Aug. 24, 1965 L. COOK 3,202,080

VENTILATORS

Filed Oct. 5, 1962 3 Sheets-Sheet 1

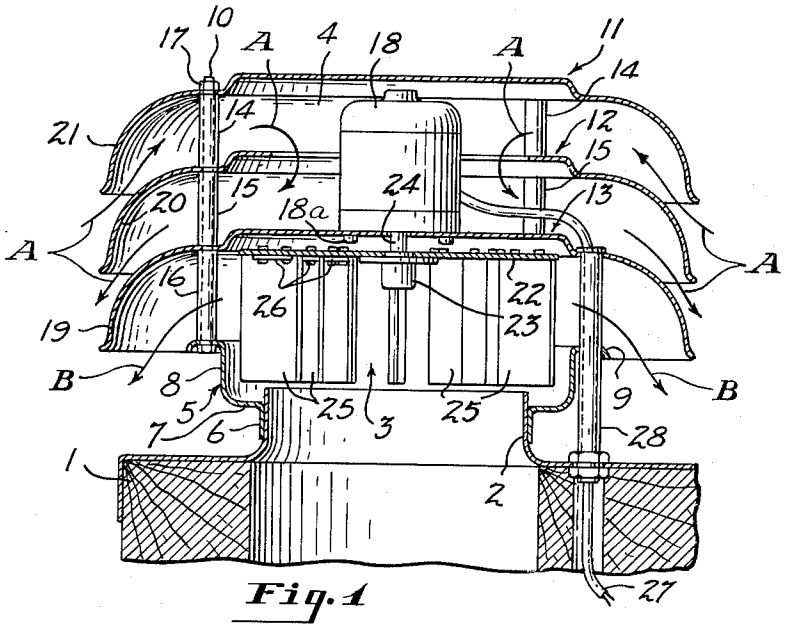


Fig. 1

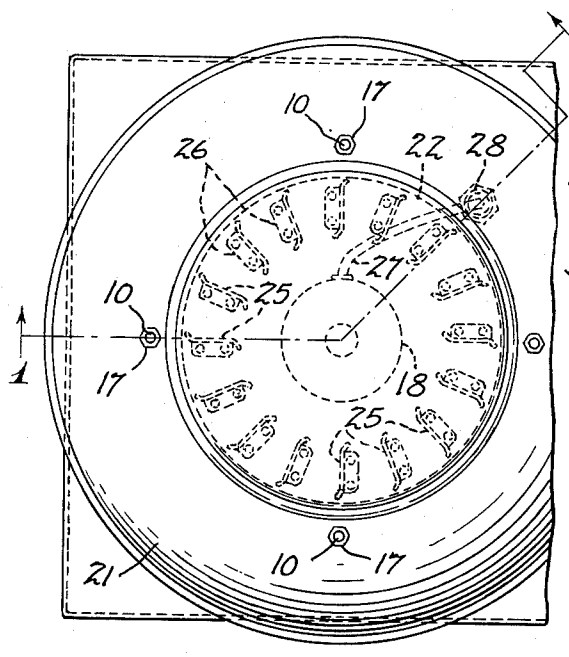


Fig. 2

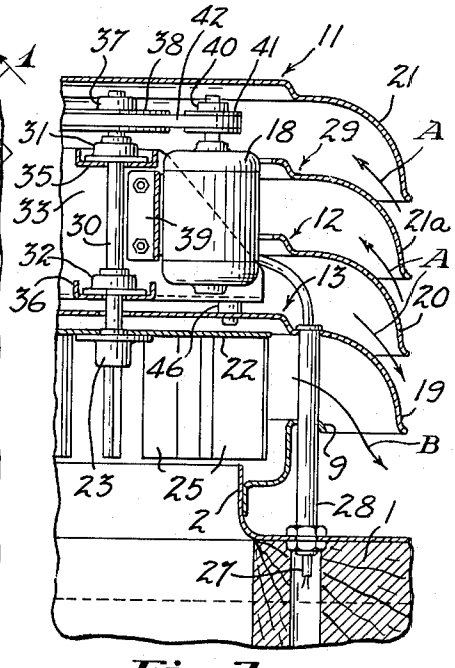


Fig. 3

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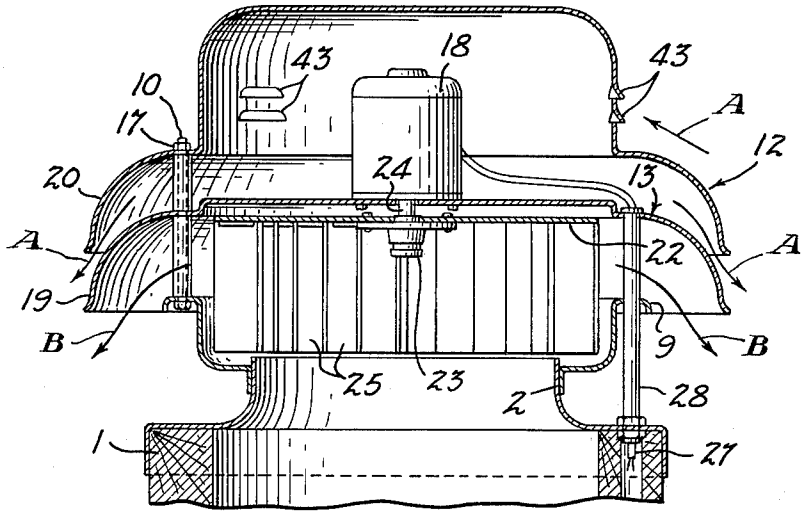


Fig. 4

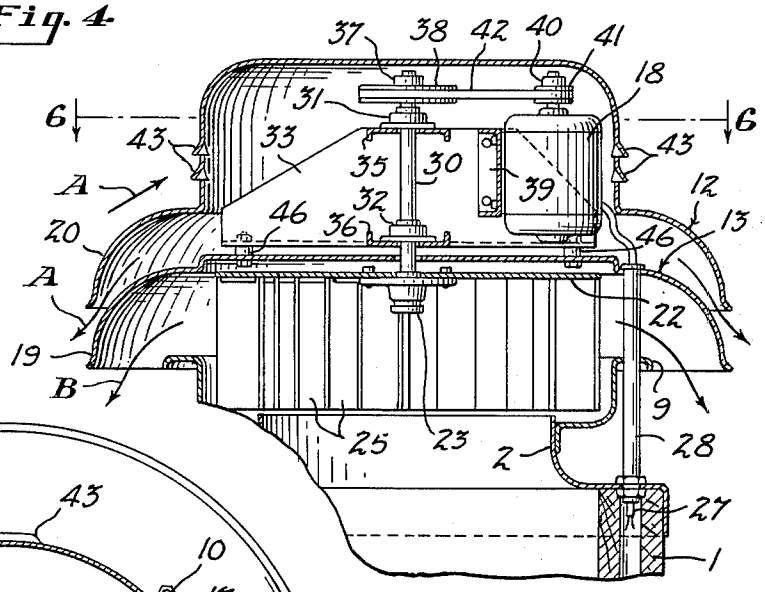


Fig. 5

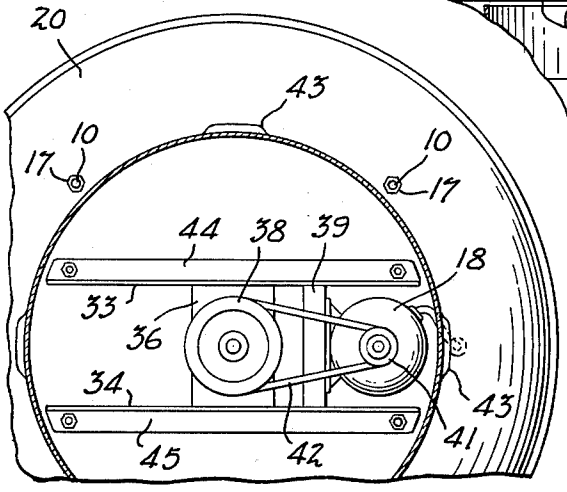


Fig. 6

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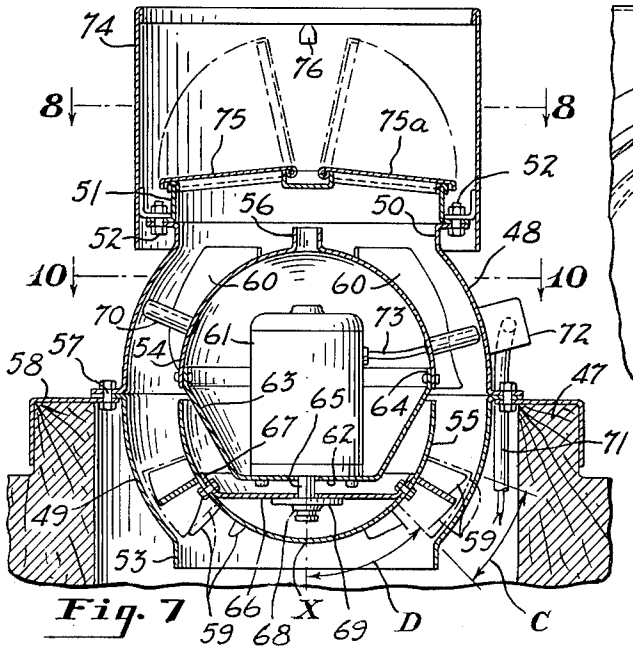


Fig. 7

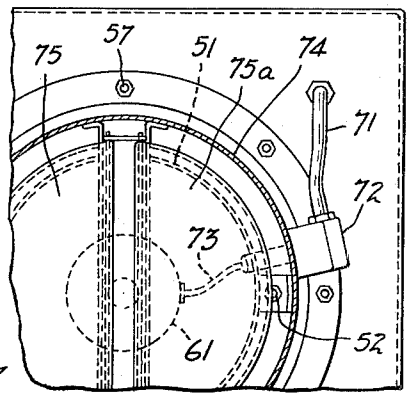


Fig. 8

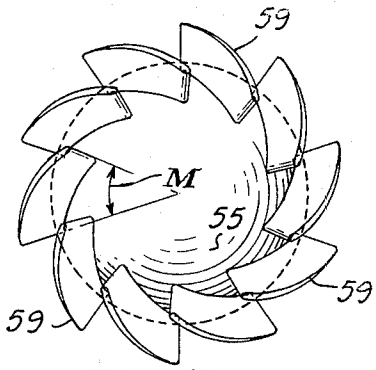


Fig. 9

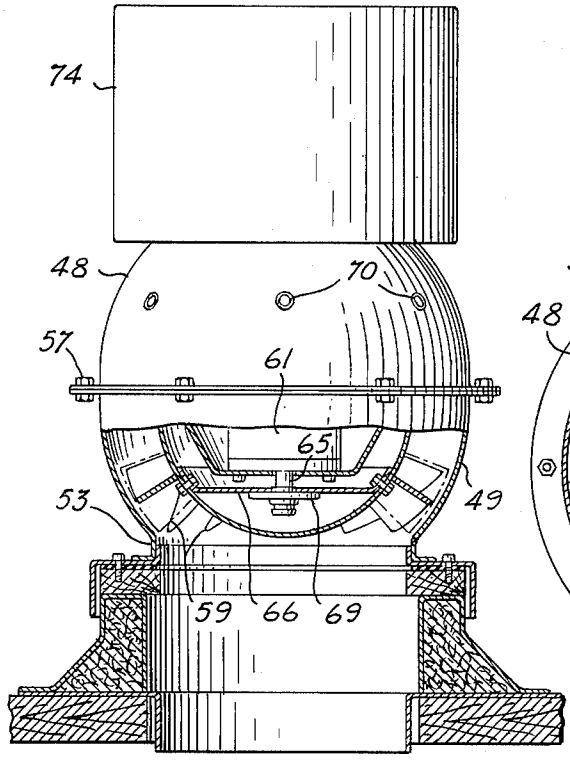


Fig. 11

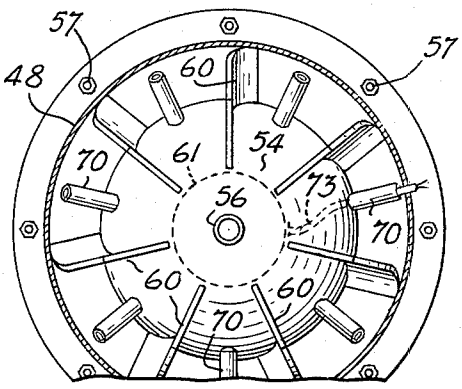


Fig. 10

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United States Patent Office 3,202,080 Patented Aug. 24, 1965



3,202,080

# VENTILATORS

Loren Cook, Berea, Ohio, assignor to Loren Cook Company, a corporation of Ohio

Filed Oct. 5, 1962, Ser. No. 228,558
7 Claims. (Cl. 98—43)

My invention relates to ventilators and more particularly to roof ventilators that are compact in design and are quiet and efficient in operation.

In roof ventilators as heretofore constructed, the area in the motor compartment is frequently insufficient to accommodate a comparatively large motor. Another serious defect in prior roof ventilators is the lack of proper ventilation to cool the motor. In ordinary ventilators and particularly those in which the blower wheel is rotated by a motor through a belt drive, the normal heat build-up in the motor compartment adversely affects the bearings and also causes rapid belt deterioration which eventually causes cracking and segmentation of the belt and this is particularly true when the air being exhausted through the ventilator is at a temperature of approximately 150° F. or higher.

In accordance with my invention, I have provided an improved ventilator which while being compact in design has a compartment which is large enough or which may be easily made large enough to accommodate a comparatively large motor. The accordance with my invention improved ventilating means are also provided through which air flows to cool the motor and in which the discharge of air from the ventilator causes the flow of air through the ventilating means to increase as the speed of the motor and blower wheel increase to thereby dissipate the heat generated by the increased speed of the motor. In my improved ventilator, means are also provided to reduce pressure and turbulence loss.

It is therefore an object of my invention to provide a ventilator including a motor compartment having an air entrance opening and an annular opening for the discharge of air therefrom and in which the ventilator is provided with an annular opening for the discharge of air from a room or building which is arranged below an annularly downwardly inclined baffle which forms the bottom wall of an air discharge outlet from the motor compartment to thereby create a negative pressure above the baffle during the discharge of air through the ventilator which in turn draws air from the motor compartment through the outlet opening and causes an inflow of air into the motor compartment through the inlet opening.

Another object of my invention is to provide a roof ventilator having a motor compartment, annular inlet and outlet openings through which air is circulated through the motor compartment to cool the motor and in which the ventilator is provided with an annular opening leading outwardly from a blower wheel which is arranged so that as air flows outwardly through the discharge opening, it causes air to circulate through the motor compartment which circulation of air through the motor compartment increases as the rotative speed of the motor and blower is increased.

A further object of my invention is to provide an improved roof ventilator including a blower wheel provided with air foil blades in which a venturi-shaped conduit means extends into the chamber containing the blower wheel and in which an outwardly extending wall surrounds the lower portion of the blades of the blower wheel which permits the wheel to operate under a slight internal pressure to thereby improve the efficiency of the wheel and provide a structure that is quiet and more efficient in operation than previous constructions.

A still further object of my invention is to provide an



improved ventilator having parts shaped to provide a straight line flow through the ventilator during the rotation of a motor.

Other objects and advantages of my invention will become apparent as the specification proceeds.

My invention will be better understood by reference to the accompanying drawings in which:

FIG. 1 is a cross sectional view taken on a plane passing through the line 1—1 of FIG. 2;

FIG. 2 is a plan view of the ventilator shown in FIG. 1;

FIG. 3 is a view with parts shown broken away of a ventilator similar to that shown in FIG. 1 but in which the blower wheel is indirectly driven;

FIG. 4 is a cross sectional view of a modification of my invention taken on a plane which shows one set of louvres in elevation and another set in section;

FIG. 5 is a ventilator similar to that shown in FIG. 4 but showing indirect means for rotating the blower;

FIG. 6 is a sectional view taken on a plane passing through the line 6—6 of FIG. 5, looking in the direction of the arrows;

FIG. 7 is a cross sectional view of another form of my invention;

FIG. 8 is a view taken on a plane passing through the line 8—8 of FIG. 7, looking in the direction of the arrows;

FIG. 9 is a perspective view of the lower end of the rotatable part of the inner casing;

FIG. 10 is a view taken on a plane passing through the line 10–10 of FIG. 7 looking in the direction of the arrows with parts of the casing omitted; and

FIG. 11 is an elevational view with parts in section of the ventilator shown in FIG. 7 but showing a modified means for mounting the ventilator on the roof of a building.

One form of my invention is illustrated in FIGS. 1 and 2 of the drawing in which a ventilator composed of three tiers is supported upon a curb 1 extending upwardly from a roof, not shown. As shown, the ventilator includes a base portion having downwardly extending side walls which rest upon and extend around the curb to which they may be secured in any suitable manner, such as screws, and which terminate in an upwardly extending throat or duct means 2, the axis of which is in alignment with the axis of the ventilator and which serves as a support for the other parts of the ventilator. In my improved ventilator, the parts are arranged to provide a blower compartment 3 and a motor compartment 4, a discharge outlet from the blower compartment, and air inlet and discharge openings through which air may be circulated through the motor compartment to cool the motor. For supporting the upper portions of the ventilator, an annular wall is provided which is designated generally by the numeral 5. As shown, the wall includes an annular flange 6 which is welded or otherwise secured to the throat 2 and a portion which first extends radially outwardly as indicated by the numeral 7 and then upwardly as indicated by the numeral 8 and terminates in an inverted U-shaped portion 9 which forms the lower portion of the ventilator discharge opening.

To form the blower and motor compartments, a plurality of bolts 10 are provided, the head of each of which is arranged in the inverted U-shaped portion 9 and each of which extends through a plurality of spaced tiers and while the number of tiers provided will of course depend upon the size of the motor and the manner in which it is mounted in the motor compartment as shown in FIGS. 1 and 2, three tiers 11, 12 and 13 are provided which are maintained in spaced relation by a series of tubes 14, 15 and 16, the tubes 14 surrounding the portions of the bolts

10 between tiers 11 and 12, the tubes 15 surrounding the portions of bolts 10 between tiers 12 and 13, and the tubes 16 surrounding the portions of the bolts 10 between the inverted U-shaped portion 9 of wall 5 and tier 13. As shown in FIG. 1, the upper ends of the bolts 10 extend through tier 11 and are secured in place by nuts 17.

As shown in the drawings, tier 13 extends radially across the ventilator and forms a cover for the blower wheel and a support for the motor which is secured thereto by suitable means, such as bolts and nuts 18*a*. The tier 13 separates the motor compartment from the blower compartment and terminates in a downwardly extending annular baffle 19 which forms the upper wall of an annular discharge opening which extends between baffle 19 and the inverted U-shaped portion of the wall 5. The tier 12 has a central opening through which the motor extends and terminates in a downwardly inclined annular baffle 20 which is of the same size and shape as baffle 19. Tier 11 extends radially across the ventilator and serves as a cover for the motor compartment and also terminates in a downwardly inclined annular baffle 21 which is similar in size and shape to baffles 19 and 20. For strengthening tiers 11, 12 and 13, tiers 11 and 13 are provided with upwardly extending central portions and tier 12 is provided with an upwardly extending portion which terminates in an annular flange.

As illustrated in the drawings, the blower wheel includes a plate 22 which if desired may have a central depressed portion for strengthening purposes and a hub 23 secured thereto into which the shaft 24 of motor 18 extends and to which it may be secured by suitable means, such as a set screw, not shown, so that when the motor is energized it causes rotation of the blower wheel to force air outwardly. As shown, hub 23 is provided with a flange which closes the opening through which shaft 24 of the motor extends. The blower also consists of a plurality of blades 25 which are secured to the plate 22 in any desired manner and to provide quiet operation of the ventilator, each blade is of the air foil type and is provided with a flange 26 which is riveted or otherwise secured to the plate 22.

It will be noted that the throat or duct means 2 which extends upwardly from the curb has a venturi-shaped outer portion opening into the blower wheel compartment and the wall 5 is provided with a cut-off for air forced outwardly by the lower portion of the blades which permits the blower wheel to operate under a slight internal pressure, thereby improving its efficiency, and which provides with the air foil blades an efficient ventilator that is exceptionally quiet in operation. The wall 5 also prevents back pressure into the ventilator and its upwardly extending annular portion is so positioned that the cross sectional area at the outlet of the blower wheel is equal to the cross sectional area of its inlet, thereby providing a constant pressure in the blower compartment.

To cool the motor, an annular opening is provided between downwardly extending baffles 21 and 20 for the entrance of air into the motor compartment and an annular opening is provided between the downwardly extending baffles 20 and 19 for the discharge of air from the motor compartment. It will be particularly noted that the discharge of air in the annular space between the downwardly extending baffle 19 of the tier 13 and the U-shaped portion of wall 5 causes a negative pressure area above baffle 19 so that air will be drawn outwardly between baffles 20 and 19 which is replenished by air from the atmosphere flowing into the motor compartment between baffles 21 and 20. The rotative speed of the blower wheel of course depends upon the rotative speed of the motor. As the speed of the motor is increased, more heat is generated but because the speed of the blower is likewise increased, the negative pressure above baffle 19 is increased which causes an increased circulation of air through the blower to cool the motor. The arrows A indicate the path of the air for cooling the motor and the arrows B indicate the path of the air discharged through the ventilator. Any suitable means may be provided for energizing the motor. As shown, a cable 27 carrying electrical conductors connected to a suitable source of electrical energy extends through an opening in the curb and through tube 28 to the motor.

In the form of my invention shown in FIGS. 1 and 2, the downwardly extending baffles while permitting the discharge of air from the blower wheel and the free circulation of air through the motor compartment, prevents the entrance of weather elements, such as snow, sleet, or rain, into the motor and blower compartments and because the tiers are comparatively shallow, they are rigid and are free from flexing and vibrations at their outer edges when prepared by the usual spinning process.

In accordance with my invention, the size of the motor compartment may be varied to accommodate motors of various sizes or to provide an increased area to permit the motor to be suspended in the event that the blower is to be indirectly driven. For this purpose, an additional tier 29 may be arranged between tiers 11 and 12 as shown in FIG. 3 through which bolts 10 extend and which is maintained in spaced relation to tiers 11 ad 12 by tubular spacers in the manner shown in FIG. 1.

In the form of the invention shown in FIG. 3, the blower is driven by a drive shaft 30 which extends through bearings 31 and 32 which may be supported in any convenient manner. As shown in FIGS. 3 and 6, a frame is provided consisting of side walls 33 and 34, only one of which is shown in FIG. 3 between which extend upper and lower cross pieces 35 and 36 which form supports for bearings 31 and 32. As shown in FIG. 3, the lower portion of shaft 30 extends through apertures in cross piece 36, tier 13 and plate 22 and terminates in a hub 23 secured to plate 22. The shaft 30 in turn is secured to hub 23 by suitable means, such as a set screw, not shown, and serves to support the blower wheel in the desired rotatable position within the blower compartment. The upper end portion of shaft 30 also extends into a hub 37 having a pulley secured thereto. The motor 18 may be secured to the frame in any suitable manner. As shown, it is secured to a bracket 39 which in turn is secured to the side walls of the frame and its shaft extends into a hub 40 having a pulley 41 secured thereto which is arranged in alignment with pulley 38 on shaft 30 and is connected thereto by a belt 42 trained around the pulleys. When motor 18 is energized, it rotates shaft 30 which in turn rotates the blower wheel.

Another form of my invention is shown in FIGS. 4 to 6 which is similar to that shown in FIGS. 1 and 2 but in which only two tiers 12 and 13 are shown. In this form of the invention, tier 12 is provided with a dome which projects upwardly a sufficient distance to accommodate the motor and is provided with spaced louvres 43 through which air flows into the motor compartment when air is drawn outwardly from the motor compartment through the annular opening between baffles 20 and 19 when air is exhausted from the ventilator through the annular opening between baffle 19 and the U-shaped portion 9 of wall 5 and while only four louvres are shown in the drawing, each of which is composed of two openings, it will of course be understood that the number of louvres as well as the number of openings in each louvre may be increased when the size of the ventilator is large.

Another modification of my invention is shown in FIGS. 5 and 6 which is similar to that shown in FIG. 4 with the exception that the blower is indirectly driven as shown in FIG. 3 and consequently the parts have been designated by the same numerals. When annular inlet openings are provided, they provide better ventilation than spaced louvres and while one annular inlet opening is usually sufficient to provide the desired circulation of air through the motor compartment, when four tiers are provided as shown in FIG. 3, air may flow into the motor compartment through the annular openings between baffles 21

and 21*a* and between baffles 21*a* and 20. In my improved ventilator, it will also be noted that in all of the modifications, air enters the motor compartment from outside of the building and the motor is completely protected from air or fumes being drawn outwardly from the building.

When a frame is provided to support the motor and the drive shaft for the blower wheel, means are preferably provided to resiliently support the frame from tier 13 and while any suitable means may be provided for this purpose as shown, each of the sides of the frames has a flange 44 and 45, respectively, extending therefrom as shown more particularly in FIG. 6 and a pair of rubber mounts 46 are arranged between each flange and tier 13, each of which has a bolt extending therethrough, the head of which is arranged below tier 13 and the upper end portions of two of such bolts extend through openings at the opposite ends of one of the flanges and are secured thereto by suitable means, such as nuts, and the upper end portion of each of the other two bolts extends through the respective openings in the opposite ends of the other flange and are secured thereto by similar means.

Another form of my invention is shown in FIGS. 7 to 11, a portion of which is inserted within an opening in a curb 47 extending upwardly from the roof of the building. As shown, the ventilator includes an outer casing consisting of the conically-shaped parts 48 and 49, part 48 terminating in a cylindrical throat 50 having an outwardly extending flange which is connected to an outwardly extending flange on an outlet duct means 51 by bolts 52, and part 49 terminating in a throat 53 which extends into the opening in the curb. The ventilator also includes an inner casing consisting of a stationary semispherically-shaped part 54 and a rotatable semispherically-shaped part 55. The outer surface of the stationary part 54 has a convex portion which is tangent to a plane passing through the junction of part 48 and its throat 50 and terminates in an open tubular projection 56 arranged in axial alignment with the axis of the ventilator and the outer surface of the rotatable part 55 of the inner casing terminates in a convex portion which is tangent to a plane passing through the junction of the second part of the outer casing and its throat. As shown in FIG. 7, the axis of the inner casing is in axial alignment with the axis of outlet duct means 51 and the upper and lower parts of the outer casing are connected together at their enlarged portions by suitable means, such as bolts 57 which also extend through a base portion 58 which fits over the curb.

For drawing air from the building, a plurality of blades 59 are secured to the outer periphery of the lower rotatable portion of the inner casing. As shown, the blades are of the air foil type and are relatively short and while the length of the blades of different size rotors will of course vary, in the modification shown, the root of each of the blades is approximately 2.7 inches and the tip is approximately 3.7 inches in length. As shown in FIG. 9, each of the blades has a concave portion facing the inlet to the ventilator and the angle C formed between the leading and trailing edges of each blade is approximately 25° and the angle D between the leading edge of each blade and the axis of the ventilator is approximately 45° and while the number of blades may be varied depending upon the size of the rotary part of the ventilator, in the modification shown, ten blades are provided and the angular distance between the leading and trailing edge of each of the blades on the periphery of the rotary part of the inner casing is approximately 39° as indicated by the letter M in FIG. 9.

In my improved ventilator, the part 48 of the outer casing is connected to the inner casing by air turning vanes 60 which extend from the inner end of the conically-shaped portion 48 to the junction of the conically shaped portion with the throat 50. Each of the air turning vanes is of an air foil design and has a slight bend therein to provide a substantially concave surface which is arranged in opposed relation to the concave surface in each



of the air driving blades. The number of air turning vanes will of course depend upon the size of the ventilator. It has been found, however, that if the number of air turning vanes is the same or if the number of air driving blades is a multiple of the number of air turning vanes, an air turbulence occurs in the ventilator. As shown, there are ten air driving blades and seven air turning vanes.

For rotating the part 55 of the inner casing, a motor 61 is secured to the base portion 62 of a mounting plate by suitable means, such as bolts. As shown the mounting plate has a conically-shaped wall 63 which terminates in an annular flange 64 which is welded or otherwise secured to the stationary part 54 of the inner casing. The shaft 65 of motor 61 extends through an opening in the base portion 62 of the mounting and through an aperture in a plate 66 having a conically-shaped flange 67 to which the rotatable portion 55 of the inner casing is secured in any suitable manner, such as by bolts. The free end portion of shaft 65 terminates in a hub 68 having a flange 69 secured thereto which is also secured to mounting plate 66 and consequently when motor 61 is rotated it rotates casing 55. The flange 68 also prevents entrance of air into the motor compartment through the aperture through which the motor shaft 65 extends.

It will be noted that a comparatively large space is provided within the inner casing for the motor which may therefore be of a comparatively large size and that the air driving blades are spaced a substantial distance from the convex end X of the inner casing so that a comparatively large number of blades may be applied to the rotatable portion of the inner casing.

For cooling motor 61, a plurality of tubes 70 are provided which extend through the part 48 of the outer casing and through the stationary part 54 of the inner casing and while the number of breathing tubes may be varied, a breather tube is arranged between each pair of air turning vanes. Motor 61 may be energized in any suitable manner. As shown, a tube 71 extends from inside the room or building to which the ventilator is applied to a junction box 72 and conductors 73 lead from the junction box 71 through one of the air tubes to the motor.

In the modification shown in FIGS. 7 to 10, the conically-shaped part 49 of the outer casing is arranged at such distance from the rotatable part of the inner casing that the tip portion of the leading edge of each of the blades is arranged in proximity to the part 49 of the outer casing at the junction of the part 49 with its throat 53 and the conically-shaped part 48 of the outer casing is arranged at approximately the same distance from the stationary part of the inner casing as the part 49 of the outer casing is arranged from the rotatable inner part 55 and the trailing edge of each of the air turning vanes terminates at the junction of the conical part 48 of the outer casing with its throat 50. By arranging the tip of the leading edge of each of the blades in line with the junction of the part 49 with its throat 53, a substantially straight line flow of air into the ventilator with the minimum of resistance is obtained and in a like manner by arranging each of the air turning vanes so that the trailing edge of each vane terminates at the junction between the conical part 48 and its throat 50, air is discharged from the ventilator with the minimum of resistance.

In accordance with my invention, the air driving blades are comparatively short and the outer casing is arranged in such close proximity to the inner casing that a static pressure is built up in the area between the outer and inner casings and the air driving blades and the air turning vanes. From comparative tests, it has been found that when the angle C formed by a plane passing through the leading edge and a plane passing through the trailing edge of each blade is an acute angle of approximately 25° as shown in FIG. 7, the driving blades are particularly efficient during rotation in drawing air smoothly into the ventilator and discharging it there-

from with less impact than when the angle varies substantially from 25°. When the blades are comparatively short, the cross sectional area of the space H between the inner and outer casings and the air driving blades and the air turning vanes is comparatively large which permits air to be built up within the ventilator and because of the low air turbulence the part 55 of the ventilator may be efficiently rotated. The fact that the air turning vanes are slightly concave also aids in providing a straight line flow. In my improved ventilator as shown in FIGS. 7 to 10, there is a distinct combination between the short air driving blades, the air turning vanes, and the plenum chamber H arranged between the inner and outer casings and the air drivnig blades and air turning vanes which permits air pressure to be built up within the ventilator because when such a combination is present, it has been found that air from the inlet duct means may be drawn into the ventilator in a substantially straight line flow and discharged in a substantially straight line flow into the outer duct means with substantially no turbulence. In the modification shown in FIGS. 7 to 10, it will be noted that the cross sectional area of the inlet duct means is substantially the same as the cross sectional area of the plenum chamber between the inner and outer casings is approximately the same as the cross sectional area of the throat of the second part of the stationary part of the outer casing and the outlet duct means. By providing such an arrangement, air passing through the unit will have a substantially constant pressure and velocity.

When iar is forced outwardly through the throat 50 and the duct means 52, air is drawn outwardly from the motor compartment through the outlet tube 56 which is replenished by air passing through the breather tubes 70. The motor is therefore protected from air passing from the building that may be contaminated with fumes from the room or building.

To protect the ventilator from weather elements when the ventilator is installed upon a roof, an annular baffle 74 is provided which may be mounted in place in any suitable manner. As shown, a pluralit yof angularly-shaped brackets are provided, one flange of each of which is secured to the baffle by suitable means, such as by welding or bolts and other flange of which extends inwardly over the outwardly extending mating flanges on the throat 50 and conduit means 51 and is secured thereto by the bolts 57 which connect these two flanges together. A pair of dampers 75 and 75*a* are also provided which are pivotally mounted upon rods extending through base portions of brackets secured to the opposite sides of the baffle, each of which is limited in its pivotal movement by a stop 76. The dampers close by gravity. When motor 61 is energized, however, air is forced outwardly through duct means 51 which opens the dampers and when the motor is deenergized, the dampers return to their normally closed positions. As shown, the upper surface of each of the dampers is inclinde downwardly so that when weather elements, such as rain, or melted snow or ice, fall upon the dampers, the water flows downwardly between the duct means 51 and the baffles. Water from weather elements striking the inner portion of the baffle, such as rain, or melted snow or ice, also flows downwardly along the interior of the baffle and between the baffle 74 and the conduit means 51.

The modification shown in FIG. 11 is similar to that shown in FIGS. 7 to 10 and the parts have accordingly been designated by the same reference numerals. In the modification shown in FIG. 11, however, the throat 53 terminates in an outwardly extending flange which may be secured in any suitable manner, such as by welding or screws, to the base portion which fits over the curb.

What is claimed is:

1. A ventilator including a base for application to a curb on a roof of a building and having an annular conduit means extending upwardly therefrom, a tier spaced upwardly from said base and consisting of a radially extending circular wall having a central opening therein which terminates in a downwardly inclined annular baffle, means for supporting said tier in place, a blower arranged between said wall and said conduit means, means for providing a compartment for said blower including a second cylindrical wall extend substantially vertically upwardly relative to the base which surrounds the lower portion of said blower and which terminates below the upper portion of said blower and the circular wall of said tier, means for supporting the second cylindrical wall, a motor supported on the radially extending wall of said tier, a shaft extending through the central opening in the wall of the first tier which is secured to said blower and whichi s rotatable by said motor, means providing a compartment for said motor including a third circular wall arranged above said motor having its central portion arranged in alignment with said conduit means and a downwardly extending portion and said ventilator also including a downwardly inclined second baffle arranged parallel to and in spaced relation to the baffle of the first tier and providing therebetween an annular outlet passage for air from the motor compartment when said motor is energized to rotate said blower to draw air through said conduit means and force it outwardly between the second circular wall and the baffle of the first tier, means for supporting the third circular wall and the second baffle in place, and means for providing an opening leading into the motor compartment through which air may be drawn into the motor compartment to replace the air drawn outwardly between said baffles during the rotation of said blower.

2. A ventilator including a base for application to a curb on the roof of a building and having an annular conduit means extending upwardly therefrom, a tier spaced upwardly from said base and said conduit means and consisting of a radially extending circular wall having a central opening therein which is arranged in axial alignment with the vertical axis of said conduit means and which terminates a downwardly inclined annular baffle, means for supporting said tire in place, a blower arranged between said wall and said conduit means, means for providing a compartment for said blower including a second annular wall extending vertically upwardly relative to the base which surrounds the lower portion of said blower and which terminates at a sufficient distance below the upper portion of said blower and the circular wall of said tier to provide an annular air discharge opening between the second wall and the baffle of the first tier which has substantially the same cross sectional area as the inlet conduit means, means for supporting the second cylindrical wall, a motor supported on the radially extending wall of said tire, a shaft extending through the central opening in the wall of said tier which shaft is secured to said blower and is rotatable by said motor, means providing a compartment for said motor including a third circular wall arranged above said motor having its central portion arranged in alignment with said conduit means and a downwardly extending portion, and said ventilator also including a downwardly inclined second baffle arranged parallel to and in upwardly spaced relation to the baffle of the first tier and providing therewith an annular outlet passage for air from the motor compartment when said motor is energized to rotate said blower to draw air through said conduit means and force it outwardly between the second circular wall and the baffle of the first tier, means for supporting the third circular wall and the second baffle in place, and means for providing an opening leading into the motor compartment through which air may be drawn into the motor compartment to replace the air drawin outwardly from the motor compartment between said baffles during the rotation of said blower.

3. A ventilator including a base for application to a

curb on the roof of a building and having an annular conduit means extending upwardly therefrom, a tier spaced upwardly from said base and said conduit means and consisting of a radially extending circular wall having a central opening therein and a downwardly inclined annular baffle, a blower arranged between said wall and said conduit means including blades which extend radially outwardly relative to the axis of the ventilator, means for providing a compartment for said blower including a second annular wall having its lower periphery secured to said conduit means, a portion which etxends radially outwardly relative to the axis of the ventilator below the lower portion of the blower and a portion which extends substantially vertically upwardly around the lower portion of the blower to cut off air forced outwardly by the lower portion of the blower and which terminates in an inverted U-shaped flange, means for supporting said tier at a sufficient distance above said flange to provide an annular outlet opening between the second wall and the circular wall of said tier which has substantially the same cross sectional area as the conduit means leading into the blower compartment, a motor supported on the radially extending wall of said tier, a shaft extending through and substantially closing the central opening in the wall of said tier which shaft is secured to said blower and is rotatable by said motor, means providing a compartment for said motor including a third circular wall arranged above said motor having its central portion arranged in alignment with said conduit means and a downwardly extending portion and said ventilator also including a downwardly inclined second baffle arranged parallel to and in spaced upwardly relation to the baffle of said tier and providing therewith an annular outlet passage for air from the motor compartment when said motor is energized to rotate said blower to draw air through said conduit means and force it outwardly between the second annular wall and the baffle of said tier, means for supporting the third circular wall and the second baffle in place, and means for providing an opening leading into the motor compartment through which air may be drawn into the motor compartment to replace the air drawn outwardly from the motor compartment between the baffles during the rotation of said blower.

4. A ventilator as defined in claim 3 in which the third circular wall and its downwardly extending portion are substantially in the form of a dome and in which the downwardly inclined second baffle which is spaced upwardly from the downwardly inclined baffle of the first tier to provide an annular air discharge passage from the motor compartment is integral with said dome and the means for providing the opening leading into the motor compartment is in the shape of a louver formed in said dome.

5. A ventilator including a base for application to a curb on the roof of a building and having an annular conduit means extending upwardly therefrom, a tier spaced upwardly from said base and said conduit means and consisting of a radially extending circular wall having a central opening therein which is in alignment with the vertical axis of said conduit means and which terminates in a downwardly inclined annular baffle, a blower arranged between said wall and said conduit means, means for providing a compartment for said blower including a second annular wall extending substantially vertically upwardly relative to the base which surrounds the lower portion of said blower to cut off air forced outwardly by the lower portion of the blower and which terminates at a sufficient distance below the upper portion of said blower and the circular wall of the first tier to provide an annular air discharge opening between the second annular wall and the wall of the first tier which has substantially the same cross sectional area as the inlet conduit means, means for supporting the second cylindrical wall, a motor supported on the radially extending wall of said tier, a shaft extending through the central opening in the wall of the first tier which is secured to said blower and which is rotatable by said motor, means providing a compartment for said motor including a second tier having an annular flange surrounding the motor, the outer portion of which terminates in a downwardly extending annular baffle which is spaced upwardly from the baffle of the first tier to provide an annular passage leading from the motor compartment through which air is discharged when the blower is energized to draw air from the building through said conduit means and discharge it between the second wall and the downwardly extending baffle of the first tier, a third tier arranged above said motor having a central wall arranged in axial alignment with said conduit means and which terminates in an annular downwardly inclined baffle which is spaced upwardly from the baffle of the second tier and is parallel thereto to provide an annular opening leading into the motor compartment through which air may flow into the motor compartment to replenish air drawn outwardly between the baffles of the first and second tiers when the blower is energized to force air from the building outwardly between the second wall and the baffle of the first tier.



6. A ventilator including a base for application to a curb on the roof of a building and having an annular conduit means extending vertically upwardly therefrom, a first tier spaced upwardly from said base and said conduit means and consisting of a radially extending circular wall having a central opening therein which is arranged in axial alignment with the vertical axis of said conduit means and which terminates in a downwardly inclined annular baffle, a blower arranged between said wall and said conduit means, means for providing a compartment for said blower including a second annular wall extending substantially vertically upwardly relative to the base which surrounds the lower portion of said blower to cut off air forced outwardly by the lower portion of the blower and which terminates at a sufficient distance below the upper portion of said blower and the circular wall of the first tier to provide an annular air discharge opening between the second annular wall and the wall of the first tier which has substantially the same cross sectional area as the inlet conduit means, means for supporting the second cylindrical wall, a motor supported on the radially extending wall of the first tier, a shaft extending through the central opening in the wall of the first tier which is secured to said blower and which is rotatable by said motor, means providing a compartment for said motor including a second tier having an annular flange surrounding but spaced from the motor and a downwardly extending annular baffle which is spaced upwardly from the baffle of the first tier to provide an annular passage leading from the motor compartment through which air is discharged when the blower is energized to draw air from the building through said conduit means, a third tier having an annular flange surrounding the motor and a downwardly inclined baffle which is parallel to the baffle of the first tier but is spaced upwardly therefrom to provide an annular air inlet passage leading into the motor compartment, a fourth tier having a central wall arranged above said motor, the central portion of which is in alignment with the axis of said conduit means and having an annular downwardly inclined baffle which is spaced upwardly from and is parallel to the baffle of the third tier to provide a second annular passage leading into the motor compartment through which air may flow into the motor compartment which together with the air that flows into the motor compartment through the annular passage between the baffles of the second and third tiers replenishes air drawn outwardly between the baffles of the first and second tiers when the blower is energized to force air from the building outwardly between the second wall and the baffle of the first tier, and means for maintaining said tiers in spaced relation to each other.

7. A ventilator including a base for application to a curb on the roof of a building and having an annular conduit means extending upwardly therefrom, a tier spaced upwardly from said base and said conduit means and consisting of a radially extending circular wall having a central opening therein which is arranged in axial alignment with the vertical axis of said conduit means and which terminates in a downwardly inclined annular baffle, a blower arranged between said wall and said conduit means and having blades which extend radially outwardly beyond the conduit means, means for providing a compartment for said blower including a second annular wall having its lower peripheral portion secured to the outer periphery of said conduit means, a portion extending radially outwardly, and a portion extending substantially vertically upwardly relative to the base which surrounds the lower portion of said blower to cut off air forced outwardly by the lower portion of the blower and which terminates in an inverted U-shaped flange and in which the vertically extending portion of the second annular wall is at a sufficient distance below the upper portion of said blower and the circular wall of the first tier to provide an annular air discharge opening between the second annular wall and the wall of the first tier which has substantially the same cross sectional area as the inlet conduit means, a motor supported on the radially extending wall of said tier, a shaft extending through and substantially closing the central opening in the wall of the first tier which shaft is secured to said blower and which is rotatable by said motor, means providing a compartment for said motor including a second tier having an annular flange surrounding but spaced from the motor and a downwardly extending annular baffle which is spaced upwardly from the baffle of the first tier to provide an annular passage leading from the motor compartment through which air is discharged when the blower is energized to force air from the building through said conduit means, a third tier having an annular flange surrounding the motor which terminates in a downwardly inclined baffle which is arranged above the baffle of the second tier and which provides an annular air inlet passage into the motor compartment between the baffles of the second and third tiers, a fourth tier having a central wall arranged above said motor, the central portion of which is in axial alignment with said conduit means and which has an annular downwardly inclined baffle which is spaced upwardly from the baffle of the third tier to provide a second annular air passage leading into the motor compartment which together with the air which flows into the motor compartment through the annular passage between the second and third baffles replenishes air drawn outwardly between the baffles of the first and second tiers when the blower is energized to force air from the building outwardly between the second wall and the baffle of the first tier, and means for maintaining said tiers in spaced relation to each other.




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