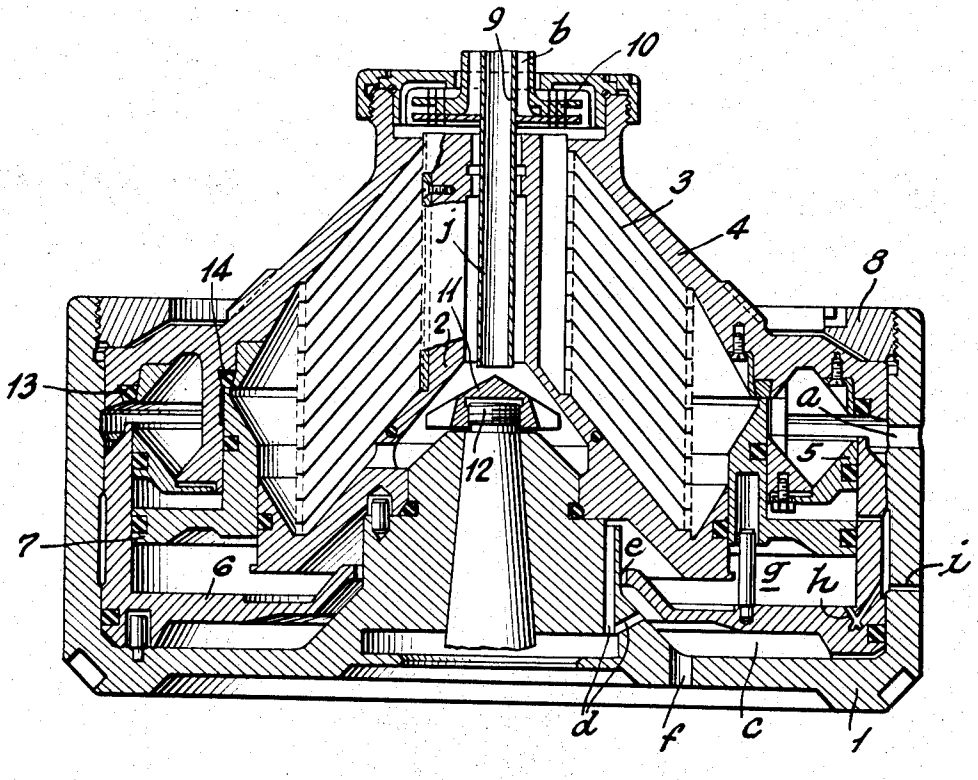
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DRUM OF DISC BOWL CENTRIFUGE FOR SEPARATING LIQUID MIXTURE

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# DRUM OF DISC BOWL CENTRIFUGE FOR SEPARATING LIQUID MIXTURE

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1 Claim. (Cl. 233—20)

## ABSTRACT OF THE DISCLOSURE

A drum for a disc bowl centrifuge for separating liquid mixtures containing non-fluid fractions, including a body, a holder provided with discs mounted in the body, a working chamber constituted by the spaces between the discs, a reservoir for accumulating the non-fluid fraction arranged behind and concentrically with respect to the working chamber, discharge slots in the body serving to discharge the non-fluid fraction from the reservoir due to centrifugal forces, a first piston within the body for closing and opening the discharge slots, a second piston operably related to the first piston and body for cutting-off a portion of the reservoir and said second and first pistons alternately moving along the axis of the drum for bringing the cut-off portion of the reservoir into communication with the working chamber and with a receiver for the non-fluid fraction located exteriorly of the drum via the discharge slots.

The present invention relates to disc bowl centrifuges for separating liquid mixtures, and more particularly to the drums of disc bowl centrifuges used for separating liquid mixtures containing non-fluid fractions.

The drums of disc bowl centrifuges known heretofore and used to separate liquid mixtures containing non-fluid fractions comprise a working chamber defined by the discs, a reservoir for the accumulation of the non-fluid fraction arranged concentrically behind the working chamber, and a piston serving to overlap the discharge slots of the drum during the process of separation.

These centrifuges allow not only a manual discharge of the non-fluid fraction but also an automatic discharge under the action of centrifugal forces. During the discharge of the non-fluid fraction, however, the process of separation is discontinued since in the course of discharge a hermetic sealing of the working chamber cannot be effected.

It is therefore an object of the present invention to provide a drum for the disc bowl centrifuge for the separation of liquid mixtures containing non-fluid fractions which will permit an automatic discharge of the non-fluid fraction in the course of a continuous separation process.

Another object of the invention is to provide a drum for the disc bowl centrifuge for separating liquid mixtures containing non-fluid fractions in which a hermetic sealing of the working chamber is ensured during the period of discharging the non-fluid fraction from the drum.

Yet another object of the present invention is to provide a drum for the disc bowl centrifuge for separating liquid mixtures containing non-fluid fractions in which the non-fluid fraction being discharged will contain a minimum percentage of moisture.

In accordance with the above and other objects, the present drum for use in a disc bowl centrifuge for separating liquid mixtures containing non-fluid fractions comprises a working chamber formed in the spaces between the discs, a reservoir for the accumulation of the non-fluid fraction arranged concentrically behind the working chamber, and a first piston serving to overlap the discharge slots of the drum in the process of separation, the piston being provided with a second piston disposed in said drum and adapted to cut off a portion of the reservoir for the accumulation of the non-fluid fraction during the discharge period of said fraction from the cut-off portion of the reservoir into a receiver outside of the drum.



The second piston travels alternately with the first piston which overlaps the discharge slots of the drum thus connecting the cut-off portion of the reservoir with the working chamber and with the receiver outside the drum, respectively.

The present invention thus makes it possible to effect an automatic discharge of the non-fluid fraction in the course of a continuous process of separation, while the hermetic sealing of the working chamber during the discharge provides for a minimum percentage of moisture in the non-fluid fraction being discharged.

The invention is further described in accordance with one particular embodiment thereof given by way of illustration with due reference to the accompaying drawing in which the drum of the disc bowl centrifuge is shown in axial section.

The drum of the invention comprises a body **1** in which a holder **2** provided with discs **3** is disposed. The spaces between the discs constitute a working chamber behind which and concentrically arranged therewith is a reservoir for the accumulation of the non-fluid fraction. A portion of the reservoir is defined by a cover **4** and a disc **5**.

To overlap or open and close discharge slots *a* of the body **1** a first piston **6** movable along the axis of the drum is provided. The cut-off of a portion of the reservoir for accumulating the non-fluid fraction during the period of discharge of the fraction is effected by means of a second piston **7** also movable along the axis of the drum. All of the elements of the drum disposed in the body **1** are fixed in position by means of a nut **8** threadedly engaging the side wall of the body.

In the upper portion of the drum head disc **10** provided with a feeding tube **9** is positioned and the disc is formed with channels *b* through which the clarified liquid fraction is drained from the working chamber of the drum.

The drum is fixed on the upper end of a vertical shaft **12** of the centrifuge by means of a nut **11** and rotates together with the shaft.

The joints between the elements of the drum are sealed with gaskets.

The operation of the invention is as follows:

Auxiliary fluid (water) is fed or introduced through ducts *d* and slits *e* into space *c* of the drum located below the piston **6** and the bottom wall of the body **1** and any excess fluid overflows through opening *f* provided in the bottom wall. When the fluid feed is stopped, its residue will flow from upper space *g* located between pistons **6** and **7** through openings *h* and *i* to the outside of the body, and the auxiliary fluid still contained in space *c*, by pressing on the lower surface of the piston **6**, will urge the piston upwards until the piston bears against a packing ring **13**. The piston **6** will then overlap or close the discharge slots *a* of the body, whereby the working chamber of the drum and the reservoir for the accumulation of the non-fluid fraction are hermetically sealed or isolated from the receiver outside the drum.

Then, the liquid mixture containing a non-fluid fraction is fed via duct *j* for separation. This mixture by exerting pressure on the conical surface of piston **7** will urge the piston **7** downwards and thus bring the cut-off portion of the reservoir serving to accumulate the non-fluid fraction into communication with the working chamber of the drum.

Under the action of centripetal forces, solid particles which are heavier than the dispersion medium, are separated and accumulate in the reservoir for the non-fluid fraction.

As soon as a portion of the reservoir in the drum is filled with separated particles forming the non-fluid fraction, auxiliary fluid is fed through duct *d* into space *g*. The excess of the fluid escapes through openings *h* and *f* and slits *e*.

When the auxiliary fluid partially fills the space *g*, the pressure affecting the lower surface of the piston **7** becomes greater than that of the liquid mixture above the piston. The piston **7** will be urged upwards until it bears against a packing ring **14**, thus cutting off a portion of the reservoir for the non-fluid fraction from the working chamber.

When the space *g* is completely filled with the auxiliary fluid, the pressure thus built up and acting on the surface of the piston **6** will be greater than the pressure acting on the bottom of the piston **6** and created by the auxiliary fluid in the space *c* which has a free surface on the radius (with respect to the axis of the drum) where the opening *f* is located. As soon as the piston **6** has travelled downwards, the non-fluid fraction from the cut-off portion of the reservoir will be discharged into the receiver outside the drum through the slots *a* of the body **1** under the action of centrifugal forces. Thereafter, the feed of the auxiliary fluid into space *g* is discontinued. The residue of the auxiliary fluid will escape from such space through openings *h* and *i*. When part of the fluid leaves the space *g*, the piston **6** will first travel upwards, with the pressure force of the auxiliary fluid from below being greater, and then, when the amount of auxiliary fluid in the space *g* becomes insignificant, the pressure exerted by the fluid mixture on the piston **7** from above will urge the latter downwards.

As a consequence, the working chamber will be placed into communication with the cut-off portion of the reservoir for the non-fluid fraction where separated particles will again accumulate thus forming the non-fluid fraction.

Such alternate travel of the pistons **6** and **7** enables the cut-off portion of the reservoir for the non-fluid fraction to be placed in turn in communication with the working chamber and with the receiver outside the drum.

Hence it is possible to effect an automatic discharge of the non-fluid fraction of any physico-chemical structure from the drum with a minimum percentage of moisture and without interrupting the process of separation for the period of such discharge, i.e. to effect a continuous process of separation of liquid mixtures containing non-fluid fractions.

The invention is not to be confined to any strict conformity to the showings in the drawings but changes or modifications may be made therein so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.



What is claimed is:

**1.** A drum for a disc bowl centrifuge for separating liquid mixtures containing non-fluid fractions, comprising a body having a bottom wall, a side wall and an open end, a holder disposed within said body, discs arranged on said holder, a working chamber defined by the spaces between said discs, means providing a reservoir for accumulating the non-fluid fraction behind and concentrically arranged respecting said working chamber, said reservoir providing means including a cover for said open end of said body and a disc located between said cover and said bottom wall, said side wall having discharge slots communicating with said reservoir for discharging the non-fluid fraction due to centrifugal force, a first piston mounted within said body for axial movement between the bottom wall and the cover whereby movement towards the cover closes the discharge slots and movement towards the bottom wall opens the discharge slots, a second piston mounted within the first piston for axial movement between the head of the first piston and said cover for cutting-off a portion of said reservoir, means for introducing an auxiliary fluid into a space between the bottom wall of the body and the first piston for moving said piston axially until it engages said cover thereby closing said discharge slots and sealing said working chamber and reservoir from the outside of said body, and means for introducing a liquid mixture containing a non-fluid fraction into the working chamber whereby said mixture moves said second piston toward the head of the first piston for providing communication between the working chamber and cut-off portion of the reservoir with the non-fluid fractions being separated and accumulated in the reservoir due to centripetal forces, the fluid being fed into the space between the second piston and the head of the first piston and when the pressure in such space exceeds that of the liquid mixture, the second piston moves axially until it engages the cover thus isolating the reservoir from the working chamber and when such latter space is filled with fluid, the first piston moves toward the bottom wall opening the discharge slots so that the non-fluid fraction in the cut-off portion of the reservoir will be discharged therethrough into a receiver located outside said body.


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