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POWER WASHING CENTRIFUGAL SEPARATOR

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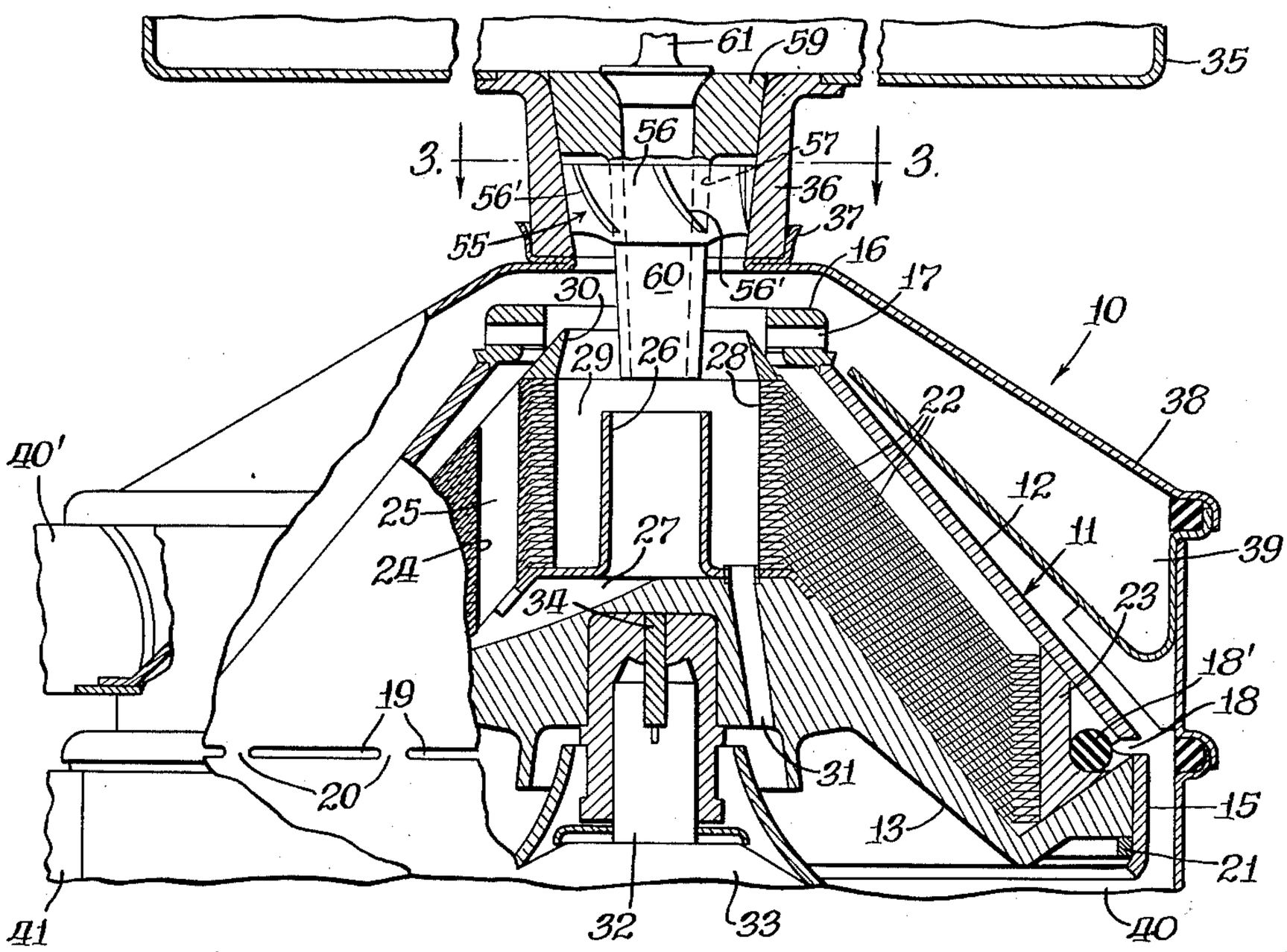

Fig. 1.

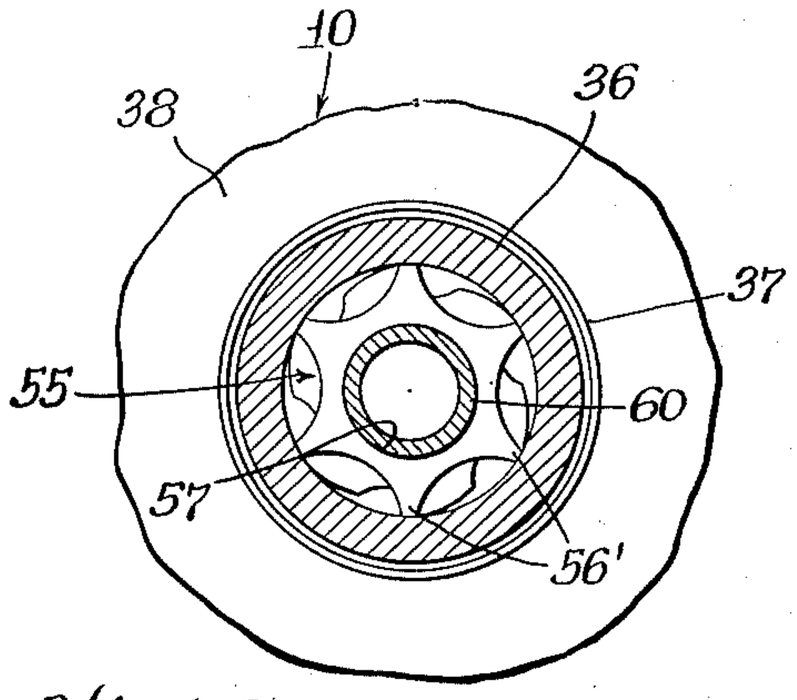

Fig. 3.

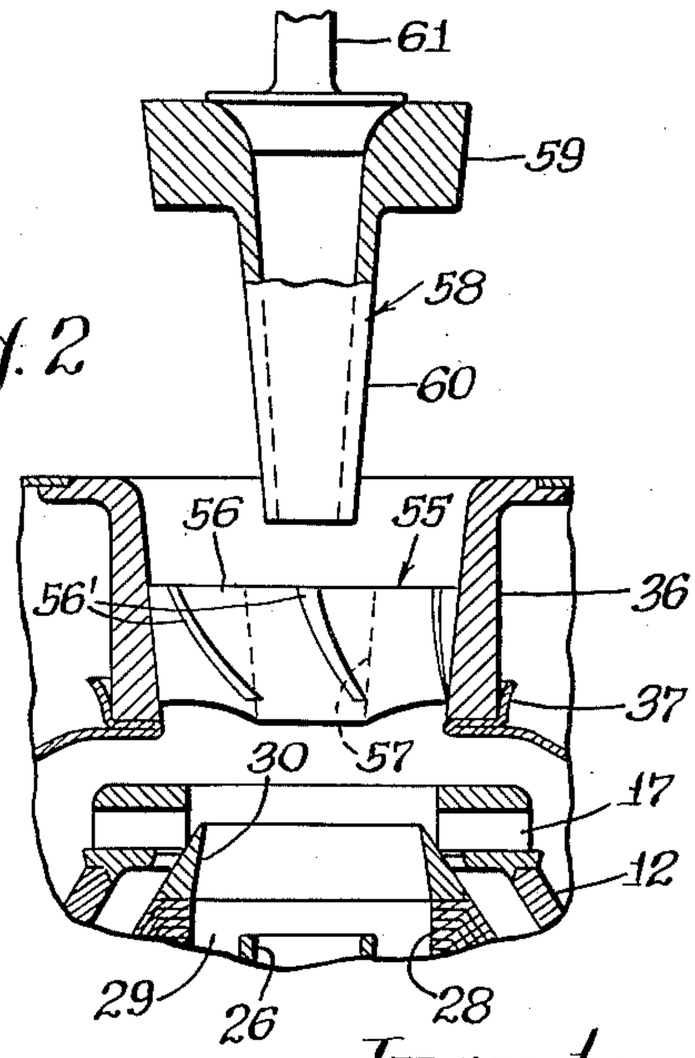

Fig. 2

Inventor.
John R. Orelind
Paul O. Pippel
Atty.

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POWER WASHING CENTRIFUGAL SEPARATOR

John R. Orelind, Wilmette, Ill., assignor to International Harvester Company, a corporation of New Jersey

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5 Claims. (Cl. 233—1)

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This invention which is a division of co-pending application Serial No. 772,837 filed September 8, 1947, which became Patent No. 2,603,413 on July 15, 1952, relates to a centrifugal separator, and more particularly to a power washing cream separator. More specifically, it relates to a power washing cream separator having improved means for washing the cream separating bowl.

In power washing centrifugal separators of the type with which the present invention is concerned, a high speed separating bowl is provided with a plurality of superposed separating discs. A washing liquid discharge opening is provided at the maximum internal periphery of the bowl and this opening is controlled by centrifugal valve means.

After the separating operation, washing liquid is introduced at the top of the separating bowl and upon a lowered speed of rotation of said bowl the centrifugal valve means operates to permit the escape of the washing liquid. In this manner the internal parts of the separating bowl are thoroughly washed without the necessity of disassembling the bowl parts. The centrifugal force of the water scours the inner surfaces of the bowl so that power washing is effected. Power washing separators of this type are generally provided with a plurality of superposed separating discs having center holes in alignment with one another to provide a cylindrical space extending axially of the bowl. The individual discs must have their surfaces thoroughly cleaned and washed, and the separated inner peripheral edges of the discs provide the entrances for the washing liquid that flows between and scours the surfaces of the discs.

It is exceedingly important that sufficient washing liquid be directed toward the inner peripheral edges of the discs since the most difficult place to wash is at this location. It is desirable, therefore, to direct washing fluid along the inner peripheral edges of the discs in a controlled and predetermined amount.

It is applicant's prime object therefore to provide a construction wherein predetermined amounts of washing liquid can be efficiently directed toward the inner peripheries of the discs.

Still another object is to provide a power washing cream separating bowl having in combination therewith a stationary supply can provided with an annular deflector disc arranged to deflect predetermined quantities of washing liquid directly against the inner peripheral edges of a plurality of rotating separating discs.

A still further object is to provide a power

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washing cream separating bowl having in combination therewith a deflector means arranged outside said bowl, said deflector means including a fluted element arranged to direct a predetermined quantity of washing liquid against the inner peripheral edges of a disc pack within the bowl.

Other objects will become more readily apparent from a reading of the description and upon examination of the accompanying drawings.

In the drawings:

Figure 1 is an elevational view, partially in section, of a power washing centrifugal separator structure.

Figure 2 is a milk feed tube axially displaced above the deflector element.

Figure 3 is a sectional view taken along the line 3—3 of Figure 1, showing an improved deflector element in plan elevation.

Referring particularly to Figures 1 and 2, a centrifugal cream separator structure is generally designated by the reference character 10. The cream separator structure 10 includes a revoluble separating bowl 11 having an upper bowl portion 12 and a lower bowl portion 13. The separator bowl 11 is provided with a sloping inner wall 14 joined at its lower end by a downwardly extending annular rim 15. The upper bowl portion 12 also includes at its top end a collar 16 having conventional skim milk outlets 17. At the apex of the inner sloping wall 14 with the downwardly extending rim 15 there is provided a substantially continuous washing liquid discharge outlet 18. The discharge outlet 18 is formed by means of a plurality of openings 19 separated by connecting elements 20. The upper bowl portion 12 and the lower bowl portion 13 are joined in telescoping and assembled relation by means of a snap split ring 21.

The separating bowl 11 is provided with a disc pack consisting of a plurality of superposed separating discs 22. The outer peripheral edges of the separating discs 22 are supported on a plurality of circumferentially spaced upwardly extending wings 23 only one of which is shown. The wings 23 are spaced to provide a support for a centrifugal valve element or rubber sealing ring indicated at 18'. Each separating disc is provided with at least one eccentric opening 24, the openings being in vertical alignment with one another to form a passageway 25.

A milk inlet tube 26 is centrally positioned for rotation therewith on the lower bowl portion 13. The inlet tube 26 is in communication with a distributor chamber 27, which communicates with

the passageway 25. Each disc is provided with a centrally disposed opening 28, and the inner peripheral edge of each opening is in alignment with the others to provide a substantially cylindrical space 29 extending axially of the bowl 11. A skim milk dividing collar 30 is provided on the uppermost disc 22.

The lower bowl portion 13 is provided with a downwardly extending cream outlet 31, the upper end of which is in communication with the cylindrical space 29. A driving member 32 projects upwardly into the lower bowl portion 13. The driving member 32 is driven by an electric power unit 33, and is connected to the bowl portion 13 by means of a key 34.

A liquid supply container 35 is positioned above the separating bowl 11. The supply container 35 includes a discharge spout or conduit 36 extending downwardly toward the separating bowl. The lower end of the discharge spout, or conduit 36, is supported on an annular collar 37 forming the upper end of a stationary tinware structure generally designated by the reference character 38. The tinware structure 38 includes a skim milk receiving chamber 39 and a cream receiving chamber 40. The skim milk receiving chamber 39 is in communication with a skim milk discharge spout 40' and the cream receiving chamber 40 is in communication with a cream discharge spout 41.

A washing liquid deflector element is shown in Figures 1 through 3. The deflector element shown is generally designated by the reference character 55. The element 55 includes a plurality of spiral fluted openings 56 and also a centrally disposed opening 57. A milk feed tube 58 having an annular shoulder 59 is axially movable to close and open the discharge spout 36. The milk feed tube 58 also includes a narrow tapering conduit 60 which is adapted to be inserted through the central opening 57 of the deflector element 55. A valve member 61 is provided for regulating the flow of fluid through the tapering conduit 60. Figure 4 shows the axial displacement of the milk feed tube 58 so that the relationship of the parts may be more clearly apparent.

The separating operation of the cream separating bowl is conventional. Whole milk from the supply can 35 is free to course downwardly through the tapering conduit 60 upon the displacement of the valve element 61. The skim milk escapes through the skim milk openings 17 to the skim milk receiving chamber 39. The cream leaves the bowl through the cream outlet 31 and thereupon flows into the cream receiving chamber 40. The separating speed may be somewhere near 10,000 R. P. M.

After the separating operation is completed, the operator fills the liquid supply container 35 with a washing liquid. The milk feed tube 58 is thereupon axially displaced upwardly and washing liquid thereupon descends downwardly through the discharge conduit 36. As the washing liquid engages the spiral flutes of the deflector element 55, it is divided into a plurality of individual spirally directed streams by means of the fluted openings 56 defined by spiral flutes 56'. The fluted openings 56 and flutes 56' are so arranged that the individual streams of water are whirled spirally, directed downwardly and radially outwardly against the inner peripheral edges of the separating discs. The individual streams of water are thereupon broken up by the inner peripheral edges of the discs and the water

thereupon is whirled centrifugally outwardly between said discs. In this manner a sufficient quantity of washing liquid is properly directed to clean the most difficult surfaces, namely, the surfaces of the separating discs. As this water is whirled centrifugally outwardly the speed of rotation of the separating bowl decreases until a speed of approximately 6,000 R. P. M. is reached. At this point the valve ring 18' contracts sufficiently to permit the washing liquid to be discharged through the discharge opening 18. A small quantity of washing liquid descends through the central hole 57 of the deflector element 55. This quantity is directed downwardly into the milk inlet tube 26 and serves to wash this tube and the distributor chambers 27.

The deflector element 55 is stationary and the streams of washing liquid which descend through the openings are directed to strike the inner peripheral edges of the rotating disc pack. Immediately upon striking these surfaces the streams are broken up and particles of water are pumped centrifugally outwardly by virtue of the centrifugal force actuated by the rotating bowl.

It can thus be seen that the objects of the invention have been fully achieved. Applicant has provided a deflector element which is stationarily positioned outside of a rotating bowl. This deflector element is constructed and arranged to direct quantities of washing liquid against the inner peripheral edges of the separating discs. Thus applicant directs the washing liquid to the place where it is most needed. It is to be understood that modifications and changes may be made in this construction which do not depart from the spirit of the invention as disclosed nor the scope thereof as defined in the appended claims.

What is claimed is:

1. A power washing centrifugal separator comprising a rotatable bowl, a pack of frusto-conical discs within said bowl, said discs having center holes, the inner peripheral edges of which are in substantial axial alignment with one another to form a substantially cylindrical space extending axially of said bowl, the combination therewith of a liquid supply container positioned above said bowl, a discharge conduit on said supply container, and a stationary deflector means supported on said discharge conduit, said deflector means including a fluted member arranged above the cylindrical space of said bowl to receive and direct quantities of washing liquid from said discharge conduit radially outwardly against the inner peripheral edges of said discs.

2. A power washing centrifugal separator comprising a rotatable bowl, a pack of frusto-conical discs within said bowl, said discs having center holes, the inner peripheral edges of which are in substantial axial alignment with one another to form a substantially cylindrical space extending axially of said bowl, the combination therewith of a liquid supply container positioned above said bowl, a discharge conduit on said supply container, and a stationary deflector means supported within said discharge conduit, said deflector means including a fluted member arranged above the cylindrical space of said bowl spirally to direct individual streams of washing liquid from said discharge conduit against the inner peripheral edges of said discs.

3. A power washing centrifugal separator comprising a rotatable bowl, a pack of frusto-conical discs within said bowl, said discs having center holes, the inner peripheral edges of which

are in substantial axial alignment with one another to form a substantially cylindrical space extending axially of said bowl, a milk distributor chamber in communication with said cylindrical space for rotation with said bowl, discharge openings at the outer peripheral edge of said bowl, and valve means for regulating the discharge of washing liquid from said bowl, the combination therewith of a supply container, said supply container having a discharge conduit, a milk feed tube within said discharge conduit, said milk feed tube being of substantially less diameter than said discharge conduit and in axial alignment with said milk inlet tube, and a fluted deflector means positioned in an annular space formed by the outer peripheral surface of the milk feed tube and the inner peripheral surface of the discharge conduit, said deflector means being arranged to direct washing liquid from the supply container against the inner peripheral edges of said discs.

4. A power washing centrifugal separator comprising a rotatable bowl, a pack of frusto-conical discs within said bowl, said discs having center holes, the inner peripheral edges of which are in substantial axial alignment with one another to form a substantially cylindrical space extending axially of said bowl, a milk distributor chamber in communication with said cylindrical space for rotation with said bowl, discharge openings at the outer peripheral edge of said bowl, and valve means for regulating the discharge of washing liquid from said bowl, the combination therewith of a supply container, said supply container having a discharge conduit, a milk feed tube within said discharge conduit, said milk feed tube being of substantially less diameter than said discharge conduit and in axial alignment with said milk inlet tube, and a deflector means, said deflector means being supported and extending transversely within said discharge conduit, the deflector means including flutes arranged to direct washing liquid delivered

through said discharge spout against the inner peripheral edges of said discs.

5. A power washing centrifugal separator comprising a rotatable bowl, a pack of frusto-conical discs within said bowl, said discs having center holes, the inner peripheral edges of which are in substantial axial alignment with one another to form a substantially cylindrical space extending axially of said bowl, a milk distributor chamber in communication with said cylindrical space for rotation with said bowl, discharge openings at the outer peripheral edge of said bowl, and valve means for regulating the discharge of washing liquid from said bowl, the combination therewith of a supply container, said supply container having a discharge conduit, a milk feed tube within said discharge conduit, said milk feed tube being of substantially less diameter than said discharge conduit and in axial alignment with said milk inlet tube, and a deflector means positioned transversely within the discharge conduit, said deflector means having a centrally disposed opening encircling the milk feed tube, spiral flutes on said deflector means, said spiral flutes defining with said discharge conduit a plurality of substantially spirally extending openings, the openings being arranged to direct washing liquid entering into said discharge conduit against the inner peripheral edges of said discs.

JOHN R. ORELIND.

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