United States Patent

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[72] Inventor **Desmond H. Vines**
Rosebank, Johannesburg, Transvaal Province, Republic of South Africa

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[73] Assignee **Hilmac Consultants Proprietary Ltd.**
Braamfontein, Johannesburg, Transvaal Province, Republic of South Africa

[54] **AUTOMATICALLY CONTROLLED CLOSURE ASSEMBLIES**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **55/432,** 55/459, 55/466, 137/525
[51] **Int. Cl.** **B01d 45/18**
[50] **Field of Search** 55/367, 432, 459, 466; 137/525.1, 525

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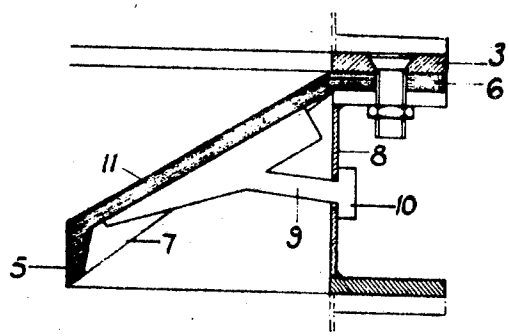
Primary Examiner—Dennis E. Talbert, Jr.
Attorney—Mason, Fenwick & Lawrence

ABSTRACT: A closure assembly for dust-separating equipment or the like comprising a flexible member made of at least three separate sector-shaped elements assembled to complete a circular shape, a peripheral support for the member providing means for securing the assembly in position and applying predetermined loading of the elements to maintain them in a circular shape in plan.



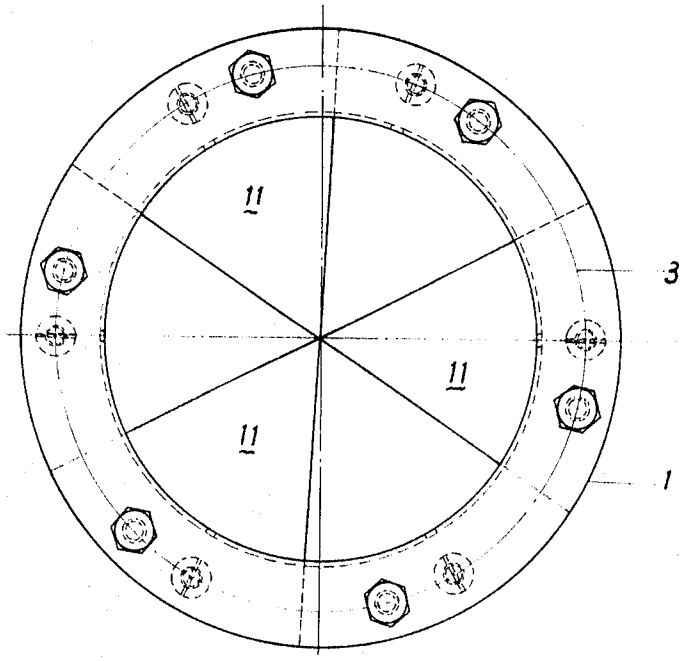


FIG. 2

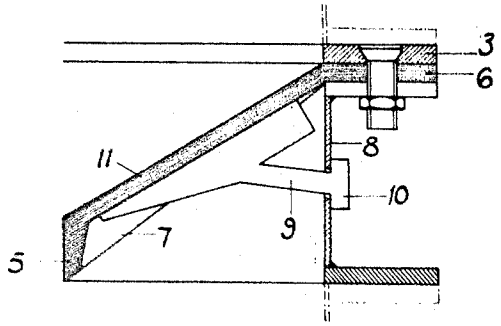


FIG. 1

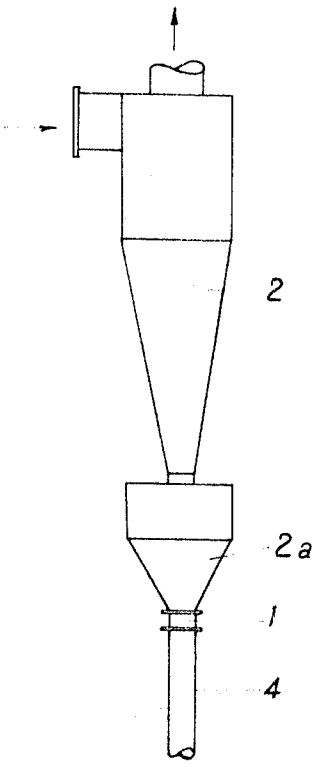


FIG. 3

INVENTOR
DESMOND HARRY VINES
BY
Mason, Fenwick & Lawrence
ATTORNEYS

AUTOMATICALLY CONTROLLED CLOSURE ASSEMBLIES

This invention relates to closure assemblies located in the bases of receptacles where there is a reduced pressure within the receptacle and which closure assemblies are adapted to open automatically to discharge the contents of the receptacle on predetermined loading.

A very important application of the above form of assembly is in the removal of solids from gas streams using any dry-type dust collector operating under reduced pressure for example, cyclone separators and fabric collectors. In such cases, there is a reduced pressure within the receptacle and the atmospheric pressure thus tends to maintain the assembly in the closed condition so retaining the separated solids in the receptacle. It is, of course, desirable that these solids be automatically removed from the system.

It is the object of the present invention to provide a simple construction which will open automatically under predetermined loading and which will not require a large space for its installation.

According to this invention there is provided a closure assembly comprising a flexible member made of at least three sectors to complete a circular shape, a peripheral support for the member providing means for securing the assembly in position and predetermined loading of the sectors to maintain the circular shape.

Further features of this invention provide for the flexible member to be a rubber diaphragm or a diaphragm of material having similar physical properties, with radial stiffening ribs extending along the edges of the sectors on the outer surfaces thereof and for the inclusion of stops to limit the closing movement of each sector.

The invention also provides for there to be six sector-shaped elements making up the diaphragm.

Yet a further feature of the invention provides for the sector-shaped elements to form an inverted cone when in the closed position.

An example of this invention, which is not to be considered as being limitative to the scope thereof, will be described with reference to the accompanying drawings in which:

FIG. 1 is a sectional elevation of a closure assembly sector showing the sector in the closed position,

FIG. 2 is a plan view of a closure assembly, and

FIG. 3 is a diagrammatic view showing a closure assembly included in a cyclone separator.

An example of the invention, as applied to any dry-type dust collector plant operating under reduced pressure, for example a cyclone separator will be described.

In such a plant, cyclone separators are used with a receptacle in the base adapted to discharge to the atmosphere. Usually special valve mechanisms utilizing a space of upwards of 18 inches are used to control these outlets.

The closure assembly 1 of the present invention is attached to the outlet of the dust collecting receptacle 2*a* of the cyclone separator 2 by a simple peripheral flange 3 and when installed occupies a space which is small compared with that of known units above referred to. A chute 4 may be fixed to the lower flange of the closure assembly 1. The chute 4 will transport the collected dust to a suitable container or conveyor as may be required.

The closure member 1 is a diaphragm 5 made of rubber or material having similar physical properties, and is basically circular in shape with the periphery 6 clamped in position by the peripheral flange 3. The diaphragm 5 is divided into six sector-shaped elements and each element has stiffening ribs 7 along the radial edges of the sector on the outer surface thereof. The sector shaped elements slope inwardly and

downwardly with respect to the flange 3 so as to form an inverted cone when the assembly is installed and in the closed position.

Rigidly attached to the circumferential wall 8 of the assembly and associated with each sector through a flexible shank 9 are a series of stops 10. The stops 10 prevent the inner diaphragm 5 flexing in the direction of the surface 11. On opening of the assembly 1 the flexible shanks 9 deform.

In use the inner surface 11 of the diaphragm 5 will be subjected to the normal subatmospheric conditions of the separator and the stops 10 prevent any inward flexing of the diaphragm elements.

The dust builds up and is supported on the diaphragm 5 until such time as the load overcomes the pressure difference on either side of the diaphragm 5. Thus loading will be predetermined and once reached the sectors will flex to open a discharge passage for the material collected.

When the pressure difference on either side of the diaphragm overcomes the weight of the remaining dust the assembly 1 will automatically close.

The closure assembly is simple and readily replaceable if the diaphragm becomes damaged for any reason.

What I claim as new and desire to secure by Letters Patent is:

1. The combination of a dust collector having a dust removal opening and a closure assembly for said opening, comprising, a hollow tubular housing defining a passageway for dust and having an inlet means at one end connected to said dust removal opening of said dust collector and an outlet on the other end of the housing, a flexible closure member peripherally fixed to and bridging the housing across the passageway between said inlet and said outlet, said closure member including a plurality of separate aliquot parts in contact at the center of the passageway and along their side edges which are radial to the passageway when the closure member is in closed position, said closure member being formed of material having sufficient resistance to deformation to support a predetermined quantity of dust upon one surface facing said inlet when closed but being of sufficient flexibility to permit its separate parts to flex in a direction away from said inlet toward said outlet to separate to release the dust when the predetermined quantity is exceeded, and stop means engaged with said housing and said closure members and extending between said housing and each of said aliquot parts, said stop means being operatively constructed and arranged for preventing said aliquot parts from flexing beyond their closed position toward said inlet but permitting said flexing movement of said aliquot parts toward said outlet for releasing the dust when said predetermined quantity is exceeded.

2. The combination as claimed in claim 1 wherein, each of the separate parts of the closure member has stiffening ribs along its radial side edges on the surface opposite that upon which dust is supported.

3. The combination as claimed in claim 1 wherein, said stop means is connected to each of the separate parts of the closure member on the surface opposite that upon which the dust is supported to limit the movement of the separate parts toward closed position.

4. The combination as claimed in claim 3 wherein, the separate parts of the closure member extend downwardly toward said outlet from said housing at a point adjacent said inlet and form an inverted cone when the closure is in closed position.

5. The combination as claimed in claim 4 wherein, each of the separate parts of the closure member has stiffening ribs along its radial side edges on the surface opposite that upon which dust is supported.