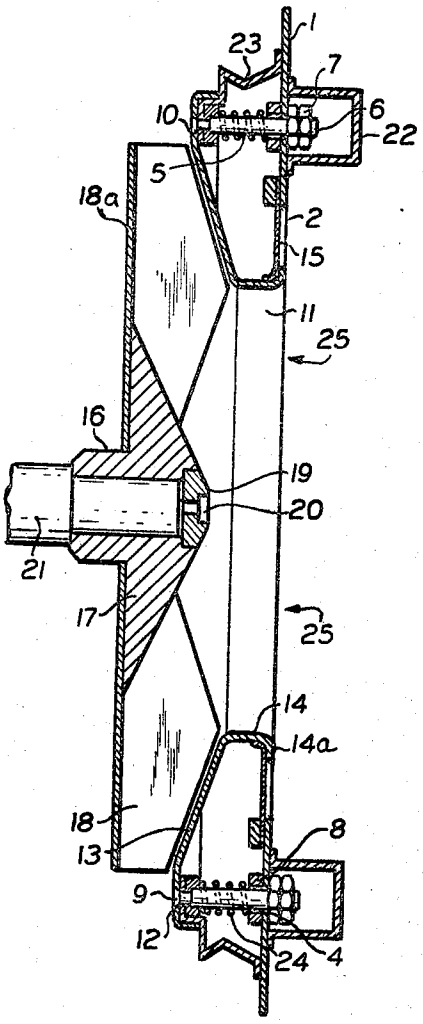
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SELF-CLEANING FAN

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SELF-CLEANING FAN

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ABSTRACT OF THE DISCLOSURE

A centrifugal fan for pneumatic material handling systems in which the fan shroud is mounted on springs for movement away from the impeller fan blades upon the accommodate the different impellors. The change in the and the shroud, thereby permitting dislodging of the foreign matter and entrainment thereof in the air stream.

BACKGROUND OF THE INVENTION

Where centrifugal fans are employed in pneumatic material handling systems, particularly in textile mill air cleaning systems, there is a danger of the material becoming wedged between the impeller blades of the fan and the normally stationary shroud. As a result, there is an increase in friction between the fan blade and shroud, and a resultant increase in the energy required to drive the fan. The friction produced often generates sufficient heat so that when the fan is used in textile mills, ignition of the textile fibers in the air stream, and sometimes explosion results. Additional dangers arise from the fact that the impeller fan blades may bind, leading to burn out of the fan motor windings.

By providing for larger clearance between the impeller blades and the shroud, though some of the aforementioned dangers are eliminated, the loss of fan efficiency makes such procedure undesirable.

It has been proposed in the prior art, such for example as in Swiss patent 292,367 to employ a centrifugal fan in which the fan housing is of a size to accommodate impeller blades of different diameter. An axially adjustable diffuser is provided which acts as an inlet shroud and the axial position of the diffuser is selectively adjusted to accommodate the different impellers. The change in the axial position of the diffuser plate requires that the fan be stopped, and obviously this proposal is not feasible to accommodate randomly occurring accumulations of foreign matter.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a centrifmind, that the present improved centrifugal fan construction has been provided in which the fan shroud is positioned with respect to the fan blade in fashion such as to eliminate the possibility of accumulations of foreign matter tending to interfere with the rotation of the impeller.

It is an object of the invention to provide a centrifugal fan in which the jamming of fibers between the impellor fan blade and the shroud is prevented, or at least can no longer bring about injurious consequences.

This is accomplished in accordance with the teachings of this invention by mounting the shroud of a centrifugal fan on a resilient support, permitting movement of the shroud away from the fan blades upon the accumulation of any material between the fan blades and the shroud, to thereby free the material. According to the invention, this resilient shroud support is provided by a spring mount ing for the shroud supporting the shroud for axial movement and tilting movement with respect to the impellor fan blades. Thus, upon the accumulation of material between the fan blades and the shroud, the shroud will be displaced to free the foreign material permitting its entrainment in the air stream produced by the fan for subsequent removal.

BRIEF DESCRIPTION OF THE DRAWING

The specific details of a preferred embodiment of the invention, and their mode of functioning, will be described in clear, concise and exact terms in conjunction with the accompanying drawings wherein:

The figure is a schematic cross-sectional view through a centrifugal fan provided with a spring mounted shroud in accordance with the teachings of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawing, a centrifugal fan, in accordance with the teachings of this invention is shown mounted on a wall member **1** of a fan housing, or the like, provided with a circular opening **2**. Arranged about the periphery of this circular opening **2** are a plurality of uniformly spaced holes **4**. Four holes 90° apart are found desirable. Through each of these holes **4**, studs **5** pass with clearance. The ends **6** of the studs **5** are externally threaded, and nuts **7** are arranged on these threaded ends **6** of the studs **5**. On the side of the wall **1** opposite the nuts **7**, each stud **5** passes through a bushing **8**. Bushings **8** are formed with conical openings wider at the end adjacent the wall than at their other end. A screw **9** is threadedly engaged in an internally threaded recess at the end of stud **5** opposite the nuts **7**.

A clamping ring **10** supports the shroud **11** with respect to studs by engaging flange **12** on the shroud **11**.

As seen in the drawing, the shroud **11** is formed with a conical surface **13** extending between flange **12** and annular inlet surface **14**. The shroud inlet surface **14** is formed with a flanged edge **14***a* which is connected by a resilient sealing ring **15** with the wall **1**.

As in conventional fashion in connection with centrifugal fans, the impellor **16** is formed with a hub **17** on which the fan blades are mounted. Disc **18***a* extends from the hub **17** and supports the fan blades. The passage for air through the fan is defined by the disc **18***a* and the shroud surface **13**, as will be understood by those skilled in the art. The impellor **16** is secured by means of clamping disc **19** and bolt **20** to the drive shaft **21**.

Dust protecting caps **22** are preferably provided on the side of wall **1** remote from the impellor **16** to enclose the threaded end of stud **5** and the nuts **7**. Bellows **23** are arranged between the clamping ring **10** and the shroud **11**, with the free end of the bellows **23** resting against the wall **1** to provide a dust free enclosure for the stud **5** which is provided with a compression coil spring **24** compressed between ring **10** and sleeve **8** so as to bias the shroud **11** to its desired operative position with respect to the fan blades **18**.

OPERATION

In operation, air is drawn through the shroud in the direction indicated by the arrow **25**. In the event that any material entrained in the air should wedge between the fan blades **18** and the conical shroud surface **13**, the shroud will be moved away from the fan blades through opening **2** against the resilient force exerted by sealing ring **15**, and compression springs **24**.

The studs **5** move axially against the action of these springs **24**. As a result of the conical bores of the sleeves **8**, the shroud may be tilted out of its plane into an angle to the plane of the impellor without a jamming of the bolts taking place.

As a result of this displacement of the shroud, the space between the fan blades **18** and the shroud **11** is in-

creased at the point of material accumulation, and the material loosens itself and is carried away in the air stream. Additionally, the support of the shroud by means of the spring permits a wobbling movement of the shroud in the event that any fibers become snagged on a fan blade and continue to rotate with the latter before release. Under the action of the springs **24**, the shroud **11** returns to its original operative position, and the fan continues to operate in normal fashion.

The above disclosure has been given by way of illustration and elucidation, and not by way of limitation and it is desired to protect all embodiments of the herein disclosed inventive concept within the scope of the appended claims.

What is claimed is:

1. A centrifugal fan for pneumatic material handling systems, said fan comprising: an impeller fan; a fan shroud positioned with respect to the fan to define the path of an air stream through the fan; a resilient mounting for said shroud arranged to be covered by said shroud and separately by said shroud from the air stream permitting displacement of said shroud with respect to said fan, and protecting said mounting from contamination by matter entrained in said air stream; said mounting including rigid supports for said shroud; and guide sleeves surrounding said supports permitting movement of said supports so as to permit orientation of said shroud into a plane out of parallel with the plane of said impeller fan.

2. A centrifugal fan, as in claim **1**, in which said mounting comprises: studs secured at one end to said shroud; conical sleeves in which said studs slide; and a compression spring between a fixed wall and said shroud surrounding said studs.

3. A centrifugal fan, as in claim **2**, in which said mounting comprises a resilient sealing ring between the fixed wall and said shroud.

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