Oct. 17, 1950 I. I. SOLZMAN 2,526,290

AIR EXHAUSTER

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Fig 1.

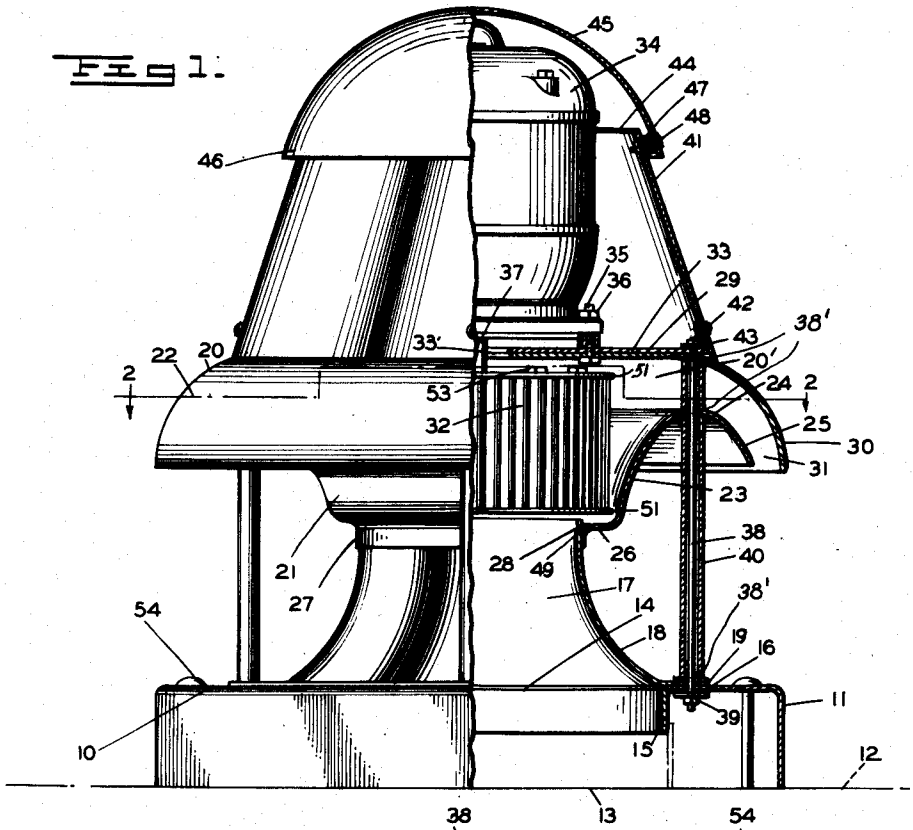
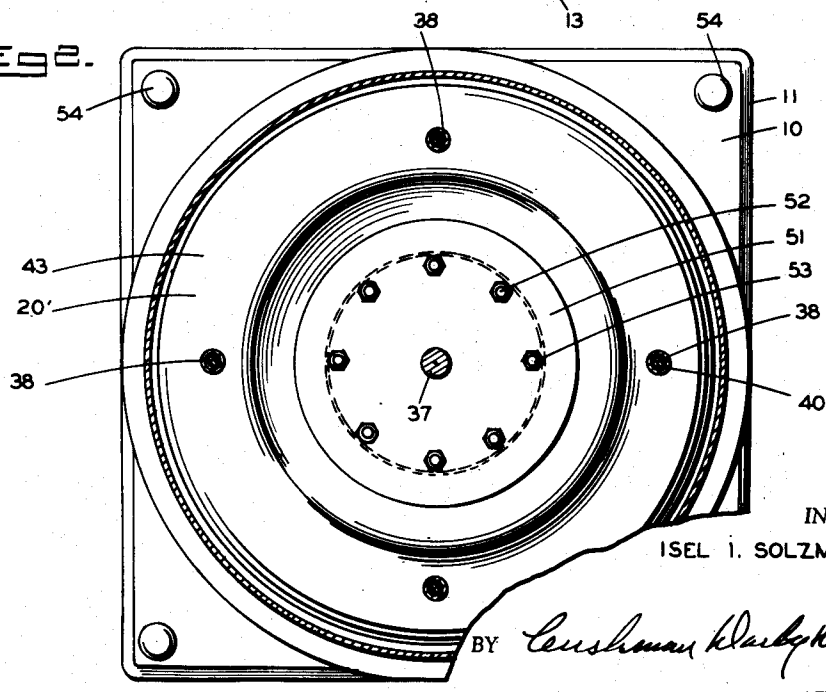


Fig 2.



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AIR EXHAUSTER

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5 Claims. (Cl. 98—43)

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This invention relates to an improved power-operated ventilator or air exhauster.

An important object of the invention consists in providing a ventilator casing with simple, efficient and positive means for drawing polluted air into and through the casing and discharging the air outwardly from the casing and downwardly through an annular outlet passage. The casing has mounted therein a motor-operated fan and an air inlet flue or nozzle so shaped as to eliminate turbulence and noise and which delivers the air through the casing and discharges the same through the annular outlet. Additionally, means are provided for preventing re-circulation of the air from the outlet or discharge side of the casing back to the inlet or suction side. The inlet flue or nozzle is shaped to very closely follow the static pressure curve of the fan so as to increase the efficiency of the ventilator by cutting off or reducing the area of the chamber in which the fan is mounted, and is shaped so as to create a scroll effect without enclosing the fan entirely.

A further object consists in providing the casing with a fan chamber comprising a lower hood and a spaced upper hood, the lower hood being shaped to have an intermediate upwardly and outwardly deflecting air portion terminating in a downwardly curved outer end. The intermediate portion also has an inwardly extending shoulder below the fan that terminates in a downwardly annular collar or inner end which encircles and is connected to the upper portion of the inlet flue member. The upper hood is preferably provided with an intermediate transverse portion terminating in a downwardly curved annular flange spaced from the outer end of the inner hood to provide an annular and downwardly tapered discharge outlet from the casing.

Another object comprehends the provision of a ventilator assembly including a base on which is mounted a flared inlet flue which communicates with a fan casing at its upper end, which casing is formed of spaced curved hood members. A motor mounted on the top of the upper hood has an operating shaft connected to the fan positioned in the chamber and circumferentially spaced bolts connect the fan casing to the base, and also may be used for maintaining the inlet flue member in a fixed position on the base. The flue member is so connected to the base and the fan casing as to coact with the bolts to provide a structural support for the motor and fan when the parts are assembled.

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Other objects and advantages of the invention will become apparent from the following description when taken in conjunction with the accompanying claims and drawings.

Referring to the drawings in which is shown a preferred embodiment of the invention:

Figure 1 is a side elevational view with parts in section of the ventilator constructed in accordance with the present invention, and

Figure 2 is a sectional view taken substantially along the line 2—2 of Figure 1.

Referring to the drawings, 10 indicates a metal base which may be of any suitable size and shape and, as shown, is square and provided with downwardly extending sides 11 arranged to be mounted on a roof or the like 12 having an opening 13 therein (Fig. 1). The top of the base 10 has a circular opening 14 in which extends a depending skirt 15 of an annular flange member 16 that is of such diameter as to overlap and engage the underside of the top of the base 10 adjacent the opening 14. The skirt 15 extends downwardly into the base 10 to provide attaching means for duct work and the like, and may be integrally formed from the top of the base.

Above the opening 14 and supported by the base 10 is an air inlet tubular member or nozzle 17 that is preferably formed with a downwardly and outwardly flared portion 18 that terminates in an annular flange 19 positioned to rest on the top of member 10. A fan casing 20 is positioned above the flue member 17 and preferably comprises a curved annular lower hood 21 and a complementary curved upper hood 22 that are spaced from each other so as to form the chamber 20' in the casing 20. The lower hood 21 has a curved intermediate portion 23 (Fig. 1) which extends upwardly and outwardly as at 24 and then downwardly as at 25 at its outer end. The intermediate portion 23 of the inner hood is also formed with an inwardly extending annular shoulder 26 that terminates in a downwardly extending annular collar or flange 27 that encircles the upper end portion 28 of the flue 17. The upper hood 22 has an intermediate, flat, circular portion 29 that closes the top of the casing 20 and has an annular downwardly flared outer flange 30 which is spaced from the outer end 25 of the inner hood so as to form a downwardly tapered annular discharge passage 31 that extends completely around the fan casing so as to direct the air from the casing outwardly and downwardly therefrom. Any suitable type of fan 32, such as a turbine or sirocco fan, is positioned

within the chamber 20'. A plate 33 is mounted on the transverse portion 29 of the upper hood 22 and provides a support for a motor 34 which may be connected to the plate by any suitable means such as the threaded retaining bolts 35 and nuts 36. The top 29 of the outer hood 22 and the plate 33 have central openings 33' which communicate with the chamber 20' and through which extends a driving shaft 37 from the motor 34. The shaft 37 is operatively connected to the fan 32 so that when the motor is in operation, the fan causes the polluted air to be drawn through the axial inlet member 17 into the chamber 20' and discharge outwardly and downwardly therefrom through the annular outlet 31.

The plate 33 and the upper and lower hoods of the fan casing 20, as well as the flange 19 of the flue 17, are provided with circumferentially spaced openings 38' which register with complementary aligned openings in the top of the base 10, so as to receive threaded retaining bolts 38 for firmly connecting the motor 34, fan 32 and their associated parts to the base 10, when the nuts 39 are threaded to the bolts 38. Guide sleeves 40 may be positioned between the base and the fan casing 20 through which the bolts 38 extend. The sleeves 40 engage the walls of the openings in the lower hood 21 so as to provide firm bearing surfaces for the hoods when the parts are assembled.

The motor 34 may be enclosed in a housing 41 that is secured at its lower end by the bolts 42 and spaced bracket members 43 to the top of the main casing 20. The housing 41 has its upper end 44 opened so as to be covered by a top 45 that overlaps the housing as at 46 and is spaced therefrom by the washers 47 and bolts 48 in order to provide circumferentially disposed passages for allowing the outside air to be conducted into the housing in order to cool the motor 34 and then be discharged through the openings 33' into the chamber 20', so as to discharge through the outlet 31. Thus, means are provided for cooling the motor during the operation of the ventilator. The parts of the ventilator when assembled provide a unitary structure which can readily be mounted on a roof, or associated with a wall or the like that is exposed to changeable weather conditions.

The flange or collar 27 on the lower end of the inner hood 21 may be connected to the inlet flue member 17 by welding as at 49 or any other suitable means, and the upper end 28 of the flue 17 extends into the chamber 20' of the casing 20 so as to prevent re-circulation of the air from the discharge outlet 31 back to the inlet flue or suction side 17 of the fan. The inlet flue 17 rests on the base 10 and is secured thereto by the bolts 38. It also coacts with the bolts 38 to assist in supporting the fan 32, motor 34 and their associated parts when the ventilator is assembled. The blades of the fan 32 may be retained in a fixed position by the vertically spaced discs or plates 51 through which extend the threaded bolts 52 that are secured to the plates by the nuts 53. Spaced bolts 54 extending through the top of the base 10 may be of such length as to secure the ventilator in a fixed position on the roof 12.

The inlet flue 17 is so shaped as to eliminate turbulence and noise of the air delivered into the fan casing and discharged through the annular outlet 31. Moreover, the lower hood 21 is shaped to reduce or cut off the area of the chamber in which the fan is positioned and creates a scroll effect without entirely closing the fan and with the result that the curved shape of the inner hood very closely follows the static pressure curve of the fan, so as to materially increase the efficiency of operation of the ventilator by cutting off a lower portion of the chamber adjacent the lower end of the fan which results in a substantial increase in performance of the ventilator.

As the outside air is allowed to enter circumferentially at the top of the housing 41 to cool the motor 34, it will be seen that the ventilator may safely and efficiently be used in industrial plants and the like, where polluted air containing corrosive fumes, explosive gases, and wet air are to be handled. Since the air circulating through the housing 41 is under negative pressure at all times when the unit is in operation, the passage of polluted fumes into the motor housing is prevented so that the motor 34 is protected from the corrosive or deleterious action of the fumes being handled. Moreover, where explosive gases are mixed in with the exhaust air, due to the motor housing 41 being under negative pressure, it will act to prevent the contact of such explosive fumes with the electrical motor and its connections, and also obviates the necessity and expense of providing explosion-proof motors. As the motor 34 is positioned above and spaced from the chamber 20', it is completely out of the air stream passing through the inlet flue 17, chamber 20' and the discharge outlet 31 when the ventilator is in operation. Further, the motor 34 is protected from the explosive or corrosive fumes by reason of the fact that the discharge of polluted air from the chamber 21 is downwardly and away from the motor through the outlet 31 so that any air which might be drawn into the housing to ventilate or cool the motor would either be free of corrosive fumes or would be so highly diluted by the outside air as to remove its deleterious or explosive effects.

It will be understood that the form of the invention shown is merely illustrative of a preferred embodiment and that such changes may be made as fall within the scope of the following claims.

I claim:

1. A ventilator of the class described having in combination, a base provided with a central opening, an air inlet tubular member extending upwardly from the base, said tubular member having an outwardly flared lower end portion terminating in an outwardly disposed annular flange resting on the base, said flange having spaced circumferentially disposed openings, a fan casing above said tubular member, said casing including a lower hood and a spaced upper hood, a fan in said casing, said lower hood having an intermediate upwardly and outwardly deflecting portion terminating in a downwardly curved outer end, said intermediate portion also having a shoulder portion extending inwardly below the fan and terminating in a downwardly extending annular inner end encircling and connected to the upper end of said tubular member, said upper hood having an intermediate transverse portion terminating in a downwardly curved annular flange spaced from the outer end of the inner hood to provide an annular and downwardly disposed air discharge outlet from the casing, a plate on the transverse portion of the upper hood, said plate and upper hood having central orifices, a motor mounted on the plate and having a drive shaft extended through said orifices and operatively connected to said fan for drawing polluted air through the inlet member and delivering it down-

wardly through the discharge outlet, said plate and said hoods having vertical openings aligning with the openings in the flange on the tubular member and the base, and detachable retaining means extended through said aligned openings for transferring the weight of the motor and fan to the base.

2. A ventilator as called for in claim 1 in which means are provided for preventing recirculation of the air from the outlet side of the fan to the inlet side thereof.

3. A ventilator as called for in claim 1 in which the upper end of the tubular member extends into the casing above the shoulder on said lower hood to prevent recirculation of the air from the annular outlet to the tubular member.

4. A ventilator as called for in claim 1 in which the upper hood of the casing has a housing mounted thereon for the motor, said housing having an open top, a cap closing the open top and spaced from the housing to allow outside air to pass into the housing to cool the motor and be discharged through said annular outlet.

5. A ventilator of the class described having in combination, a base provided with a central opening and a depending tubular skirt extending downwardly into said opening, an air inlet tubular member extending upwardly from the base, said tubular member having an outwardly flared lower end portion terminating in an outwardly disposed annular flange resting on the base so as to align the tubular member with said opening, said flange having spaced circumferentially disposed openings, a fan casing above said tubular member, said casing including a lower hood and a spaced upper hood, a fan in said casing, said lower hood having an intermediate upwardly and outwardly deflecting portion terminating in a downwardly curved outer end, said intermediate portion also having a shoulder portion extending inwardly below the fan and terminating in a downwardly annular inner end encircling and connected to the upper end portion of said tubular member, said upper hood having an intermediate transverse portion terminating in a downwardly curved annular flange spaced from the outer end of the inner hood to provide an annular and downwardly tapered air discharge outlet from the casing, a plate on the transverse portion of the upper hood, said plate and upper hood having central orifices, a motor mounted on the plate and having a drive shaft extending through said orifices and operatively connected to said fan for drawing polluted air axially through the inlet member and delivering its downwardly and annularly through said discharge outlet, said plate and said hoods having vertical openings aligning with the openings in the flange on the tubular member, bolts extending through said aligned openings for transferring the weight of the motor and fan to said base, said tubular member coacting with the bolts to provide a structural support for the motor and the fan, an opened top housing mounted on said plate for enclosing the motor, and a cap connected to the housing for covering the top thereof, said cap being spaced from the housing to allow air to pass through the housing and said orifices into said casing and discharge through said outlet, said inlet tubular member being shaped to eliminate turbulence and noise as air passes through the same and discharge through said outlet, the upper end portion of said tubular member extending into the fan casing above the annular collar on the lower hood so as to provide means for preventing recirculation of the air from the outlet side of the fan to the inlet side thereof.

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