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INLET BOX FOR CENTRIFUGAL FANS

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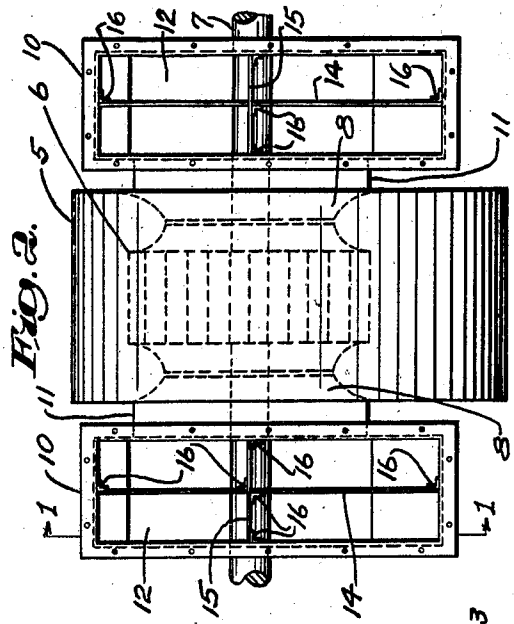


Fig. 2.

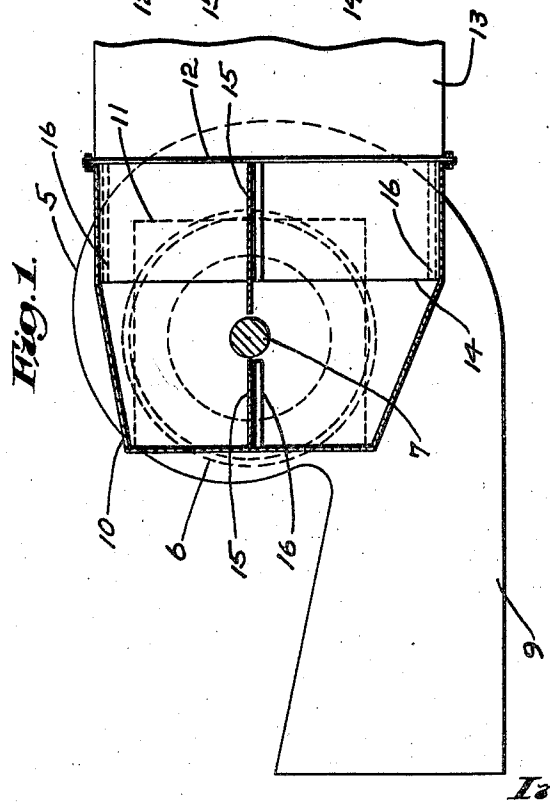


Fig. 1.

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INLET BOX FOR CENTRIFUGAL FANS

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5 Claims. (Cl. 230—132)

This invention relates to inlet boxes for centrifugal fans. Rectangular inlet boxes are usually provided at the axial inlets of centrifugal fans for connection to the inlets and to ducts which convey air to be acted upon by the fans. Losses occur in such inlet boxes which result in reductions in the expected performances of the fans with which they are used.

This invention reduces the losses in a rectangular inlet box by providing in the inlet box, air guide vanes which prevent the air from spinning in the box and which prevent the air entering the box from crowding directly toward the axial inlet of the fan.

In one embodiment of the invention applied to a centrifugal fan having a horizontal shaft on which a fan wheel is mounted, a rectangular inlet box has a vane which extends from its air inlet in a plane parallel to the plane of the axial inlet of the fan, to a point adjacent the axial inlet and which divides the inlet passage in the box into two substantially equal portions. This vane acts to prevent the air entering the inlet box from being drawn by the suction of the fan directly towards the axial inlet without filling the inlet box as it should. Another vane extends perpendicular to the other vane, the length of the inlet box except for a gap for clearing the fan shaft. This vane divides the inlet box into two substantially equal passages, one below and the other above the fan shaft, and its function is to prevent the air in the inlet box from spinning as it enters the axial inlet to the fan wheel. The two vanes provide cellular construction for bracing the inlet and dispense with the need for external bracing.

Use of the two vanes of this invention results not only in improved fan performance but in the reduction in size of the inlet boxes and as a result of the latter, in reducing the distance between the pedestals for supporting the fan shaft, and the overall width of the fans.

Objects of the invention are to improve the efficiency of air flow in rectangular inlet boxes; to reduce the sizes of rectangular inlet boxes, and to reduce the sizes of fans with which rectangular inlet boxes are used.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is an elevation view of a centrifugal fan equipped with an inlet box of this invention, the inlet box being shown in section, the section being taken along the lines 1—1 of Fig. 2, and

Fig. 2 is an end view of a double inlet centrifugal fan equipped with inlet boxes embodying this invention.

The fan 5 has the wheel 6 mounted on the shaft 7. The axial inlets 8 conduct air into the wheel. The air from the wheel is delivered through the outlet 9.

The inlet boxes 10 are attached in the conventional manner to the opposite sides of the fan and have the rectangular air discharge outlets 11 adjacent and in substantial alignment with the axial inlets 8.

The inlets 12 of the inlet boxes are connected in the conventional manner to the ducts 13 which conduct air to the fan.

The vertical vanes 14 extend between the upper and lower walls of the boxes 10, from the inlets 12 thereof to points substantially midway between the inlets 12 and the shaft 7. The purpose of these vanes is to prevent the air entering the inlets 12 of the boxes 10 at the points most distant from the axial inlets 8 from flowing directly towards and into the inlets 8. The vanes 14 force the air entering the inlets 12 at the points most distant from the inlets 8 to travel a considerable distance into the boxes before it can be drawn by the suction of the fan into the inlets 8. Thus the inlet boxes are fully loaded by being filled with air and there is no short circuit flow.

The vanes 15 bisect the inlet boxes along a horizontal plane extending through the shaft 7 and are provided with openings as illustrated by Fig. 1 for permitting the shaft to extend therethrough. The air in its movement through the inlet boxes towards the axial inlets 8 to the fan wheel 6, may tend to spin because of some condition upstream of the inlet boxes. The vanes 15 stop the spin and guide the air on opposite sides thereof without spin into the axial inlets 8.

The vanes 14 and 15 are attached to each other and to sides of the inlet boxes 10 by the structural angles 16 and form cellular supporting structures which enable the boxes to be constructed with thinner walls and which eliminate the need for external bracing.

The inlet boxes provided with the vanes as described are so efficient in handling the air without turbulence and without spin that they increase the performance of the fan with which they are used substantially to that which would be attained by the same fans without inlet boxes. They also are greatly reduced in width (measured along the shaft of the fans) enabling the pedestals of the fans to be moved closer together, thus reducing the size of the fans and providing saving in material.

For example, on a given system of duct work, 35,000 cubic feet per minute of air at a static pressure of 3.96 inches of water, at a motor speed of 900 R. P. M. is desired. A given fan will give this performance with free inlets. Adding the usual inlet boxes results in a reduction in volume to 31,200 C. F. M. and a reduction in pressure to 3.14". Substituting the inlet boxes of this invention results in bringing back the performance substantially to that of the free inlet condition.

The inlet boxes embodying this invention may be reduced in width (measured along the axis of the shaft) about 20%. Otherwise the outside dimensions of the inlet boxes are conventional.

While the vanes 14 have been referred to as vertical and the vanes 15 as horizontal, the fan housings may, of course, be rotated for convenient placement and connection to duct work so that the vanes may be placed at angles to their described positions.

While one embodiment of this invention has 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 as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A rectangular inlet box for a centrifugal fan having a shaft, said inlet box having an outlet arranged centrally around said shaft and having an inlet extending in a plane substantially parallel to said shaft, a vane in said box extending from said inlet, substantially perpendicular to said plane and said shaft and terminating short of said shaft, and a second vane in said box extending substantially perpendicular to said first mentioned vane, said second vane extending in a plane intersecting said shaft from said inlet to the opposite side of said box and having an opening therein for the passage of said shaft therethrough.

2. A rectangular inlet box for a centrifugal fan having a shaft, said inlet box having an outlet arranged centrally around said shaft and having an inlet extending in a plane substantially parallel to said shaft, a vane in said box extending from said inlet, substantially perpendicular to said plane and said shaft and terminating short of said shaft, and a second vane in said box extending substantially perpendicular to said first mentioned vane, said vanes extending substantially along the center lines of said box.

3. A rectangular inlet box for a centrifugal fan having a shaft, said inlet box having an outlet arranged centrally around said shaft and having an inlet extending in a plane substantially parallel to said shaft, a vane in said box extending substantially perpendicular to said plane and said shaft and terminating short of said shaft, and a second vane in said box extending substantially perpendicular to said first mentioned vane, said second vane extending in a plane intersecting said shaft, from said inlet to the opposite side of said box, and having an opening therein for the passage of said shaft therethrough, said first mentioned vane being located substantially half way between said outlet and the side of said box opposite thereto.

4. A rectangular inlet box for a centrifugal fan having a shaft, said inlet box having an outlet arranged centrally around said shaft and having an inlet extending in a plane substantially parallel to said shaft, a vane in said box extending from said inlet, substantially perpendicular to said plane and said shaft and terminating short of said shaft, said vane being located substantially half way between said outlet and the side of said box opposite thereto.

5. A rectangular inlet box for a centrifugal fan having a shaft, said inlet box having an outlet arranged centrally around said shaft and having an inlet extending in a plane substantially parallel to said shaft, and a vane in said box extending in a plane intersecting said shaft, from said inlet to the side of said box opposite thereto, and having an opening therein for the passage of said shaft therethrough, said vane dividing said box into two substantially equal air passages for supplying air from said inlet into said outlet.

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