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OMNIDIRECTIONAL VENTILATOR

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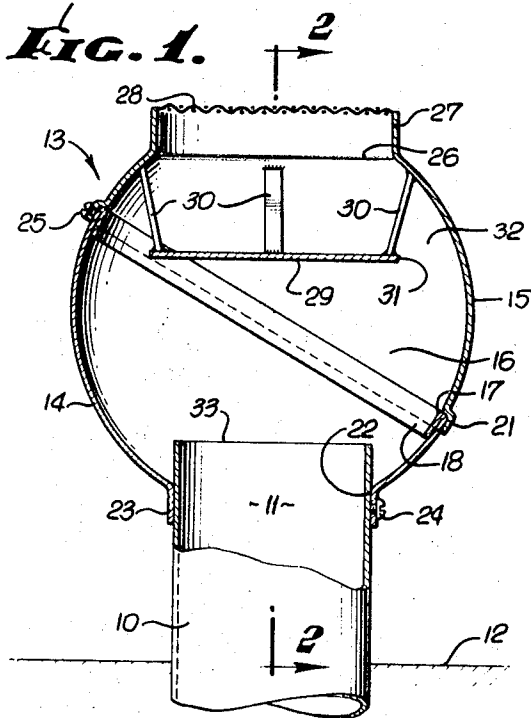
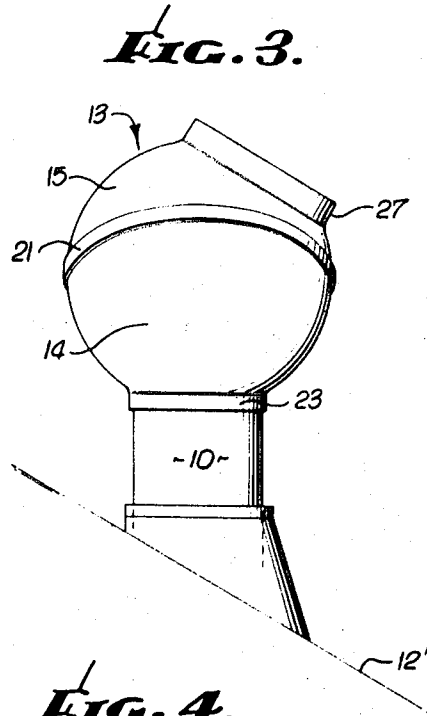
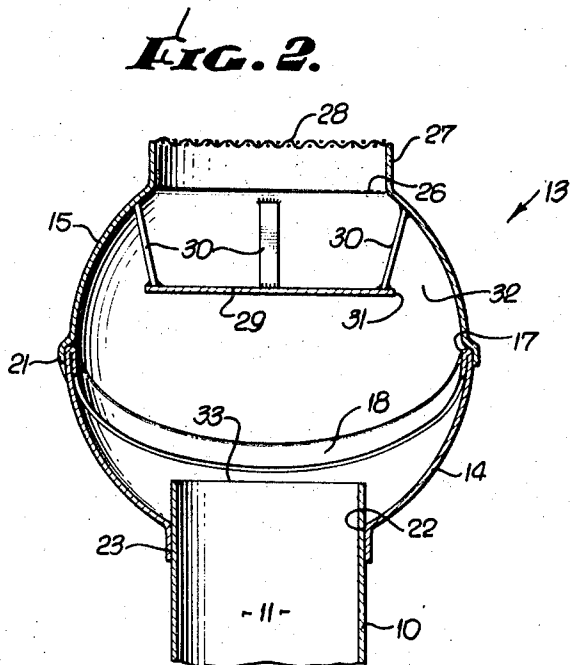
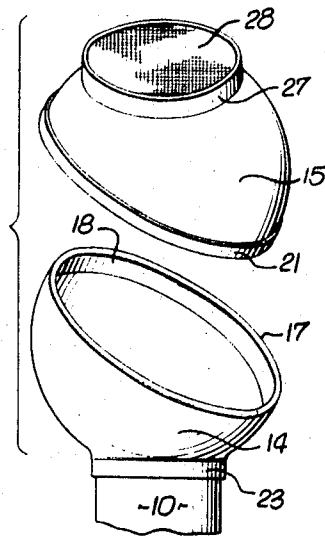


FIG. 4.



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OMNIDIRECTIONAL VENTILATOR

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Continuation-in-part of application Ser. No. 479,734,

Aug. 16, 1965, now Patent No. 3,382,792. This ap-

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13 Claims

ABSTRACT OF THE DISCLOSURE

The invention resides in an omnidirectional ventilator the parts of which are so joined together that the rim of the outlet can always be parallel to any surface upon which the device is mounted and over which air flows. To provide adequate structure, the ventilator is constructed as an oblate spheroidal assembly with opposite matching sections, for greatest convenience, joined to each other at substantially the location of greatest diameter. There is an inlet opening into one of the sections and an outlet opening in the other of said sections in an angular relationship such that when the device is mounted above a surface, the outlet opening is substantially parallel to the surface.

This is a continuation-in-part of copending application Ser. No. 479,734, filed Aug. 16, 1965, now Patent No. 3,382,792.

Wind tunnel and aerodynamic tests have long demonstrated that when air blows with respect to any surface the air will assume a path parallel to the surface. This is true whether the surface be a flat roof, either pitched or level, or in fact if the surface be a hill side, vertical wall, or virtually any surface, flat or curved, over which wind blows or air may pass. Most effective ventilation for stationary ventilators can be achieved when the plane of the ventilator outlet is made parallel to the surface over which air is passing. Heretofore, many stationary type ventilators and even ventilators with moving parts have been constructed so that they do move a percentage of air from a chamber to be vented to the exterior. Some of these, while working with reasonable effectiveness in some installations, are extremely ineffective in other installations because the surface may be pitched at a different angle. Apparently, the art has not recognized that stationary ventilators should be so manufactured or adjustable so that when installed they are in the most efficient and advantageous position and will retain that position as long as the installation remains.

It is therefore among the objects of the invention to provide a new and improved ventilator device which depends entirely upon suction induced by the passage of air over the ventilator outlet which can be set at the maximum effective position which it will maintain throughout all directions of air passage.

Another object of the invention is to provide a new and improved ventilator device which is omnidirectional, which is always capable of placement in the most efficiently performing position and which is sufficiently versatile so that it can be used for the venting of virtually any type of chamber, whether stationary or moving, and whether the chamber be installed on level ground or a hill side.

Still another object of the invention is to provide a new and improved adjustable ventilator device which is extremely simple and inexpensive in construction, which is adjustable so as to be always set in a position of optimum effectiveness, and wherein there are no moving parts needed for operation, once the device has been set in proper position of adjustment.

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Also among the objects of the invention is to provide a new and improved ventilator device which is less sensitive to gusts and eddies in the flow of air over it than ventilators heretofore in use.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view of the device mounted in proper attitude upon a horizontal surface.

FIGURE 2 is a longitudinal sectional view on the line 2—2 of FIGURE 1.

FIGURE 3 is a side elevational view of the device mounted in proper attitude upon a sloping surface.

FIGURE 4 is an exploded view of the parts of the device.

In an embodiment of the invention chosen for the purpose of illustration an adjustable device is shown and described, although it should be understood that the device may be manufactured with the parts in fixed attitudes of adjustment when installation conditions are known in advance. There is shown in the selected embodiment a riser pipe 10 providing an inlet passage 11 which may be connected through a surface 12 to an appropriate chamber to be vented (not shown). In FIGURE 1 the surface 12 is shown to be horizontal. A hollow spherical assembly indicated generally by the reference character 13 consists of two semispherical sections, namely a lower semispherical section 14 and an upper semispherical section 15. These two sections together form a substantially spherical chamber 16.

An annular edge 17 of the lower semispherical section 14 has a flange 18 rolled over to stiffen it, the roll being along the circumference of a great circle 20. An enlarged circumferential flange 21 of the upper semispherical section 15 fits snugly over the edge 17 with a tight but slidable fit, so that the sections can be rotated one with respect to the other.

At the lower end of the lower semispherical section 14 there is an opening 22, the plane of which is at an angle with respect to the plane of the great circle 20 which in the chosen embodiment is substantially 30 degrees. An annular reinforcing collar 23 is provided in which may be placed screws 24 which can be tightened into position against the riser pipe 10 to hold the lower semispherical section in a selected position of rotation. Similar tightening screws 25 may also be provided to anchor one of the spherical sections with respect to the other once a proper relationship has been determined.

At the upper end of the upper spherical section 15 is an exit opening 26 surrounded by an annular flange 27. In this instance also the plane of the exit opening 26 and the plane of the upper edge of the flange 27 as well are at an angle with respect to the plane of the great circle 20 of substantially 30 degrees, namely the same angular disposition as the opening 22, but in reverse direction, when positioned as shown in FIGURE 1. Over the top of the flange 27 is an insect screen 28. Below the exit opening 26 is a rain shield 29 attached to the inner wall of the upper semispherical section 15 by means of tabs 30. The perimeter 31 of the rain shield 29 is spaced a substantial distance below the exit opening and from the inside wall of the respective semispherical section so that the area of an annular passage 32 is approximately as large as the area of the exit opening 26.

It is further significant that the diameter of the inlet passage 11 of the riser pipe 10 and of an inlet port 33 at the upper and can be up to 70 percent of the diam-

eter of the great circle 20. When the diameter of the inlet passage 11 is at 70 percent, the diameter of the exit passage 26 may also be about 70 percent, allowing a clear through passage of 70 percent of the diameter of the sphere for any direction from horizontal to vertical adjustment, to horizontal adjustment on the opposite side. For best values of flow and suction capability versus the size of the ventilator, the diameter of the outlet passage 28 should be something less than 70 percent of the diameter of the great circle. The diameter of the inlet passage 11 need not exceed 60 percent of the diameter of the great circle.

It is also significant that the height of the flange 27 should be approximately .08 to .15 times the diameter of the sphere as determined by the great circle 20.

Further, the plane of the outlet opening 26 can be adjusted for all intermediate angular relationships between vertical and horizontal by a partial rotation of one semispherical section with respect to the other and a corresponding rotation of the lower semispherical section about the riser pipe. An example of this is illustrated in FIGURE 3, where the device is mounted upon a sloping roof surface 12'. Here both semispherical sections have been rotated slightly, within their limits of rotation, until the edge of the flange 27 is parallel to the roof surface 12'. This parallel relationship can be achieved regardless of the angular pitch of the roof surface 12' merely by rotating the semispherical sections with respect to each other a suitable amount and rotating both of them a correspondingly suitable amount about the riser pipe 10.

The disclosure in making reference to the drawings of the selected embodiment has referred to a spherical structure made of two halves joined together. Where the adjusting feature is omitted the spherical form may on occasions be constructed otherwise, as for example by hydraulic expansion or molding as a unit. What is of importance is the acceleration of flow of air produced by the spherical shape which, assisted by the height of the flange, augments to an appreciable degree to venting effect of air moving past the device. The flange, protruding outwardly around the outlet, which is 60% to 70% of the diameter of the oblate spheroidal form, causes the air to be deflected up and over the outlet and it is this action which augments the venting flow outwardly. As viewed downwind the shoulders on either side of the outlet cause the air to travel farther and faster, thereby causing a reduction in atmospheric pressure in those two regions which in turn augments the outflow through the areas of the outlet nearest those points.

Although the device is one readily applicable to a roof surface, the device can be mounted with equal facility upon a chimney or on a vent pipe from a stationary engine, a boiler, or virtually any chamber or vehicle to be vented. If the chamber is located upon a hill side, the adjustable ventilator can be so adjusted that the exit opening is parallel to the hill side and thereby parallel to the direction of wind flowing parallel with the hill side. On the other hand, should the device be mounted upon a boat, even on the vertical or sloping side wall of the hull or cabin, the outlet opening can always be adjusted in a direction such that it is parallel to the surface and therefore parallel to the flow of air along the surface, as the boat moves through the water. Hence, it will be clear that the device is equally applicable to both stationary and movable vehicles and adjustable irrespective of the shape or direction of the surface upon which it is mounted.

Moreover, tests have shown that by comparison with a conventional cylindrical ventilator pipe the device herein disclosed operates 30% more effectively when the outlet openings of both are mounted parallel to the roof surface. Also, should there be any occasion to tilt the pane of the outlet relative to the roof surface, the device of the invention can be tilted with the axis 34 degrees from vertical before any down draft starts, whereas down

draft will start in a cylindrical pipe the axis of which is tilted 23 degrees from vertical.

In summary, the invention relates to a uniquely versatile, high performance, stationary, omnidirectional exhaust ventilating device which has been found to function efficiently regardless of the direction or velocity of the wind or the degree of slope of the surface upon which it is mounted. It may be installed either flush with the surface or upon a riser pipe. It will perform equally well as a supplemental augments to the basic function of a smokestack or chimney. Its design is such that a completely effective rain shield and/or insect screen may be incorporated with substantially no loss of efficiency. Since its concept is such that its efficiency is unimpaired regardless of the direction or velocity of the wind or the degree of slope of the surface upon which it is mounted, flush with the surface or upon a riser pipe or chimney, it obviates the necessity of unsightly bent or angled vent pipes, hoods, weathervanes, or other aesthetically disturbing paraphernalia in the full and complete exercise of its function.

While the invention has herein been shown and described in what is conceived to be a practical and effective embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A ventilator device for connection to a chamber in association with a surface over which air flows, said ventilator device comprising

a hollow oblate spheroidal assembly on said surface, an outer hemispherical section thereof having an exit opening therein and an outwardly extending flange around said exit opening having a free edge thereof extending in a plane substantially parallel to said surface, an inner imperforate hemispherical section thereof having an inlet opening therein of a size comparable to said exit opening, said flange having a height between about 8% and 15% of the medial diameter of said oblate spheroidal assembly.

2. A ventilator device according to claim 1 including a riser pipe extending between said surface and said inlet opening, the upper end of said riser pipe having a junction with the inner hemispherical section at a line lying in a plane perpendicular to the axis of said riser pipe, the plane in which the free edge of the flange extends being at an oblique angle with respect to the plane of said junction.

3. A ventilator device according to claim 1 wherein said surface is at an oblique sloping angle with respect to a horizontal plane and the plane of said free edge is substantially parallel to said sloping angle.

4. A ventilator device according to claim 1 wherein the diameter of the outlet opening is from about 60% to about 70% of the diameter of the spheroidal assembly at the area of greatest diameter and the diameter of the inlet opening is about 50% of said diameter of the spheroidal assembly.

5. A ventilator device according to claim 1 wherein there is a rain shield in the section having the exit opening, said rain shield being mounted in a position spaced below said exit opening leaving a space around said rain shield not substantially less than the area of said exit opening.

6. A ventilator device according to claim 1 wherein there is an insect screen extending entirely across said exit opening.

7. A ventilator device according to claim 1 wherein said sections are matching semispherical sections.

8. A ventilator device for connection to a chamber in association with a surface over which air flows, said ventilator device comprising,

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a hollow oblate spheroidal assembly on said surface,
an outer hemispheroidal section thereof having an exit
opening therein and an outwardly extending flange
around said exit opening having a free edge thereof
extending in a plane substantially parallel to said
surface, an inner imperforate hemispheroidal section
thereof having an inlet opening therein of a size com-
parable to said exit opening,
said sections of the hollow oblate spheroidal assembly
being semispherical sections,
a circumferentially slidable joint interconnecting said
sections, the free edge of said exit opening extending
in a plane making an angle with the plane of said
joint of between about 20 degrees and about 45 de-
grees, an edge of said inlet opening lying in a plane
making an angle with the plane of said joint sub-
stantially equal to the first identified angle, said sec-
tion with the inlet opening having a circumferentially
rotatable connection relative to said surface, whereby
to enable adjustment of said flange to a position sub-
stantially parallel to said surface.
9. A ventilator device according to claim 8 wherein
the angle between the great circle and the plane of the
edge of said flange is 30 degrees.
10. A ventilator device according to claim 8 wherein
the cross-sectional area of each opening is substantially

70 percent of the cross-sectional area of the spherical
assembly at the great circle.
11. A ventilator device according to claim 8 wherein
there are means for anchoring said sections to each other
and to the surface in selected positions of adjustment.
12. A ventilator device according to claim 8 wherein
there is a rain shield in the semispherical section having
the exit opening, said rain shield being mounted in a
position spaced below said exit opening leaving a space
around said rain shield not substantially less than the
area of said exit opening.
13. A ventilator device according to claim 8 wherein
the height of the flange is between about 8 percent and
about 15 percent of the diameter of said great circle.

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