

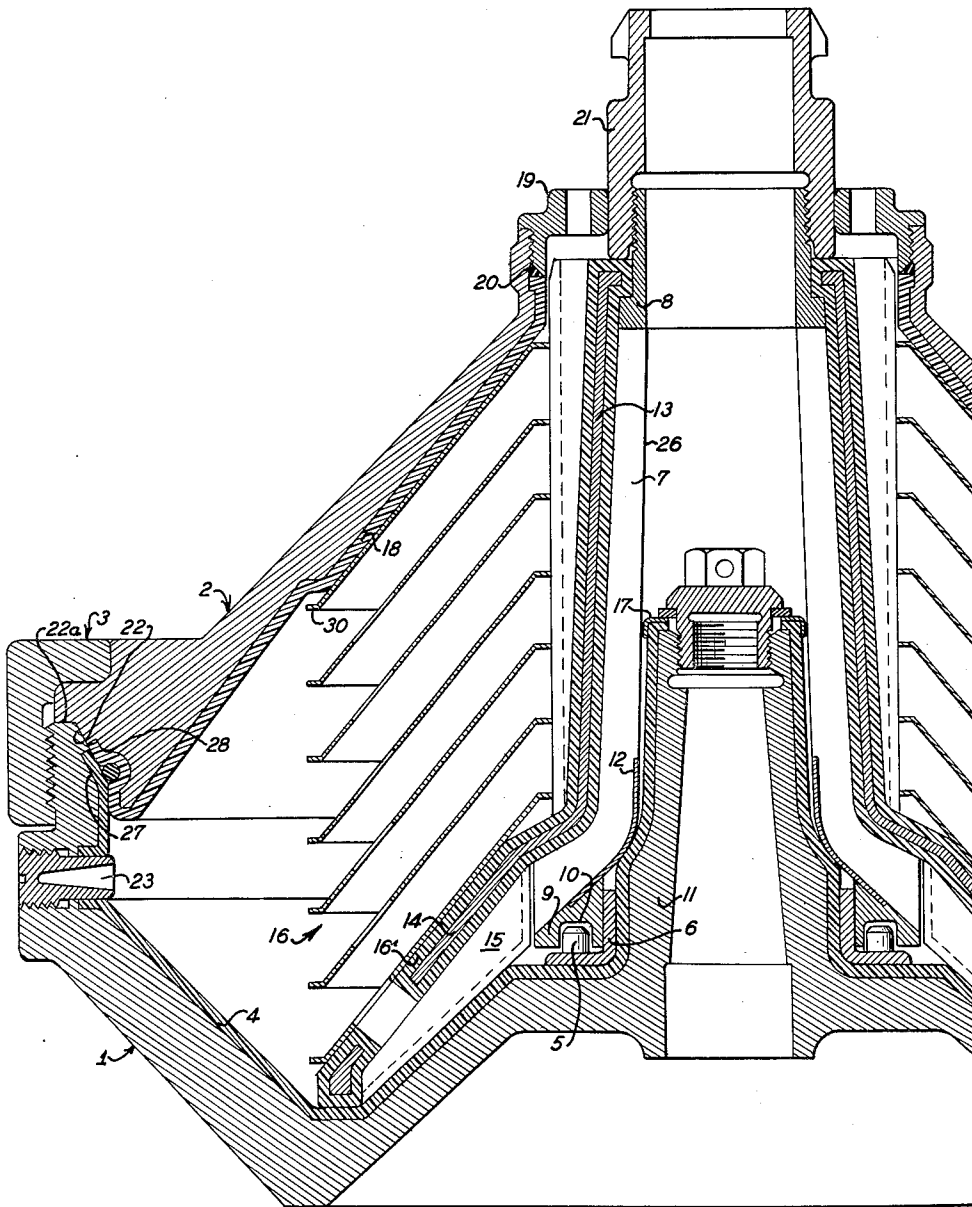
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CENTRIFUGAL SEPARATOR HAVING LINING OF ELASTOMER MATERIAL

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1

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## CENTRIFUGAL SEPARATOR HAVING LINING OF ELASTOMER MATERIAL

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This invention relates to centrifugal separators and more particularly to such separators lined with elastomer material to render the apparatus suitable for use in treating corrosive materials. The principal object of the invention is to provide a lining characterized in that there are no discontinuities along the lining. Such construction produces no areas within the bowl which are susceptible to attack by corrosive material.

In order to prevent damage by corrosion in the centrifugal treatment of corrosive liquids, it has been customary for a long time to line the parts of the bowl, which come into contact with the centrifuge liquid and generally consist of forged steel with a stainless steel plate. Stainless steel, however, is also not always resistant to corrosion, particularly not in the presence of chlorine ions. For such centrifuge liquids, rubberized bowls are generally employed. The rubberizing consists of several thin layers which are bonded one over the other onto the metal parts and thereupon vulcanized at suitable temperature.

With the centrifuge bowls known up to the present time, lined with rubber on other elastic material, disadvantages are encountered however which are avoided by the bowl in accordance with the invention.

It is known that the bowl bottom part and the bowl inserts, for instance the distributor, must be locked together so as to prevent relative rotation. For this purpose, there are generally provided on one of these bowl parts locking lugs which engage in corresponding recesses of the other part of the bowl. In the case of one known lining, both these lugs and the surfaces adjoining the recesses are covered with a protective covering. Aside from the difficulties caused in the lining of such parts, the cooperation of rubberized parts does not always afford dependable assurance against rotation. The large amount of friction between the rubberized parts is also detrimental in connection with the assembling and taking apart of the bowl. In order to maintain the play of the anti-rotation device as low as possible, the lugs must fit well in the recesses. Upon assembling these bowls, bulgings of the rubber layers can prevent a firm seat of the inserts on all sides in the bottom part of the bowl while upon disassembly the lining can be torn and damaged, particularly at the edges of ribs and lugs. In order to circumvent this drawback, an attempt has been made to make out of resistant material the ribs and lugs firmly connected with the parts and leave them uncovered. This, however, means an interruption of the protective layer and such interruptions are always the starting points for the peeling of the protective covering from the metal. The corrosive liquid can therefore pass behind this layer, form bubbles under the action of the centrifugal force, and destroy the metal.

In addition to the locking device, the lining of the distributor also affords considerable difficulties in the case of disk bowls. In general, the inner surface of the distributor which limits the inlet space of the bowl is equipped with driving blades in order to impart the speed of rotation of the bowl to the incoming material to be centrifuged. The narrow distributor neck makes the covering of the driving ribs with the protective covering very difficult so that one is limited to covering the

2

outer distributor neck and the distributor base. The fact that the entire distributor must be replaced by a new one when the driving ribs are destroyed by corrosion is particularly disadvantageous.

Another disadvantage of the centrifuge bowls previously lined with elastic material is that upon assembling the bowl, the unlined driving blades may damage the lining of the bowl hub and upon tightening of the closure ring cut into said lining. Furthermore, when the bowl cover is placed on, a metal guide is not present in the case of the previously known models so that lined parts can be damaged by the edges of uncovered parts.

All of these disadvantages are eliminated with the bowl in accordance with the invention. One essential feature of the invention is that the lining of the bowl parts is not interrupted. The locking pieces are firmly connected with rings which are bonded, vulcanized, or in some other manner fastened to the continuous lining. Locking members and rings consist of non-corrosive material.

Another feature of the invention is that in the case of disk bowls, the driving ribs of the distributor neck are combined in the form of a replaceable unit which is detachably connected to the distributor. In the case of chamber bowls, the blade insert as it constitutes an independent part. In order to prevent the blade insert cutting into the lining of the bowl hub when the upper and lower parts of the bowl are pressed together, there is provided a protective plate which is adapted to the shape of the bowl hub. In order, furthermore, to prevent the damaging of the lining of the hub upon insertion of the distributor or of the blade insert, the outer upper edge of this lining is framed with metal. Due to the fact that in the case of disk bowls, the blade insert is detachably connected as an independent unit to the distributor, it is merely necessary, after a corresponding time of operation, to replace this insert only by another one. However, it can also be made of non-corrosive material. A further characteristic of the bowl in accordance with the invention is the metallic guiding of the bowl cover when it is placed on. By this guide, a tilting of the cover and thus damage to its lining is made impossible. Too great a pressing of the linings of the bowl cover and the bottom part of the bowl is prevented by the metallic resting of both parts during the tightening of the closure ring.

The invention will be further described with reference to the accompanying drawing wherein an embodiment of the invention is depicted.

According to the invention, the bowl and bowl cover are each at least partially lined with elastomer material such as rubber or plastic, and have radially extending mating surfaces for closely fitting the bowl cover on the bowl. The mating surfaces each have a radially extending recess which extends part way along the mating surfaces from inside the bowl, and the bowl lining extends into the recess of the bowl mating surface and the bowl cover lining extends into the recess of the cover mating surface. The normal thickness of the lining parts disposed in the recesses is greater than the depth of the recesses and the closure means which secures the bowl and bowl cover together, presses the bowl and bowl cover together, so that the mating surfaces outwardly of the recesses engage each other in metal-to-metal engagement. Thus, the bowl and bowl cover are tightly secured together, and the lining parts in the recesses are compressed providing a hermetic seal.

The insert for guiding material centrifuged within the bowl is detachably mounted in the bowl for rotation therewith. The detachable mounting means comprises a base member secured to the bowl and a base member secured to the insert and the base member secured to

the bowl is secured to the bowl by bonding to the elastomer bowl lining. The radially extending driving blades, which extend to adjacent an inwardly disposed elastomer lined surface of the bowl and terminate in edges disposed adjacent the elastomer lined surface, are advantageously provided with protecting plates which extend axially of the bowl and are secured to the edges of the driving blades. Thus, engagement of the blade edges and the elastomer of the lined bowl surface is prevented so the lining is not cut by the blade edges.

Referring to the drawing, there is there shown a disk separator. The separator consists of a bottom part 1 and a cover 2, which are held together by means of a closure ring 3. On the lining 4 of the bottom part 1 of the bowl, there is bonded or vulcanized a base member or ring 6 consisting of non-corrosive material and having secured thereto the bare locking lugs 5. In this way an interruption of the lining 4 is prevented. The bowl insert includes the disk set 16, distributor 13 and driving blades 7. The driving blades 7 are connected rigidly together to form a single replaceable unit by means of a sleeve 8 and an insert base member or ring 9. The ring 9 is provided with bare recesses 10 to receive the locking lugs 5. In order to prevent the ribs 7 digging into the lining 4 of the bowl hub 11, an axially extending protective plate 12 adapted to the shape of the bowl hub 11 is secured to the edges 26 of the driving blades 7 along the bottom third thereof. The distributor 13 is provided, below the distributor foot 14, with firmly connected driving blades 15. The distributor 13 with foot 14 and blades 15 is lined on all sides with a protective layer 16' consisting of elastomer material. The outer edge of the lining 4 terminating on the shaft of the bowl hub 11 is metallically framed by means of a profile ring 17.

The lining 18 of the bowl cover 2 is clamped fast at its upper end by means of a ring 19. It may be advisable to insert a special gasket 20 between the ring 19 and the lining 18.

The blade unit consisting of the driving blades 7, the sleeve 8 and the ring 9 is inserted in the distributor 13 outside the bowl. The blade unit and the distributor are detachably connected with each other by screwing the distributor head 21 onto the sleeve 8. The unit which is thus produced is inserted into the bottom part 1 of the bowl and turned until the locking lugs 5 engage in the recesses 10 of the blade unit. In this connection, the ring 9 is guided along the outer surface of the cylindrical part of the ring 6. The edges of the driving blades 7 therefore do not come into contact with the lining of the bowl hub 11. By the cooperation of the unlined lugs with the unlined recesses, a good seat for the insert, as well as good assurance against rotation, are assured. Likewise, no friction of rubberized parts against each other can occur since the distributor foot 14 and the driving blades 15 come to rest on the bottom of the bowl only after the lugs 5 have engaged in the recesses 10. The ring 19 connected with the bowl cover 2 is guided on the cylindrical outer surface of the distributor head 21 when the bowl cover is placed on. In this way a tilting of the bowl cover and thus damage to the rubberized inner surface are avoided. The bowl and bowl cover are provided respectively with radially extending mating surfaces 22a and 22 and disposed along these surfaces, respectively, are recesses 27 and 28. The lining of the bowl and bowl cover extend into these recesses and the linings are of such thickness that the abutting portions thereof are compressed by each other and provide a seal. Due to the fact that the bottom part 1 of the bowl and the bowl cover 2 are metallically seated at radially extending mating surfaces 22 and 22a, when screwed together by means of the closure ring 3, the surface pressure between the linings is limited. The disk bowl shown in the embodiment is equipped on the periphery of the bowl with nozzles 23 which make an interruption of the lining necessary at these points. These

interruptions are however insignificant since the lining is not raised from the metal under the pressure of the centrifugal force but rather pressed firmly against the metallic face. The invention is not limited to disk bowls, but can also be employed advantageously in connection with bowls of any other type. Of course, it is also possible to provide the locking lugs on the wing unit and the corresponding recesses in a ring arranged in the bottom part of the bowl.

The insert is secured in the bowl for rotation therewith by the detachable mounting provided by engagement of the lugs 5 in recesses 10 and by engagement of insert elements with the bowl and bowl cover. The distributor foot 14 extends radially outwardly from the insert hub and engages the bowl at its outer extremity, and the top disc 30 of the disc set 16 extends radially outwardly and engages the bowl cover. The distributor foot 14 and the top disc 30 press against the bowl and bowl cover and aid in suitably securing the insert in the bowl.

I claim:

1. In a centrifugal separator having a rotatably mounted bowl at least partially lined with a protective layer of elastomer material, a bowl cover, closure means for fixedly securing the bowl cover to the bowl, a removable insert for guiding material centrifuged within the bowl, lug means secured to the base of said bowl, and corresponding recesses in said insert for receiving said lugs to connect said bowl and insert for rotation together, the improvement which comprises said lug means being mounted on a separate base member bonded to the surface of said elastomer material layer leaving said layer of elastomer material uninterrupted at the area of said lug means.

2. Improvement according to claim 1 in which said insert includes a radially extending driving blade terminating in an edge disposed adjacent said protective layer of elastomer material, and including an axially extending protective plate secured to said edge of said driving blade, whereby engagement of the blade edge and the layer of elastomer material is prevented.

3. Improvement according to claim 1 in which the bowl and bowl cover are each at least partially lined with a protective layer of elastomer material and in which said bowl and bowl cover have radially extending mating surfaces for closely fitting the bowl cover on the bowl, the mating surfaces each having a radially extending recess extending part way along the surfaces from inside of the separator, the protective layer lining the bowl extending into the recess of the bowl mating surface and the protective layer lining the bowl cover extending into the recess of the cover mating surface, the normal thickness of the protective layers disposed in the recesses being greater than the depth of the recesses, said closure means securing the bowl and cover together with said mating surfaces outwardly of said recesses in mating metal-to-metal engagement whereby the bowl and bowl cover are tightly and hermetically sealed together without injury to the protective layers.

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