Aug. 3, 1943. H. J. FINDLEY 2,325,842

VENTILATING APPARATUS

Filed Sept. 7, 1942 2 Sheets-Sheet 1

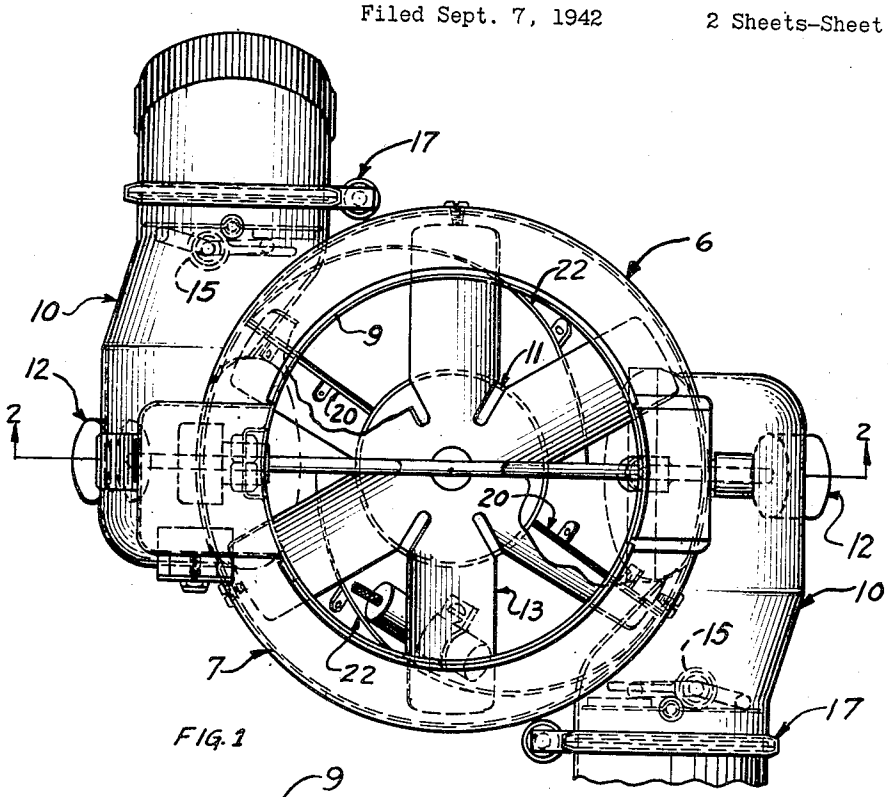


FIG. 1

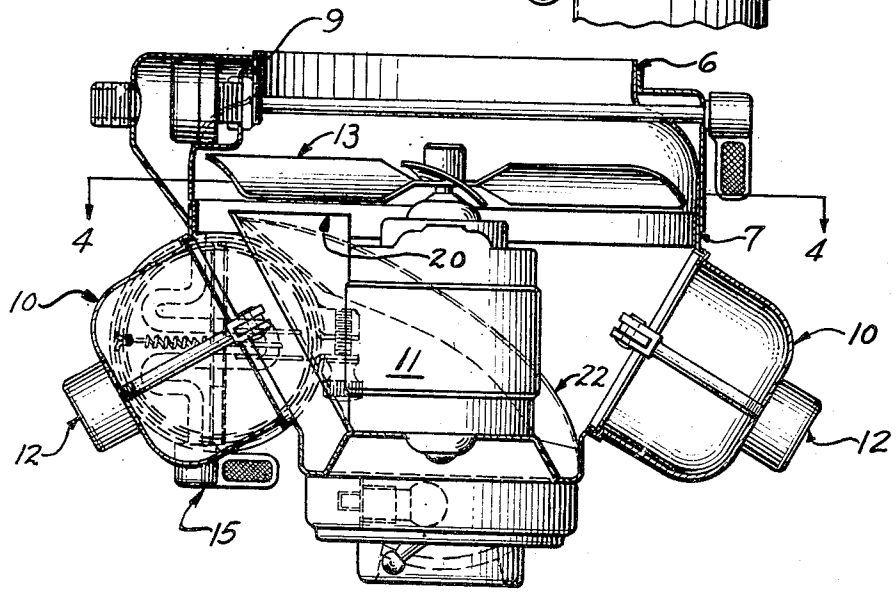


FIG. 2

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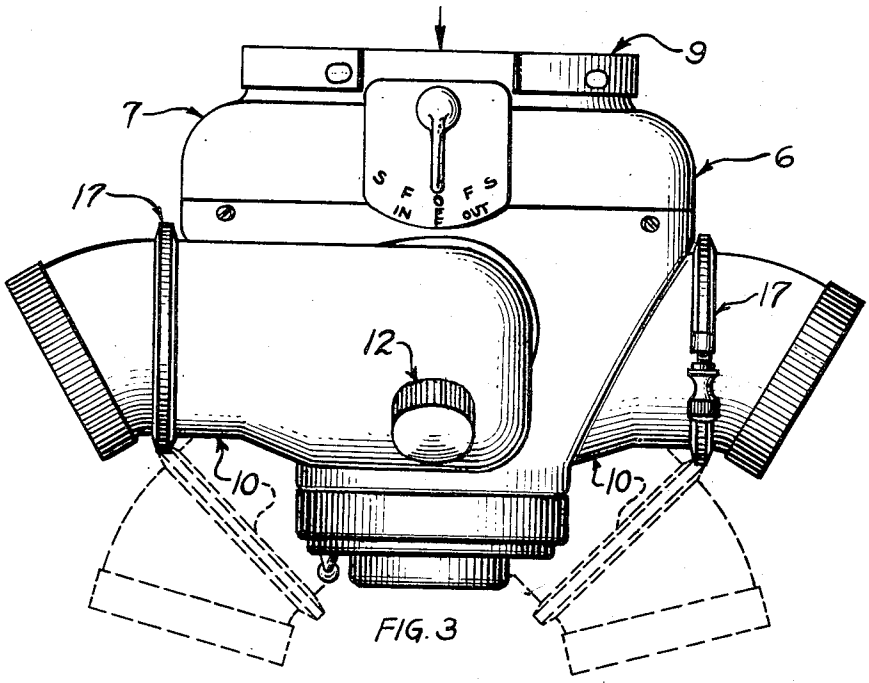


FIG. 3

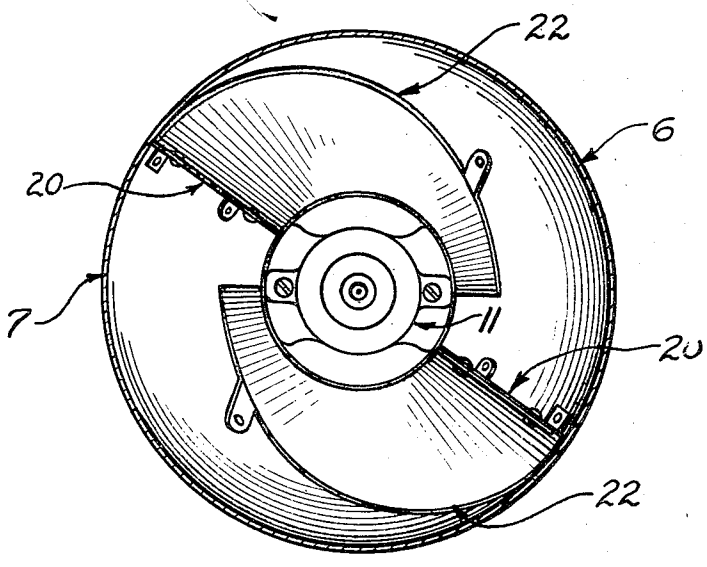


FIG. 4

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UNITED STATES PATENT OFFICE

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VENTILATING APPARATUS

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Application September 7, 1942, Serial No. 457,579

6 Claims. (Cl. 230—42)

This invention relates to fluid pumps in general, and, more particularly concerns a ventilating apparatus powered by reversible motor means for movement of air into or out of an enclosure, such as vehicles and the like.

Objects of the invention include the provision of a circular generally truncated conical shaped housing member having an axial air passage and a pair of tangentially disposed peripheral air passages, and a fan therein operable by reversible driving means for discharge of air, selectively, from said passages depending upon the direction of rotation of said fan; the provision in an air circulator as above described of fin means disposed parallel to the longitudinal axis thereof and extended radially therefrom for cutting off a portion of the air moved toward each of said air passages to restrict the circular velocity of the air moved thereto for improved efficiency in either direction of rotation of the fan; the provision in an air circulating assembly, of any of the above described types, of parti-circular spiral fin means consisting of one or more plate-like members of generally involute scroll form radiating from the longitudinal axis of the air circulator and arcuately extended over a portion of the central periphery thereof to provide a smooth path for the air with the fan operating in either direction of rotation.

Further and other objects and advantages of this invention reside in the novel combination and arrangement of parts about to be described when taken in conjunction with the drawings forming a part of this specification, and are more particularly pointed out in the appended claims.

In the drawings like reference characters denote corresponding parts in the several views, and in which:

Fig. 1 is a plan view, with portions broken away to reveal the interior, of a preferred form of ventilating apparatus embodying the teaching of this invention; and

Fig. 2 is a vertical sectional view of the structure shown in Fig. 1, taken substantially on the line 2—2 thereof;

Fig. 3 is a side elevational view of the apparatus shown in Figs. 1 and 2; and

Fig. 4 is a sectional view of a detail revealing the casing air deflectors, taken substantially on the line 4—4 of Fig. 2.

Now having reference to the drawings, particularly Figs. 1, 2 and 3, there is shown a preferred form of ventilating apparatus or air circulator unit, generally designated 6. A housing 7 generally circular in cross-section is comprised of a plurality of sheet metal members which has a substantially truncated conical appearance in elevation. On one end of the housing concentric with the longitudinal axis thereof is a large air passage 9, and upon diametrically opposite sides of the housing 7 are a pair of air inlet or outlet passages 10 secured tangentially thereto in an adjustable position by any suitable fastening means such as the threaded stud 12.

Within the housing 7, adjacent the lower truncated end thereof is secured a reversible electric motor 11, disposed upon the longitudinal axis of the housing below the air passage 9 and that mounts a fan 13 for operation in either direction of rotation for movement of air into or out of the passage 9. The fan 13 is of the propeller type for axial air delivery and has blades pitched to give substantially uniform efficiency or capacity of air movement during indraft or outdraft operation. That is to say, whether air is being inducted through the passage 9 into the air chamber within the housing 7 and from the outlet passages 10 during indraft operation, during one direction of rotation of the fan; or air is being inducted through the outlet passages 10 into the air chamber within the housing and educted from the passage 9 during outdraft operation upon the opposite rotation of the fan. As shown, the outlet passages 10 each have a spring biased butterfly shut off valve 15 controllable by a suitable lever means outside the conduit. Beyond the shut-off valves 15 in each instance is a collar or sleeve 17 fitted over a separable portion or elbow of the outlet passages for manually adjusting the distribution or pick-up of air to or from any selected area, dependent upon the direction of fan rotation.

It was found during extensive experimentation with the operation of the above described unit that while satisfactory efficiency or capacity of air movement could be effected in one direction of rotation of the fan, the reverse direction of rotation was unsatisfactory, due to the high circular velocity of the air passed through the ventilator. To overcome such defection an air deflector 20 was mounted in the path of the air moved through the housing 7, as best seen in Figs. 2 and 4, adjacent each outlet passage 10, and such deflectors, together with subsequent deflectors to be described, form an important part of this invention. The air deflectors 20 will be referred to as vertical deflectors because of their disposition substantially parallel to the longitudinal axis of the housing 7 and are extended in a generally radial direction from adjacent each outlet passage 10. Approximately one-half of the total air channel in the lower part of the housing is cut-off by each of these deflectors, which thus prevents the air from attaining a high circular velocity in passing through the unit. Such effect is much more apparent when the fan is rotated counter-clockwise, that is during air outdraft operation, than during clock-wise rotation of the fan, and since it may be as important to remove foul air and fumes from a vehicle as

it is to induct a blast of fresh outside air on the operator thereof the value of such deflectors is obvious.

In addition to the vertical deflectors **20** above referred to a second set of deflectors **22** generally referred to as the spiral deflectors are best shown in Figs. 1, 2 and 4. The spiral deflectors **22** are obviously named from the generally spiral form they are caused to assume from one end, fixed to the housing **7** at the outer ends of the vertical deflectors **20** adjacent the lower edge of the outlet passages, to the opposite end which has been extended in a generally spirally upward and inward direction about the longitudinal axis of the housing to adjacent the upper edge of the outlet passages but spaced inward therefrom. The use of these spiral deflectors **22** provide a smoother path for the air moved through the housing **7** whether it is moving into or out of the passage **9**, thereby improving the air delivery. Various other features of the air circulator **6** such as the controls, switch knobs, dome light, etc. have been disclosed, but since they form no part of this particular invention, a detailed description thereof is believed unnecessary.

From the foregoing disclosures it will be apparent there has been described a novel ventilating apparatus or air circulating unit embodying, among other things, the objects and advantages of the invention first described. It is not intended, however, to be limited to the concrete embodiment shown which is illustrated merely to disclose the genus of the invention, as many variations will now be suggested in actual practice to those skilled in this art, and the spirit of the invention is considered commensurate with the scope and substance of the following claims.

What I claim is:

1. In combination, an air circulating unit comprising a housing defining an air collecting chamber therein, a propeller fan in said chamber driven by a reversible electric motor, an axially disposed air passage into said chamber, a plurality of arcuately spaced air passage means comprising swivelable and rotatable hollow members secured to the outer periphery of said housing, and dual radially and spirally arranged air deflector means disposed in the path of the air moved through said air chamber for substantially uniform efficiency of air movement in either direction of rotation of said fan.

2. In combination, an indraft, outdraft air circulating unit comprised of a housing defining an air collecting chamber therein, a propeller fan operable in either direction of rotation in said chamber and driven by a reversible electric motor, said housing having an air passage disposed on the longitudinal axis thereof, a plurality of arcuately spaced air passages comprising swivelable and rotatable hollow members tangentially disposed on the periphery of said housing, and dual radially and spirally arranged air deflector means disposed in the path of air moved through said air chamber for substantially uniform efficiency of air movement during indraft or outdraft operation dependent upon the direction of rotation of said fan.

3. In combination, an air circulator unit comprised of a housing substantially circular in cross-section and generally truncated conical shaped form defining an air collecting chamber therein, an axially disposed air passage into the housing, a plurality of arcuately spaced air passages comprising swivelable and rotatable hollow members disposed normal to said first named passage and secured tangentially to the outer periphery of said housing, a fan in said chamber driven by a reversible motor supported therein, and dual radially and spirally arranged air deflector means disposed in the path of the air moved through said air chamber for substantially uniform efficiency of air movement into said first named passage and out of said passages, or in the reverse order, dependent upon the direction of rotation of said fan.

4. In combination, an air circulator unit comprised of a housing substantially circular in cross-section and generally truncated conical shaped form defining an air collecting chamber therein, an axially disposed air passage into the housing, a plurality of arcuately spaced air passages comprising swivelable and rotatable hollow members disposed normal to said axially disposed air passage and secured tangentially to the outer periphery of said housing, a fan in said chamber driven by a reversible motor supported therein, air deflector means disposed in the path of the air moved through said air chamber for substantially uniform efficiency of air movement into said axially disposed passage and out of said passages, or in the reverse order, dependent upon the direction of rotation of said fan, and said radial air deflector means comprising plate members disposed adjacent said passages and extended therefrom in a generally radial direction and substantially parallel to the longitudinal axis of the housing for diverting the air flow into said passages.

5. In combination, an air circulator unit comprised of a housing substantially circular in cross-section and generally truncated conical shaped form defining an air collecting chamber therein, an axially disposed air passage into the housing, a plurality of arcuately spaced air passages comprising swivelable and rotatable hollow members disposed normal to said axially disposed air passage and secured tangentially to the outer periphery of said housing, a fan in said chamber driven by a reversible motor supported therein, air deflector means disposed in the path of the air moved through said air chamber for substantially uniform efficiency of air movement into said axially disposed air passage and out of said air passages, or in the reverse order, dependent upon the direction of rotation of said fan, said air deflectors consisting of vertical plate members disposed adjacent said peripherally disposed air passages and extended therefrom in a generally radial direction and substantially parallel to the longitudinal axis of the housing for diverting the air flow into said air passages when the fan is operated in one direction, and including other air deflectors consisting of longitudinally curved plate members disposed in a generally spiral direction from the outer edge of said vertical plate members in an arcuate path around the longitudinal axis of said housing to effect a smooth path for air moved thereover when the fan is operated in either direction of rotation.

6. The combination, as defined in claim 3, including means for adjustably positioning the outer ends of said peripherally disposed air passages in selected discharge positions with out disturbing its mounting means on the air collecting housing.

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