invention embodies a guard member designed to prevent the discharge of wax which splashes from the dislodging tool and to minimize turbulence in connection with the use of a separator of the type described above. To this end, a splash guard 16 is provided adjacent the end of the centrifugal separator from which the wax is discharged. This splash guard comprises an annular skirt 17 extending axially of the rotor and attached to a head portion 18. The annular skirt 17 is slightly smaller in diameter than the neck 25 of the portion of the centrifugal separator which surrounds the guard member, it being necessary to provide some clearance between the guard and the neck of the rotor because of vibration of the rotor and in order to permit movement of the nozzle 14 toward and from the wax stratum within the rotor. The guard is provided with an opening 19 in its head 18 in order to provide for the introduction of the feed nozzle 15 into the receiving end of the central receiving tube 26 of the rotor.

The skimming nozzle is secured to a connection tube 22 which is in turn secured to the head 18 of the splash guard by securement to a plate 20 which is provided with an opening 21 to receive the feed nozzle 15 and is bolted to the head 18 of the guard 16. The portion of the connecting tube which extends above the head of the guard may be reciprocated by means of mechanism connected to its flange 23 to cause limited movement of the nozzle through its guide bearing 24 and adjustment of the position of the nozzle relative to the wax stratum within the rotor.

The opening 19 in the head of the guard 16 is

somewhat larger than the surface of the nozzle 15 within this opening. The nozzle 15 serves as an abutment to limit movement of the guard 16 to the left as viewed in Figs. 1 and 3, and the relative sizes and positions of the outer skirt 17 of the guard 16, the nozzle 15 and the opening 19 are such that movement of the guard 16 toward the left is limited to prevent contact of any part of the skirt 17 with any part of the rotor.

In addition to the annular skirt 17, the guard comprises a flange 25 extending from the skirt 17 toward the center of the rotor and with an arcuate flange portion 26 lying radially inwardly of the skimming nozzle and having a curvature of the same general character as that of the skimming nozzle. The flange 26 is designed to prevent splash of wax to the opposite side of the rotor from that occupied by the skimming nozzle and the flange 25 is designed to deflect wax splashing in a direction approximately at right angles to the plane of the mouth of the nozzle. A flange 27 connects the flange 26 with the skirt 17 and the flanges 25, 26 and 27 afford between them provision for deflection and return to the body of wax within the rotor of a large part of the wax which splashes from the nozzle 14. The guard 16 also embodies a flange 28 which directly overlies the zone of the rotor occupied by the skimming nozzle and deflects a large part of the wax which splashes upwardly from that nozzle.

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 sub-joined claims.

I claim:

1. In a centrifugal separator, the combination comprising a centrifugal rotor having an open neck, a non-rotating dislodging tool projecting into the path of a subsided constituent within said rotor and a splash guard within the open neck of said rotor adjacent said dislodging tool, said splash guard including a head portion lying in a plane substantially at right angles to the axis of the rotor and an annular skirt portion depending from the head and lying in close proximity to the neck of the rotor.

2. In a centrifugal separator, the combination comprising a centrifugal rotor having an open neck, a non-rotating dislodging tool projecting into the path of a subsided constituent within said rotor and a splash guard within the open neck of said rotor adjacent said dislodging tool, said splash guard including a head portion lying in a plane substantially at right angles to the axis of the rotor, and an annular skirt portion depending from the head portion and extending into the rotor in a direction substantially parallel to the rotor axis, said skirt portion being spaced from but lying in close proximity to the neck of the rotor.

3. In a centrifugal separator, the combination comprising a centrifugal rotor having an open neck, a non-rotating dislodging tool projecting into the path of a subsided constituent within said rotor and a splash guard within the open neck of said rotor adjacent said dislodging tool, said splash guard including a head portion lying in a plane substantially at right angles to the axis of the rotor, an annular skirt portion depending from said head and extending into the rotor in a direction substantially parallel to the rotor axis and lying in close proximity to the neck of the

rotor, and a flange extending from said skirt substantially parallel to the head portion overlying a portion of said dislodging tool and designed to deflect wax splashed longitudinally away from the body of subsided material within the rotor by said tool.

4. In a centrifugal separator, the combination comprising a centrifugal rotor having an open neck, a feed nozzle extending into the neck of the rotor, a non-rotating dislodging tool arranged in the end of the rotor adjacent said feed nozzle and projecting into the path of a subsided constituent within said rotor, a splash guard having a head portion surrounding said feed nozzle, a skirt portion depending from said head portion into the neck of the rotor, and lying in proximity to the neck of the rotor and flange portions extending from said skirt portion along a line between said tool and the axis of said rotor designed to deflect subsided material splashed from the main body of subsided material within the rotor by said dislodging tool.

5. In a centrifugal separator, the combination comprising a centrifugal rotor having an open neck, a skimming nozzle projecting into said open neck and into the path of a subsided constituent within said rotor and a splash guard associated with said skimming nozzle having a head portion to which said skimming nozzle is secured and through which said skimming nozzle passes, said splash guard being provided with a skirt portion depending from said head portion and extending into the rotor in a direction substantially parallel to the rotor axis in close proximity to the neck of the rotor, said skirt portion being provided with flanges lying between said skimming nozzle and the axis of said rotor designed to deflect subsided material splashed from the main body of such material within the rotor by said skimming nozzle laterally from said body of subsided material and with a flange portion overlying the skimming nozzle and designed to deflect material splashed from the main body of subsided material within the rotor by said skimming nozzle in a direction longitudinally of the rotor.

6. As an element of a centrifugal separator, the combination comprising a skimming nozzle and a splash guard, said splash guard being provided with a head portion through which said skimming nozzle projects and to which said skimming nozzle is secured, and with a skirt portion depending from said head portion and including flanges extending in a generally inward direction toward the axis of said skirt portion to form a partial enclosure for said skimming nozzle.

7. In a centrifugal separator, the combination comprising a centrifugal rotor, a non-rotating dislodging tool projecting into the path of a subsided constituent within said rotor and a splash guard adjacent said dislodging tool including a head portion having a depending guard portion lying between the axis of the rotor and the dislodging tool designed to deflect material splashed inwardly toward the rotor axis by said dislodging tool, said centrifugal separator being provided with a feed nozzle extending through an opening in the head of said guard portion, said opening being larger than the adjacent surface of the feed nozzle, whereby the feed nozzle serves as an abutment to prevent movement of said guard member against rotating parts of the centrifugal separator.

LEO D. JONES.