May 30, 1933. R. B. BOURNE 1,911,744

WINDOW VENTILATOR AND SILENCER

Filed May 27, 1931 2 Sheets-Sheet 1

Fig. 1.

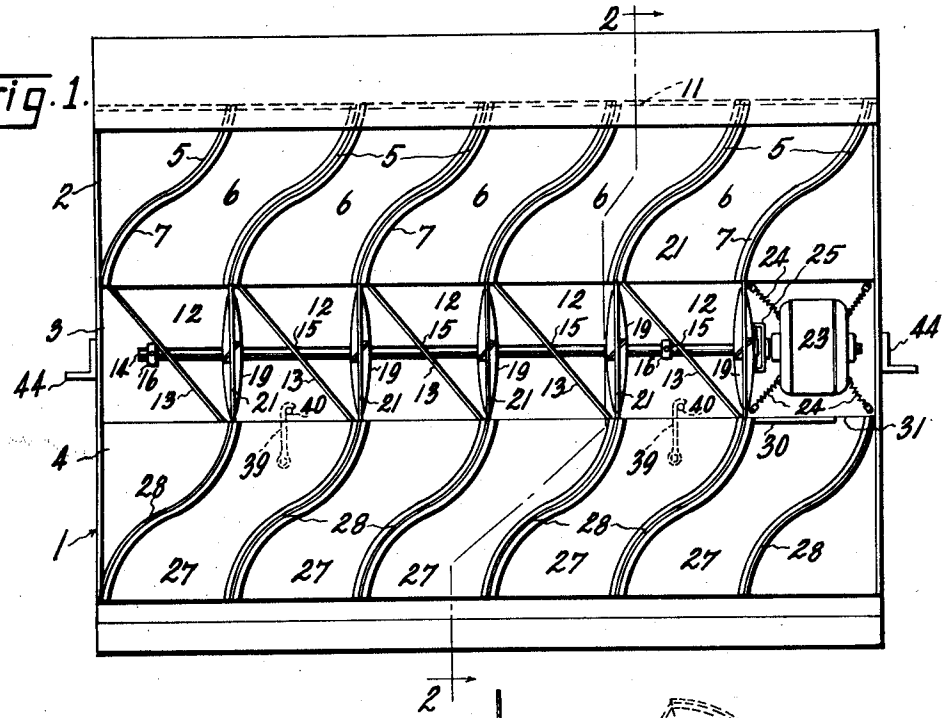


Fig. 2.

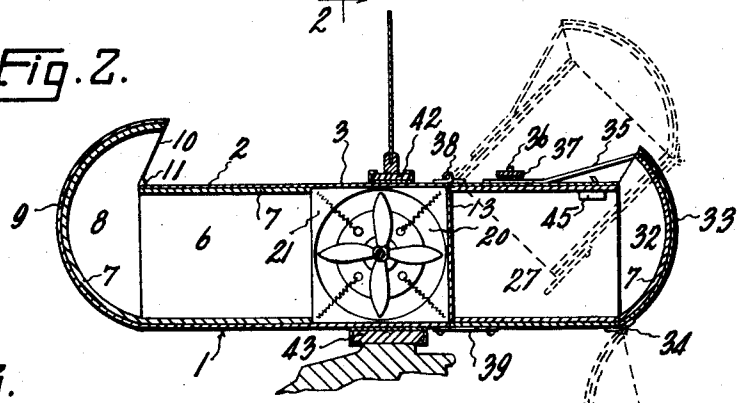
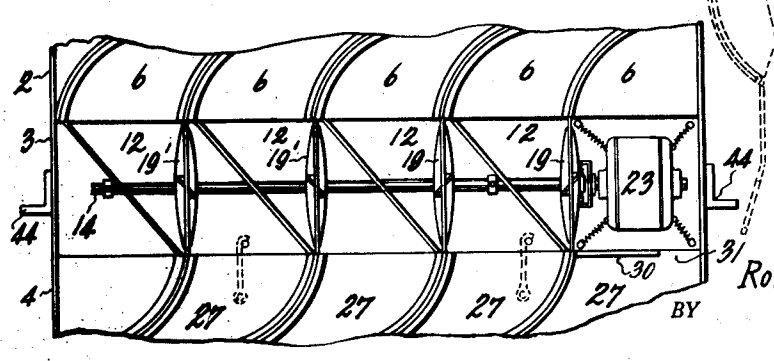


Fig. 3.



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Fig. 4.

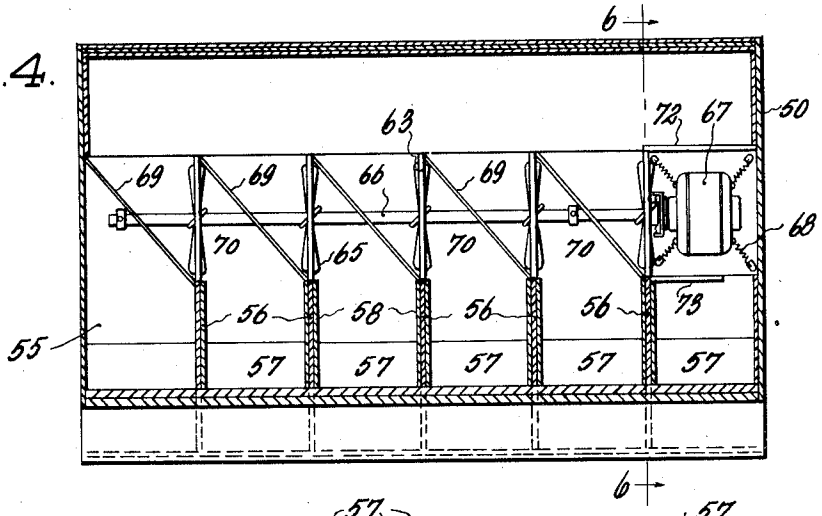


Fig. 5.

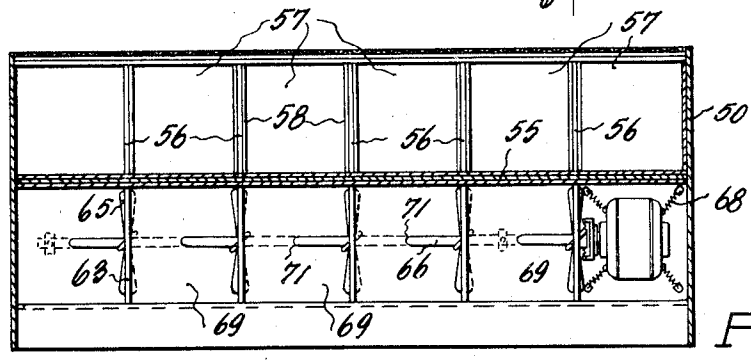


Fig. 6.

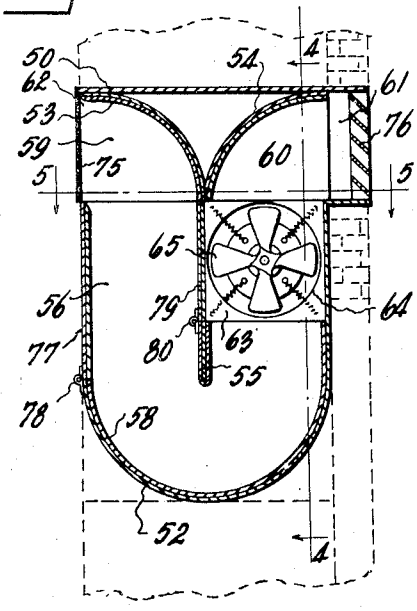
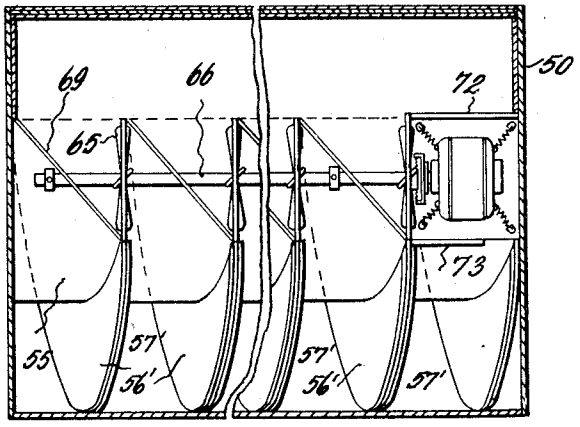


Fig. 7.



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UNITED STATES PATENT OFFICE

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WINDOW VENTILATOR AND SILENCER

Application filed May 27, 1931. Serial No. 540,337.

The present invention relates to devices for providing positive ventilating for a room through a wall opening, which may be a window opening or a specially formed permanent opening, and which at the same time will prevent extraneous sounds such as street noises from entering the room through said openings.

Devices of this type, intended for non-permanent installation, are commonly placed in the opening formed between the sill and sash of a partly opened window. The opening thus formed is rectangular and generally is more or less slot-like in nature. One of the objects of the present invention is to utilize to the greatest advantage the full area of the opening so provided for the passage of air in and out of the room. A further object is to provide substantially similar advantages in a permanent installation. Other and further objects will be apparent from the following specification and claims.

In the accompanying drawings which illustrate one embodiment of each form of the invention:

Fig. 1 is a top plan view of the window type, the cover being broken away;

Fig. 2 is a section substantially on line 2—2 of Fig. 1; and

Fig. 3 is a partial plan view similar to Fig. 1 showing a modified arrangement of fans;

Fig. 4 is a side view of the wall type, the outer wall of the casing being broken away;

Fig. 5 is a sectional view substantially on line 5—5 of Fig. 6;

Fig. 6 is a sectional view substantially on line 6—6 of Fig. 4; and

Fig. 7 is a fragmentary view similar to Fig. 4 but showing a modified formation of the passageways.

Referring to Figs. 1, 2 and 3, the window type of the device comprises a generally rectangular casing 1 made up of an exterior sound attenuating section 2, a central fan section 3, and an interior sound attenuating section 4. The exterior section 2 is divided by curved partitions 5 into a plurality of tortuous passageways 6, the partitions 5 and the casing walls being covered with sound absorbing material, such as felt or the like, as shown at 7. Communication from passages 6 to the outside air is through a manifold chamber 8 formed by a curved hood member 9 and end pieces 10. Member 9 extends upwardly and inwardly, as best shown in Fig. 2, so as to cast more or less of a sound shadow whereby street noises cannot directly enter the device. The extension of the free edge of member 9 inwardly of the outer edge of casing 1, as shown, prevents rain from entering the manifold or air passages. The top of casing 2 is provided with an upwardly extending flange 11 whereby any water collecting on top of the casing is prevented from entering the manifold 8.

The central fan section 3 is made up of a number of diagonally disposed passages 12, connecting with passages 6, and formed by diagonally positioned partitions 13. A propellor shaft 14 is mounted lengthwise of section 3, passing through holes 15 in partition 13 and journaled in self oiling bearings 16 supported by brackets 17 secured to the partitions. A plurality of fans 19, one in each passage 12, are secured to shaft 14 and turn in openings 20 formed in transversely positioned plates 21, the openings 20 being of a diameter to just permit clearance of the fan blades. Shaft 14 and the fans carried thereby are driven from a reversible motor 23 suspended by springs 24 at one end of section 3, the motor shaft being connected to the shaft 14 by a vibration damping coupling 25.

The inner sound attenuating section 4 is divided into a plurality of tortuous passages 27 by curved partitions 28 covered in the same manner as partitions 5 with sound absorbing material 7. Passages 27 communicate with the diagonally disposed passages 12. In order to properly cool the motor 23, the passage 27 opening to the motor is provided with a vertical plate 30 provided with an opening 31 to the rear of the motor so that the air current passing through that passage 27 and the connecting passages 12 and 6 are directed around the motor. The passages 27 open to the room through a manifold chamber 32 formed by a curved hood member 33 hinged to the lower edge of section 4 as at 34. Mem-

ber 33 normally directs the incoming air upwardly towards the window, but is adapted to be held in adjusted position to variously direct the air current by a link 35 pivoted at one end to the free edge of member 33 and provided at its other end with a slot engaging over a threaded pin 36 secured to the top of the casing. A nut 37 on pin 36 is adapted to clamp the link in desired position and, as will be obvious, link 35 may be freed from pin 36 to allow member 13 to drop to the dotted line position of Fig. 2, thus permitting the incoming air to blow directly and horizontally into the room, or it may be positioned to completely close the passages 27.

In order to permit easy access to the mechanical parts of the device, such as the motor and fan assembly, section 4 as a whole is hinged to section 3 as at 38, permitting the section to be swung upwardly as shown in dotted line in Fig. 2. Section 4 is held in normal position with respect to section 3 by hooks 39 pivoted to the underside of section 4 and adapted to engage lugs 40 secured to the underside of section 3.

The casing is provided with top and bottom pads 42 and 43, respectively, whereby the sash and sill of the window may make a sound proof contact with the top and bottom of the casing. The device is fitted snugly between the side members of the window frame by means of padded brackets 44. The motor is conveniently controlled, reversed or stopped, by a switch assembly 45 positioned adjacent the inside edge of section 4.

It will be seen that the device of this invention lends itself to manufacture in any reasonable width to accommodate a large range of window widths, at the same time efficiently utilizing such width for the moving of air. The use of a plurality of fans permits relatively small diameter fans to be used, thus rendering the device more compact. Furthermore, since each fan moves but a small fraction of the total air moved, a large amount of air may be passed through the device at low velocity, thus precluding the possibility of creating noises within the device by air turbulence.

Either type of device may be modified in the manner shown in Fig. 3 so as to provide for the motion of air both into and out of the room simultaneously, such an arrangement being desirable where there is no other available means, such as a window or a transom, for taking care of the air which passes through the device. The only modification necessary is to supply one half of the passages 12 with fans 19′ having propellers opposite in pitch to those in the other passages. In this construction the motor need not be reversible. While it is ordinarily preferable that there should be an equal number of fans and passages delivering air in opposite directions, conditions may occur which would make it desirable to deliver a larger volume of air in one direction than the other and this situation may be easily met by providing a greater number of fans pitched in the direction of the desired greater draught than in the opposite.

In Figs. 4, 5 and 6, the device is shown adapted for a permanent installation in a special wall opening. In such installations, it is desirable that the entire structure be accommodated in the wall so that the interior and exterior openings may be flush with the wall surface. The present invention is well adapted for such installation. As shown in Figs. 4, 5 and 6, the structure comprises a generally rectangular casing 50 having a transverse thickness substantially equal to the available wall thickness, as shown in dotted lines in Fig. 6. The bottom of the casing is rounded as at 52 and inwardly curving plates 53 and 54 connecting with a downwardly extending partition 55 divide the casing longitudinally. A plurality of transverse partitions 56 divide the interior into a plurality of tortuous passages 57, the walls of which are covered (as indicated at 58) with sound absorbing material such as felt. Partitions 56 preferably extend only to the top of partition 55 so that curved plates 53 and 54, respectively, form inner and outer manifold chambers 59 and 60 which respectively communicate with an opening 61 in the outer surface of the wall and an opening 62 in the inner surface of the wall.

The ends of partitions 56 adjacent the outer manifold take the form of plates 63 which are apertured as indicated at 64 to receive fans 65 which turn in the openings 64, and are mounted on a common shaft 66. Shaft 66 is driven from a reversible motor 67 spring mounted, as shown at 68, at one end of the casing. The motor is controlled by the usual switch assembly, not shown. The upper edges of plates 63 are connected to the adjacent partition at a point just below the fan openings 64 by inclined plates 69 forming diagonally disposed passageways 70 communicating with passages 57, the shaft 66 passing through apertures 71 in the plates 69. The passage 57 in which the motor is positioned is closed at the top by a plate 72 and a baffle 73 positioned below the motor compels the air entering the adjacent diagonal passage 70 to pass around the motor. The inner wall opening 62 is conveniently covered by a grill 75 and the outer opening 61 may be provided with louvers 76. To permit access to the motor and fans, the inner wall is provided with a door 77 hinged as at 78 and a similar door 79 hinged at 80 is provided in the partition 55.

A somewhat increased length of the sound attenuating passages may be secured by curving the partitions 56 as shown at 56′ in Fig. 7,

thus giving a double curvature to the passages 57'.

It will be understood that the device may be inserted in the wall opening in inverted position from that shown in the figures, or in vertical position, as may be desired, and that the terms "top" and "bottom" in the specification are used for convenience of reference only and not in any limiting sense.

What I claim is:

1. A silencing ventilator for wall openings which comprises a casing, a plurality of tortuous sound attenuating passages within the casing and having openings inside and outside the wall, a fan positioned within each passage to rotate in a plane at right angles to the plane of the wall opening, and means to simultaneously drive said fans.

2. A silencing ventilator for wall openings which comprises a casing, a plurality of tortuous sound attenuating passages within the casing and having openings inside and outside the wall, a fan positioned within each passage intermediate the ends of the latter to rotate in a plane at right angles to the plane of the wall opening, and means to simultaneously drive said fans.

3. A silencing ventilator for wall openings which comprises a casing, a plurality of tortuous sound attenuating passages within the casing and having openings inside and outside the wall, a fan positioned within each passage to rotate in a plane at right angles to the plane of the wall opening and a motor positioned in one of the passages to simultaneously drive said fans.

4. A silencing ventilator for wall openings which comprises a casing, a plurality of tortuous sound attenuating passages within the casing and having openings inside and outside the wall, a fan positioned in each of said passages to rotate in a plane at right angles to the plane of the wall opening, and means to simultaneously drive said fans, half of said fans being pitched to drive air inwardly through their respective passages and the other half being pitched to drive air outwardly through their respective passages.

5. A silencing ventilator for windows and the like which comprises a casing, a plurality of tortuous sound attenuating passages within the casing communicating at one end with a manifold chamber, said chamber being formed by a hood member extending upwardly and inwardly of the upper edge of the casing to form an opening outside of the window, and a second manifold chamber in communication with the other end of said passages, said second chamber being formed by an adjustable hood member hinged to the lower edge of the casing and adapted in one position to extend upwardly and inwardly of the upper edge of the casing to form an opening inside the window and to direct incoming air currents upwardly toward the window.

6. A silencing ventilator for windows and the like which comprises a casing adapted for mounting between a window and its sill and having an exterior section with an opening outside the window, a central section, and an interior section, the latter having an opening inside the window, a plurality of tortuous sound attenuating passages in said casing communicating between said outside and said inside opening, a fan positioned in each of said passages within the central section, and a motor positioned in the central section to simultaneously drive said fans, said inside section being hinged to the central section to permit access to the motor and fans.

7. A silencing ventilator comprising a casing adapted to be positioned in a wall, said casing having an outside opening and an inside opening, a plurality of tortuous sound attenuating passages within the casing, a fan positioned within each passage adjacent said outside opening to rotate in a plane at right angles to the plane of the wall and means to simultaneously drive said fans.

8. A silencing ventilator comprising a casing adapted to be positioned in a wall, said casing having an outside opening and an inside opening, both said openings being flush with the wall surface, a plurality of tortuous sound attenuating passages within the casing and communicating between said openings, a fan positioned within each passage to rotate in a plane at right angles to the plane of the wall, and means to simultaneously drive said fans.

9. A silencing ventilator comprising a casing adapted to be positioned in a wall, said casing having an outside opening and an inside opening, a plurality of U-shaped sound attenuating passages within the casing and communicating between said openings, a fan positioned within each passage to rotate in a plane at right angles to the plane of the wall, and means to simultaneously drive said fans.

10. A silencing ventilator for wall openings which comprises a casing, a plurality of partitions in the casing forming a plurality of tortuous easy curving passageways within the casing and having openings inside and outside the wall, circular aligned openings formed in the partitions, a shaft positioned transversely of the casing and passing axially through said circular openings, fans secured to said shaft and positioned in said circular openings, inclined plates positioned across the passages intermediate the fans to deflect the air entering the passages to said fans to be discharged thereby into and through the next adjacent passage, and a motor for driving said shaft.

11. A silencing ventilator for wall openings, which comprises a casing, a plurality

of partitions in the casing forming a plurality of tortuous easy curving passages within the casing and having openings inside and outside the wall, circular aligned openings formed in the partitions intermediate their ends, a shaft positioned transversely of the casing and passing axially through said circular openings, fans secured to said shaft and positioned in said circular openings, inclined plates positioned across the passages intermediate the fans to deflect the air entering the passages to said fans to be discharged thereby into and through the next adjacent passage, and a motor positioned in one of said passageways for driving said shaft.

In testimony whereof I have affixed my signature.

ROLAND B. BOURNE.