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M. A. SMITH, JR
FAN BLAST TRANSFORMER
Filed Sept. 20, 1935

2,144,035
2 Sheets-Sheet 1

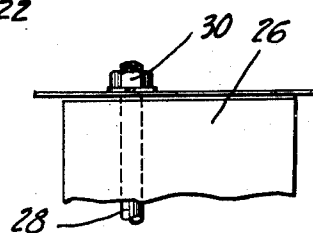
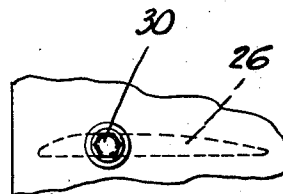
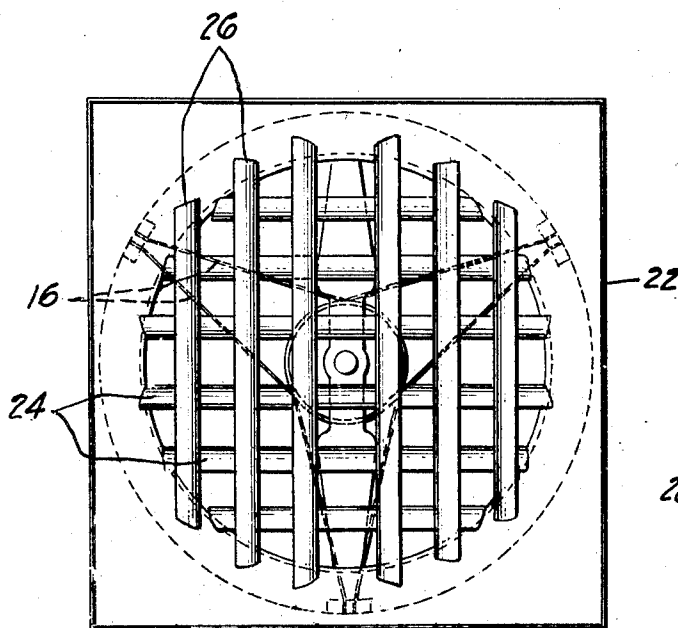
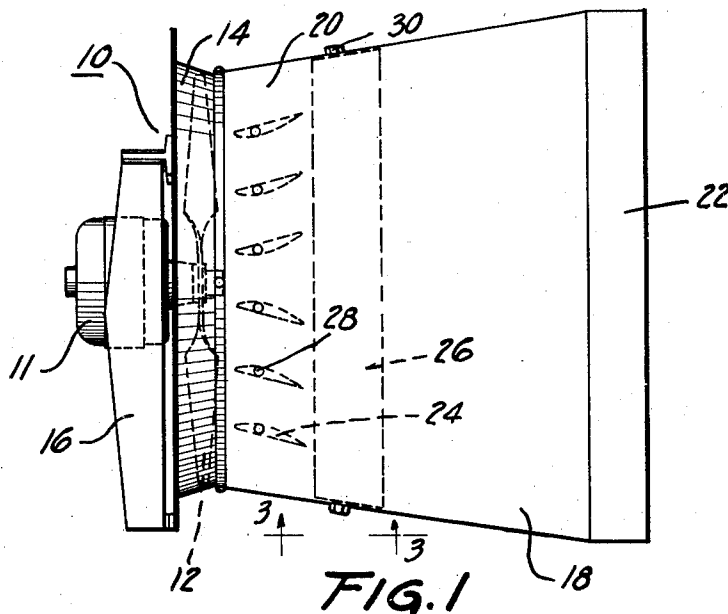


FIG. 2

FIG. 3

FIG. 4

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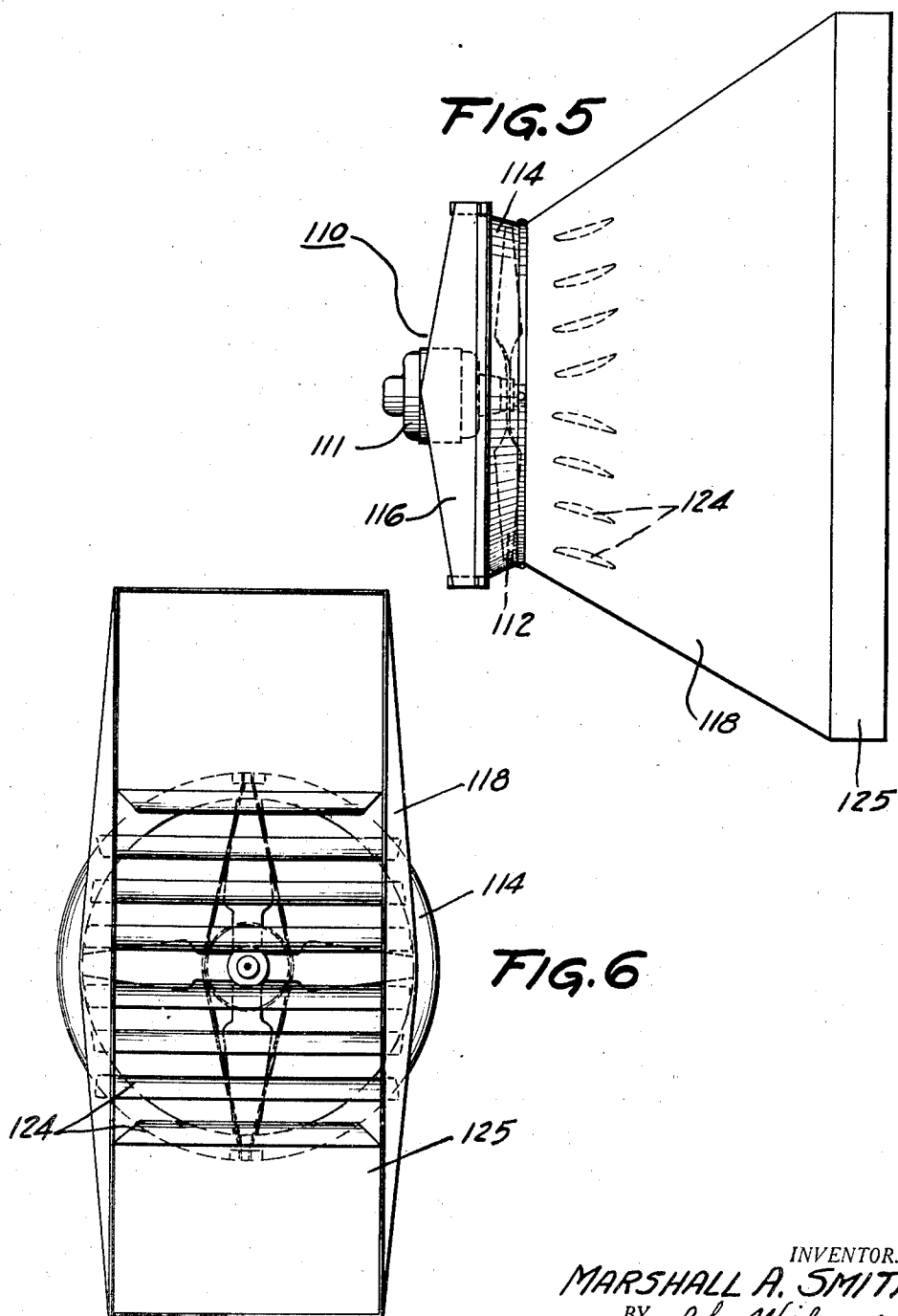
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UNITED STATES PATENT OFFICE

2,144,035

FAN BLAST TRANSFORMER

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Application September 20, 1935, Serial No. 41,382

2 Claims. (Cl. 230-120)

This invention relates to ventilating fans, and more particularly to a ventilating fan blast transformation piece adapted to quickly and efficiently transform the circular air blast expelled by a conventional ventilating fan from a circular blast to a square, rectangular, or any other desired shape of blast.

In certain industrial operations, such for example as the drying of hides or the cooling operation of heat treating processes employed with metals of various types, it is desirable that a uniform velocity of air be directed over a given area, which may be of any shape, such for instance as square or rectangular. In operations of this type it is undesirable to employ a conventional type ventilating fan because of the fact that a greater velocity of air is directed over a given area than is directed over other areas not covered by the effective working area of the blade. With the conventional type of fan it is obviously impossible to cover anything other than a circular area. The effectiveness of the cooling blast of air of the conventional fan when used in connection with industrial operations of the type indicated above is therefore very small.

An object of this invention is therefore to provide an air flow transformation piece which may be attached to a conventional type of fan to distribute the air expelled by the fan uniformly over any desired area.

A further object of the invention is to provide a manually actuated adjustable air flow diffuser operable to vary the quantity of air delivered to any specified portion of the effective working area of the diffuser.

A still further object of this invention is to provide a ventilating fan air diffuser having airfoil-shaped vanes adapted to transform the circular blast of the fan to any desired shape with the minimum of frictional losses.

Another object of the invention is to break up the inherent helical motion of the air flow from a circular ventilating fan, and to deliver the air at a uniform velocity and in straight parallel channels of flow over any desired area.

Other objects and advantages of this invention will be apparent from the following detailed description, considered in connection with the accompanying drawings, submitted for purposes of illustration only, and not intended to define the scope of the invention, reference being had for that purpose to the subjoined claims.

In the drawings wherein similar reference characters refer to similar parts throughout the several views:

Figure 1 is a side elevation of a ventilating fan equipped with an air flow diffuser in accordance with the present invention adapted to uniformly transform a circular air blast to cover a square area;

Figure 2 is an end elevation of Figure 1;

Figure 3 is a view taken on the line 3-3 of Figure 1;

Figure 4 is a plan view of Figure 3;

Figure 5 is a view similar to Figure 1 showing a diffuser adapted to transform the air flow to uniformly cover a rectangular area; and

Figure 6 is an end elevation of Figure 5.

Referring to the drawings, there is shown for purposes of illustrating this invention a ventilating fan 10 of the general type disclosed in my copending application Serial No. 5,691, filed February 9, 1935.

It will be observed that the fan includes a driving motor 11 adapted to impart rotative motion to the blades 12. The blades of this particular fan are designed to deliver a uniform quantity of air over the entire working area of the blade. It is to be understood, however, that the present invention is not restricted to this particular blade structure, because any type of blade and any type of ventilating fan may be employed.

In the illustrating embodiment a venturi-shaped ring 14 surrounds the blades 12, and is held in proper position by arms 16 as more fully described in my copending application referred to above.

In the embodiment of the invention illustrated in Figures 1 and 2, a diffuser 18 having a circular air inlet end 20 is fixed to the outer edge of the Venturi-shaped ring 14. The diffuser 18 tapers outwardly to a square-shaped outlet 22.

The diffuser 18 is provided with a plurality of horizontally and vertically extending airfoil-shaped transformation pieces or vanes 24 and 26 respectively. The vanes 24 and 26 are mounted on studs 28 extending therethrough and projecting through the side walls of the diffuser 18. The airfoil-shaped transformation pieces may be set to any desired angle, and retained in a fixed position by tightening the nuts 30 into engagement with the side walls of the diffuser 18.

In the operation of this device air is expelled through the Venturi-shaped ring 14 by the blades 12 of the fan. The air impinges upon the horizontally disposed airfoil-shaped vanes 24, and is immediately directed outwardly in the vertical direction in the expanding diffuser 18. The air flow then impinges upon the vertically disposed airfoil vanes 26 whereupon it is immediately directed

outwardly in the horizontal direction in the expanding diffuser 18.

The circular air flow of the fan is thus broken up and the helical rotation of the air stream eliminated as the air flows through the diffuser. The air flowing from the square shaped outlet 22 is of uniform velocity over the entire area of the outlet.

The embodiment of the invention illustrated in Figures 5 and 6 is similar in many respects to the embodiment illustrated in Figures 1 and 2. Corresponding parts have therefore been given similar reference numerals with the addition of 100. In this embodiment of the invention it will be observed that a single row of horizontally extending airfoil-shaped vanes 124 are employed, and that the outlet 125 of the diffuser 118 is rectangular in shape rather than square.

In the operation of this embodiment of the invention, as the air flows over the transformation pieces 124 it is directed outwardly from the center by an amount proportional to the angle of incidence between the airfoil sections and the direction of air flow. The angle of incidence may of course be varied at will so as to direct any desired proportion of air to any particular portion of the outlet of the diffuser to satisfy the requirements of the particular operation in which the diffuser is being used.

While the invention has been described with particular reference to two preferred embodiments thereof, it is to be understood that the scope of the invention is to be limited by nothing appearing herein, other than the following claims,

as various changes can be made without departing from the spirit of the invention.

I claim:

1. Ventilating equipment comprising an air moving fan, a conical ring surrounding the fan and having a section of approximately the same diameter as the fan disposed forwardly thereof, an air diffuser including a tubular member having a circular air inlet housing adapted for attachment to the conical shaped ring at the section of smallest diameter and a square air outlet passage, and air distributing means including rows of airfoil shaped air deflecting baffles pivotally mounted in the tubular member at right angles to each other near the inlet to discharge the air at uniform velocity over the area of the outlet passage.

2. Ventilating equipment comprising a bladed fan adapted to discharge air at uniform velocity over its working area, means to drive the fan, a conical ring surrounding the fan and having the section of smallest diameter which approximates the diameter of the fan disposed forwardly thereof, an air diffuser including a circular air inlet passage attached to the section of smallest diameter of the conical ring and a generally square air outlet passage remote from the air inlet, and air distributing means including rows of airfoil shaped air deflecting baffles pivotally mounted in the diffuser near the inlet passage and at right angles to each other to discharge air at uniform velocity over the area of the outlet passage.

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