Nov. 10, 1931. H. F. SCHMIDT 1,830,857

VENTILATING COWL

Filed Dec. 18, 1929

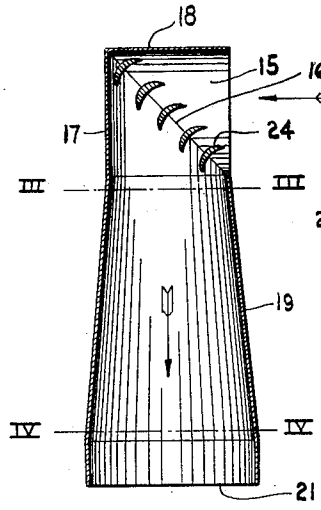


Fig. 1.

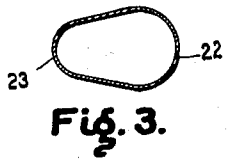


Fig. 3.

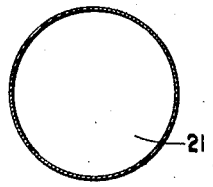


Fig. 4.

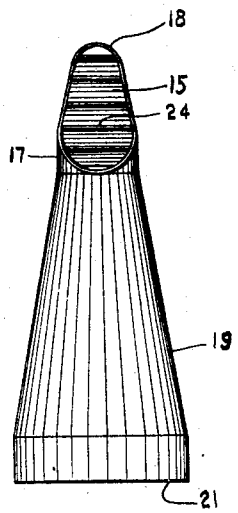


Fig. 2.

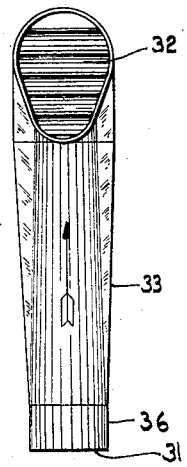


Fig. 6.

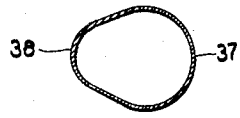


Fig. 7.

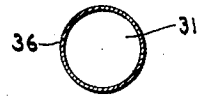


Fig. 8.

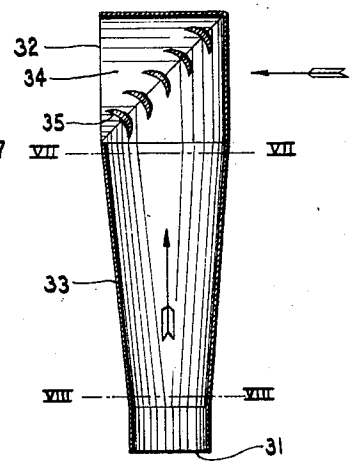


Fig. 5.

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UNITED STATES PATENT OFFICE

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VENTILATING COWL

Application filed December 18, 1929. Serial No. 414,975.

My invention relates to cowls or ventilators, that is, ducts or conduits generally employed for discharging air into a compartment, as in the case of a ventilator of the discharge type, or, for removing air or other gases from a compartment, as in the case of a ventilator of the suction type, and it has for an object to provide apparatus of the character designated which shall be more effective and which shall have a greater capacity for transmitting air or other gases than apparatus of this character heretofore provided.

It has for a further object to provide a cowl which shall be so formed as to effect a velocity-pressure conversion of the air passing therethrough in order that the air may leave the cowl with sufficient static pressure to insure the required velocity of flow against the resistance offered by the connecting ventilating system as in the case of a discharge cowl, or, in order that the air may enter the cowl at a sufficiently low pressure as will provide the required induction of air, as in the case of a suction cowl.

It has for still another object to provide a cowl which shall have less frontal area and which shall consequently offer less wind resistance than the cowls heretofore provided and which shall also have a stream-lined contour so as to reduce the resistance offered against its passage through the air, or the passage of the air about the cowl.

It has for still another object to provide a cowl which shall embody improved means for changing the direction of flow of the air from the horizontal to the vertical or, vice versa, with minimum loss in energy.

These and other objects are effected by my invention, as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a side view, in sectional elevation, of one form of discharge cowl constructed in accordance with my invention;

Fig. 2 is a front end view of the cowl shown in Fig. 1;

Figs. 3 and 4 are sectional views taken on the lines III—III and IV—IV of Fig. 1, respectively;

Fig. 5 is a side view, in sectional elevation, of one form of suction cowl constructed in accordance with my invention;

Fig. 6 is a rear end view of the cowl shown in Fig. 5; and,

Figs. 7 and 8 are sectional views taken on the lines VII—VII and VIII—VIII of Fig. 5, respectively.

Referring to Figs. 1 to 4 of the drawings, I show a form of discharge cowl embodying a longitudinally extending inlet portion 15 cut diagonally at 16 and joined to a vertically-extending portion 17. The portions 15 and 17 are preferably of identical cross section and together may be said to form an inlet elbow 18. Joined to the vertically-extending portion 17 of the elbow is a diverging portion 19 which terminates in a downwardly directed outlet 21.

Preferably, as shown in Fig. 3, the elbow end of the cowl, in cross section, has its major axis extending in the direction of the wind and this is also true of the greater length of the divergent portion 19. This reduces the exposed or frontal area of the cowl, and, hence, the cowl offers less resistance to its movement through the air in cases where the cowl is moved through the air or, the air offers less resistance in passing about the cowl, in cases where the cowl is stationary. In addition, the cowl is preferably stream-lined by having both its front and rear surfaces curved, as at 22 and 23, respectively, the rear surface 23 having a slightly lesser radius of curvature than the front surface 22. The air, therefore, not taken in by the cowl, passes over its outer surface with as little disturbance as possible. As stated heretofore, the

base or inlet portion 21 of the cowl is preferably made circular in cross section, as shown in Fig. 4, inasmuch as it is the customary practice to adjust the angular position of the cowl in accordance with the prevailing direction of the wind.

In order that the air may travel through the elbow portion 18 in the most efficient manner, I provide, within the elbow and on its diagonal line, a plurality of splinters or guide vanes 24 arranged to receive the horizontally moving air and to direct it downwardly into the vertically-extending, diverging portion. The splinters or guide vanes 24 serve to turn or change the direction of the air with a minimum loss in energy and they also remove any tendency toward turbulence or the creation of eddy currents. In addition, they cooperate to deliver the air to the divergent portion 19 with a more uniform pressure and velocity across the length of the cowl from its front to its rear surface. Owing to the fact that the width of the elbow portion of the cowl is less than its length, the arrangement of the splinters in this portion has some structural advantages in that they may be made relatively short in length and consequently they have greater rigidity and exert a better reinforcing effect.

From the foregoing, the operation of my improved cowl will be apparent. Air enters the inlet 15 in a substantially horizontal direction and is directed by the elbow portion 18 and the splinters or guide vanes 24 into the vertically-extending and diverging portion 19. As stated heretofore, the splinters serve to deliver the air to the diverging portion at a relatively uniform velocity and pressure throughout the length of the cowl so as to render the diverging portion as highly effective as possible. As the flow-area of the diverging portion increases in the direction of flow, the air passing therethrough has its velocity reduced and a portion of the kinetic energy of the air is thus reduced into static pressure.

The increased static pressure is, therefore, available to force the air through the ventilating system supplied by the cowl against the resistance to flow offered by such ventilating system. As a result, a given size of cowl constructed in accordance with my invention is capable of circulating a greater quantity of air through a ventilating system than cowls of the type heretofore provided. It will therefore be obvious that cowls constructed in accordance with my invention offer less wind resistance, occupy less space, entail less weight of material, etc. for a given capacity than the forms of cowls heretofore provided.

Referring now to Figs. 5 to 7, I show a cowl of the suction type which is constructed in accordance with my invention and which is similar to the cowl shown in Figs. 1 to 4 except that, in this type, the inlet 31 is generally located at the lower end of the cowl and the outlet 32 at the upper end. A diverging portion 33 is formed between the inlet and the outlet so as to provide an increase in flow-area in a direction from the inlet toward the outlet. Consequently, as the air passes through the diverging portion, it has its velocity decreased and some of its kinetic energy is transformed into static pressure. In this way, a greater static pressure difference is created between the inlet and the outlet of the cowl and, as cowls of this character generally discharge to the atmosphere, a lower sub-atmospheric pressure prevails at the entrant portion of the cowl and its capacity for withdrawing air or other gases from the ventilating system with which it connects is consequently increased.

Like the discharge cowl shown in Figs. 1 to 4, the suction cowl shown in Figs. 5 to 8 has an elbow portion 34 preferably equipped with splinters or guide vanes 35 for changing the direction of the gaseous media from the vertical to the horizontal in the most efficient manner possible. The base portion 31 is preferably made circular to facilitate turning the cowl while the elbow portion 34 as well as a considerable part of the divergent portion 33 is stream-lined, as shown in Fig. 7, the front surface 37 preferably having a greater radius of curvature than the rear surface 38.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. A cowl having a vertically-extending portion embodying a vertical opening and a curved connecting portion having a horizontal opening, one of said openings being arranged for the intake of gaseous media and the other of said openings for the discharge of gaseous media, said curved portion having its cross-sectional area elongated in a direction from the front toward the rear so as to reduce its frontal area and said vertical portion diverging in a direction from the inlet toward the outlet so as to effect a velocity-pressure conversion of the gaseous media passing through the cowl.

2. A cowl having a vertically-extending portion provided with a discharge opening at its lower end and an elbow portion connecting with the upper end of the vertical portion and having a horizontal inlet, the distance between the side walls of said elbow portion being less than the distance between the front and rear walls and said vertical portion diverging in a direction from the

elbow portion toward the discharge opening so as to effect a velocity-pressure conversion of the gaseous media passing through the cowl, and guide vanes extending between the side walls of said elbow portion.

3. A cowl having an inlet portion for the admission of gaseous media and an outlet portion for the discharge of the gaseous media, said cowl increasing in flow-area in a direction from the inlet portion toward the outlet portion so as to effect a velocity-pressure conversion of the gaseous media passing therethrough, the entrant portion of said cowl embodying curved front and rear walls, the radius of curvature of the front wall being greater than the radius of curvature of the rear wall.

4. A cowl having a vertically-extending portion provided with a discharge opening at its lower end and an elbow portion connecting with the upper end of the vertical portion and having a horizontal inlet, the depth of said elbow portion being greater than its width, whereby the frontal area of the cowl is reduced, and said vertical portion diverging in flow-area in a direction from the elbow portion toward the discharge opening so as to effect a velocity-pressure conversion of the gaseous media passing through the cowl.

5. A cowl having a vertically-extending portion provided with a circular discharge opening at its lower end, and an elbow portion connecting with the upper end of the vertical portion and having a horizontal inlet, the depth of said elbow portion being greater than its width, whereby the frontal area of the cowl is reduced, and said vertical portion diverging in flow-area in a direction from the elbow portion toward the discharge opening so as to effect a velocity-pressure conversion of the gaseous media passing through the cowl, and guide vanes provided in the elbow portion for delivering the gaseous media to the vertical portion with a more uniform velocity and pressure across the cowl.

6. A cowl having a vertically-extending portion embodying a vertical opening and an elbow connecting portion having a horizontal opening, one of said openings being arranged for the intake of gaseous media and the other of said openings for the discharge of gaseous media, said elbow portion having its cross-sectional area elongated in a direction from the front toward the rear so as to reduce its frontal area.

7. A cowl having a vertically-extending portion embodying a substantially circular opening and an elbow connecting portion having a horizontal opening, one of said openings being arranged for the intake of gaseous media and the other of said openings for the discharge of gaseous media, the distance between the side walls of said elbow portion being less than the distance between the front and rear walls of said elbow portion and said vertical portion conforming with the contour of the elbow portion at its end adjacent thereto and transforming to the circular opening disposed at its other end.

8. A cowl as claimed in claim 7 wherein a plurality of transversely-spaced guide vanes are provided in an intermediate axial portion of the elbow portion.

In testimony whereof, I have hereunto subscribed my name this 17th day of December, 1929.

HENRY F. SCHMIDT.