United States Patent

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[31] **P 17 82 612.9**

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[54] **CONTROLLED DESLUDGING OF CENTRIFUGAL SEPARATORS**
4 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **233/20**
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[50] **Field of Search** 233/19, 20, 46, 47

[56] **References Cited**
UNITED STATES PATENTS

3,167,509	1/1965	Steinacker	233/20
3,189,268	6/1965	Nilsson	233/27
3,301,476	1/1967	Hemfort	233/20

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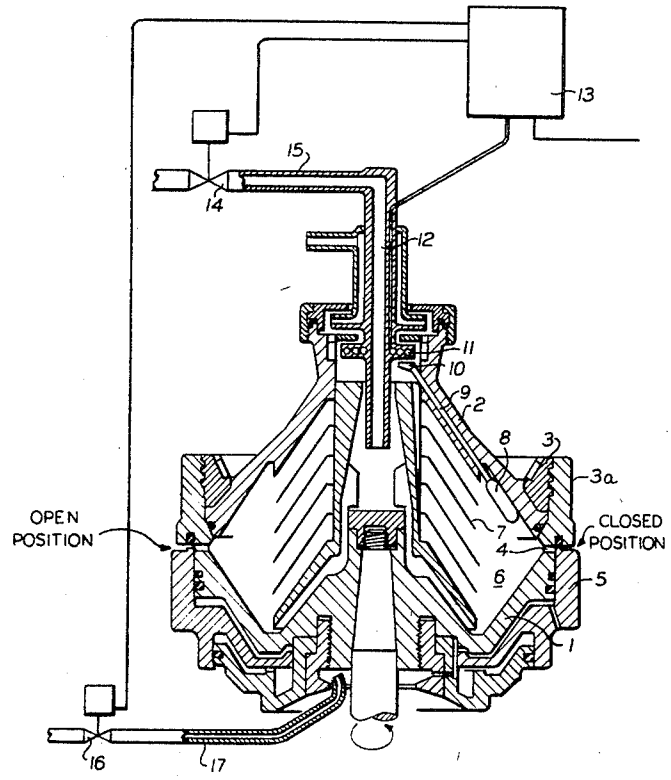
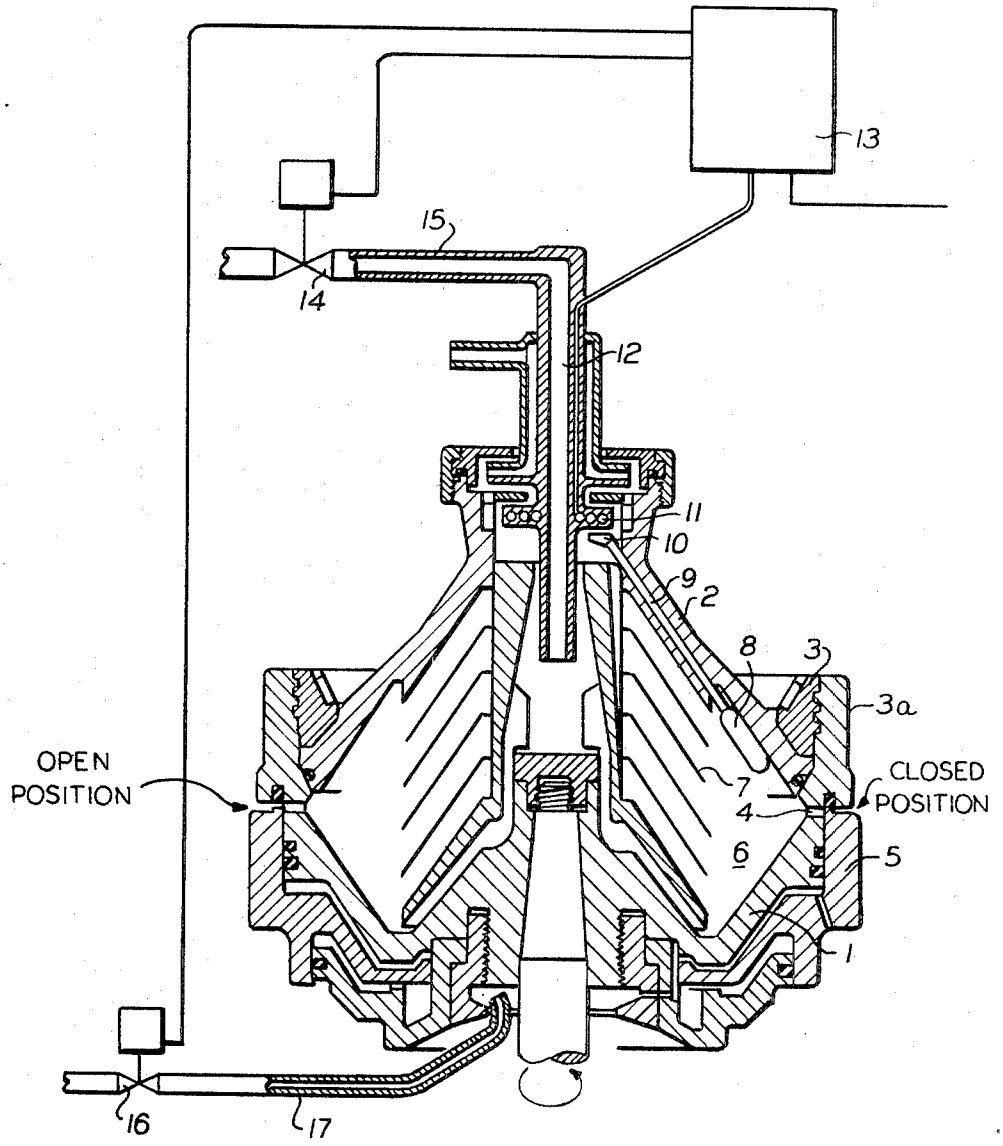
ABSTRACT: A self-cleaning liquid-solids separator with valve means, such as a controllable sliding-ring valve, for discharging sludge through the periphery of the bowl is equipped with a float that will sense the liquid-solids interface in the bowl during operation. A sensing device, e.g. an electric coil, is attached to the shaft of the drum and senses the position of an elongated member or rod attached to the float and extending inwardly towards the shaft. When the end of the rod approaches close enough to the shaft, which indicates the sludge has built up to a predetermined level, the sensing device activates opening of the sludge discharge valve means, and if desired, after a certain amount of sludge has been discharged, the closing of the valve means.





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CONTROLLED DESLUDGING OF CENTRIFUGAL SEPARATORS

PRIOR ART

Control apparatus for self-cleaning separators are known which automatically cause sludge discharge ejection or orifices in the periphery of the drum to open according to a specific time program. Since the filling of the sludge chamber depends upon the solid content of the mixture, the throughput of the drum and the capacity of the sludge chamber, it can happen that the sludge ejection orifices may be opened too early or too late when the solid content in the mixture varies, when the throughput varies, or when the drum is not completely emptied in the preceding desludging operation.

In the first case, too much of the desired liquid is lost in the desludging operation; in the second case the sludge stratum grows into the plate stack, impairing the flow of the liquid and hence the clarifying action of the drum.

In automating the operation of separators, the tendency has been to construct the drum of the separator so that it starts the desludging action itself when the level in the sludge chamber has reached a predetermined point. A self-controlling system that operates independently of time in this manner obviates the above-named disadvantages of time control, and apparatus of this sort have previously been described in U.S. Pat. Nos. 3,167,509 and 3,301,476.

Every control system has its advantages and disadvantages. Electrical systems have performed well as regards sensitivity and reliability of response. Mechanically, however, they are usually very delicate and hence poorly suited for the severe conditions of separator operation. Also, nearly all electrical components require an insulated mounting, and since liquid mixtures are as a rule electrically conductive, liquid spray and condensation might imperil the insulation when the components are used in a separator. Another difficulty in the use of electrical systems for sensing sludge level in a centrifugal separating drum is caused by the fact that the drum is rotating and the controls and switchgear are located outside of the drum. When an element that responds to changes in sludge level is installed in the drum, the power to operate it must be delivered to it from the outside and the signal it emits must be transmitted to the outside. For this purpose, sliprings are generally used, which have to be mounted on the shaft in an insulated manner. Aside from the fact that insulated mounting presents difficulties for the reasons stated above, they can also interfere with and be damaged by the disassembly and reassembly of the drum.

U.S. Pat. No. 3,189,268 discloses a system wherein the shifting of the boundary surface between two components of the mixture being separated varies the capacity between two insulated wires and the drum when the boundary surface lies within the radial reach of the wires.

In this system the use of sliprings is avoided by connecting a second condenser in series with the sensing capacitor, one plate of which is attached to the rotating drum and the other to the stationary housing.

This prior art system, however, is evidently suitable only for mixtures of high ohmic resistance, such as may be constituted by mixtures of oil and water. In the case of liquids having relatively high conductivity, capacitive measurements are not easily possible.

THIS INVENTION

The invention is a system for the automatic initiation of the desludging of a centrifugal separator. It operates with equal reliability with all mixtures and in all types of separators, even in so-called hermetic separators. An electrical transducer instead of sliprings is used as the sensing element.

The system according to the invention is characterized by a float which is disposed in the sludge chamber of the drum and is displaceable toward and away from the axis of rotation. It is suitably guided in its movements in the drum, and is provided on its inner extremity with a means for influencing an electrical or magnetic field produced by a condenser or coil affixed to a structural part extending into the drum. The disadvantages described above are eliminated by the cooperation of a stationary electrical part with a mechanical part that rotates with the drum.

THE DRAWING

An example of one embodiment of the invention is represented in the drawing.

DESCRIPTION AND EXAMPLE

With reference to the drawing, the lower part of the drum **1** and the drum cover are held together by a ring **3** and its retaining ring **3***a*. The lower part of the drum is provided with sludge ejection orifices **4**, shown closed on the right side and open on the left. These orifices are periodically opened by a sliding-ring valve **5** in a known manner. In the sludge chamber **6**, outside of the plates **7**, there is disposed a float **8**, which is guided by means of a rod **9** in a bore in the drum cover **2**. The float body is specifically lighter than the heaviest component of the mixture to be separated and immersed only partially in the latter. As the level of the heaviest component or sludge increases, the float is displaced toward the axis of rotation.

Rod **9** has on its inner extremity an appropriately shaped body **10** of suitable material, so that, when the float **8** is displaced inwardly, it affects the capacity of a condenser or the inductance of a coil **11**.

In the example, a coil **11** is fastened to the stationary infeed tube **12**, and the body **10** cooperates with it according to the position of the float **8**. Coil **11** is connected outside of the drum to other electrical elements in the box **13**, which start the desludging of the drum when a certain inductance value in coil **1** is reached, doing so, for example, by closing an electrically operated valve **14** in the mixture-feeding tube **15** and opening valve **16** in a hydraulic fluid line **17**, the fluid causing valve **5** to open. At the end of a preset time of when the sludge falls to a predetermined level, the positions of these valves can be reversed.

What I claim is:

1. In a self-cleaning liquid-solids centrifugal separator having a rotatable bowl with a sludge discharge orifice on the periphery thereof adapted to be opened and closed during the operation of the separator; an improvement for initiating the desludging of said separator comprising a float means within said bowl and adapted to sense the liquid-solids interface in said bowl, said float means including an elongated member disposed inwardly towards the axis of revolution of said bowl, sensing means for sensing the position of the end of said elongated member relative to axis of revolution, and control means operatively connected to said sensing means and adapted to open said sludge discharge orifice when the built-up solids in said bowl reaches a predetermined level.

2. The improvement of claim **1** wherein said bowl, is conical and said elongated member is supported by and extends along the inner conical periphery of said bowl towards said axis of revolution.

3. The improvement of claim **2** wherein said sensing means includes an element attached to a fixed member within said bowl and extends around said axis of revolution and is adapted to sense changes in said electromagnetic field induced by the position of the end of said elongated member relative thereto.

4. The improvement of claim **3** wherein said element is an electric coil and said end of elongated member inductively couples therewith.