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2,834,536

SPIN VANE CONTROLS FOR FANS

Filed Sept. 29, 1955

2 Sheets-Sheet 1

Fig. 1.

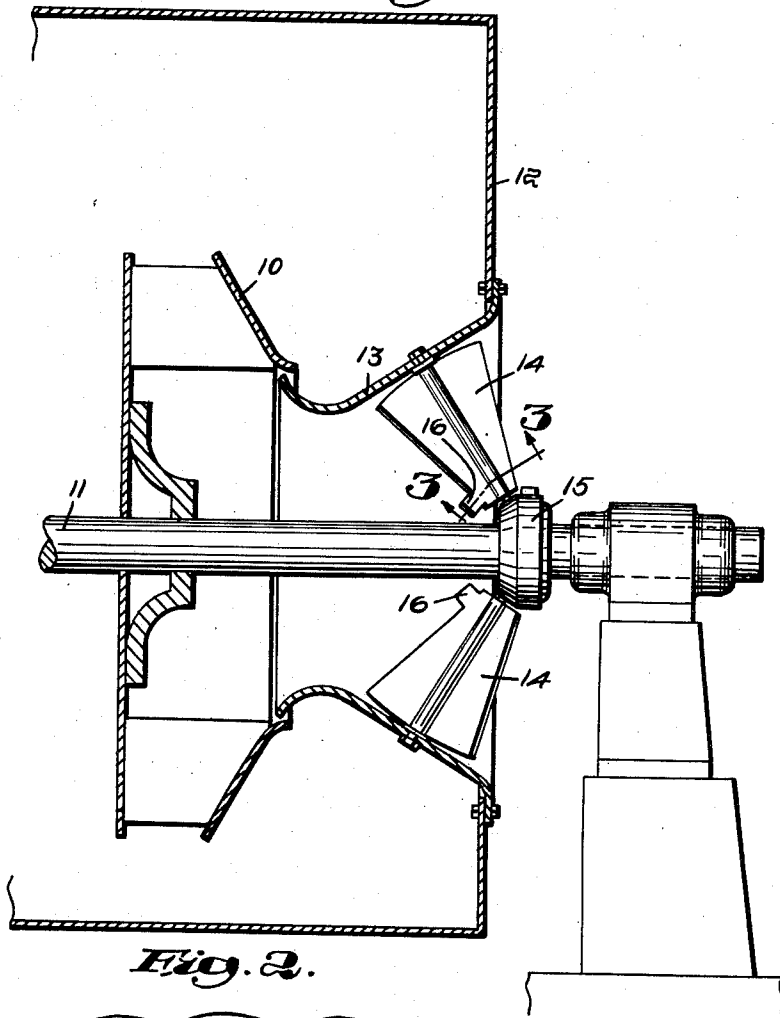


Fig. 2.

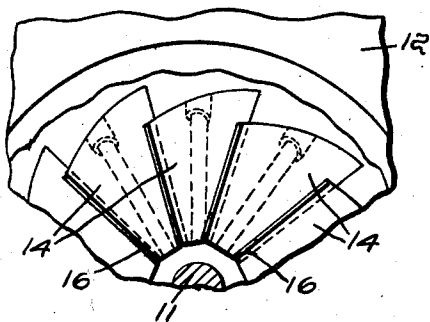
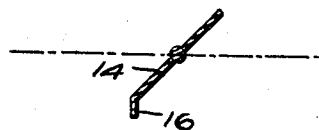


Fig. 3.



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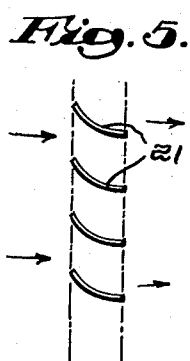
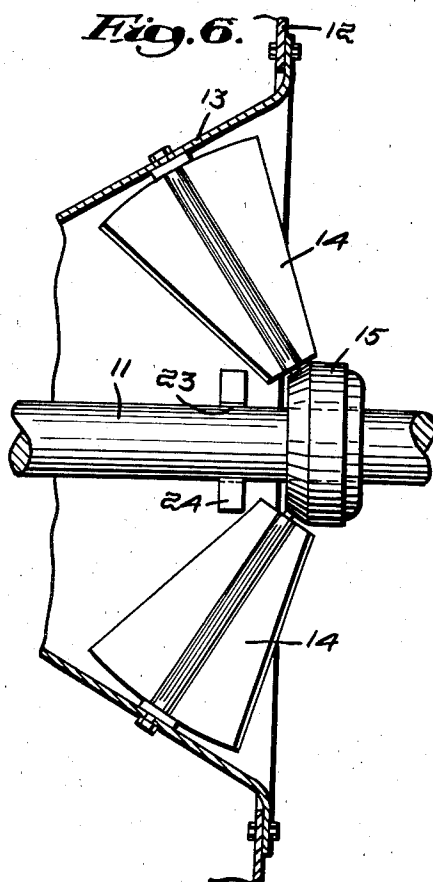
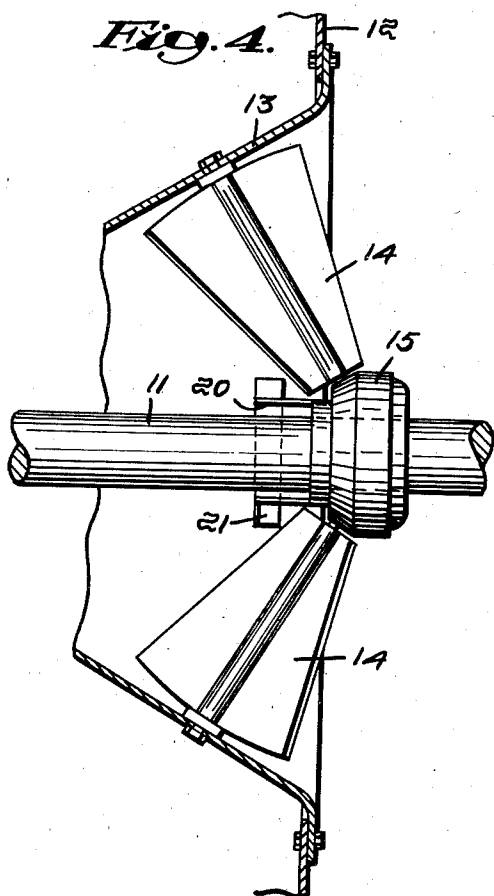
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2 Sheets-Sheet 2



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SPIN VANE CONTROLS FOR FANS

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2 Claims. (Cl. 230-114)

This invention relates to fans used for moving air or other gases, and relates more particularly to spin vanes for varying the volumes of gas moved by such a fan.

Adjustable spin vanes are widely used for varying the volume of gases moved by fans. Their advantages and methods of operation are fully disclosed in the U. S. patents of H. F. Hagen, Nos. 1,846,863 and 1,989,413. The latter patent discloses spin vanes having pivot rods supported at their outer ends in inlet sheets, and supported at their inner ends in a support around a fan shaft, and is the type of construction to which this invention relates.

It has been observed that with spin vanes such as are disclosed in the Hagen Patent No. 1,989,413 pulsations may occur in the gas stream when the vanes are in about mid-position, and I have found that the pulsation can be prevented or greatly reduced by causing the gas flowing between the spin vanes to flow parallel to the fan shaft, instead of spinning in the direction of wheel rotation as usually occurs, in a small annular ring or core around the fan shaft. In one embodiment of this invention, this is accomplished by attaching flat tabs to the downstream edges of some of the vanes, which tabs extend parallel to the axis of the fan shaft when the vanes are at mid-position. In another embodiment of this invention, a small fixed ring having spin vanes on its outer surface which are shaped and positioned to remove the spin from the gas, is located around and spaced from the fan shaft downstream of the spin vanes. In still another embodiment of this invention, a small ring attached to the shaft for rotation therewith and located downstream of the spin vanes has spin removing vanes on its outer surface.

An object of this invention is to prevent fans having spin vanes from pulsing when the vanes are at an intermediate position.

Another object of this invention is to prevent the gas entering a fan having spin vanes in its inlet from spinning in the zone of the fan shaft when the vanes are at an intermediate position.

This invention will now be described with reference to the annexed drawings, of which:

Fig. 1 is a side section of a centrifugal fan embodying this invention;

Fig. 2 is a fragmentary view looking into the upper portion of the spin vanes of the fan of Fig. 1 from their rear;

Fig. 3 is a section along the line 3-3 of Fig. 1;

Fig. 4 is a fragmentary side section of the inlet with spin vanes therein of another fan embodying this invention;

Fig. 5 is a fragmentary developed view of the spin removing vanes of Fig. 4, and

Fig. 6 is a fragmentary side section of the inlet and spin vanes therein of still another embodiment of this invention.

Referring first to Figs. 1-3 of the drawings, a centrif-

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ugal fan has a conventional wheel 10 attached to a rotary shaft 11. The fan has a casing 12 with an inlet sheet 13. Spin vanes 14 are pivoted at their outer ends in the inlet sheet, and at their inner ends in an annular support 15 which contains mechanism for rotating the vanes as disclosed in the U. S. patent of E. L. Richardson, No. 2,100,489.

The vanes 14 are conventional except that at or adjacent the inner ends of their downstream sides, they have flat tabs 16 which, when the vanes 14 are at about their mid-position where pulsations ordinarily occur, have portions which extend radially and longitudinally so as to guide the gas passing them axially, without spin, into the fan wheel. The portions of the spin vanes 14 which extend outwardly of the tabs 16 cause the gas to spin in the direction of wheel rotation as is conventional. All of the vanes 14 can be provided with tabs or they can be omitted from some of the vanes. In one centrifugal fan which was tested, just two oppositely positioned spin vanes were provided with tabs which stopped the objectionable pulsation which ordinarily occurred. As shown by Fig. 1, the outer ends of the tabs 16 are spaced from the fan shaft a small fraction of the distance the outer ends of the vanes 14 are, and the inner ends of the tabs are closer to the shaft than the inner ends of the vanes are.

At other positions of the spin vanes, the tabs have no appreciable effect upon the gas entering the fan wheel.

In the embodiment of the invention illustrated by Figs. 4 and 5 of the drawings, instead of using tabs on the spin vanes, an annular ring 20 is secured to the support 15, and has contra-spin vanes 21 on its exterior surface at its downstream end. These vanes 21 are shaped to cause the gas flowing around the shaft 11 into the fan wheel to flow parallel to the fan shaft. The vanes 21, of course, have this action at all positions of the spin vanes 14, but due to the small radius of the annulus in which they operate, and to the obstruction to flow caused by the support 15, there is little effective spin imparted by the spin vanes in the zone of influence of the straightening vanes 21.

The embodiment of the invention illustrated by Fig. 6 of the drawings has an annular ring 23 secured to the fan shaft 11 for rotation therewith, at the downstream sides of the spin vanes 14. The ring 23 has contra-spin propeller blades or vanes 24 shaped to remove any spin imparted to the gas entering the fan by the inner portions of the spin vanes 14. The vanes 24 can be shaped similar to the vanes 21 as shown by Fig. 5.

While embodiments of this invention have been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated by the drawings and modifications thereof may be suggested by those skilled in the art, without departure from the essence of the invention.

What I claim as my invention, is:

1. In a fan having a fan shaft with an air moving rotor, having an inlet sheet extending around said shaft, having an annular spin vane support around said shaft, and having spin inducing vanes pivoted at said sheet and said support, the combination of means for removing the spin from the air in a small annulus around and adjacent the surface of said shaft comprising tabs on the downstream sides of said vanes protruding towards said rotor, the outer ends of said tabs being spaced a distance from said shaft which is a small fraction of the distance the outer ends of said vanes are, and the inner ends of said tabs being located closer to said shaft than the inner ends of said vanes are.

2. The combination claimed in claim 1 in which said

tabs are substantially radial to the axis of said shaft
when said vanes are at an intermediate position.

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