

Sept. 22, 1942.

A. F. FOEHRENBACH ET AL

2,296,635

VENTILATOR

Filed July 31, 1940

3 Sheets-Sheet 1

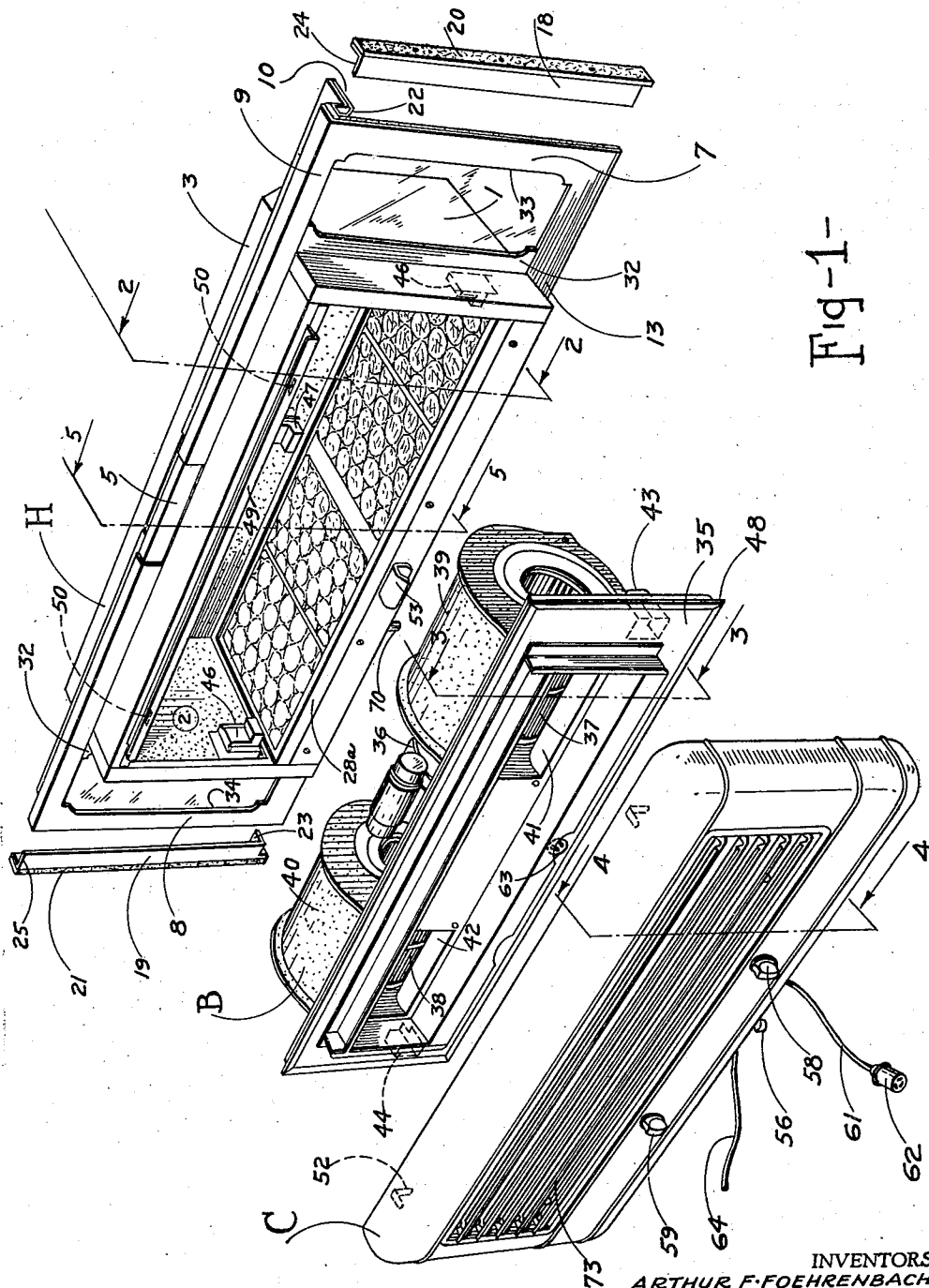


Fig. 1-

INVENTORS
ARTHUR F. FOEHRENBACH
DONALD B. BUERGIN
DONALD K. MACLEOD

BY

Richard W. Watts
ATTORNEYS

Sept. 22, 1942.

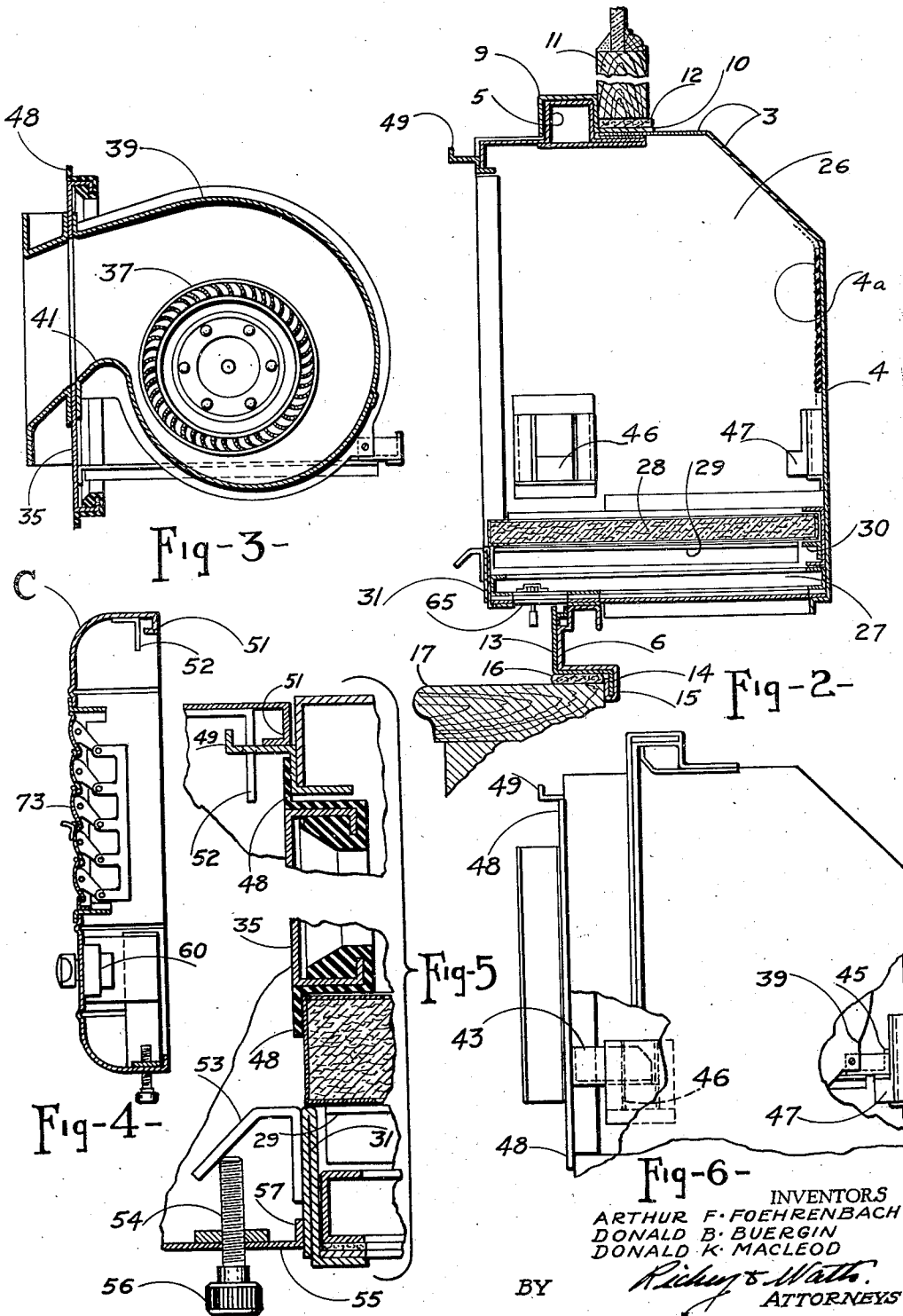
A. F. FOEHRENBACH ET AL

2,296,635

VENTILATOR

Filed July 31, 1940

3 Sheets-Sheet 2



Sept. 22, 1942.

A. F. FOEHRENBACH ET AL

2,296,635

VENTILATOR

Filed July 31, 1940

3 Sheets-Sheet 3

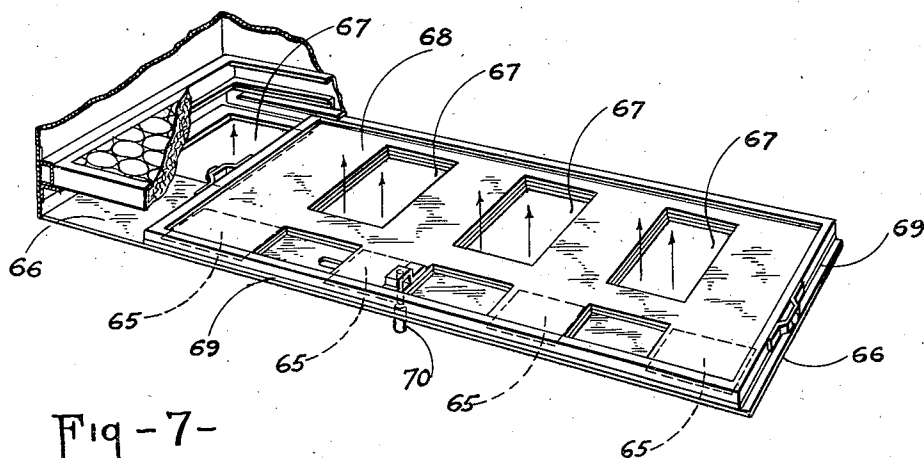


Fig - 7-

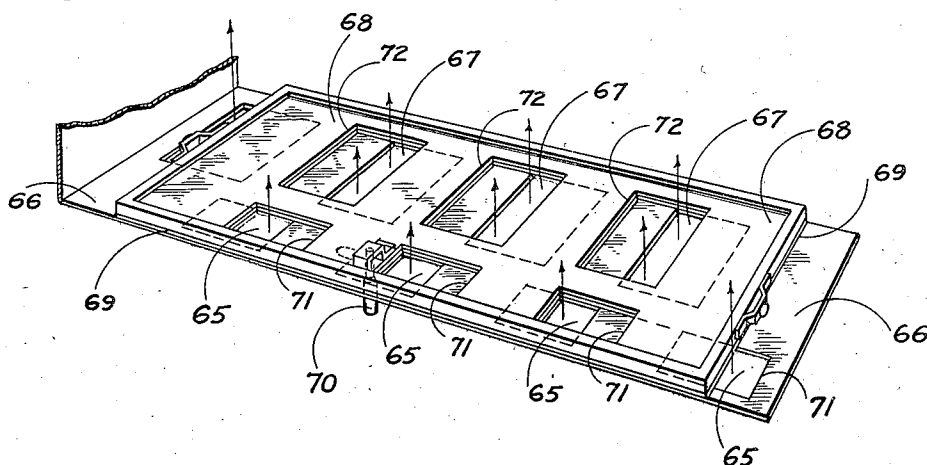


Fig - 8-

INVENTORS
ARTHUR F. FOEHRENBACH
DONALD B. BUEGIN
DONALD K. MACLEOD

BY

Rickey & Mott
ATTORNEYS

UNITED STATES PATENT OFFICE

2,296,635

VENTILATOR

Arthur F. Foehrenbach and Donald B. Buerger,
Canton, and Donald K. Macleod, Wooster, Ohio,
assignors to Republic Steel Corporation, Cleve-
land, Ohio, a corporation of New Jersey

Application July 31, 1940, Serial No. 348,792

9 Claims. (Cl. 98—94)

This invention relates to ventilating apparatus and more particularly to an improved window ventilator for drawing outside air into a room and/or circulating the air within the room.

A number of devices have been employed for room ventilation which consist essentially of a fan mounted in a housing supported on a window sill with the window sash in partially open position. In this type of apparatus a motor driven fan is employed to draw outside air into the room and the present invention relates to certain improvements in this type of apparatus whereby an exceedingly simple, attractive, and effective ventilating unit is obtained.

It is among the objects of our invention to provide a window ventilator which is adapted either to force outside air into a room only, to exclude all outside air and circulate the air in the room, or to cause any desired proportion of inside and outside air to be mingled and circulated in the room.

Other objects of our invention include: the provision of an improved window ventilator structure in which the blowers or fans may readily be removed and replaced; the provision of a window ventilator which is extremely silent in operation and which is also effective to exclude external noises from the room; the provision of an improved damper for adjusting the flow of air through the ventilator; the provision of a window ventilator which may readily be installed in windows of different widths; and the provision of a window ventilator which is well adapted to economical manufacture, possesses a minimum of moving parts, and may be very easily dissembled when desired.

The above and other objects of our invention will appear from the following description of one embodiment thereof, reference being had to the accompanying drawings, in which—

Figure 1 is an exploded perspective view of our improved ventilator showing the main housing, blower unit and front cover in spaced apart relation.

Figure 2 is a transverse cross-sectional view taken on line 2—2 of Figure 1, showing the main housing installed in position in a window.

Figure 3 is a transverse cross-sectional view through the blower unit taken on line 3—3 of Figure 1.

Figure 4 is a transverse cross-sectional view of the front cover taken on line 4—4 of Figure 1.

Figure 5 is an enlarged fragmentary cross-sectional view of the assembled cover and housing taken substantially on line 5—5 of Figure 1.

Figure 6 is an end elevation of the housing and fan unit, the housing end wall being partially broken away to show the resilient supports for the blower unit in the main housing.

Figure 7 is a fragmentary detached perspective view of the damper structure for controlling the entry of air to the ventilator unit, the outside inlet opening being wide open and the inside air opening being completely closed.

Figure 8 is a view similar to Figure 7 but showing the damper positioned to admit both outside and inside air into the ventilator mixing chamber.

In Figure 1 the main housing is indicated generally at H, the blower unit at B, and the front cover at C. The housing H is open at the front, partially open at the bottom, and has end walls 1 and 2, a top 3 and a rear wall 4. Preferably, these walls are coated with an adherent sound absorbing material indicated at 4^a in Figure 2. A hollow rib 5 extends along the top 3 and a supporting and sealing channel 6 extends across the bottom of the housing H. In order to permit our ventilator to be fitted to windows of different widths we provide the adjustable end wings 7 and 8.

Referring particularly to the wing 7, as seen in Figures 1 and 2, the top longitudinal member 9 is shaped to fit over the rib 5 and has an extending flange 10 which, when the unit is installed in a window, lies below the bottom of the window sash 11. A felt seal strip 12 forms a weather tight joint between the window 11 and the top of the housing H and it will be observed from Figure 2 that, by providing the rib 5 and its adjustable extension 9, entry of rain or air between the window and the top of the ventilator is effectively prevented.

The bottom longitudinal member 13 of the sliding wing 7 is formed as shown in Figure 2 and includes a downwardly extending rib 14 which slides into the U-shaped channel 15 of the housing supporting member 6. A felt seal 16 is placed between the housing support and the window sill 17 and, as the U-shaped channel 15 is formed with its open edge inwardly, driving rain and wind cannot work in between the sliding wings and the channel supporting member 6 and a weather tight joint is formed between the bottom of the housing H and the window sill. The above description of end wing 7 also applies to the end wing 8.

End brackets 18 and 19 are secured to the sides of the window frame by screws or other suitable means (not shown). These brackets consist es-

sentially of angle members faced with felt sealing strips 20 and 21 which engage the sides of the window frame and provide weather tight joints. At the outer end of the wing 7 an inclined surface 22 extends across the channel which forms the end of the longitudinal member 9. The bottom ends of the sides of the supporting channels 18 and 19 are inturned as seen at 23 and it will be observed that when the brackets 18 and 19 are secured to the opposite sides of a window frame and the end wings 7 and 8 are adjusted so that the total width of the housing unit and end wings is equal to the width of the window frame, the housing and its associated parts may be positioned in the window by merely lifting it sufficiently to permit the inclined surfaces 22 of the wings 7 and 8 to hook over the top edges 24 and 25 of the brackets 18 and 19. This arrangement provides for extremely easy and quick installation and removal of the entire ventilating apparatus, as it is only necessary to lift the entire unit sufficiently to permit the bottom of the lips 10 to clear the top edges 24 and 25 of the attaching brackets whereupon the entire unit can be removed.

The interior of the housing H is divided generally into two chambers or sections, a fan chamber 26 and an inlet or mixing chamber 27 (see Fig. 2). These chambers are separated by the flat rectangular filter body 28 which preferably consists of a mass of oil impregnated glass wool or the like supported in a suitably perforated flat rectangular housing 28^a. This filter is adapted to slide in and out of position in the housing H on rails or slides 29 mounted on the ends 1 and 2 of the housing. A similar supporting rail 30 is mounted on the rear wall 4 of the housing.

When the filter 28 is in position as shown in Figure 2 its front edge is supported adjacent the top edge of the short upwardly extending wall 31 and thus serves to complete the enclosure of the mixing chamber 27.

Decoratively formed webs 32 are secured to the end walls 1 and 2 of the housing and are preferably contoured to correspond with the edges 33 and 34 of the wings 7 and 8. After the proper position for the wings 7 and 8 is determined to fit any particular window, glass is cut to fit the space between the edges 33 and 34 and the webs 32 and thus, regardless of the width of the window our improved unit can readily be installed with a minimum of light obstruction.

The blower unit B comprises a front panel 35 which carries the driving motor 36. A pair of blower fans 37 and 38 are mounted on opposite ends of the shaft of the motor 36 and are enclosed in suitable housings 39 and 40. Discharge openings 41 and 42 are formed in the front panel 35 and inlet air is drawn into the fans through the open ends of the fan rotors. Lugs 43 and 44 are attached adjacent the ends of the blower unit B and a longitudinally extending supporting angle 45 (see Fig. 6) extends between the blower housings 39 and 40. Secured to the ends 1 and 2 of the housing H are rubber angle brackets 46 and a similar bracket 47 is mounted on the rear wall 4 of the housing. The brackets 46 engage the lugs 43 and 44 and the rubber bracket 47 engages the rear blower support 45. With this arrangement the sole support of the entire blower unit B is effected by the three rubber angles 46, 46, and 47 and any vibrations are absorbed by the rubber mounting thus making for extremely quiet operation. Furthermore, when necessary, the blower unit may

be removed by merely drawing it forward out of the housing H. A rubber edging 48 extends around the panel 35 and, when the blower unit B is in position in the housing H, engages and forms a seal joint with the front of the housing and the front edge of the filter 28. This is best seen in Figure 5.

Along the front edge of the top 3 of the housing H is an angle member 49 having spaced slots 50 formed therein. This angle engages and supports the inturned top flange 51 of the front cover C and cover latching arms 52 extend through the holes 50, as seen in Figure 5, to secure the top edge of the front cover C in position on the housing H. An inclined locking flange 53 is secured to the upwardly extending portion 31 of the housing H and is adapted to be engaged by a screw 54 having threaded engagement through the bottom portion 55 of the cover C. As clearly seen in Figure 5, the end of the screw 54 engages the inner surface of the inclined flange 53 and, by tightening the knurled head 56 of the screw 54, the bottom edge 57 of the front cover is drawn into tight engagement with the front of the housing H. To remove the cover the screw 56 is withdrawn until it clears the bottom of the flange 53, the bottom edge of the cover swung outwardly and the cover lifted bodily from its support on the flange 49.

A blower speed adjusting knob is indicated at 58 and an on and off switch at 59. The speed adjusting knob preferably operates a rheostat 60 and electrical connections from the cover C to the blower unit B are completed through a suitable cord 61 and attachment plug 62. A receptacle 63 for the plug 62 is supported on the front panel 35 of the blower unit and current is supplied to the apparatus through a flexible cord 64, of any suitable length, which may be attached to any suitable power supply.

From the above description it will be seen that the three units making up our improved ventilator are quickly and easily separated from each other. The rubber mounting for the blower unit permits each removal and replacement of the unit and eliminates vibrations and noises which may accompany the operation.

As is best seen in Figure 2, the housing H, when installed in a window, is located partly within the room and partly outside of the room. In order to control the ventilating action of the machine we provide a series of openings 65 in the bottom panel 66 of the housing H. These openings 65 are disposed on the inside of the room. Other inlet openings 67, located out of alignment with the openings 65, are disposed on the opposite side of the supporting channel 6 and thus are located out of doors or on the opposite side of the window. A sliding damper, comprising a plate or panel 68 covered with a layer of felt 69 on its lower surface, slides back and forth on the panel 66. An operating rod 70 extends downwardly below the bottom of the housing, within the room, and provides means for sliding the damper panel 68 into any desired position. Openings 71 in the damper 68 are adapted to co-act with the openings 65 to form variable ports for permitting air from within the room to be drawn into the mixing chamber 27 below the filter 28. In like manner, openings 72 in the damper 68 cooperate with the outdoor openings 67 to provide means for carrying the quantity of outside air drawn into the mixing chamber 27.

When the damper 68 is in its extreme right hand position, as shown in Figure 7, the indoor

openings 65 are completely closed while the out-door opening 67 are wide open. With this setting of the damper, assuming that the fan motor 36 is operating, all of the air drawn into the chamber 27 will be from the outside of the window. This air will be drawn from the chamber 27 through the filter 28 into the blower chamber 26 and will be discharged through the blower outlet openings 41 and 42 and the adjustable louvres 73 on the front cover C, into the room.

If it is desired to cause recirculation of the air within the room in addition to forcing outside air into the room, the operating arm 70 may be moved to the left into a position such as shown in Figure 8. In this position the indoor inlets 65 and the outdoor inlets 67 are both partially open and air will be drawn into the mixing chamber 27 both from within the room and from out of doors. The inside and outside air is thus drawn into the chamber 27 where it mingles and passes through the filter 28 and is discharged by the fans 37 and 38 out into the room. By varying the position of the damper 68 any desired proportion of inside air to outside air may be obtained and, when the damper 68 is moved to its extreme left hand position, the outside openings 67 will be completely closed and the inside openings 65 will be completely open, and the only action of the ventilator will be to recirculate the air within the room.

With our extremely simple proportioning damper arrangement, located so that all of the air passing through the damper enters a common mixing chamber disposed ahead of a filter, all of the air passed by the fans 37 and 38 is first filtered. Furthermore, the indoor and outdoor air is caused to mingle before it enters the fan chamber 26 and thus the air discharged through the adjustable louvres 73 will be of uniform temperature and free from dust, etc.

Although we have described the illustrated embodiment of our invention in considerable detail it will be understood by those skilled in the art that numerous variations and modifications may be made in the specific form of apparatus employed, and we do not, therefore, wish to be limited to the particular ventilator structure herein shown and described but claim as our invention all embodiments thereof coming within the scope of the appended claims.

We claim:

1. In ventilating apparatus, a housing, means for supporting said housing partially inside and partially outside of a window, said housing having a bottom portion provided with a plurality of openings disposed outside of the window and a plurality of openings disposed inside of the window; a sliding damper having openings corresponding to said housing bottom openings, means for sliding said damper to vary the ratio of outside opening to inside opening, and means in said housing for drawing air through said openings and discharging said air inside of said window.

2. In ventilating apparatus, a housing to be positioned partly inside and partly outside of a window frame and between the window frame and window sash, an upwardly projecting rib on the top of said housing and extending longitudinally thereof, a downwardly projecting flange extending longitudinally of and below the bottom of said housing and substantially in vertical alignment with said top rib, said rib and flange lying adjacent to the frame and sash when the housing is in assembled position therewith,

and end wings slidably engaging said top rib and bottom flange on opposite ends of said housing and adjustably movable toward and away from each other to fit against upright parts of said frame.

3. In ventilating apparatus, a housing to be positioned in the space between a window frame and window sash and to lie partly inside and partly outside of said frame, an upwardly projecting rib on the top of said housing and extending longitudinally thereof, a downwardly projecting flange extending longitudinally of and below the bottom of said housing and substantially in vertical alignment with said top rib, and end wings slidably engaging said top rib and bottom flange on opposite ends of said housing and adjustably movable toward and away from each other, said end wings having overlapping engagement with said rib and flange whereby a substantially weather-proof joint is maintained, said rib, flange and wings cooperating with the window frame and sash to close the space around said housing.

4. In ventilating apparatus, a housing, an upwardly projecting rib on the top of said housing and extending longitudinally thereof, a downwardly projecting flange extending longitudinally of and below the bottom of said housing and substantially in vertical alignment with said top rib, end wings slidably engaging said top rib and bottom flange on opposite ends of said housing and adjustable toward and away from each other, webs extending from the ends of said housing, and glass panels supported by said end wings adjacent said webs whereby said wings and webs frame said glass panels.

5. In ventilating apparatus, a housing, a filter in said housing extending horizontally across the housing above the bottom thereof whereby said housing is divided into a lower inlet chamber and an upper fan chamber, means for supporting said housing in a window frame or the like with said housing partly inside and partly outside of said frame, an opening into said inlet chamber from the inner side of said frame, an opening into said inlet chamber from the outer side of said frame, a single damper means having openings therethrough to coact with said openings into said inlet chamber for simultaneously and progressively opening said inner opening and closing said outer opening and vice versa, said fan chamber having an outlet on the inner side of said window frame, and fan means in said fan chamber for drawing air through said openings and filtering and discharging said air through said outlet.

6. In a ventilator of the type described, a housing having a flat bottom portion formed with a plurality of inlet openings, a flange for supporting said housing on a window frame or the like whereby some of said inlet openings are disposed outside of said frame and some inside, a sliding damper for controlling said inlet openings, said damper comprising a flat plate having openings positioned to co-act with said inlet openings to vary the effective area of said inlet openings, a felt sheet between said damper plate and the bottom of said housing, means projecting outside of said housing for moving said damper, and means in the housing for drawing air thru said openings and discharging it on the inner side of said frame.

7. In a ventilator of the type described, a housing having a flat bottom portion formed with a plurality of inlet openings, a flange for

supporting said housing on a window frame or the like whereby some of said inlet openings are disposed outside of said frame and some inside, a sliding damper for controlling said inlet openings, said damper comprising a flat plate having openings positioned to coact with said inlet openings to vary the effective area of said inlet openings, a felt sheet between said damper plate and the bottom of said housing, means projecting outside of said housing for moving said damper, said bottom inlet openings which are disposed outside of said frame being out of alignment with said bottom inlet openings which are disposed inside of said frame whereby movement of said damper will vary the ratio of total outside opening area to total inside opening area, and means in said housing to cause air to flow through said openings and to the inner side of said frame.

8. In a ventilator of the type described, a housing, a fan unit enclosed in said housing, said fan unit having a front panel provided with rubber flanges to bear against the front side of said housing and having a plurality of sup-

porting lugs, and a plurality of resilient rubber brackets secured to the inside of the walls of said housing, said fan unit lugs resting upon said rubber brackets and supporting said fan unit substantially free from other supporting contact with said housing.

9. In a ventilator of the type described, a housing, rubber supporting brackets in said housing, a fan unit supported in said housing on said brackets, a front cover for said housing, and means for detachably securing said front cover in position on said housing, said securing means including an angle flange at the top of said housing, a flange at the top of said cover and engaging said housing flange, an inclined plate secured to said housing adjacent the bottom of said cover and a screw having threaded engagement with said cover and adapted to engage said inclined plate whereby tightening of said screw will draw said cover firmly against said housing.

ARTHUR F. FOEHRENBACH.
DONALD B. BUERGIN.
DONALD K. MACLEOD.