

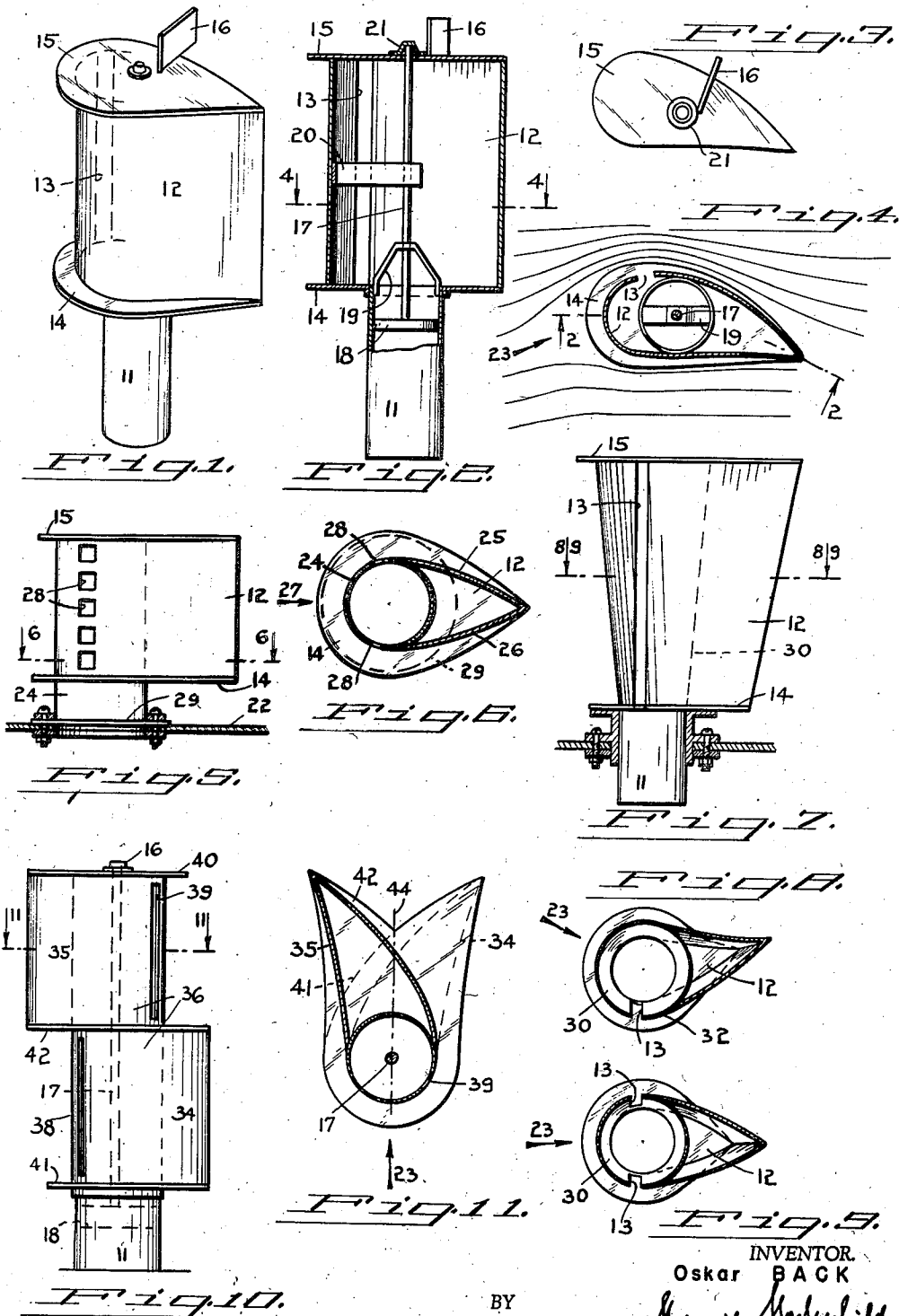
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CHIMNEY OR VENTILATION COWL

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CHIMNEY OR VENTILATION COWL

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This invention refers to a chimney or ventilation cowl adapted to draw off air, gases or vapours from rooms, chimneys, flues, ventilation ducts or the like, and to protect the draught of chimneys or flues from disturbances which might occur at their mouth due to increased pressure produced by the flow of the ambient air.

More specifically this invention has for its object the improvement of that type of ventilation apparatus which utilizes the reduced pressure or partial vacuum field produced, as is generally known, by the increased velocity of the ambient air or other flow at definite places of the contour of stream-line bodies.

In the known type of ventilating apparatus of this kind the mouth of the chimney, flue, or duct, is covered by means of a hollow tubular body of symmetric wingform of suitable length and of stream-line cross-section and the tapering flanks of the wing are provided on their whole lengths with openings. In this known type, however, no effective partial vacuum or reduced pressure can be maintained within the body as the openings are arranged at the zone where the pressure increases due to the decreasing shape of the stream-line form of the body.

In contrast thereto, the invention has for its object to provide the side walls of a hollow tubular stream-line body of the aforesaid type with one or more openings only at the place or places where the highest velocity of the ambient air flow or current occurs. This is the place where due to the stream-line form of the body the stream-lines converge from the front part of the body and from which place they diverge to the rear.

These openings may be of the form of longitudinal slots, or of a number of small openings, one above the other. By means of these openings, the flow of the ambient air draws off the air, gas, or vapour from the hollow body. The device, when used on a chimney, will be effective also for the reason that the dynamic pressure of the natural wind which at the mouth of the chimney might cause a back flow of the flue gases is converted into a decrease of pressure which will protect the chimney draught from such back flow of the flue gases.

An object of the invention is to prevent an equalization of pressure which may be caused by stray currents from above or from below and passing around the edges of the hollow body. According to this feature of the invention, the top or the base of the hollow body, or both, are covered with protruding end plates or flanges generally of the contour of the side walls.

It is a further object of this invention to intensify the reduction of pressure obtained at a definite place of the hollow tubular body of stream-line form by making use of the so-called "circulation" which, in accordance with the modern theory of aero- and hydrodynamics is superimposed upon the flow when, instead of a symmetric stream-line body symmetrically set to the medium, the body is asymmetric, or when a symmetric or an asymmetric body is asymmetrically oriented with regard to the medium, or set into a pitch or angular position to the direction of the medium. The decrease of pressure is then intensified at that side of the body surface which is set into the current of the medium, and the gain in pressure reduction on this side of the body is greater than the loss in pressure reduction at the other side of the body which is set out of the current.

The apparatus when used in the natural wind or currents of changing directions, as is generally known in ventilation cowls, may be loosely mounted on its supporting structure so as to be able to rotate about the discharge opening or openings of one or more flues or other ducts, and it is an object of this invention to provide setting means for automatically setting the hollow tubular body asymmetrically and into a predetermined position or pitch to the wind.

The automatic setting of the apparatus into the angular position desired may be attained by designing the stream-line shape of the hollow body so as to bring the axis of rotation into such a position relative to the centroid of pressure that the angular position desired coincides with that position of the body in which the resultant of all moments with regard to the rotation axis is zero.

Another expedient for automatically setting the apparatus consists in steering surfaces such as wind vanes arranged on the top or on the side or the sides of the hollow body, and which are adjusted to set the body at the most favorable angle relative to the current.

Another means for automatically setting the apparatus into the angular position required, consists in composing the hollow body of one or more pairs of stream-line units, one unit being the inverted image of the other, and both units being symmetrically displaced with regard to a common longitudinal axis, in such a way that each unit is set at the correct angle to the wind or current.

In order to avoid losses due to sudden changes of sectional area in the duct, according to a further embodiment of the invention, the flue which is covered by the hollow body projects into the

hollow body preferably up to the top and communicates directly with the suction openings.

The diffuser action of the apparatus may be increased by enlarging the extension of the flue or other duct projecting into the hollow body conically towards the top of the hollow body, thus forming an inverted truncated cone; the sectional area of the hollow body increases correspondingly from bottom to top.

In the drawing affixed to this specification and forming part thereof, some embodiments of my invention are illustrated diagrammatically and by way of example, but it will be readily understood that my invention is by no means limited to the examples illustrated and described and may be embodied in other forms without departing from the principle underlying my invention and from the ambit of my appended claims.

In the drawing:

Fig. 1 is a side view of a cowl of a stream-line asymmetrical wing profile;

Fig. 2 is its vertical longitudinal section, along the line 2—2 of Fig. 4;

Fig. 3 is a top view;

Fig. 4 is a horizontal section, along the line 4—4 of Fig. 2 of this wing profile;

Figs. 5 and 6 are an elevation, and a horizontal section along the line 6—6 of Fig. 5, of a stream-line symmetrical wing profile;

Fig. 7 illustrates the side view of a conical wing shaped body whose cross section along line 8/9—8/9 is shown in

Fig. 8 for an asymmetrical stream-line wing profile, and in

Fig. 9 for a symmetrical profile, respectively;

Fig. 10 is a front view, and

Fig. 11 a horizontal section, along line 11—11 of Fig. 10, of a pair of asymmetrical stream-line wing profiles symmetrically displaced with regard to a common longitudinal axis.

Referring to Figs. 1 to 4 of the drawing, 11 is a chimney or ventilation flue, 12 the rotatable cowl in form of a hollow body of an asymmetrical stream-line wing form. The hollow body 12 is provided with a longitudinal discharge slot 13. The hollow body is covered at both its ends with end plates or flanges 14, 15 respectively.

The hollow body is supported by means of brackets 20, 21, and may rotate about axle 17 secured by means of structures 18, 19 to the flue 11. By means of a wind vane 16, provided on the top plate 15, the hollow body may be set, with regard to the direction 23 of the wind, into the position which is the most favorable for its action, as is shown in Fig. 4.

In Fig. 4 the stream-lines of the wind, flowing along the hollow body, are shown. At the place of, or in proximity to, the place where the wind velocity and the corresponding decrease of pressure are greatest, the suction opening 13 is arranged in the wall of the hollow body 12. Through this opening, under the action of the wind or other current passing the hollow body, the air, gas, or other medium is drawn off from the chimney, or ventilation flue, or duct.

The protruding discs 14, 15 protect the places of depression at the hollow body against equalization of pressure from below or above.

The body of symmetrical wing shape shown in Fig. 5 may also be turnable or may be secured by means of a flange 29 to the roof 22 of a car or other vehicle. In order to avoid sudden changes in the size of the sectional areas, the suction pipe 24 projects into the interior of the hollow body and reaches the top surface 15. Due to the sym-

metrical form of the body, fields of decreased pressure are produced at both sides 25 and 26, of the body. The suction openings 28 are arranged at or near the places of greatest intensity of these depressions. The front surface 24 of the hollow body and the suction pipe extension may be made of one piece, the suction openings 28 traversing the extension pipe 12.

In the embodiments shown in Figs. 7 and 8, and in Figs. 9 and 10, respectively, the extensions 30 of the flues or ducts are enlarged conically towards the top plate 15 of the hollow body and thus form inverted truncated cones. Correspondingly, the sectional areas of the asymmetrical form, Fig. 8, and the symmetrical form, Fig. 9, may increase from bottom 14 to top 15. Suction openings 13 are arranged at the convex suction side only of the asymmetrical wing profile, Fig. 8; but at both sides, in the case of a symmetrical profile, Fig. 9.

The turnable cowl shown in Figs. 10 and 11 is composed of one pair of inversely arranged units 34, 35, of preferably asymmetrical shape. These units are symmetrically displaced with regard to a common longitudinal axis 44. Due to the symmetry of the whole, the body will always place itself symmetrically with regard to the current. The suction openings 38 and 39, respectively, of both units 34 and 35, are at opposite sides of the body. An intermediary protruding disc or flange 42 is provided which protects both fields of low pressure from being neutralized by the high pressure of the respective other unit. The hollow body may also be composed of more than one pair of symmetrically displaced units.

In this symmetrical arrangement of two inversely asymmetric wings, by appropriately adjusting their relative position, both wing units can be made to set themselves always at the correct angle to the current.

I claim:

1. A chimney or ventilation cowl comprising in combination a flue, a hollow tubular body covering said flue, said hollow tubular body composed of at least one pair of units of wing form of suitable length and of stream-line cross sections, one of said units being the inverse image of the other and both of said units symmetrically displaced with regard to a common longitudinal axis, said hollow body turnably arranged upon said flue and suction openings in both said units at, or in proximity to, the places, where the highest velocities of the ambient air current occur.

2. A chimney or ventilation cowl comprising in combination a flue, a hollow tubular body covering said flue, said hollow tubular body composed of at least one pair of units of asymmetrical stream-line wing form of suitable lengths and stream-line cross sections, one of said units being the inverse image of the other and both of said units symmetrically displaced with regard to a common longitudinal axis, means for rotatably supporting said hollow body, suction openings in both said units at, or in proximity to, the places where the highest velocities of the ambient air current occur, an extension of said flue projecting into said hollow body and communicating with said suction openings.

3. A chimney or ventilation cowl comprising in combination a flue, a hollow tubular body of suitable length and of asymmetric wing cross section covering said flue, said tubular body having a side wall of greater curvature and a side wall of less curvature, said side wall of greater curvature being provided with at least one suction opening at or in proximity to the place where due to the

stream-line form of said hollow tubular body the ambient air flows round the body with greatest velocity.

4. In a chimney or ventilation cowl which comprises a flue and a hollow tubular body of suitable length covering the mouth of said flue and forming a wing of stream-line contour, said hollow tubular body being provided with at least one suction opening at its side, only at the place where due to its form the stream of the ambient air converges from the front and diverges to the rear.

5. In a chimney or ventilation cowl which comprises a flue and a hollow tubular body of suitable length covering the mouth of said flue and forming a wing of stream-line contour, said hollow tubular body being provided with at least one suction opening at its side, only at the place where due to its form the stream of the ambient air converges from the front and diverges to the rear, the combination with end plates covering the top and the base of said hollow tubular body, said end plates projecting outward from and along the contour of said hollow tubular body and forming flanges generally of the contour of said hollow tubular body.

6. In a chimney or ventilation cowl which comprises a flue, a hollow tubular body of suitable length covering the mouth of said flue and forming a wing of stream-line contour, said hollow tubular body being provided with at least one suction opening at its side, only at the place where due to its form the stream of the ambient air converges from the front and diverges to the rear, end plates covering the top and the base of said hollow tubular body, said end plates projecting outward from and along the contour of said hollow tubular body and forming flanges generally of the contour of said hollow tubular body, the combination with means for rotatably

supporting said hollow tubular body and setting means for automatically setting said hollow tubular body asymmetrically and into a predetermined angular position deviating from the direction of the wind.

7. A chimney or ventilation cowl as set forth in claim 6 wherein the axis of rotation of said hollow tubular body and its centroid of pressure are so disposed with regard to each other that the resultant of all moments of pressure with regard to said rotation axis is zero in the desired angular position of said hollow tubular body to the wind.

8. A chimney or ventilation cowl as set forth in claim 6 wherein said hollow tubular body forms a wing of asymmetric stream-line contour and the axis of rotation of said hollow tubular body and its centroid of pressure are so disposed with regard to each other that the resultant of all moments of pressure with regard to said rotation axis is zero in the desired angular position of said hollow tubular body to the wind.

9. In a chimney or ventilation cowl which comprises a flue, a hollow tubular body of suitable length covering the mouth of said flue and forming a wing of stream-line contour, said hollow tubular body being provided with at least one suction opening at its side, at the place where due to its form the stream of the ambient air converges from the front and diverges to the rear, the combination with an extension of said flue projecting into said hollow body and communicating with said suction opening, the front part of said flue extension being of one piece with the front part of said hollow body.

10. A chimney or ventilation cowl as set forth in claim 9, wherein said flue extension is of truncated cone shape.

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