S. F. McDONALD.

VENTILATOR.

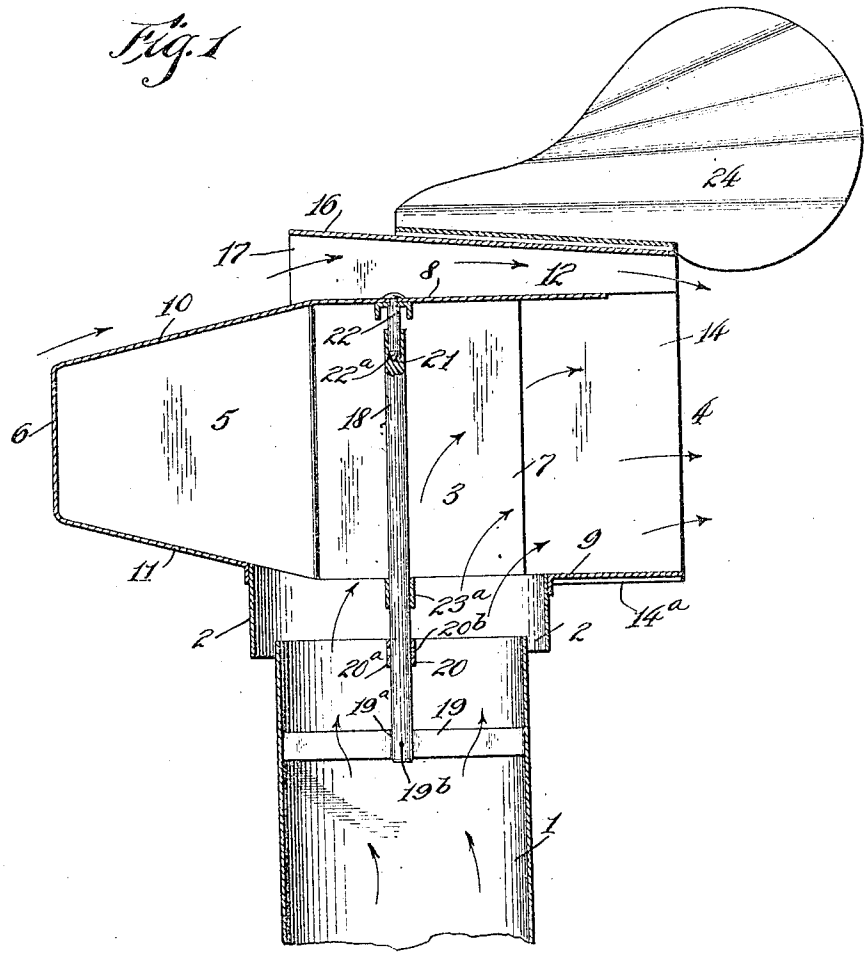
APPLICATION FILED DEC. 1, 1916.

1,292,832.

Patented Jan. 28, 1919.

2 SHEETS—SHEET 1.

Fig. 1



Inventor

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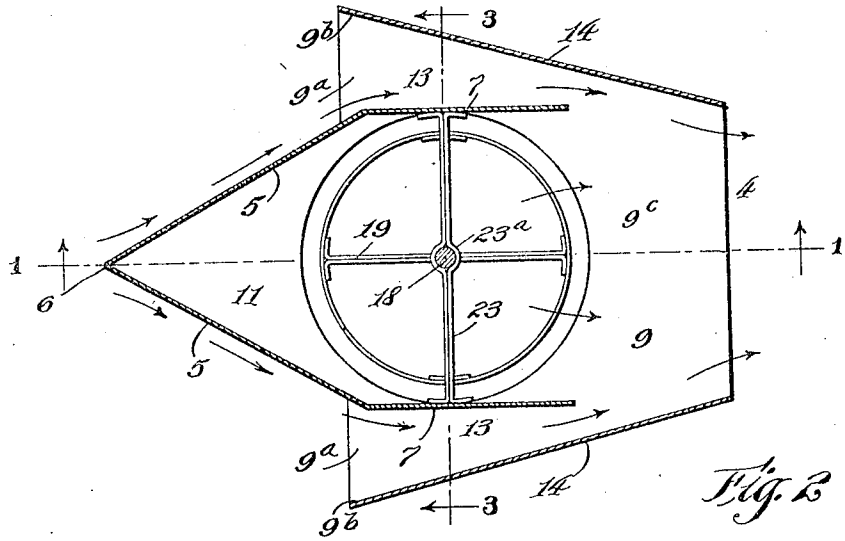


Fig. 2

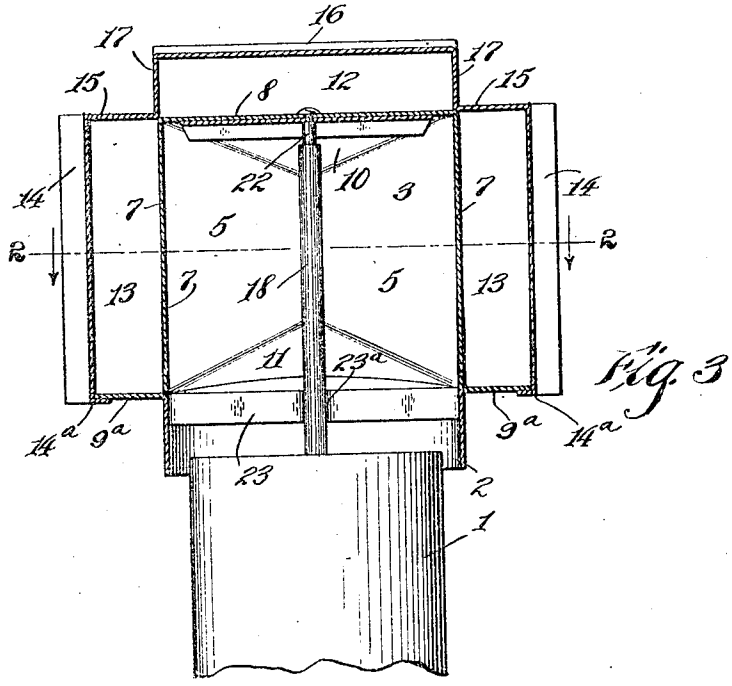


Fig. 3

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UNITED STATES PATENT OFFICE.

STEPHEN F. McDONALD, OF CLEVELAND, OHIO.

VENTILATOR.

1,292,832. Specification of Letters Patent. Patented Jan. 28, 1919.

Application filed December 1, 1916. Serial No. 134,275.

To all whom it may concern:

Be it known that I, STEPHEN F. McDONALD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Ventilators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to ventilators, and more particularly to ventilators of the rotary-cowl ejector-duct type. Among the general objects which it is the aim of this invention to secure are an even flow of the exhausted air throughout the entire cross-sectional area of the exhaust duct and the air shaft connected thereto and a maximum aspirating effect of the ejector duct or ducts upon the exhaust duct, with a corresponding increase in the efficiency of the ventilator. I secure the foregoing objects in and through the embodiment of my invention illustrated in the drawings forming part hereof wherein Figure 1 represents a central vertical sectional view through a ventilator of the type referred to and constructed in accordance with my invention, said view corresponding substantially to the line 1—1 of Fig. 2 and looking in the direction of the arrows; Fig. 2 a transverse horizontal sectional view through the upper rotary cowl portion of the ventilator corresponding substantially to the line 2—2 of Fig. 3 and looking in the direction of the arrows; and Fig. 3 a central vertical sectional view corresponding substantially to the line 3—3 of Fig. 2 and looking in the direction of the arrows; the parts below the rotary cowl being shown in elevation.

Describing by reference characters the various parts illustrated herein, 1 denotes a portion of the fixed lower section or air shaft of the ventilator. The upper end of this shaft is shown as telescoping within and as annularly spaced from the lower end of a neck 2 which projects downwardly from the bottom of the rotary horizontally extending cowl-section of the ventilator, indicated generally at 3, and having a lateral discharge outlet indicated generally at 4. For convenience of description, that end of the cowl or rotary section 3 which is presented toward the wind will be referred to hereinafter as the "front" end or portion while the opposite or discharge end will be referred to as the "rear" end or portion. This upper rotary section comprises a body the inner portion of which is polygonal in cross-section, the section as shown herein being rectangular. This inner portion is wedge-shaped at its front end, the wedge being provided by the inclined sides 5 meeting at a common front edge 6. At their rear ends, the sides 5 merge with the sides 7 of the discharge portion of said body. The top wall 8 of the said inner portion is preferably horizontal and parallel with the bottom wall 9 of said body. The top and bottom walls 10 and 11 of the front or wedge-shaped end of the cowl are preferably inclined, as shown, and are in effect inclined extensions of the walls 8 and 9 respectively. The walls 10 and 11 preferably do not intersect, while the neck 2 depends from the walls 9 and 11.

It will be observed that the walls 7 are arranged as close as possible to the sides of the duct formed within the neck 2, extending tangentially to the upper end of said duct, as will appear from Fig. 2; also that the rear ends of these walls do not extend as far as the rear side of the duct formed within said neck but terminate somewhat short thereof. It will also be seen from Fig. 1 that the top wall 8 projects a short distance beyond the rear side of said neck and overhangs the duct formed therewithin. The importance of this arrangement in connection with the outer portion, which provides ejector ducts, will be explained hereinafter.

In addition to the inner portion thus described, the cowl comprises an outer portion which is so connected to and associated with the inner portion as to form an ejector therewith which will secure the efficiency referred to hereinbefore. The ejector is shown as made up of three ejector ducts coöperating respectively with the top and the sides of the inner portion, and these ducts are formed between the walls of the inner and outer portions in the manner shown herein. It will be observed that the bottom wall 9 is extended horizontally and laterally beyond the sides 7, as indicated at 9^a, and that the edges 9^b of these side extensions are tapered from front to rear, the bottom wall portion 9^c at the rear of the ends of the sides 7 being common to both the inner and the outer body. The outer portion is preferably formed from a single sheet of metal so shaped as to provide with

the top, sides, and extensions 9^a of the inner portion ejector ducts which diminish in cross sectional area from the front to the rear ends thereof. The ejector duct at the top is designated generally by the numeral 12 while the ducts at the sides are each designated generally by the numeral 13, each of the ducts 12 and 13 being preferably rectangular in section. The ducts 13 are each provided between a side wall 7 of the inner portion and a vertical wall 14 of the outer portion, the bottoms of the walls 14 being secured to the edges of the extensions 9^a in any convenient manner, as by flanges 14^a which may be soldered or otherwise secured to said extensions. The metal of the outer portion is shown as so bent at 15 as to provide walls parallel with the extensions 9^a, the metal in the upper portion of said outer portion being so bent and shaped as to provide a top wall 16 and parallel side walls 17 extending upwardly from the sides of the wall 8, the top wall converging toward the rear end of the wall 8. The walls 14, 15, 16 and 17 are extended rearwardly as far as the rear end of the wall 9^c and the front ends of the said walls preferably project a short distance beyond the junction of the walls 5 and 7.

By the construction shown, the ejector ducts 13 each extend from a short distance in front of the junction of the walls 5 and 7 to a point substantially even with the rear side of the air shaft 1. These ducts are abruptly tapered from their front to their rear ends, the width of each of the ducts at the rear end of the wall 7 being between one-half and one-third of its width at the front or receiving end. The duct 12 is also tapered from the front to the rear end of the wall 8 but to a much less extent than is the case with the side ducts 13.

For the purpose of supporting the upper rotatable section or cowl of the ventilator from the shaft section 1, a post 18 is provided, the lower end whereof may be conveniently supported by means of vertically spaced bars or straps 19 and 20 extending across the shaft section 1 and each having a central sleeve 19^a and 20^a respectively to which the post may be connected, as by means of pins 19^b, 20^b respectively. At its upper end, the post is shown as provided with a bearing 21 for the conical end 22^a of a pin 22 secured to the upper wall 8 of the inner rotary body, the rotary body being centered with respect to said post by means of a sleeve 23^a on the cross bar 23. A vane 24 is carried by the wall 16 (being secured thereto in any convenient manner) whereby the cowl may be kept in operative relation to the wind in the usual manner.

By the peculiar manner of forming the ducts 13, a maximum condensation of the air flowing through said ducts occurs in close proximity to the duct formed within the neck 2 and preferably slightly in advance of the rear side of said duct, but substantially flush with the rear of the air shaft 1. The air discharged through the duct 12 also issues from this duct in as close proximity to the duct formed within the neck 2 as is practicable, it being advisable to extend the wall 8 beyond the rear side of the duct within said neck in order to prevent any liquid (such as rain or water of condensation) from dropping into the air shaft. It is not necessary or desirable that the air moving through the duct 12 should be as greatly condensed at its outlet as is the case with the air discharged from the ducts 13, since the air moving through the latter ducts is discharged in as close proximity as possible to the sides of the upper end of said duct and the major portion of the ejecting operation is performed by said ducts 13. The practical result of arranging the ducts in the manner described is to secure within the neck 2, and hence in the air shaft therebeneath, an even and uniform flow of air throughout the entire cross-sectional area of such neck and shaft, so that any one part of the cross-sectional area of the shaft will operate as efficiently as any other part. Furthermore, the particular arrangement of the ducts insures, for a given velocity of wind, a maximum velocity of flow through the air shaft and the exhaust duct with which it communicates.

A further and important advantage of my construction resides in the fact that, should the wind be light and strike on one side only of the wedge-shaped front end of the inner cowl member, it will be directed through the duct on that side and be condensed so as to exercise an effective aspiration upon the air shaft, even in cases where the wind is too light to rotate the cowl. Furthermore, arranging the discharge ends of the lateral ducts substantially flush with the rear side of the air shaft 1 insures a maximum efficiency in exhausting the air from said shaft. The arrangement of the upper plates 8 and 16 prevents moisture, snow and sleet from entering the air shaft. Moreover in warm weather, the wall 8, being cooler than the wall 16, serves to condense the water vapor in the air and thus of itself facilitates a circulation of air through the duct 12.

Having thus described my invention, what I claim is:—

1. In a ventilator of the character described, the combination of an air shaft, and a rotary cowl having an opening in the bottom thereof with which said air shaft communicates and comprising a body having a tapered front end, there being an open-ended horizontal ejector duct extending on each side of said body and rearwardly substantially as far as the rear side of said air shaft, and there being an ejector duct above

the top of said body and having its discharge end at the rear of said opening, the tapered front end being located substantially outside said ducts.

2. In a ventilator of the character described, the combination of an air shaft, and a rotary cowl having an opening in the bottom thereof with which said air shaft communicates, said cowl comprising a body having a tapered front end, there being an open-ended horizontal ejector duct at each side of said body and at the top of said body and extending rearwardly as far as the rear side of said shaft, the said ducts being tapered from front to rear to produce a condensation of the fluid passing therethrough.

3. In a ventilator of the character described, the combination of an air shaft, and a rotary cowl comprising a body of rectangular cross-section having a wedge shape front end and provided in its bottom with an opening with which the air shaft communicates, there being outer side walls forming with the side walls of said body ducts tapering from front to rear and extending substantially as far as the rear side of said air shaft and there being an outer top wall forming with the top wall of said body a duct which tapers from front to rear, said duct extending rearwardly beyond said opening.

4. In a ventilator of the character described, the combination of an air shaft, and a rotary cowl comprising an elongated body having an opening in its bottom communicating with said shaft and being substantially rectangular in cross-section, the front ends of the side walls of said body converging and meeting in a vertical plane and the rear portions of said walls extending substantially tangential to said opening and rearwardly substantially as far as the rear side of said air shaft, the rear portion of the top wall of said body extending substantially parallel with the bottom wall and to the rear of said opening, there being walls located externally of the rear portions of the side and top walls of said body and forming separated ejector ducts therewith, all of said ducts decreasing uniformly in cross sectional area from the front to the rear ends thereof and the cross sectional area of each of said side ducts at the inlet or front end thereof being at least twice the cross sectional area of each of said ducts at its rear or discharge end, the said ducts merging into a common discharge outlet extending rearwardly beyond the rear ends of the side and top walls of said body.

5. In a ventilator of the character described, the combination of an air shaft, and a rotary cowl with which said shaft communicates, said cowl comprising an inner body having a tapered front end the top whereof extends rearwardly beyond the rear side of said air shaft and an outer body having a discharge outlet extending beyond the rear end of the inner body, there being separated ducts provided between the inner body and the outer body at the top and sides of said inner body, the said ducts diminishing in cross sectional area from the front to the rear ends thereof.

In testimony whereof, I hereunto affix my signature.

STEPHEN F. McDONALD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."