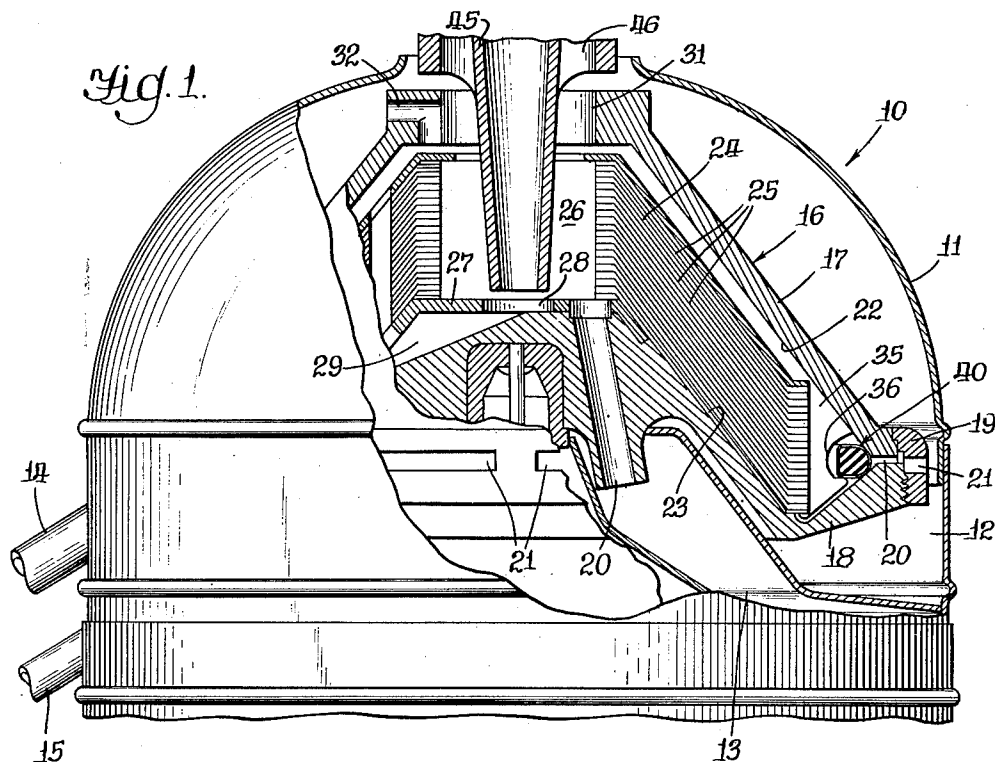
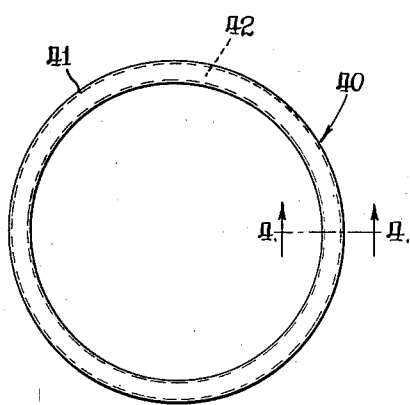
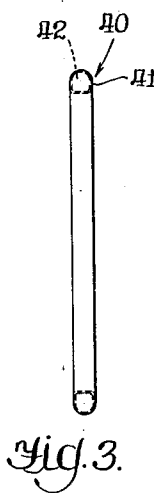
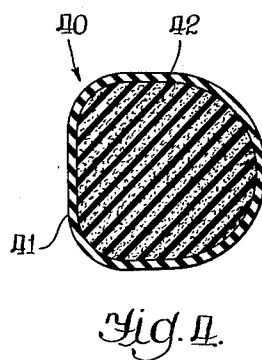


April 6, 1954

K. C. TREGILLUS
CENTRIFUGALLY OPERABLE VALVE RING FOR
POWER WASHING CREAM SEPARATORS
Filed April 12, 1952

2,674,254



Inventor
Kenneth C. Tregillus
Rene P. Rippe
Atty.

UNITED STATES PATENT OFFICE

2,674,254

CENTRIFUGALLY OPERABLE VALVE RING
FOR POWER WASHING CREAM SEP-
ARATORSKenneth C. Tregillus, Yellow Springs, Ohio, as-
signor to Vernay Laboratories, Inc., a corpora-
tion of Ohio

Application April 12, 1952, Serial No. 282,061

9 Claims. (Cl. 137—56)

1

This invention relates to a centrifugally operable valve ring. More specifically the invention relates to a centrifugal valve element operable to control the discharge of washing liquid through the discharge orifice of a power washing cream separator.

In the Harstick Patent 2,473,948, patented June 21, 1949, a speed control centrifugal valve for cream separators is disclosed. In this construction the separating bowl has interior surfaces which slope to a minimum internal periphery at which point an annularly extending washing liquid discharge opening is provided. A centrifugal valve ring is positioned adjacent to and is coextensive with the discharge opening. The valve ring consists of a sealing element which is provided with a spring core. The spring core is covered by means of a rubber sheath and the valve structure is expandable and contractable with respect to the discharge opening for controlling the discharge of washing liquid there-through. In the type of power washing separating bowl disclosed the bowl is rotated at a predetermined speed whereupon the sealing element or valve ring is effective to expand and to engage and seal the discharge opening of the separating bowl. Washing liquid is then introduced into the bowl and the liquid is rotated within the bowl until the rotating speed of the bowl is lowered to a point wherein the restitutional force of the ring is operative to contract and decrease the diameter of the valve element whereupon the discharge orifice is uncovered and the washing liquid may be discharged therethrough. It can be seen that in the design of sealing rings of the type utilized for power washing cream separators certain problems occur. One of these problems is to fabricate a ring which will expand at a predetermined centrifugal speed to seal the discharge port or orifice in the absence of a hydraulic load, this action taking place when the bowl is initially rotated without any liquid being delivered to the bowl. At the same time the valve element or ring must have a high enough modulus or restitutional force to contract and open the discharge orifice in the presence of a hydraulic force, namely the liquid which is added during rotation at lower predetermined centrifugal speed.

The valve element shown in the above mentioned application is effective to operate successfully in the performance of the washing function of the bowl. However, the utilization of a coil spring within the ring greatly increases the cost of the ring and since a ring of this type has

2

a limited life the cost of maintenance is greatly increased. Also under certain conditions it has been found that the rubber sheath will have a tendency to lose its adhesion with respect to the spring whereupon the ring may rapidly deteriorate. Further problems with respect to this type of ring are occasioned since the spring is of metal material and great care must be taken that no pin holes or other openings occur in the rubber sheathing which might provide for possible contamination. This also greatly enhances the cost of the ring. It is a prime object of the invention therefore to provide an improved valve element for regulating the discharge of washing liquid from a power washing cream separator, the valve element being comparatively inexpensive in initial cost and in maintenance.

It is another object of this invention to provide an improved centrifugally operable valve, the valve being constructed of a rubber-like material having a substantially high density core. Another object is to provide a centrifugally operable valve ring, the ring comprising a core of relatively hard material, the relatively hard core being covered by a relatively soft rubber-like sheath which is adapted to engage and effectively seal the discharge opening of a power washing cream separator during centrifugal rotation of the ring about its axis.

Another object is to provide an improved centrifugally operable valve element. The element being constructed of a rubber-like material and having embedded therein a finely dispersed metal or metal oxide or other high density material which increases the density of the ring to a much greater degree than the density of normal rubber-like materials, the purpose of the high density construction being to provide a valve element for centrifugal bowl structures which will operate in an efficient and effective manner during a power washing operation.

A still further and more specific object is to provide a centrifugal type of valve including an annular elastic element adapted to expand and contract in response to centrifugal force, the element including a center or core material having the characteristics of being hard and of a high density, the core being covered by a soft resilient material bonded to the core, the soft material being suitable for sealing against the discharge opening of a power washing cream separator.

These and further objects will become more readily apparent upon reading of the specification

3

when examined in connection with the accompanying sheet of drawing.

In the drawing:

Figure 1 is a side elevational view of a cream separator structure, the view having portions broken away to illustrate the bowl and interior parts of the bowl for showing the application of a centrifugal valve element embodying the features of the invention;

Figure 2 is a plan view of a centrifugally operable valve element;

Figure 3 is an end view of the valve element shown in Figure 2; and

Figure 4 is a sectional view through the improved valve element shown along the line 4—4 of Figure 2.

Referring now particularly to Figure 1 a centrifugal separator is generally designated by the reference character 10. The centrifugal separator 10 includes a tinware construction 11 having an upper skim milk receiving chamber 12 and a cream receiving chamber 13 positioned below the chamber 12. The chamber 12 is provided with a skim milk outlet 14 and the cream receiving chamber 13 is provided with a cream outlet 15.

A centrifugally operable separating bowl 16 is positioned within the tinware structure 11. The separating bowl 16 comprises an upper bowl part 17 and a lower bowl part 18 held in assembled relation by means of a clamping ring 19. The upper and lower bowl parts 17 and 18 are suitably spaced in an axial direction to provide a substantially continuously extending washing liquid discharge opening 20. The washing liquid discharge opening 20 is shown in the sectional portion of Figure 1 and it must be understood that this discharge opening is continuous about the circumference of the bowl 16. The clamping ring 19 is provided with a plurality of circumferentially spaced openings 21 which are in alignment or registry with the discharge opening 20.

The interior of the bowl 16 is provided with annular sloping walls 22 and 23 which suitably support a disc pack 24, the disc pack 24 including a plurality of separating discs 25 which are positioned in superposed relation. The inner peripheral edges of the separating discs 25 provide an annularly extending space 26. A wall 27 is formed at the lower end of the space 26, the wall 27 having an opening 28 which is in communication with a distributor chamber 29. The cream outlet is in communication with the annular space 26 and a cream chamber 13. The bowl 16 is open at its top as indicated at 31 and a skim milk outlet 32 is in communication with the space 26 and the chamber 12. The separating discs are supported at their outer peripheral ends by means of a plurality of wings 35 only one of which is shown. Each wing 35 is suitably provided with a recess 36, the recess providing clearance for a centrifugally operable valve element or ring generally indicated by the reference character 40.

As best shown in Figure 1 the valve element 40 is positioned adjacent to and is coextensive with respect to the discharge opening 20, the adjacent structure of the upper and lower bowl parts 17 and 18 defining a valve seat against which the valve element is adapted to seat. As shown in Figures 2, 3, and 4 the valve element 40 includes an annularly extending core 41, this core being formed of a semi-hard rubber compound. The core 41 is enclosed by a sheet of rubber-like material 42, this rubber-like material being relatively soft when compared with the core material and being of a characteristic which effectively seals

4

the discharge opening 20. In order to increase the density of the rubber core 41 to a much greater extent than that which can be found in the normally used rubber materials, the core 41 includes a heavy loading of finely divided litharge (PbO). This which is finely divided is dispersed in the rubber core as a pigment. The amount of high density pigment which is utilized is dependent upon the specific gravity required for efficient and effective operation of the bowl at the desired rotating speed. It has been found that up to 600 parts of litharge per 100 parts of rubber hydrocarbon by weight can be successfully incorporated in the core to give it a specific gravity of up to 3.7. It was found that other high density materials were also effective as pigments these materials being finely divided stainless steel powder, red iron oxide, and red lead. It must, of course, be understood that other materials having a high density can effectively be utilized to provide a high density core for the centrifugally operable valve ring.

The operation of cream separation is conventional. After the separating bowl 16 has functioned in its separating operation it is desired to effectively flush and clean the same. For this purpose washing liquid is introduced into the space 26 by means of the supply tube 45 disposed in the washing liquid discharge nozzle 46. Prior to the entrance of the washing liquid the bowl is rotated at a high speed which causes expansion of the valve element 40 whereupon it is moved into engagement with the inner walls of the bowl parts to effectively press the relatively soft sheet 42 over the discharge opening 20 and to therefore seal the same. The washing liquid is introduced and after a certain amount of liquid has entered into the bowl the bowl's speed of rotation is decreased whereupon at a predetermined speed of rotation the valve element 40 is effective to contract and reduce its diameter so that it is withdrawn from engagement with the discharge opening 20 and washing liquid may be discharged through the discharge opening whereby effectively cleaning the interior portions of the separating bowl. After the washing liquid has been discharged the bowl again may speed up and the operation may be repeated.

By the utilization of a valve element having a high density core a valve ring can be provided which can be entirely manufactured of a rubber-like material with the exception, of course, of the litharge or metallic pigmentation. This therefore eliminates the need of a spring or tension element embedded within the ring and therefore a much more economical valve element results. By virtue of the high density core, which is bonded to the relatively soft rubber sheath, a valve element is provided which will effectively seal the discharge opening and will rapidly respond to the changes in speed of rotation of the separating bowl in a desired manner. The core is made of a hard rubber compound which has a high modulus or restitutorial force which is sufficient to contract the ring during a lowering of the speed of the rotation of the bowl despite the presence of the hydraulic force which is occasioned by the liquid which is delivered to the interior parts of the bowl.

It can now be seen that an improved centrifugally operable valve ring has been provided, the valve ring being particularly adaptable for use with a power washing cream separating bowl. It must be understood that changes and modifications may be made which do not depart from the

spirit of the invention as disclosed nor from the scope thereof as defined in the appended claims. What is claimed is:

1. A centrifugally rotatable construction comprising a rotatable valve seat having a discharge opening a continuous annular sealing element of resilient construction adapted to be positioned adjacent to and coextensive with said discharge opening, said sealing element comprising an annular core of relatively hard high density rubber-like material, and an annular sheath of relatively soft rubber-like material enclosing said core and being bonded thereto, said sealing element being rotatable about its own axis with the valve construction to expand and contract in response to centrifugal force with respect to the discharge opening for controlling the flow of liquid there-through.

2. A centrifugally rotatable valve member comprising a first annular member of a relatively high density rubber-like material, and a second annular member bonded to said first member, said second member comprising a relatively lower density rubber-like material, said valve member being centrifugally expansible during rotation of the same about its axis.

3. A centrifugally rotatable valve construction comprising a rotatable valve seat having a discharge opening a continuous annular sealing element of resilient construction positioned adjacent to and coextensive with said discharge opening, said sealing element comprising a rubber-like material, and high density elements dispersed and embedded in said sealing element, said valve construction and said sealing element being rotatable about its own axis whereby said sealing element expands and contracts in response to centrifugal force with respect to the discharge opening for controlling the flow of liquid there-through.

4. A centrifugally operable valve member in accordance with claim 3, wherein said high density elements include finely divided litharge.

5. A centrifugally operable valve member in accordance with claim 3 including, an annular

sheath of a relatively less-dense rubber-like material enclosing said core and being bonded thereto.

6. A centrifugally rotatable valve construction comprising a rotatable valve seat having a discharge opening, an annular sealing element of rubber-like material positioned adjacent to said valve seat, and elements having a high density finely dispersed throughout and embedded within said annular sealing element, said sealing element being centrifugally rotatable with said valve construction and expansible into engagement with said valve seat for sealing said discharge opening.

7. A centrifugally operable valve construction in accordance with claim 6 in which said high density elements include metal powder.

8. A centrifugally rotatable valve construction comprising a rotatable valve seat having a discharge opening, a valve ring of resilient construction positioned adjacent said discharge opening, said valve ring comprising an annular core of relatively hard high density rubber-like material and an annular outer layer of relatively soft rubber-like material, said valve construction being centrifugally rotatable about its axis whereby said valve ring is expanded by centrifugal force against said valve seat for sealing said discharge opening.

9. A centrifugally rotatable valve construction in accordance with claim 8 wherein said outer layer comprises a sheath enclosing said core and being bonded thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,931,922	Damsel et al. -----	Oct. 24, 1933
2,116,277	Meerbeck -----	May 3, 1938
2,205,910	Raybould -----	June 25, 1940
2,339,547	Carter -----	Jan. 18, 1944
2,386,873	Mercier -----	Oct. 16, 1945
2,437,855	Leach, Jr. -----	Mar. 16, 1948