Jan. 29, 1952 H. P. FIELDS ET AL 2,583,555

WINDOW VENTILATOR

Filed May 24, 1950 3 Sheets-Sheet 1

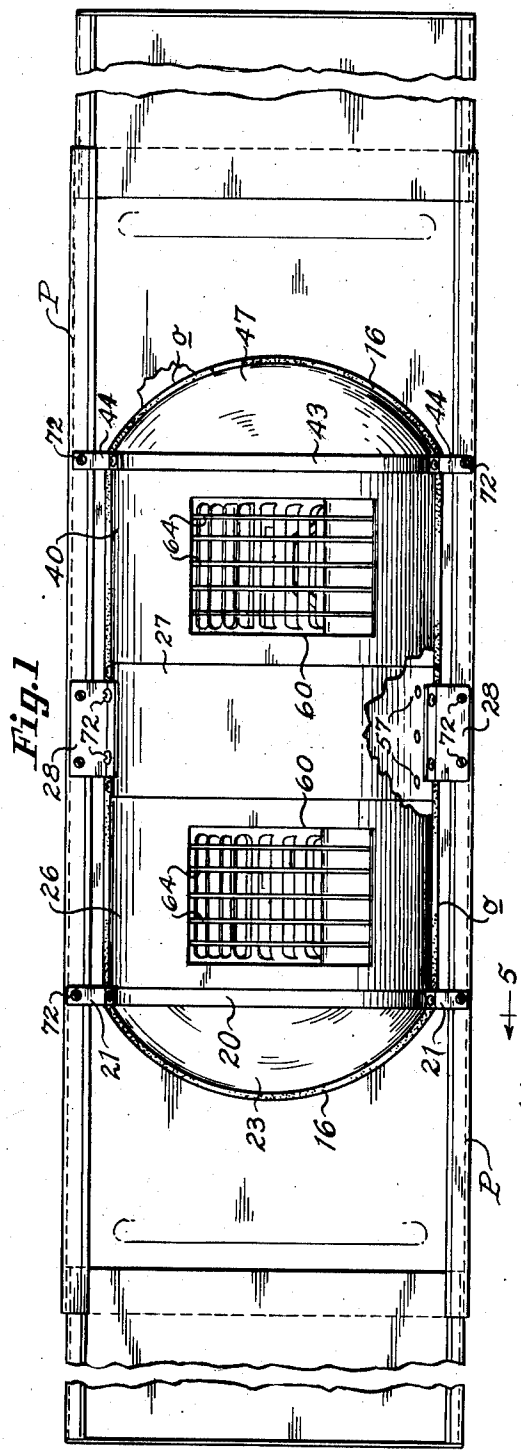

Fig. 1

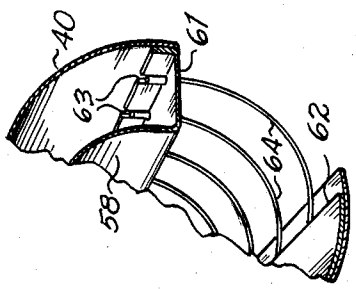

Fig. 4

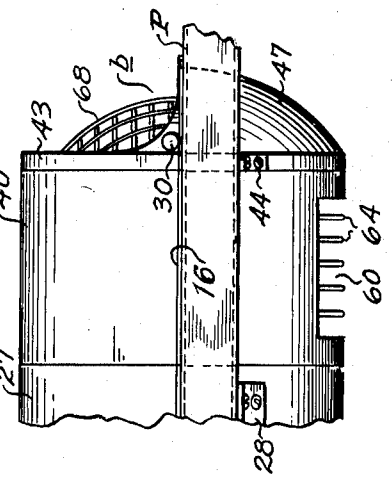

Fig. 3

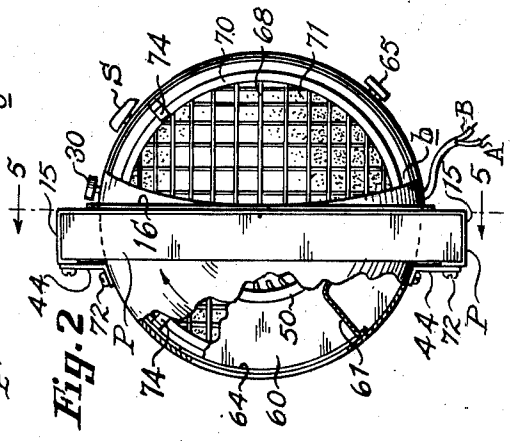

Fig. 2

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WINDOW VENTILATOR

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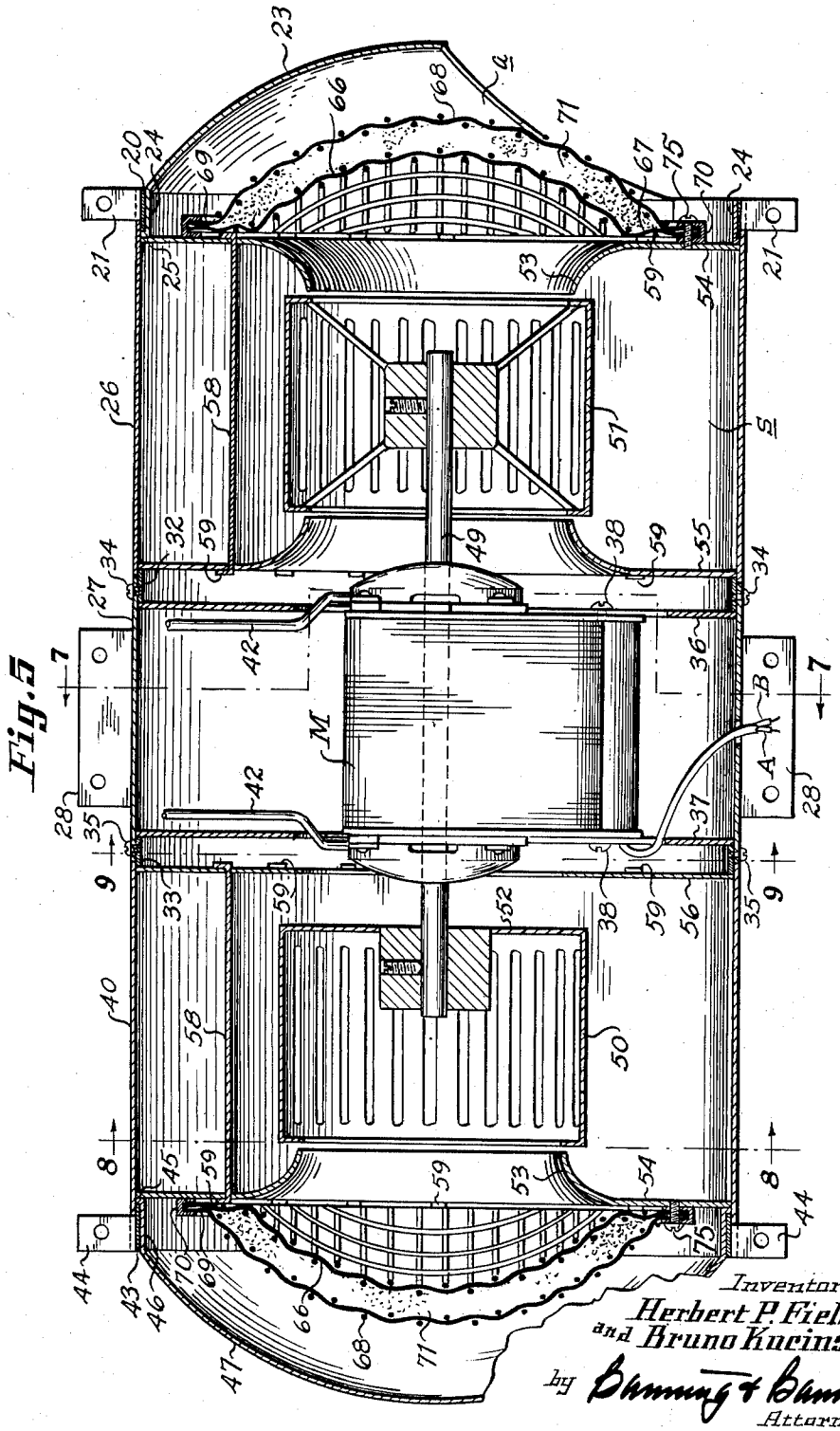

Fig. 5

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Fig. 6

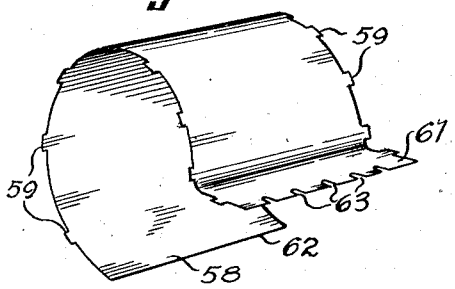


Fig. 7

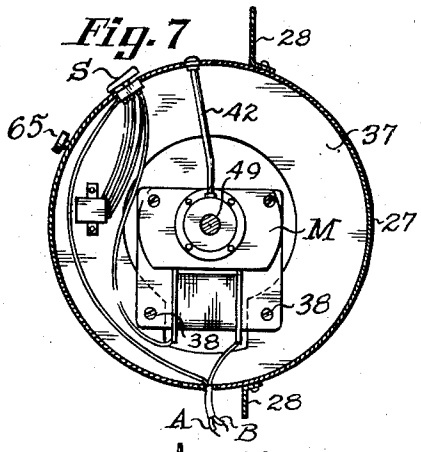


Fig. 8

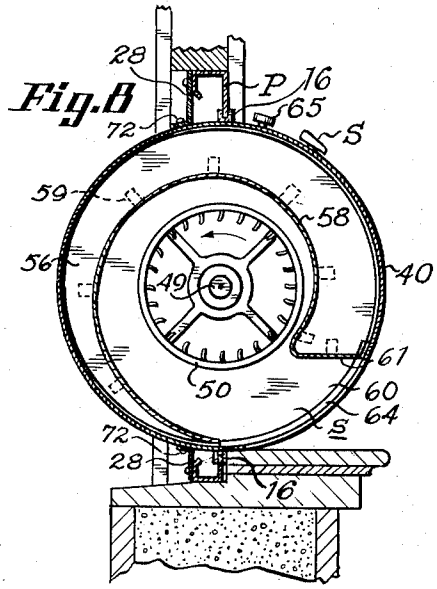


Fig. 9

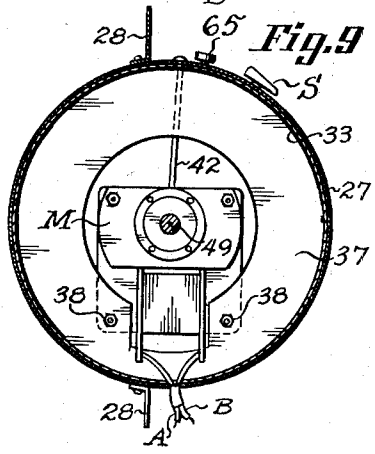


Fig. 10

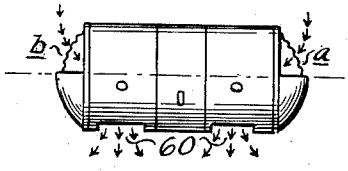


Fig. 11

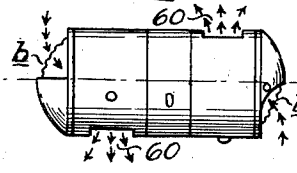


Fig. 12

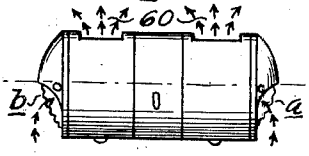
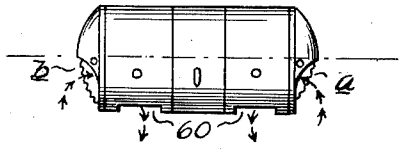


Fig. 13



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UNITED STATES PATENT OFFICE

2,583,555

WINDOW VENTILATOR

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Application May 24, 1950, Serial No. 163,816

12 Claims. (Cl. 98—94)

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This invention relates to a motor operated ventilating apparatus for use in a window opening whereby to produce a sustained movement of filtered air wholly within a room, or into or out of the room, or both, at a point adjacent the window. The apparatus is self-contained in that it may be installed upon the sill of a window, and immediately below the lower rail of a sliding sash, with one side of the apparatus exposed interiorly of the room and the other exteriorly thereof.

For its objects our invention aims to provide an improved sectional housing for a ventilating apparatus which may be readily installed and placed in use; an apparatus which embodies within itself means for controlling the volume of air which is moved therethrough, and through any one of several circuits, as desired; a ventilating apparatus which provides for filtering of the incoming air preliminary to its flowing therethrough and eduction therefrom; and an apparatus of this general character which embodies special features of improvement by which its capacity for moving air is enhanced, and the control of air movements, both as to volume and flow circuits, may be accurately controlled.

These and various other features of improvement which characterize our invention are hereinafter described in detail in conjunction with the accompanying drawings wherein—

Figure 1 is a view in elevation of the present window ventilator, showing the outer side of the mounting plate housing whose components are supported for coaxial rotation therein;

Fig. 2 is an end elevation thereof;

Fig. 3 is a fragmentary top plan view of the ventilator;

Fig. 4 is a fragmentary perspective view in vertical section of the scroll plate and the guard for its discharge opening;

Fig. 5 is an enlarged vertical section, taken on line 5—5 of Fig. 2, but with the mounting plate omitted from the view;

Fig. 6 is a perspective view of the scroll plate per se;

Fig. 7 is a transverse section through the ventilator, taken on line 7—7 of Fig. 5;

Fig. 8 is a transverse section, taken on line 8—8 of Fig. 5, showing also the associated parts of a window frame wherein the apparatus is operatively mounted;

Fig. 9 is a transverse section, taken on line 9—9 of Fig. 5; and

Figs. 10–13 are diagrammatic views in plan, illustrating the various adjustments by which to induce air movements through the several circuits which are provided in the present apparatus.

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This invention comprises a longitudinally extensible mounting plate P (of two or more plies) whose longer edges are desirably flanged at 15 to fit at its ends within the sash channels that are provided in the usual window frame (see Fig. 8). The flange along the bottom of the plate is adapted to be rested upon the window sill. The plate flange 15 itself is disposed toward the outer side of the sash channel.

There is provided in the plate P an elongated opening *o* having opposite arcuate end portions facing each other. Within this opening is accommodated a sectional cylindrical housing of like contour and size. As by means of a flexible strip 16 of rubber or the like, carried by the mounting plate, we provide a closure for the narrow clearance space adjacent the edges of the opening *o*. Adjacent the juncture of one arcuate end with the opposite straight top and bottom sides of the opening *o* is a circular ring 20 secured fixedly in place to the mounting plate as by attached brackets 21. A dome cap 23 has one end 24 underlapping the ring with an outturned marginal flange 25 arranged to engage the inner end face of the ring 20 so as to be maintained thereby in concentric inseparable relation therewith. A cylindrical casing 26 which overlaps the ring 20 for engagement at its end with the associated brackets 21 extends toward the longitudinal center of the opening *o* to abut a wide central band 27 which is fixedly secured to the mounting plate with the aid of one or more attached brackets 28.

The dome cap 23 is freely rotatable, and to facilitate such movements it may be provided with an operating knob 30. This knob which lies upon the side of the cap just inwardly of the mounting plate P will engage therewith when the cap is moved to its extreme position in either direction (see Fig. 2). The range of rotative movement of the cap is slightly less than 180°. At one point for a distance of about 165° proximate to the ring 20 the cap is cut away to provide an inlet opening *a* bounded in part by two radial edges which meet at a very wide angle. This opening is disposed upon one side or the other of the mounting plate according to the rotative position of the dome cap. While this opening might also lie in part upon both sides of the mounting plate, if the dome cap be rotated to an in-between position, no special purpose would ordinarily be served by any such adjustment.

The wide central band 27 supports on its inner face a pair of spaced rings 32 and 33 that are secured in place as by screw fastenings 34 and 35, respectively. Two centrally-apertured plates 36 and 37 abut the rings 32 and 33 on their facing ends, and between them they support a motor M which is secured thereto as by bolts 38. The ring 32 extends inwardly of the casing 26 to constitute therefor a mounting whereon this casing may be rotated. The ring 33 is disposed inwardly of a second cylindrical casing 40 which lies toward the opposite end of the housing. By the means just described the plates 36 and 37 are maintained a fixed distance apart at all times. An oil tube 42 is extended upwardly from each bearing at the end of the motor, the top ends of the tubes being exposed at the housing top so that oil may be conveniently introduced therein for lubricating purposes.

The casing 40 at its outer end portion overlies a fixed ring 43 to which are secured brackets 44 which are anchored to the mounting plate P (see Fig. 1). This ring engages a marginal flange 45 that is outturned from one end 46 of a dome cap 47 which may be a duplicate of the cap 23 in all essential respects. It is equipped with an operating knob by which to facilitate rotary adjustments, and is provided with an inlet opening *b* the same as already described.

A shaft 49 is extended axially through the motor, and upon its opposite ends are mounted rotors 50 and 51, both of the squirrel cage type. The rotor 50 is closed by a wall 52 at its inner end, but the rotor 51 is open at both ends for a reason that will presently appear. Each rotor lies oppositely of the flaring mouth 53 of an annular end baffle plate 54 and is of the proper size to draw into itself the air which passes inwardly through the mouth 53 so as to induce a rotary movement thereof within a scroll chamber *s*. Each scroll chamber extends lengthwise between the baffle plate 54 and an annular end plate 55 or 56 which engages the outer end face of the ring 32 or 33, as the case may be. The center opening in the annular end plate 55 is flared inwardly toward the proximate chamber *s* to facilitate movement of air thereinto when drawn into the casing through vents 57 at the base of the motor M (see Fig. 1).

The scroll contour of each chamber *s* is provided by a curved plate 58 (see Fig. 6) having along opposite sides spaced tabs 59 which pass through slots in the proximate annular baffle plates 54 and end plates 55 or 56, as the case may be. After insertion through the slots formed to receive them, the tabs 59 are bent into clinching position thereby interconnecting the scroll plate 58 with the associated supporting plates in unitary relation for rotation therewith. At one point the scroll is provided with a delivery opening 60 (see Fig. 8) which may extend for a distance of 45° or more. To one margin of this opening is joined a ledge 61 which extends in general tangential relation to the rotors 50 and 51, stopping short thereof to execute its scroll contour which progressively recedes from the rotor axis while approaching the casing 26 or 40, as the case may be, and ending at 62 where it is secured to the casing as by welding. The ledge edge is notched recurrently at 63 (see Fig. 6) and is then upturned (see Fig. 4) to engage with and be secured as by welding to the casing 26 or 40, as the case may be. A plurality of bowed wires 64 are extended from the notches 63, wherein they are welded, to the end 62 of the scroll to be there secured as by welding. These wires which are relatively heavy provide an adequate guard for the delivery opening 60.

In the construction thus far described the rotors will draw in air through the end inlet openings *a* and *b*, then propel it through the lateral delivery openings 60, usually for eduction into the room where ventilation is desired. The casings 26 and 40 which are coaxial with the rotors have rotative movement ranges of nearly 180° each. The operating knobs 65 therefor which are disposed inwardly of the mounting plate P will engage therewith in each of its extreme positions. As shown in Fig. 8, the delivery outlet 60 is positioned entirely to the inside of the mounting plate, but if the knob be pulled down to rotate the casing through 90° or so, the delivery outlet will then be positioned wholly to the outside of the mounting plate. Air which is drawn in through the two inlet openings *a* and *b* at opposite ends of the housing will accordingly be propelled inwardly for lateral delivery through the outlet openings 60.

There is affixed to each baffle plate 54 a wide mesh fabric 66 of metal or the like having a generally concavo-convex contour with a flat marginal flange 67. A second wire mesh fabric 68, similar in construction and contour, is affixed to the mesh fabric 66 in spaced relation thereto and provided with a flat marginal flange 69 engaging the flange 67. A clamping ring 70 extends around both flanges to connect the two mesh fabrics in unitary relation, the space therebetween being occupied by a copper mesh 71 which may be treated chemically or otherwise to serve as a filtering medium by which to separate out small foreign particles from the air which is moving therethrough in response to the current set up by operation of the two rotors. A pair of clips 74 are carried by each baffle plate 54 for engaging with the clamping ring 70 at spaced points, and in conjunction with a screw 75 serve to hold the connected mesh fabrics fixedly in position. The two clips and screw are spaced at distances sufficiently apart to provide adequate support for the mesh-filter assembly which may be passed through the wide inlet opening *a* of the adjacent cap. This makes it possible to remove the mesh-filter assembly without taking off the cap, and vice versa, thereby facilitating a ready cleaning or replacement thereof.

The ventilating apparatus as herein described makes use of a mounting plate P to which are affixed the two end rings 20 and 43 and the wide central band 27, each being provided with suitable brackets which are attached removably to the mounting plate with the aid of screws 72. All of these housing parts are substantially coradial, i. e., of the same diameter. Mounted at each end of the housing for rotation thereon are the two dome caps 23 and 47, each having a large inlet opening to one side of its axis so as to be movable to a position at either side of the mounting plate. There is also provided in the housing the two casings 20 and 43, each of these casings being rotatable through nearly 180° so as to position their delivery outlets upon either side of the mounting plate. There is no means interconnecting the several units of the housing other than the mounting plate therefor which supports only the two end rings and the central band.

In operation each dome cap is adjusted to a rotative position such as to expose its inlet opening upon the outside of the mounting plate, or upon the inner side thereof, as desired. These two possibilities are indicated in Figs. 10 and 12.

At the same time the casings 26 and 40 may be adjusted rotatively so as to present their delivery outlets either inwardly of the mounting plate P or outwardly thereof (see Figs. 10 and 12). If desired, one of the dome caps may be rotatively positioned to draw air in from the outside and educt it inwardly of the mounting plate while the other cap may be adjusted to draw out air from the inside and educt it outwardly of the mounting plate (see Fig. 11). It is thus possible to operate the ventilating apparatus in such a way as to draw air into the room and also educt air therefrom at one and the same time; or to draw air from the outside into the room or from within the room for eduction into the outside atmosphere; or to move air within the room by drawing it into one or both ends of the housing and then educt it within the room, thereby promoting a circulation of air therewithin (see Fig. 13).

For operation of the motor, conductors A and B which connect therewith lead to a source of current supply (not shown) and a multiple-speed switch S may be interposed in the electrical circuit so as to control the motor operation. In this way the occupants of the room where such a window ventilator is installed will have complete control over the air movement into the room, or outwardly thereof, or wholly within the room.

We claim:

1. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, end rings in fixed connection with the mounting plate and supported thereby, a central band section in fixed connection with the mounting plate and supported thereby, and casing sections extending from the band section, one toward each end ring and each rotatably secured to the band section, each casing section enclosing means defining a scroll chamber having a discharge outlet radially of the housing, a rotor mounted to rotate therewithin about an axis substantially in line with the mounting plate, a pair of caps secured to the casing sections at the ends of the housing, each cap having an inlet opening in communication with the scroll chamber, and a motor supported fixedly within the confines of the central band section in driving connection with both rotors.

2. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing comprising a fixed central band section secured to the mounting plate and supported thereby, a pair of casing sections closed at their outer ends and each joined rotatably with one end of the band section and in communication therewith, each casing section mounting interiorly thereof a pair of spaced transverse walls and therebetween a curved plate to define a scroll chamber wherein is a delivery opening laterally thereof and an inlet into the scroll chamber facing upon the outer end thereof, a rotor in each scroll chamber having its axis substantially aligned with the mounting plate, and a motor fixedly supported within the confines of the central band section in driving connection with both rotors.

3. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing comprising a band section fixedly secured to the mounting plate and supported thereby, a pair of centrally apertured plates fixedly positioned within the band section in spaced apart relation, a motor supported fixedly between the plates, a casing section connected with the band section for rotation relative thereto, the casing section mounting interiorly thereof a pair of spaced transverse walls and therebetween a curved plate defining a scroll chamber wherein is a discharge outlet laterally thereof and an inlet at its end remote from the motor, and a rotor positioned within the scroll chamber and mounted upon the motor shaft to be driven thereby.

4. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing comprising a rotatable casing section mounting interiorly thereof a pair of spaced transverse walls and therebetween a curved plate defining a scroll chamber wherein is an end inlet and an outlet laterally of the casing section, the curved plate terminating adjacent the outlet in a notched ledge in connection with the casing section, a rotor positioned within the scroll chamber with its axis substantially aligned with the mounting plate, a motor supporting the rotor and in driving connection therewith, means fixedly mounting the motor at a point adjacent the scroll chamber but exteriorly thereof, and a guard affixed over the delivery outlet of the scroll chamber comprising a plurality of arcuate wires each having one end affixed to the casing and the other end interengaged with the ledge notches and affixed thereto.

5. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing sections being substantially coradial and coaxial, means fixedly connecting one of the sections to the mounting plate, the remaining sections being free to rotate with respect thereto, a pair of circular rings one in connection with one end of each rotatable section and the fixed section providing a mounting whereon the rotatable sections may be rotated and confining support therefor to the margins thereof, means carried by each rotatable section providing therewithin a scroll chamber wherein is an end inlet and an outlet laterally thereof, and a motor driven rotor within the scroll chamber for educting air through the lateral outlet of the rotatable section while positioned upon either side of the mounting plate as determined by the adjusted position of the rotatable section.

6. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing sections being substantially coradial and coaxial, means fixedly connecting one of the sections in spaced apart relation to the mounting plate, another section adjacent the fixed section being free to rotate relative thereto, and means carried by the mounting plate providing a mounting whereon the rotatable section may be rotated and confining support therefor to the margins thereof, means carried by the rotatable section providing therewithin a scroll chamber wherein is an end inlet and an outlet laterally thereof, and a motor driven rotor within the scroll chamber for eductting air through the lateral outlet of the rotatable section while positioned upon either side of the mounting plate as determined by the adjusted position of the rotatable section.

7. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate with long upper and lower sides straight and with arcuate ends facing toward each other, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, end rings in fixed connection with the mounting plate and supported thereby, a central band section in fixed connection with the mounting plate and supported thereby, and casing sections extending from the band section one toward each ring and rotatably secured thereto, each casing section enclosing a pair of spaced transverse walls and therebetween a curved plate defining a scroll chamber wherein is a discharge outlet radially of the section, a rotor mounted to rotate within the scroll chamber about an axis substantially in line with the mounting plate, a pair of dome caps at the ends of the housing each having an inlet opening in communication with the scroll chamber, and a motor fixedly supported within the confines of the central band section in driving connection with both rotors.

8. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate with long upper and lower sides straight and with arcuate ends facing toward each other, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, a pair of dome caps at the housing ends each formed with a wide-angle inlet opening, a housing comprising a casing in communication with the inlet opening of each dome cap, the casing being provided with a pair of spaced transverse walls and therebetween a curved plate defining a scroll chamber wherein is a lateral outlet and a rotor within the chamber, and means supporting the dome cap and the casing for rotation, each independently of the other, and in interconnection only adjacent their margins.

9. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being a horizontally elongated opening in the mounting plate with long upper and lower sides straight and with arcuate ends facing toward each other, and a sectional cylindrical housing having a coutour and size to substantially occupy the opening fully with its axis substantially aligned with the mounting plate, the housing comprising a pair of rotatable casings together with mountings therefor, a fixed motor casing between the rotatable casings, a motor carried within the fixed casing, a pair of dome caps rotatably mounted at the outer ends of the rotatable casings, each dome cap being provided with a wide-angle inlet opening and each casing being provided with means defining a scroll chamber having a lateral outlet, and a rotor in each scroll chamber having driving means therefor in connection with the motor.

10. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being an elongated opening in the mounting plate, and a sectional cylindrical housing having a contour and size to substantially occupy the opening fully, an end ring in fixed connection with the mounting plate and supported thereby, a band section in fixed connection with the mounting plate and supported thereby, and a casing section extending between the band section and the ring and rotatably secured thereto, the casing section enclosing means defining a scroll chamber wherein is a discharge outlet radially of the section, a rotor mounted to rotate within the scroll chamber about an axis substantially in line with the mounting plate, a cap at one end of the casing section having an inlet opening in communication with the scroll chamber, and a motor fixedly supported within the confines of the band section in driving connection with the rotor.

11. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being an opening in the mounting plate, and a cylindrical housing having a contour and size to substantially fully occupy the opening with its axis substantially aligned with the mounting plate, means supporting the housing within the mounting plate opening, the housing comprising a pair of round caps at the ends each formed with an inlet opening extending through less than 180° thereof, a mesh-filter assembly arranged within each cap for interception of air entering through the inlet opening thereof, a casing in communication with the inlet opening of each cap, means supporting the cap and its associated casing for rotation, each independently of the other, the casing being provided with means defining a scroll chamber wherein is a lateral outlet and a rotor within the chamber, and means connecting each mesh-filter assembly removably to the casing free of the associated cap.

12. A ventilator having, in combination, a mounting plate arranged for positioning in a window opening, there being an opening in the mounting plate, and a cylindrical housing having a contour and size to substantially fully occupy the opening with its axis substantially aligned with the mounting plate, means supporting the housing within the mounting plate opening, the housing comprising a cylindrical casing having at its ends a pair of round caps each formed with an inlet opening extending through less than 180° thereof, means supporting each cap and casing for relative rotation, the casing being provided with means defining a scroll chamber wherein is a lateral outlet and a rotor within the

chamber, a mesh-filter assembly arranged within each cap for interception of air entering through the inlet opening thereof, and means independent of the associated cap connecting each mesh-filter assembly removably to the casing comprising a pair of clips fixedly secured to the casing and engageable with the margins of the mesh-filter assembly at spaced circumferential points thereof and a screw fastening traversing the mesh-filter assembly for threaded engagement with the casing, the screw fastening when removed therefrom permitting the mesh-filter assembly to disengage from the clips for removal from the casing outwardly through the inlet opening of the cap.

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