Oct. 10, 1944. S. W. BRUUN ET AL 2,360,104

VENTILATOR

Filed Nov. 26, 1942 2 Sheets-Sheet 1

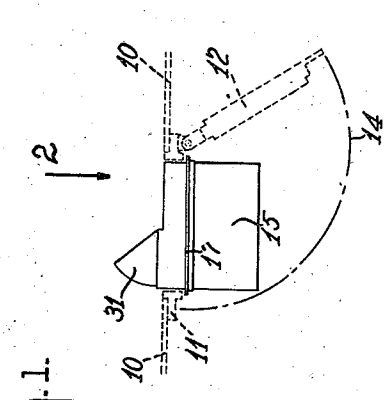


Fig. 1.

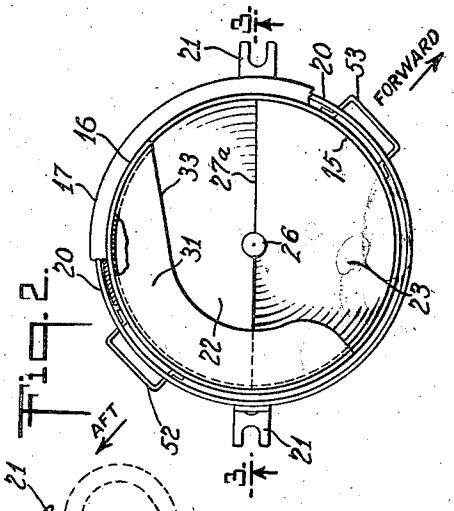


Fig. 2.

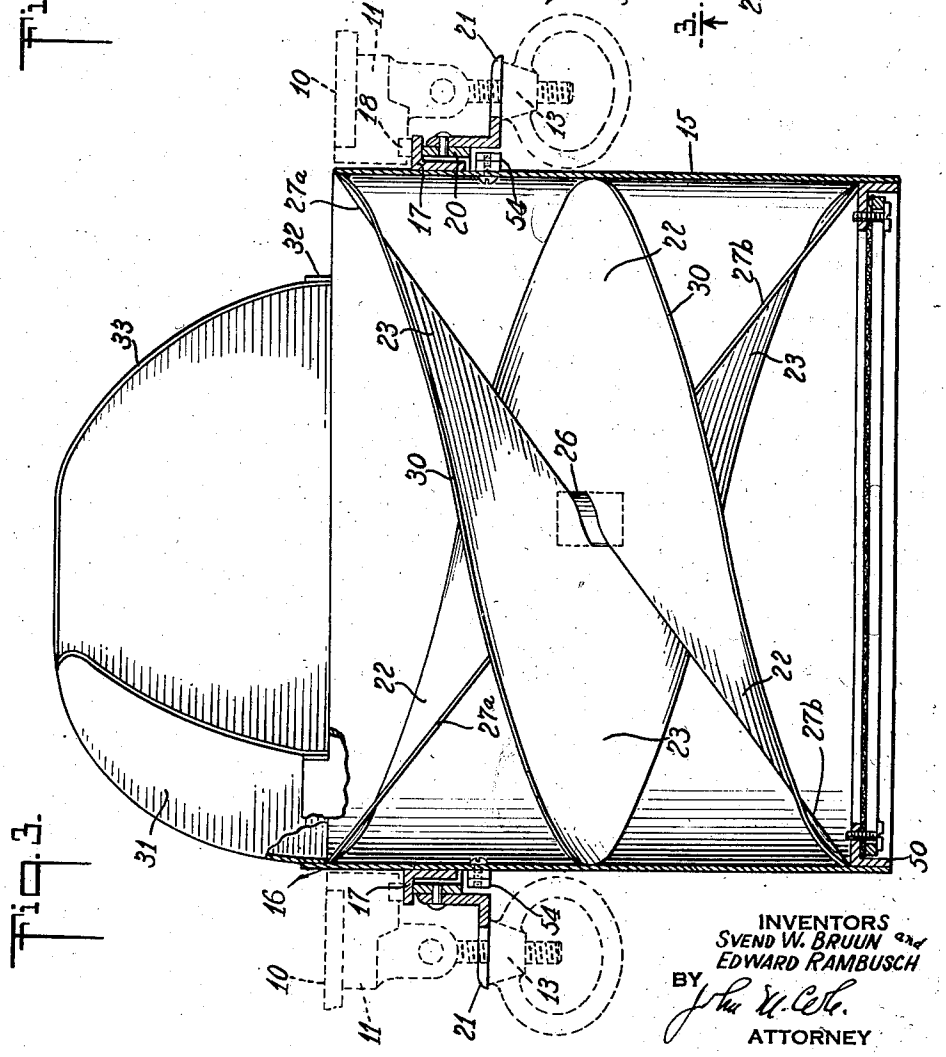


Fig. 3.

INVENTORS
SVEND W. BRUUN and
EDWARD RAMBUSCH
BY John W. Cobb.
ATTORNEY

Oct. 10, 1944. S. W. BRUUN ET AL 2,360,104

VENTILATOR

Filed Nov. 26, 1942 2 Sheets-Sheet 2

Fig. 4.

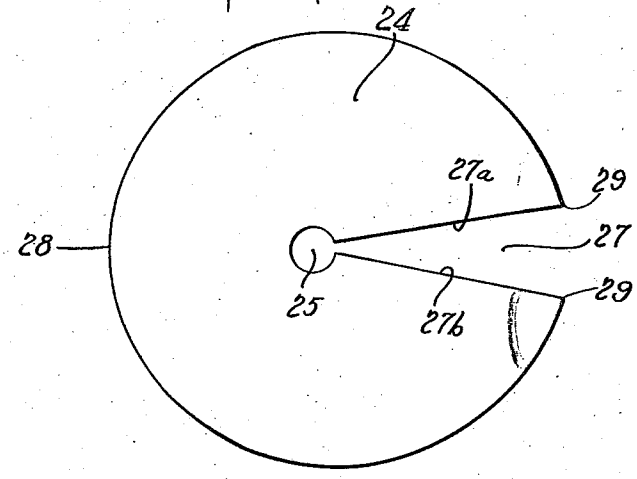


Fig. 6.

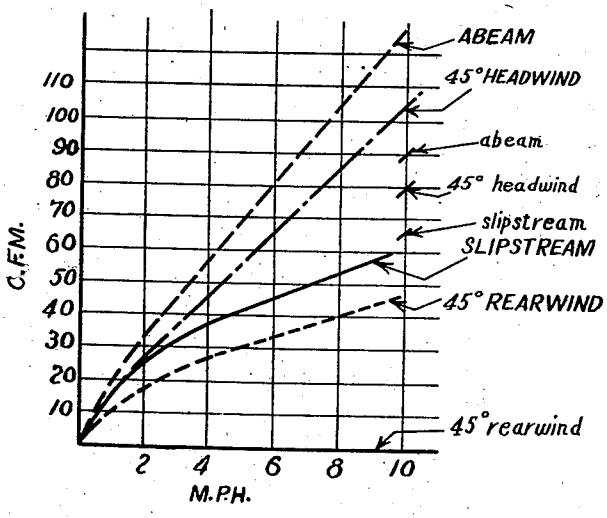
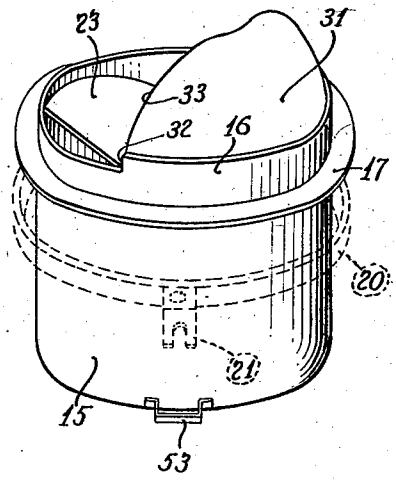


Fig. 5.



INVENTORS
SVEND W. BRUUN and
EDWARD RAMBUSCH
BY
ATTORNEY

Patented Oct. 10, 1944

2,360,104

UNITED STATES PATENT OFFICE

2,360,104

VENTILATOR

Svend W. Bruun, Palisades Park, N. J., and Edward Rambusch, Brooklyn, N. Y., assignors to Rambusch Decorating Company, New York, N. Y., a corporation of New York

Application November 26, 1942, Serial No. 467,036

8 Claims. (Cl. 98—37)

The present invention relates to ventilators, and is more particularly directed to ventilators suitable for use in portholes especially where it is essential to prevent the emission of light.

To minimize detection at night all light originating in a ship must be obscured so that no indication of light may be seen from outside the ship. In the transport service it is essential to maintain adequate ventilation and this requires that air be admitted through the portholes of the ship. Devices heretofore available for blackout ventilators for portholes have been expensive and comparatively inefficient as ventilators. In them, the structures, deemed necessary to block off the light, have introduced such resistance to air flow as to seriously impede it, especially at low wind velocities. Furthermore they were generally ineffective, or a positive deterrent, when the wind was abaft the beam.

According to the present invention a blackout ventilator is provided which gives complete obscuration with and makes possible improved air flow irrespective of the direction of the wind. The improved blackout ventilator can be easily constructed from sheet metal with simple tools and made to fit the varied conditions met with in practice. The improved device takes up no more room than that required for swinging the existing porthole cover.

According to the present invention there are no exposed fastening or adjusting devices which are subject to salt spray or corrosion rendering them useless or difficult to operate, and, instead of using such devices, the invention contemplates the use of interiorly disposed fastening devices away from salt water spray and readily accessible.

The present invention also contemplates a blackout porthole ventilator which may be readily adjusted for varying wind conditions without the necessity of removal from the porthole. It is entirely possible to arrange the ventilators on one side of the ship to get air into the ship and those on the other side to discharge the air.

Other and further objects will hereinafter appear as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, an embodiment in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In these drawings:

Figure 1 is a diagrammatic top plan view illustrating the ventilator installed in place;

Figure 2 is a view taken in the direction of the arrow 2 of Figure 1;

Figure 3 is a horizontal sectional view through the ventilator when mounted in the usual position in a porthole and taken on the line 3—3 of Figure 2;

Figure 4 is a view illustrating the blank from which the baffle is made;

Figure 5 is a perspective view of the ventilator removed from the porthole; and

Figure 6 is a diagram showing the ventilating action of the device at varying speeds and directions of wind.

A fragment of the hull of a ship is indicated at 10 and a porthole ring at 11, the porthole ring carrying a hinged window 12 and turn buckles 13. These may be of varying forms and locations depending upon the construction of the ship. The arc 14 shows the path required by opening and closing the window.

The ventilator has a horizontal cylindrical casing 15 usually somewhat shorter than the diameter of the opening and of a size just sufficiently smaller than the porthole opening to permit passing its outboard end 16 through the porthole opening. Spaced inwardly from the outboard end 16 of the casing is a suitable stop member, here shown as an angle 17, which is adapted to engage the usual gasket 18 carried by the porthole ring. A band 20 somewhat smaller in diameter than the outer perimeter of the abutment member 17 is loosely received about the casing. This ring carries brackets 21 corresponding in number and angular position with the turn buckles 13 and when the turn buckles are tightened against the brackets 21, as indicated in Figure 3, the cylindrical casing will be held in position in the porthole opening, and all the mechanism required for holding the ventilator in place will be housed in the ship and securely protected against salt spray.

The cylindrical casing 15 receives two similar baffles 22 and 23. Each of these baffles is made from a sheet metal blank such as indicated at 24 in Figure 4. This blank has a central opening 25 adapted to receive a short length of rod 26. The hole 25 departs slightly from a true circle. The blank 24 has a V-shaped notch 27 with edges 27*a* and 27*b*. The radius of curvature at the point 28 opposite the center of the notch is the same as the radius of curvature of the inside of the casing 15. The radius of curvature increases in each direction from the point 28 to the points 29, 29 such that the perimeter 30 of the blank (measured 29—28—29) is the same as

the perimeter of one turn of the helix. The angle 27 is so selected that when the above perimeter relations are to be had the maximum radius of curvature, i. e. on the lines 27a, 27b, is equal to the distance from the center rod 26 to the upper end of the casing. This makes it possible to distort the flat sheet 24 into a baffle, such as shown at 22 or 23, and have its perimeter 30 fit the inner wall of the casing 15 along a true helix, and have the perimeter of the hole 25 fit the bar 26 along another narrow helix, and have the edges 27a and 27b of the blank extend in straight lines from the center of the bar 26 out to the inside of the casing 15. These two baffles are placed 180° apart. The generatrix of the baffle is a straight line turning through 360° about a fixed point and swinging such that it intersects a cylinder in a helical path.

With the arrangement of baffles described there is very little obstruction to the passage of air through the porthole. The surfaces of the baffles against which the air from the outboard side impinges are at an angle in the neighborhood of 45°, as will be apparent from the slope of the edges 27a in Figure 3. As a result each baffle intercepts the air at angles such as to facilitate deflecting it without substantially obstructing its movement. The air is then deflected and caused to traverse a spiral or helical path between the outboard face of one baffle and the inboard face of the other baffle. At no time is there a sharp change of direction of air movement, hence eddying and turbulence is avoided. The center of the baffle at the point of minimum radius of curvature is at right angles to the axis of the cylinder. Thereafter the slope of the surface of the baffle increases. This increase in angle makes it possible for the opposite or inner surface of the baffle 22 to deflect the air which has been passing in through the path determined by the baffle 23 into directions such as to cause its easy discharge into the ship. This arrangement makes it possible to avoid abrupt changes in direction of the air so that the pressure differential necessary to create air movement through the ventilator is extremely small and the ventilating capacity of the porthole is not lost.

In the construction shown in the drawings the baffles occupy 360° and are placed 180° apart. While much less baffling would obviously prevent all direct light rays from passing through the ventilator, this arrangement is completely effective in a single turn when the baffles are covered with light absorbing black paint, or the like, for preventing any reflected or scattered light from passing from the inboard side of the ventilator to the outboard side. From the point of view of light control and absorption these baffles operate entirely differently from augur shaped, spiral baffles having the contour of a twisted ribbon, a bar, a cork screw, or the like, for, while such baffles prevent the passage of direct light, they provide curving light paths with parallel walls which facilitate the passage of light flux by reflection. For example, a 100 watt lamp close to the inboard end of the ventilator will produce no visible light flux or brightness on any part of the ventilator at any angle on the outboard side when tested in total darkness with complete darkness adaption of the eyes. This complete obscuration of inboard lighting can therefore be accomplished by a device well adapted for purposes of ventilation.

To increase air capacity of the ventilator it is provided with an air scoop 31 carried on the outboard end of the structure and normally adjusted so as to face forward as indicated in Figure 1. This scoop is preferably cut from a metal spinning. It may be a simple 45° lune as diagrammatically illustrated in Figure 1. The scoop is secured to a short extension 32 on the outboard end of the casing 15, this extension being so located relative to the ends of the baffles as to lie about 45° from the ends of the baffles.

When the ship is under way the air scoop picks up winds, whether abeam, head wind, or the air in the slip stream, and diverts it toward the baffles which guide it into the ship.

In order to improve the operation of the ventilator for winds abaft of abeam the side of the scoop which is aft of the undercovered edge 27a of the baffle 23 is cut back as indicated at 33 in the drawings. This permits wind up to about 45° abaft of abeam to blow in under the outboard end of the baffle 23. When the wind is behind this 45° line it is preferable to turn the entire ventilator through about 180° so that the scoop now receives this rear wind at a better angle. The ventilator can also be adjusted to face the scoop rearwardly in the lee side of the ship.

Figure 6 is a plot illustrating the cubic feet of air per minute passed through a 14'' ventilator at various wind velocities and directions, the wind directions being indicated by legends in capital letters. It will be noted that in each case the capacity of the ventilator increases very rapidly at low wind velocities when ventilation is normally difficult. Portions of curves of a comparative test with another form of blackout ventilator are indicated by the short lines at the 10 mile per hour wind velocity ordinate and are designated by legends in lower case letters. The general characteristic of the curves of such a device show that the capacity of the comparison ventilator is very low at low wind velocities where it is more desirable and increases with higher wind velocities, the curves being generally convex downwardly instead of convex upwardly, as in the ventilator shown herein. The greatest difference, however, relates to the rear wind, for in such cases the other ventilator entirely fails to function for carrying air into the ship.

Where it is desired to have the ventilator carry a screen the ventilator may be provided with an inner ring 50 which supports a screen 51. This ring may be welded or bolted in place. To facilitate handling the ventilator it is provided with two handles 52 and 53, one handle being permanently attached and the other removable, so that the ring 20 may be inserted on the casing or removed. This ring is held in its approximate location by suitable stops 54 secured to the casing 15.

The ability of the structure discussed above to maintain ventilation and prevent escape of light outwardly from the ship makes the device eminently suitable for use on shipboard at night where blackout conditions must be maintained. It is also very well suited for daytime use, for example, in window openings and portholes for the daytime sleeping quarters for night workers, for darkness may be maintained without loss of ventilation.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, we wish it to be understood that the particular form shown is but one of these forms, and various modifications

and changes being possible, we do not otherwise limit ourselves in any way with respect thereto.

What is claimed is:

1. A porthole ventilator for use in a porthole having the usual porthole ring, swingable window and window clamping devices, and comprising a cylinder slightly smaller than the porthole ring so as to be insertible into the opening therein from the inboard side, a flange about the cylinder for limiting the insertion, the length of the cylinder being such as to lie within the extreme arc of the swingable window, a loose ring adjacent the flange and having brackets for cooperation with the window clamping devices to secure the cylinder in place, and means carried internally of the cylinder for completely blocking off the passage of light and for permitting the passage of air.

2. A porthole ventilator having a cylindrical body provided with an outboard air scoop on one side of its axis and a stop ring limiting the insertion of the body into a porthole ring from the inboard side, a clamping ring adapted to be fixedly secured to the porthole ring, the clamping ring being loosely carried by the body and engageable with the stop ring, the body of the ventilator being angularly adjustable when the clamping ring is loosened from the stop ring, and being fixed when the clamping ring is tightened against the stop ring, and means carried internally of the cylindrical body for completely blocking off the passage of light and for permitting the passage of air.

3. The combination with a ship having the usual circular porthole ring and window clamping turn buckles, of a ventilator having a cylindrical body insertible into the ring and carrying an annular abutment engageable with the ring and an outboard air scoop, and a ring loosely carried outside the body and adapted to bear against the inboard side of the abutment, devices carried by the last mentioned ring for cooperation with the turn buckles whereby the ventilator can be secured in place from the inboard side of the ship's hull and can be turned about the axis of the porthole to adjust the position of the air scoop, and screw-like baffles in the body for providing air passages of triangular cross section and substantially 360° angular extent, the baffles being light absorbing to prevent passage of light.

4. A light excluding ventilator comprising a cylindrical shell adapted for insertion into a vertical wall opening from the inner side, an air scoop carried by the outer end of the shell so as to provide an exposed extension for diverting air into the shell, and means in the shell to helically guide the air entering the shell comprising a plurality of angularly displaced, black, opaque deflectors each comprising a single piece of continuously curving sheet material whose outer edge occupies substantially 360° of a helix and whose center is located in the shell axis midway between the ends of the helix and whose end edges extend from the center of the deflector to its periphery in a direction oblique to the shell axis.

5. A light excluding ventilator such as claimed in claim 4, having means interior of the wall for mounting the shell for adjustment about its axis so that the air scoop may be adjusted to intercept wind at different relative directions.

6. An air deflector for use in a normally horizontal cylindrical holder comprising a single piece of continuously curving sheet material having a curved peripheral edge which occupies substantially 360° of a horizontal helix and is at a constant radius from a horizontal axial line, a center which is at a point on said axial line midway between the ends of the helix, and straight inner and outer ends extending from said center to the helix in directions oblique to the axial line, whereby the slope of successive elements of the deflector as measured from the axial line increases from a predetermined angle at one end of the deflector to 90° at the center and then decreases to the same predetermined angle at the other end.

7. A ventilator comprising a normally horizontal cylindrical holder and an air deflector in the form of a single piece of continuously curving sheet material having a curved peripheral edge which occupies substantially 360° of a horizontal helix and is at a constant radius from a horizontal axial line, a center which is at a point on said axial line midway between the ends of the helix, and straight inner and outer ends extending from said center to the helix in directions oblique to the axial line, whereby the slope of successive elements of the deflector as measured from the axial line increases from a predetermined angle at one end of the deflector to 90° at the center and then decreases to the same predetermined angle at the other end, the peripheral edge of the deflector being secured to the cylindrical holder.

8. A ventilator comprising a normally horizontal cylindrical holder and two air deflectors each in the form of a single piece of continuously curving sheet material having a curved peripheral edge which occupies substantially 360° of a horizontal helix and is at a constant radius from a horizontal axial line, a center which is at a point on said axial line midway between the ends of the helix, and straight inner and outer ends extending from said center to the helix in directions oblique to the axial line, whereby the slope of successive elements of the deflector as measured from the axial line increases from a predetermined angle at one end of the deflector to 90° at the center and then decreases to the same predetermined angle at the other end, the peripheral edges of the deflectors being secured to the cylindrical holder, the deflectors being angularly displaced 180°.

SVEND W. BRUUN.
EDWARD RAMBUSCH.