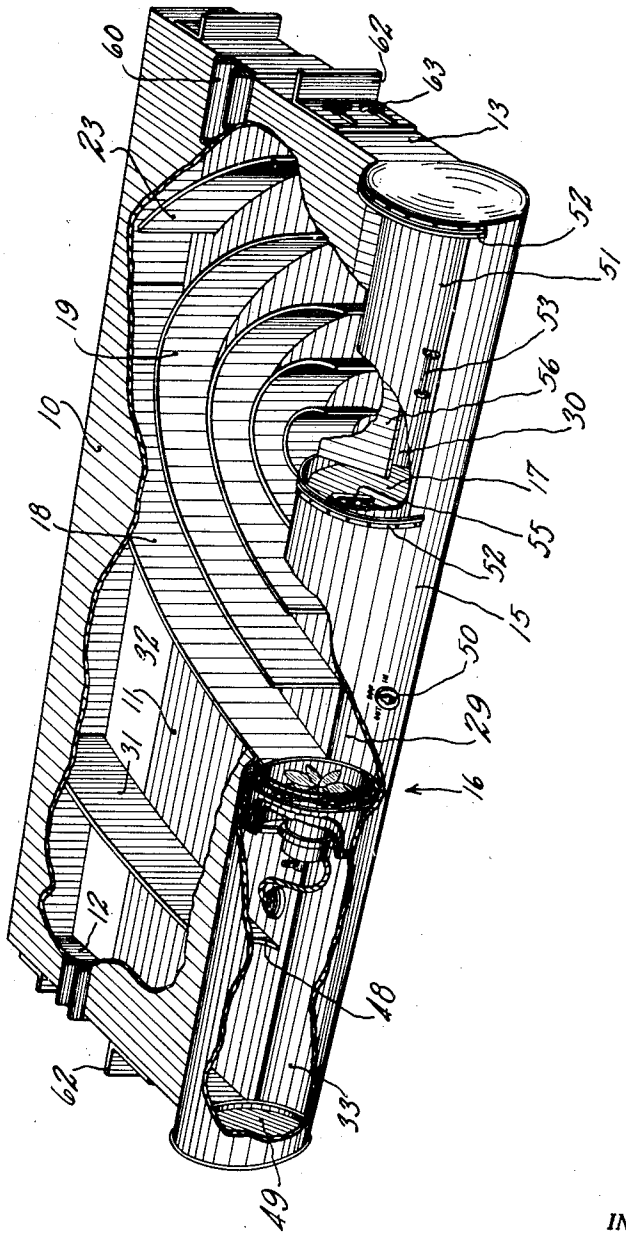
Nov. 22, 1932. R. B. BOURNE 1,888,711

WINDOW VENTILATOR AND SILENCER

Filed Feb. 4, 1930 3 Sheets-Sheet 1



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WINDOW VENTILATOR AND SILENCER

Filed Feb. 4, 1930 3 Sheets-Sheet 2

Fig. 3.

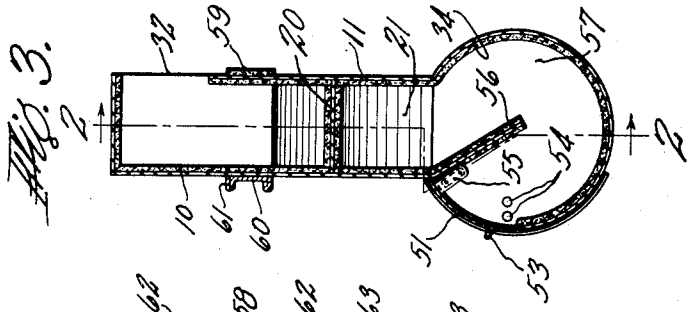
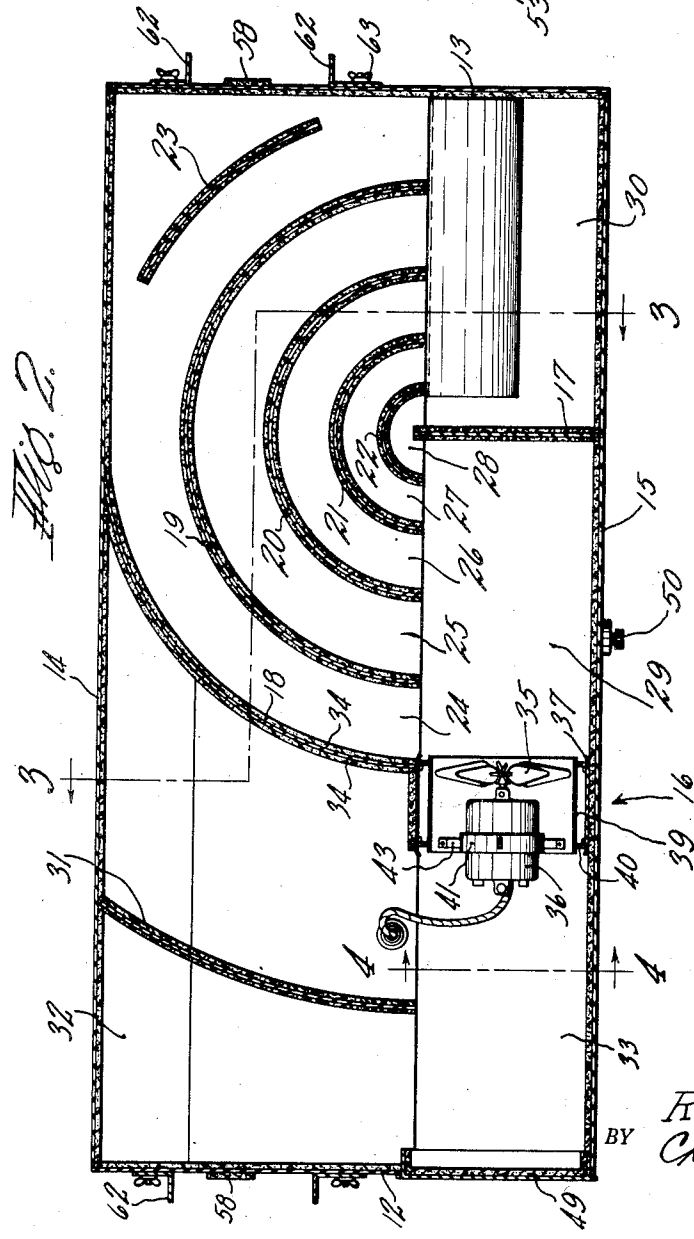


Fig. 2.



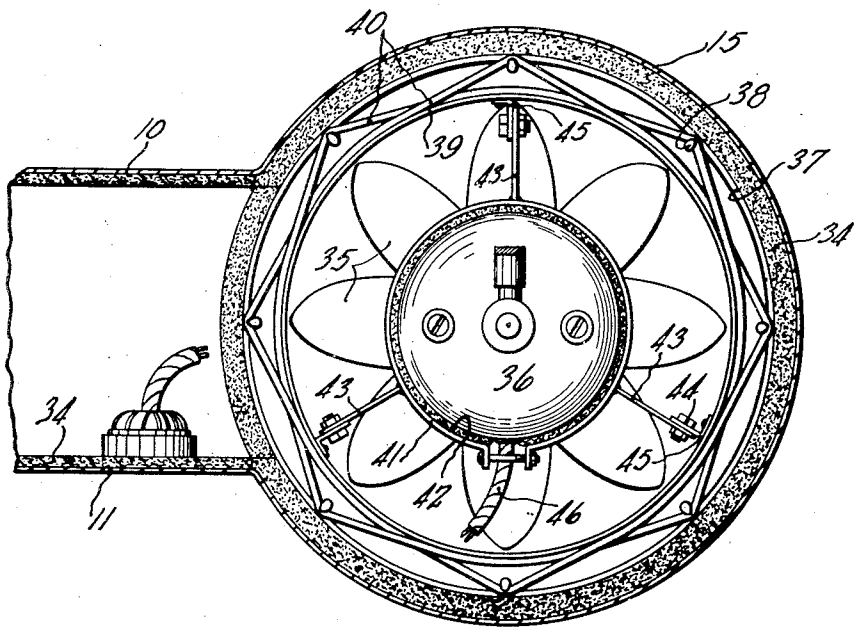
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Fig. 4.



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UNITED STATES PATENT OFFICE

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WINDOW VENTILATOR AND SILENCER

Application filed February 4, 1930. Serial No. 425,892.

Many rooms and offices depend for their supply of fresh air upon that which results from opening the windows, the buildings in which they are located not being equipped with ventilating systems. In certain locations the outside noise, either from a neighboring street or from some other source, becomes disagreeable when a window is opened, even in certain cases to the extent of making conversation difficult, and definitely lowers the efficiency of the workers in the room. The present invention relates to a device permitting the use of window ventilation without at the same time introducing outside noises into the room being ventilated.

One object of the invention is to provide a ventilating device for a window having a noise silencing structure combined with it. A further object is to provide a window ventilating device of this character in which ventilation may be secured either by the natural draft of the room or by power. A further object is to provide a device of this character in which air may be drawn into or forced out from the room as desired. A further object is to provide a power operated window ventilating device in which the noise of the air blowing mechanism is effectively prevented from reaching the inside of the room. A further object is to provide a device of this character which shall be under the control of the occupants of the room at all times, both as to the direction and as to the intensity of air flow. A further object is to provide a device of this character which can be applied to existing windows without necessitating any change in their structure. Other and further objects will appear from the following description and claims.

Referring to the drawings:

Fig. 1 is a perspective view of the device, partly broken away to show its internal construction;

Fig. 2 is a plan section of the device, taken on line 2—2 of Fig. 3;

Fig. 3 is a transverse section, taken on line 3—3 of Fig. 2; and

Fig. 4 is a section on line 4—4 of Fig. 2, on an enlarged scale and showing the manner of supporting the motor blower to prevent transfer of vibration or noise.

The device consists generally of a blower chamber having passages connecting it to the outside of the window and other passages connecting it to the interior of the room, these passages being designed and treated so as to minimize the transfer of sound through them. The various parts are supported by, and the passages referred to are mainly contained in, a substantially rectangular casing composed of a top wall 10, a bottom wall 11, two end walls 12 and 13, and a back wall 14. At the side of the casing which is to face towards the inside of the room is a cylindrical casing 15 divided into three compartments by a fan assembly 16 and a partition 17. The compartment to the left of the fan assembly 16, as viewed in Fig. 1, connects with the space between the top wall 10 and the bottom wall 11. Extending from the fan assembly to the rear wall 14 is a partition 18, preferably curved, which divides the interior of the rectangular casing into two separated chambers connected together only through the fan.

The partition 18 is preferably curved substantially as an arc of a circle with the partition 17 as a center. Other partitions 19, 20, 21, 22 and 23 are positioned concentrically with the partition 18. Each of these partitions extends from the top wall 10 to the bottom wall 11, and form between them a plurality of curved passages 24, 25, 26, 27 and 28, which extend between the central chamber 29 and the chamber 30 at the right of the partition 17. The space between the end wall 12 and the curved partition 18 is preferably broken up by one or more partitions 31, which may be curved similarly to the partition 18. In the space to the left of the partition 18, the bottom wall 11 extends to a point short of the rear wall 14, so that a space 32, opening to the bottom so as not to receive rain or snow, is provided which may act as an intake or an outlet depending upon which way the circulation of air is taking place. Assuming that air is being drawn into the room, the apparatus as thus far described will admit air through the space 32, draw it into the chamber 33 to the left of the fan, and expel

it into the central chamber 29; from where it moves in parallel streams through the passages 24, 26, 27 and 28 into the right hand chamber 30. This chamber has means which will be described for admitting air into the room.

The purpose of providing the partitions which divide the air into parallel streams is to increase the surface contact of the air with the stationary parts of the device and thus frictionally extract the energy of any sound waves which may be present. The combined cross-sectional area of the parallel passages is enough to permit the desired quantity of air to pass without any substantial resistance to flow; but at the same time the total wall area of the passages has been increased to a point where a large proportion of the sound waves will be eliminated during their passage through the device. To augment this effect, the walls of the casings, as well as each surface of the several partitions, are covered with a layer of sound absorbing material 34, such as felt. Each partition consists of a central plate of steel or other material to which is cemented or otherwise secured a layer of sound absorbing material 34 on each side.

The fan assembly, denoted generally by 16, comprises a multi-blade fan 35 directly coupled to the shaft of a motor 36, located within the cylindrical casing 15. Since one of the main objects of the invention is to produce a ventilating device which will prevent noise from entering the room, it is desirable to mount the fan assembly so that no sound due to its operation will come into the room either from the air current or by vibration imparted to the walls of the casing. As far as sound waves traveling from the fan through the air stream are concerned, elimination of noise is accomplished in the same way as with the noise from outside; the subdivided passages lined with sound absorbent material serving this purpose. Direct transfer of vibrations to the casing walls is prevented by a resilient mounting for the fan assembly as will now be described.

Mounted against the inner surface of the sound absorbent material 34 lining the cylindrical casing 15 is a ring 37 having a plurality of inwardly projecting lugs or clips 38. An intermediate ring or casing 39 is located within the ring 37 and is supported by springs or elastic cables 40 which are looped over spaced lugs and drawn around the surface of the intermediate ring. This arrangement permits the use of relatively long springs which act as shock absorbers and produce a high degree of vibration insulation between the rings. The motor 36 is supported in an inner clamping ring 41 through an interposed rubber packing 42, the clamping ring being carried on webs 43 extending inwardly from the intermediate ring. In the case shown, the webs are welded or otherwise secured to the clamping ring and are bolted at 44 to lugs 45 on the intermediate ring, as this permits dismounting the motor and fan without disturbing the vibration proof mounting itself. The intermediate ring not only provides support for the motor but also, by suitably designing the fan to revolve very closely adjacent to and within the ring, improves the aerodynamical efficiency of the device by reducing the end losses of the fan blades.

In order to facilitate further the removal of the motor, it is provided with a flexible cable 46 and a detachable plug 47 fitting into a suitably insulated contact socket within the casing. The end of the partition 31 is cut away as at 48 and the end of the cylindrical casing 15 is provided with a detachable cap 49 so that the motor and fan can be drawn bodily out of the casing when desired. This not only permits the withdrawal of these parts for repair but also permits the manufacture of interchangeable ventilating units which can be sold with or without a fan attachment. The motor used is preferably of the reversing type, and a switch is provided serving to rotate the motor in a direction to blow air into the room, in a reverse direction to blow air out of the room, or to shut off the motor entirely.

The portion of the cylindrical casing 15 between the partition 17 and the end wall 13 is provided with an opening adapted to be closed by an oscillating shutter 51 running in guides 52 and fitted with a handle 53. This shutter enables the occupant of the room to shut off the air entirely. In such a case it is desirable to interlock the shutter with the motor control in order to prevent the motor becoming overheated due to being run without any air circulation. In the present case, this has been accomplished by contact members 54 on the partition 17, included in the motor circuit, and a bridge piece 55 which closes the gap between these contact members and completes the current supply to the motor. As soon as the shutter is moved away from its wide open position, the motor is stopped by the means described.

A deflecting plate 56 is mounted within the cylindrical casing as best shown in Fig. 3, forming together with the inner wall of the casing a sharply curved outlet passage 57. This passage receives the air from the passages 24, 25, 26, 27 and 28, unites the several streams, and delivers it to the outlet formed by opening the shutter 51. This passage affords additional attenuation for sound waves, reduces turbulence at this point, and deflects incoming air upwardly and towards the window in a manner to prevent direct drafts upon the occupants of the room. The partition 56 is treated with sound absorbing material in a manner similar to the other partitions referred to.

To hold the device snugly into the window casing, it is made to such a length that elastic end pads 58 are tightly compressed when the device is inserted in the window frame. The bottom is provided with a strip of compressible material 59 and the top with a U-shaped strip of a similar substance, preferably stiffened by members 61. The window sash fits snugly into this U, not only preventing the transfer of sound at this point but also serving to hold the silencer in place under the window. The device is further held by four adjustable L-shaped end clamps 62 held in place by a slot and wing nut connection 63. The clamps are locked in place tightly against the sides of the window casing so that there will be no possibility of pushing the device out of the window. By loosening the nuts 63, the device can be readily removed when desired.

What I claim is:

1. A ventilator comprising a casing, a motor driven fan in the casing, an acoustically silenced air passage between the fan and the interior of the room, an air passage between the fan and the outer air, an adjustable shutter controlling the opening between said silenced air passage and the room, and means for preventing operation of the fan except when the shutter is open.

2. A ventilator comprising a casing adapted to be placed under the sash of a window, a partition dividing the interior of the casing into two chambers, one of said chambers communicating with the outer air and the other with the interior of the room, a motor driven blower in the casing interposed between the chambers and a plurality of relatively thin partitions dividing the last named of said chambers into a plurality of easy curving, unobstructed passages adapted to attenuate sound waves passing therethrough without offering substantial resistance to the passage of the air through the casing.

3. A window ventilator comprising a substantially rectangular casing adapted to be placed under the sash of a window, a cylindrical casing mounted on the indoor side of the first casing and communicating therewith, a motor driven fan in the cylindrical casing, a partition extending from the fan and dividing the rectangular casing into an outdoor and an indoor chamber, said outdoor chamber having an opening to the outer air and the indoor chamber having a plurality of curved partitions dividing it into a plurality of sound-attenuating passages, a partition in the cylindrical casing forcing the air to traverse said passages, and an opening from the cylindrical casing into the interior of the room.

4. A window ventilator comprising a substantially rectangular casing adapted to be placed under the sash of a window, a cylindrical casing mounted on the indoor side of the first casing and communicating therewith, a motor-driven fan in the cylindrical casing, a vibration proof mounting for the fan, a partition extending from the fan and dividing the rectangular casing into an outdoor and an indoor chamber, said outdoor chamber having an opening to the outer air and the indoor chamber having a plurality of curved partitions dividing it into a plurality of sound-attenuating passages, a partition in the cylindrical casing forcing the air to traverse said passages, and an opening from the cylindrical casing into the interior of the room.

5. A window ventilator comprising a casing adapted to be placed under the sash of a window, said casing having an outside opening and an inside opening, said casing providing an airway between said openings, and including a partition having an opening therein and arranged to divide the interior of the casing into two chambers, one of said chambers communicating with the outside opening, and the other chamber communicating with the inside opening, a motor driven blower mounted in the opening in said dividing partition, a plurality of relatively thin partitions positioned in the last mentioned chamber and forming a plurality of smoothly curving, tortuous unobstructed sound attenuating passages through which the air is constrained to travel, without substantial resistance, between the blower and said inside opening.

6. A window ventilator comprising a casing adapted to be placed under the sash of a window, said casing having an outside opening and an inside opening, said casing providing an airway between said openings, and including a vertical partition having an opening therein and arranged to divide the interior of the casing into two chambers, one of said chambers communicating with the outside opening and the other chamber communicating with the inside opening, a motor driven blower positioned in the opening in said dividing partition to direct the air crosswise of the casing at right angles to its direction of entrance and at least one smoothly curving, tortuous, unobstructed sound attenuating passage formed in the last mentioned chamber, extending from the blower to said inside opening, and curved to deliver the air substantially in its initial direction.

In testimony whereof I have affixed my signature.

ROLAND B. BOURNE.