Aug. 12, 1969 C. SILLA 3,460,750

CENTRIFUGAL SEPARATOR

Filed April 12, 1967

FIG. 1

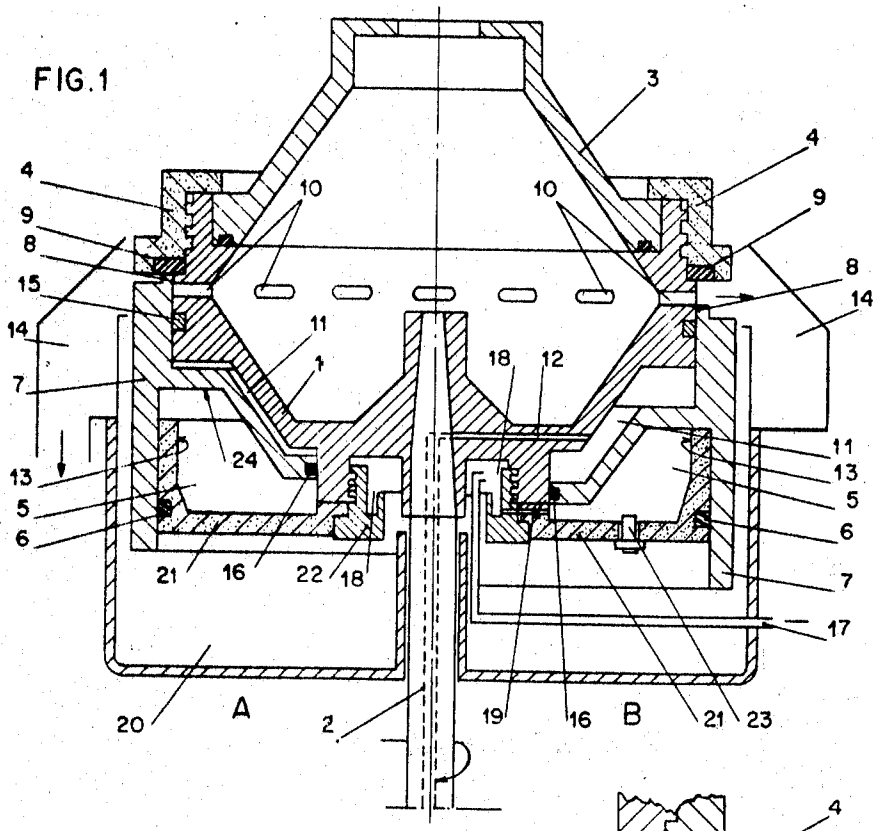
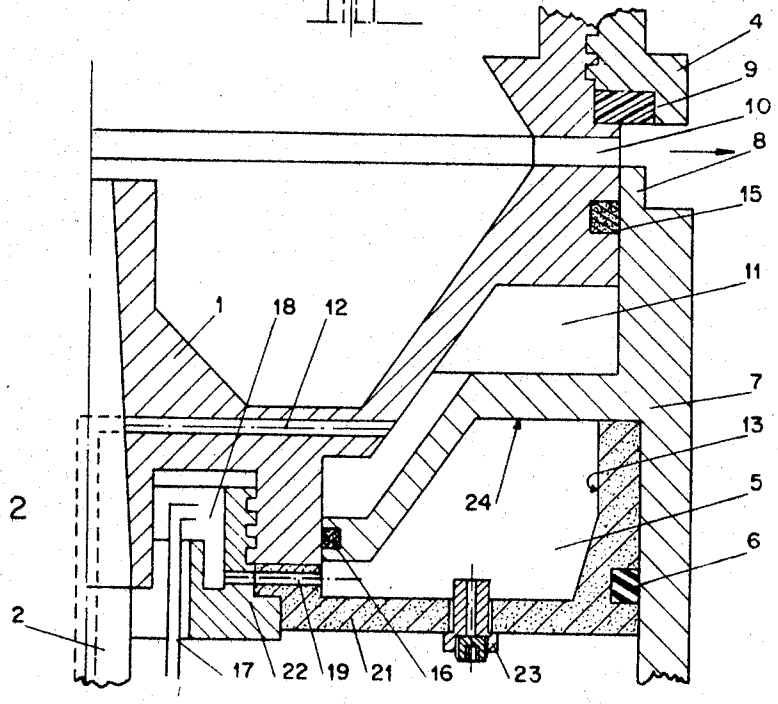


FIG. 2



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CENTRIFUGAL SEPARATOR

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U.S. Cl. 233—20 3 Claims

ABSTRACT OF THE DISCLOSURE

A centrifugal separator comprising means for closing the separator outlets which is moved in one direction by centrifugal force and in the other by fluid pressure, the actuating mechanism being so located as to prevent contamination of the separator contents by any actuating fluid.

This invention relates to a centrifugal separator for clarifying liquids, for separating solids from liquids or for separating liquids having different specfic weights.

In comparison with those centrifugal separators heretofore known, the machine embodying this invention comprises features which not only increase its efficiency but make it possible to save up to nearly half the cost of comparable conventional machines.

Moreover my machine totally eliminates the following drawbacks which occur with most conventional machines:

(a) The use of low pressure compressed air instead of the water to open the exhaust ports for solid bodies prevents the formation of any calcareous sediment on the mechanical parts involved.

(b) Because the oil chamber inside the impeller, by means of which the separating chamber is closed, lies under the air chamber and not in the opposite position as in prior art machines, it is possible to avoid all the drawbacks resulting from oil infiltrations, either into the same air chamber or into the collector for the solids separated out. Such infiltrations caused by the wear of the elastic gaskets in conventional machines not only adversely affect the sealing of the impeller itself, thus reducing the output of the machine, but put the oil in contact with the treated product thus reducing its purity.

(c) Since the oil chamber communicates with the outside by means of a pipe, it is also possible to keep the quantity of oil at a constant level, whether the impeller is at a constant level, whether the impeller is stopped or working, without being obligated to withdraw any portion thereof which would require expensive interruption to its operation.

All the above advantages in comparison with those of conventional machines make my separator preferable when wine or other liquids are to be clarified or when liquids are to be separated from solids in many different industrial processes.

In order that the invention may be more clearly understood, a preferred embodiment thereof will now be described, purely by way of example with reference to the annexed drawings, in which:

FIGURE 1 is a vertical axial section through the separator, half of which is shown in a closed position (A), while the other half (B) is in an open position; and

FIGURE 2 is a partial axial section, showing the separator in its open position on an enlarged scale.

Only those parts which are novel have been shown in detail, together with such conventional parts as are essential to an understanding of the invention.

FIGURE 1 shows the impeller 1 mounted on the vertical shaft 2 and supporting the cover 3 attached to the impeller by the threaded ring 4.

In the closed position (A) oil in the lower chamber 5, which is sealed by the gasket 6 is urged by the centrifugal force against the wall 13 and causes the cylinder 7 to be pushed upwards so that its edge 8 engages the gasket 9 in the screw-ring 4 thus closing the exhaust ports 10 for the solid or semi-solid components.

In the open position (B) air entering the chamber 11 through the pipe 12 communicating with a duct extending along the axis of the shaft acts on a larger surface and exerts a greater pressure than that produced by the oil of the lower chamber thus forcing the cylinder 7 down and opening the exhaust ports 10 through which the solid or semi-solid sediments collected in the impeller are driven out by centrifugal force, to be gathered into the circular channel 14 from where they are withdrawn through a suitable tangential pipe.

The air chamber supplied by the pipe 12 is kept perfectly air-tight by the gaskets 15, 16. The oil may be introduced into the chamber 5 whether the impeller is working or stopped through an injection nozzle, which injects oil or some other suitable liquid through the pipe 17 from which it flows into the pre-chamber 18 and thence through one or more holes 19 into the chamber 5.

Any loss of oil, due to wearing of the gasket 6 will affect neither the impeller chamber where the liquid is being treated nor the ring channel in which the solid sediments expelled by the impeller are collected and therefore will in no way contaminate the product, but will be gathered in a suitable chamber 20 below. It is to be emphasized that in order to make the mounting and dismounting of the machine easier, the bottom 21 of the chamber 5 is connected to the impeller body by means of the threaded ring 22. This bottom is also provided with an adjustable oil outlet valve 23 for regulating the oil level.

When the oil has been injected into the chamber 5 through the pipe 17 and when the impeller 1 has been started the fluid will be driven by centrifugal force toward the wall 13 pushing upwards the annulus 24 carried by the cylinder 7, the upward motion of which will force the edge 8 against the gasket 9 in the upper threaded ring 4 thus sealing shut the chamber defined by the impeller and its cover.

Of course during the rotation the heavier solid sediment or the semi-solid components of the liquid being treated will be driven by centrifugal force against the peripheral wall of the impeller.

Once the rotation time is finished, while the machine is still in motion, compressed air is injected along the channel 2 communicating through one or more holes 12 with the chamber 11. This air is supplied from a suitable source of compressed air, controlled by conventional valve means.

Since the air pressure is higher than the pressure in the chamber 5 below, the cylindrical body 7 is forced downward, opening the exhaust ports 10. At this moment the solid sediment, passing through said ports, is driven into the pipe 14 and then along the tangential discharge pipe. The chamber 11 being thus relieved of the air, the oil pressure of chamber 5 will again prevail and force the cylindrical body 7 up into its original closed position.

What is claimed is:

1. In a centrifugal separator for separating a heavier substance from a lighter one and comprising a container equipped with a rotatable impeller for centrifuging said substance, said container being provided with at least one peripherally positioned outlet for discharging said heavier substance, the improvement which comprises means for opening and closing said outlet, a chamber for

receiving an actuating liquid, which chamber is mounted to rotate with said impeller to retain when stationery and during such rotation a discrete body of actuating liquid so that said body of actuating liquid is driven by centrifugal force from a rest position within said chamber to an active position within said chamber in which it urges said outlet opening and closing means toward a closed position, and means for applying to said outlet opening and closing means at a point above said chamber a fluid pressure greater than that exerted by said actuating liquid which forces said opening and closing means into its open position.

2. A centrifugal separtor as claimed in claim 1 in which said chamber for receiving the actuating fluid is positioned below said impeller and container so that the contents of said container cannot be contaminated by leakage from said chamber.

3. A centrifugal separator as claimed in claim 1 in which said outlet opening and closing means is an annulus comprising a movable wall portion separating said actuating liquid receiving chaber and a chamber for receiving a fluid under pressure and a substantially vertical rim portion which covers and uncovers said outlet as said movable wall portion is moved back and forth in response to differences between the pressure exerted thereon by said actuating liquid and said fluid under pressure.

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