

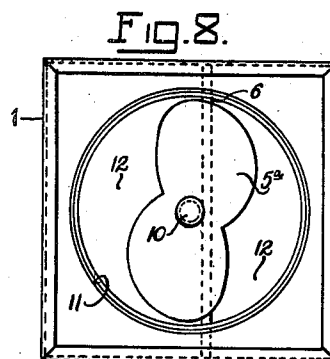
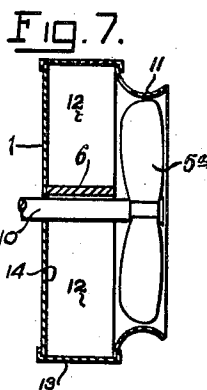
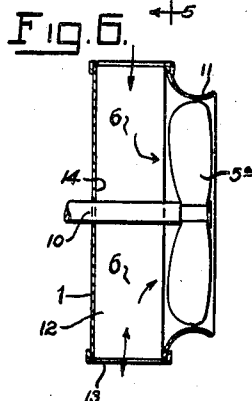
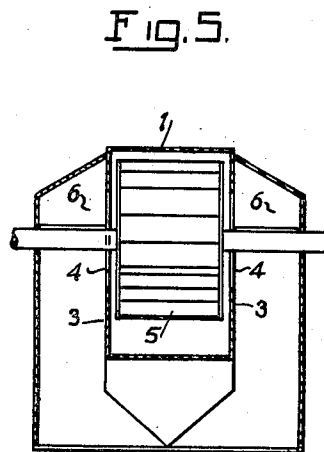
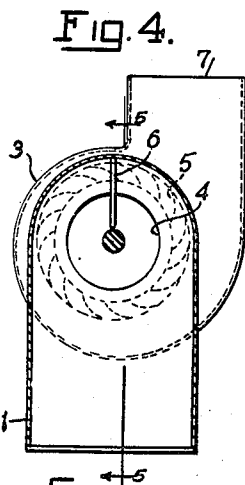
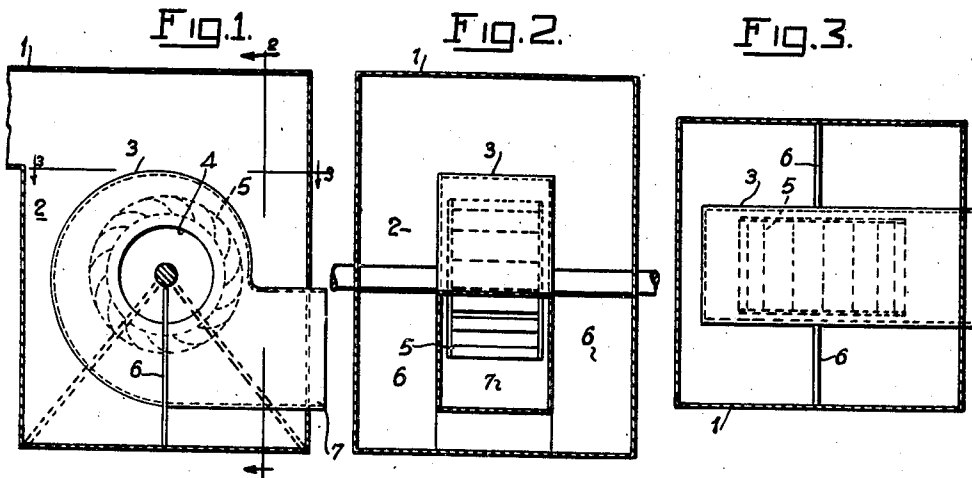
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2,325,154

VORTEX ELIMINATOR IN AIR HANDLING APPARATUS

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2,325,154

VORTEX ELIMINATOR IN AIR HANDLING APPARATUS

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145,105. Divided and this application Novem-
ber 1, 1940, Serial No. 363,931

6 Claims. (Cl. 230—120)

My invention relates to fans and in particular to the elimination of the vortex whirl at the fan inlet.

It has been a problem in connection with the inlet ducts and passageways to fans to prevent the revolution of air in the inlet passageways or chambers so that rotating air does not enter into the eye of the fan. The problem has been to prevent whirl in the air entering the eye of the fan without causing undue air resistance in doing so, and at the same time to not only maintain but increase the efficiency of the fan. It will be understood that the air, if not so controlled, has a tendency to continue whirling in the inlet passageway or duct and without proper entrance into the eye of the fan, which reduces the efficiency of the fan. As the efficiency of the fan is increased, there is a marked saving in power in the operation of the fan.

It is the object of my present invention to provide eliminator means or plates known as vortex eliminator plates. These plates are located in inlet chambers and ducts which convey air to the fan. They prevent the continued revolution of the air in these entering passageways, causing the air to enter the fan properly and resulting in a very marked increase in efficiency of the fan and in savings in power necessary to operate it.

This is a division of my application Serial No. 145,105, filed May 27, 1937, now matured into Patent No. 2,233,991.

Referring to the drawing:

Figure 1 is a side elevation of a fan, the vortex eliminator plates, and the inlet duct to the fan chamber with one side wall removed to disclose the arrangement of the plates with respect to the fan.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a view similar to Figure 1 showing the modified form of inlet box.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a vertical section through a modified form of fan and inlet box construction.

Figure 7 is a horizontal cross-sectional view thereof.

Figure 8 is a front elevation thereof.

Referring to the drawing in detail, 1 is an inlet duct which conveys air into a chamber 2 known as the inlet chamber. This chamber has located within it the volute fan casing 3

which has side entry openings 4 in alignment with which is the rotor 5. On either side of the casing 3 there is located within the chamber one or more plates known as vortex eliminator plates 6 which extend between the fan casing and the side wall of the inlet chamber. These plates may be located as indicated in full or dotted lines. Ordinarily it would be assumed that such plates would markedly decrease the efficiency of the fan, would obstruct the passage of air into the fan, and would set up back pressure and turbulence within the inlet chamber, which would be disastrous to efficiency.

I have found that none of these expected results occurs, but to the contrary the vortex within the inlet chamber is eliminated and the tendency of the air to continue whirling when entering the eye of the fan at 4 is substantially eliminated. This has resulted in such an increase in efficiency that I have found there is a saving of from three to ten per cent horsepower for centrifugal fans and as much as eighty-two per cent for propeller type fans, in the driving of the fan for an equivalent amount of air handled. After the air enters the eye of the fan without this excessive vortex whirling, it is discharged by the rotor of the fan in the usual manner through the discharge passageway 7.

In Figures 1 to 3, the plates are arranged on either side of the fan, preferably in a vertical position.

In Figures 4 and 5 these plates are arranged in the full line position radially from the axis of the fan as indicated.

In Figures 6 to 8 inclusive, a vertical transverse plate is mounted across the back of the fan within the air inlet chamber of the fan so that the air is guided in its right angle flow through the fan without turbulence and without excessive vortex whirling. The air circulating device disclosed in Figures 6 to 8 inclusive consists of a disk or propeller type fan 5a which is suitably mounted upon a drive shaft 10. The fan 5a rotates in a plane which is substantially at a right angle to the axis of the drive shaft 10. An air directing ring 11 surrounds the fan 5a, and provides the discharge outlet from a chamber 12 provided within the air inlet duct or casing 1.

Air is admitted to the chamber 12 through the air inlet openings 13 provided in the side walls of the duct or casing 1. As will be noted in Figure 6, the air is admitted into the chamber 12 angularly with respect to the drive shaft 10, and in fact at substantially a right angle thereto. The direction of air flow is altered by the fan

5a so that the air discharged from the chamber 12 by means of the fan 5a is moving in a direction substantially parallel with the drive shaft 10. The vortex eliminator plate 6 is positioned transversely of the chamber 12, and is arranged parallel with the drive shaft 10. The vortex eliminator plate 6 has one edge thereof substantially adjacent the plane of revolution of the disk or propeller fan 5a, while the other edge thereof is adjacent the rear wall 14 of the duct or casing 1. As disclosed in Figure 6, the plane of air entry into the chamber 12 is parallel with the plane of the vortex eliminator plate 6 so that there is no obstruction to the air entering the chamber 12. However, the vortex eliminator plate 6 provides an obstruction within the chamber 12 which prevents the revolution of the body of air within the chamber, and thus prevents the development of air vortex adjacent the inlet side of the disk or propeller fan 5a.

It will be understood that I desire to comprehend within my invention such modifications as may be clearly embraced within the claims and scope of my invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination, an air inlet chamber for an air circulating fan, an air outlet opening in said chamber, a propeller or disc type fan located adjacent said outlet for receiving air from said chamber and discharging the air therefrom, an air inlet for said chamber in the periphery thereof whereby the air enters said chamber angularly and passes across the inlet face of the fan tending to produce a vortex in said chamber, and a vortex eliminating baffle in said chamber having one edge thereof immediately adjacent the inlet face of said fan whereby said inlet air is prevented from rotation in said chamber adjacent the inlet face of said fan.

2. In combination, an air flow chamber for an air circulating fan having at least one air inlet opening in the perimeter thereof and an air outlet opening whereby the air in flowing through the chamber is discharged therefrom at a substantial angle to the direction of flow of the inlet air thereto, a propeller or disc type fan located in the air outlet opening of said chamber and adapted to produce air flow there-through, and a vortex or air whirl eliminating baffle disposed transversely across said chamber parallel to the inlet air flow to said chamber having one edge thereof immediately adjacent the inlet face of said fan whereby said inlet air is prevented from rotation in said chamber and adjacent the inlet face of said fan.

3. In combination, an air inlet chamber for an air circulating fan having not less than one side opening for air entry, a transverse vortex whirl eliminating baffle extending completely across said chamber and located in a plane parallel to the initial direction of air flow into said inlet chamber, and a propeller fan having the inlet face thereof disposed substantially parallel to the direction of flow of the inlet air in said chamber for causing a discharge air flow from said chamber parallel to the axis of rotation of said fan located in the discharge end of said chamber and rotatable upon an axis disposed an-

gularly to the direction of inlet air flow into the inlet chamber, said baffle having one edge thereof immediately adjacent the inlet face of said fan whereby said inlet air is prevented from rotation in said chamber while wholly unobstructed in its flow to said face.

4. In combination, a fan for circulating air constructed and arranged for discharging a body of air therefrom substantially coaxial with the axis of rotation, a chamber adjacent the inlet side of the fan and from which the fan draws air from movement therethrough, an air inlet opening in said chamber arranged for causing air to enter the chamber angularly with respect to the axis of rotation of the fan and with respect to the inlet face of the fan whereby the inlet air tends to rotate in said chamber before entering said fan, and a planar baffle plate parallel with the axis of rotation of the fan extending transversely across the chamber with one edge in parallel juxtaposition to the plane of rotation of the air inlet face of said fan and the opposite edge adjacent a wall of said chamber thereby forming an obstruction completely across the chamber to prevent rotation of the air body in said chamber without disturbing the free and unobstructed flow of air to the inlet face.

5. An air inlet chamber for a propeller or disc type air circulating fan and from which air is drawn by the fan substantially axially including means forming a chamber, an air outlet opening in a wall of said chamber forming means through which air is supplied to a propeller or disc type fan, an air inlet in a wall of said chamber forming means which directs the inlet air into said chamber angularly to the direction of movement of the air from said chamber through said outlet opening whereby the air in said chamber tends to rotate and set up an air vortex in said chamber, and a baffle means extending across said chamber substantially parallel to the direction of flow of air into said chamber through said inlet opening to prevent rotation of the air in said chamber so that the fan can receive the air from the chamber substantially axially to the fan and without rotation imparted thereto.

6. An air inlet chamber for a propeller or disc type air circulating fan and from which air is drawn by the fan substantially axially including means forming a chamber, an air outlet opening in a wall of said chamber forming means through which air is supplied to a propeller or disc type fan, an air inlet in a wall of said chamber forming means which directs the inlet air into said chamber angularly to the direction of movement of the air from said chamber through said outlet opening whereby the air in said chamber tends to rotate and set up an air vortex in said chamber, and a baffle means extending completely across said chamber and across said outlet opening substantially parallel to the direction of flow of air into said chamber through said inlet opening to prevent rotation of the air in said chamber so that the fan can receive the air from the chamber substantially axially to the fan and without rotation imparted thereto.

THOMAS A. WALTERS.