April 1, 1958 W. M. MARKER 2,828,682

VENTILATING FAN

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FIG. 1.

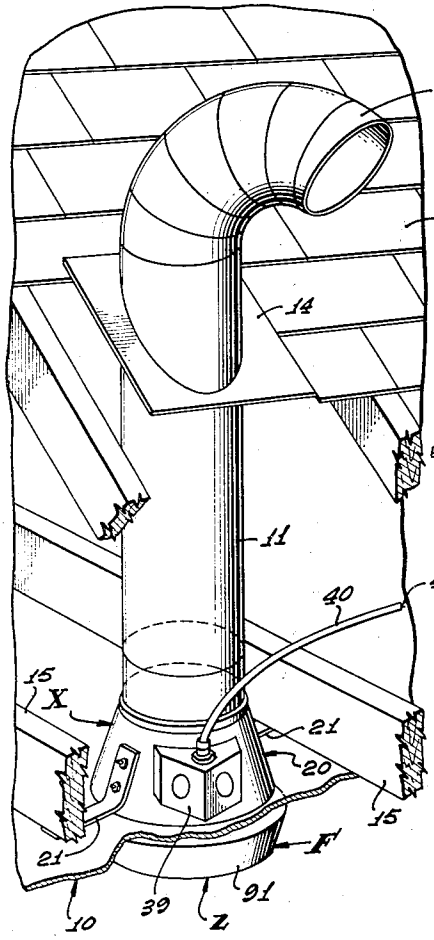
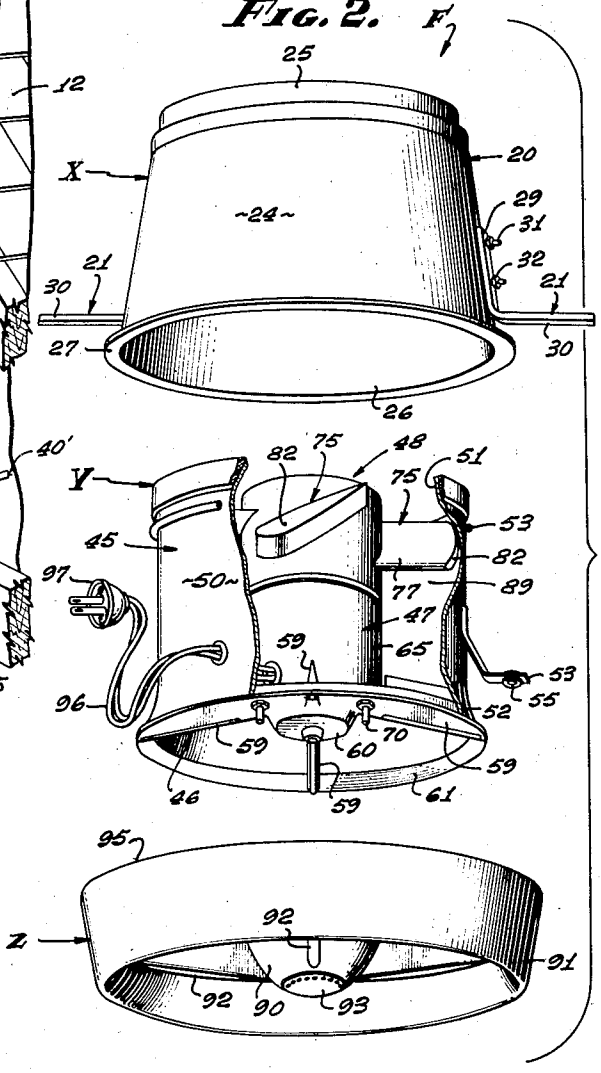



FIG. 2.




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FIG. 3.

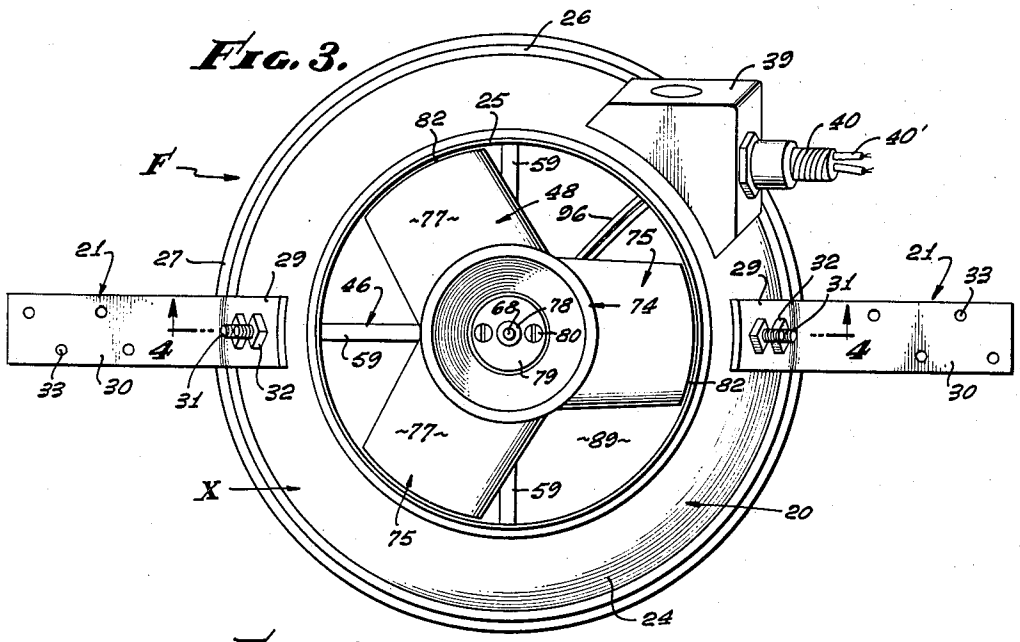
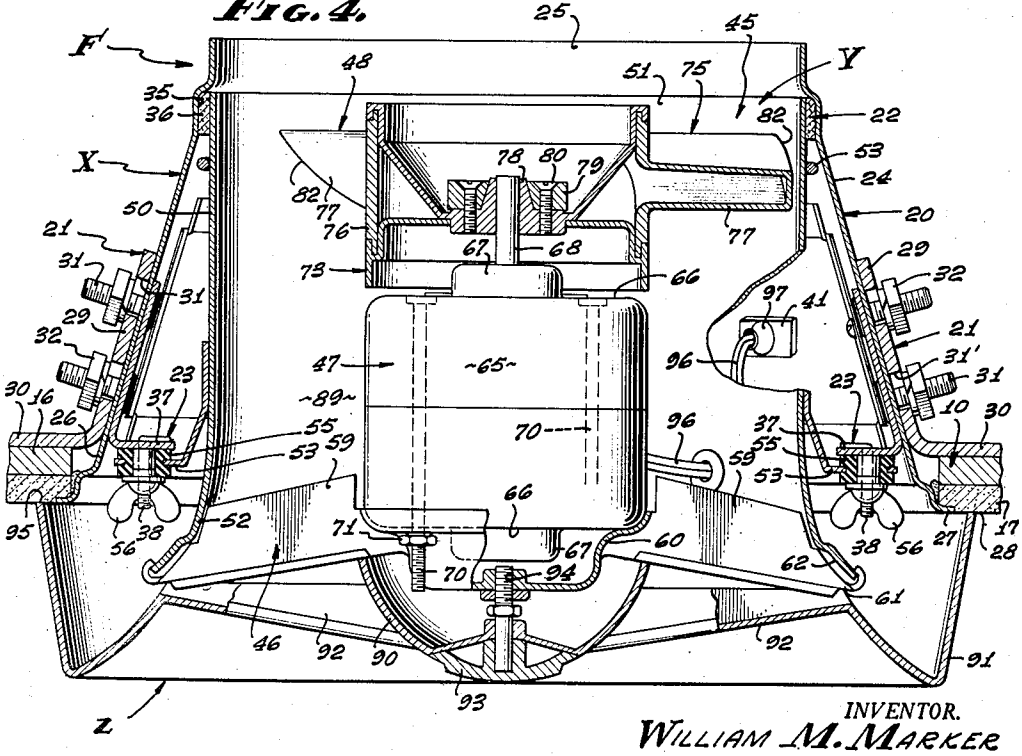



FIG. 4.




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2,828,682

# VENTILATING FAN

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Application February 28, 1955, Serial No. 491,130

6 Claims. (Cl. 98—43)

This invention has to do with a ventilating fan and it is more specifically concerned with a device in the nature of a fan or blower that can be used to advantage for the handling or circulating of air, for instance, in ventilating a room or like compartment.

This application is co-pending with my application Serial No. 417,065 entitled "Fan Construction," and with my application Serial No. D. 29,958 entitled "Ventilating Grill," now Patent Number D. 174,230, dated March 15, 1955.

It is a general object of the invention to provide a fan of the general character referred to, in the form of a simple, compact, inexpensive unit that is efficient and dependable in operation and which can be easily installed and adapted to either a ceiling or a wall of a building, or the like.

Ventilating fans are commonly employed in kitchens and like rooms, and are referred to as exhaust fans and operate to ventilate by drawing air out of the room. Such fans are effective when installed in a wall or ceiling of a room and handle a substantially large volume of air, which air is usually heavily laden with grease and other foreign matter, such as dust and lint. Therefore, ventilating fans of the character referred to become laden with grease and foreign matter to such a degree that they often become almost completely ineffective. It is, therefore, a primary object of this invention to provide a ventilating fan construction that is easily handled and manipulated so that it can be conveniently cleaned with a minimum of time and effort. That is, the parts and elements of the construction that I have provided may be quickly dismantled for cleaning and replacement of parts when required.

An object of this invention is to provide a ventilating fan which is easily adapted to be installed in either a wall or a ceiling to be effective in exhausting air from a room or compartment.

It is another object of this invention to provide a ventilating fan which is quiet in operation and which, at the same time, handles a substantial quantity of air.

It is still another object of this invention to provide a fan of the character referred to which is composed of a plurality of unit-like elements which are easily assembled or disassembled as circumstances require, each of the units being of simple construction so that each is inexpensive of manufacture.

It is still another object of this invention to provide a ventilating fan for installation in either a wall or ceiling, which is neat in appearance and which becomes laden only with a minimum of grease and foreign material.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of my invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a perspective view showing the ventilating fan of the present invention in a typical installation. Fig. 2 is an exploded perspective view showing the three basic



units which are combined in the fan construction of the present invention, and showing parts thereof broken away. Fig. 3 is an enlarged detailed plan view of the fan that I have provided showing the units thereof assembled, and Fig. 4 is an enlarged detailed sectional view taken substantially as indicated by line 4—4 on Fig. 3.

The ventilating fan of the present invention is adapted for either wall or ceiling installation, and for the purpose of illustration I have shown a typical ceiling installation. In Fig. 1 of the drawings, the ventilating fan F is shown installed in a wall or ceiling **10** and is connected with a ventilating duct **11** that continues upwardly and through a roof **12** to open at the exterior of the building or structure. The upper end portion **13** of the duct **11** is turned laterally and downwardly so that wind and rain will not enter the duct, and suitable flashing **14** is provided to seal with the roofing.

As shown, the ceiling **10** is supported by ceiling joists or rafters **15** that are horizontally disposed and spaced from each other, the spacing thereof being more or less standardized. For example, the rafters **15** may be spaced about sixteen inches on center. The wall or ceiling **10** may be any suitable layer of material or materials, such as sheets of plaster board, or may be a typical plaster wall as shown. When the wall or ceiling **10** is plastered the layer of material is composed of a layer of lath **16**, or the like, and a layer of plaster **17**. It is to be understood that the plaster **17** may be applied in several layers or coats. It is to be noted that there is a material difference between the thickness of dry wall and wet wall constructions. That is, plaster board construction is usually substantially thinner than plaster wall construction.

The ventilating fan F that I have provided is best illustrated in Fig. 2 of the drawings and involves, generally, a mounting X, a fan unit Y and a grill Z. The mounting X is carried in the structure of the building as shown in Fig. 1 of the drawings, while the fan unit Y is mounted and carried within the mounting X to be supported thereby in working position. The grill Z is provided mainly for decorative purposes and is secured to and carried by the fan unit.

The mounting X that I have provided is adapted to be carried by a wall or ceiling **10** of either plaster board or plastered construction, and acts to support and house the fan unit Y. As shown, the mounting X is a simple tubular element and involves a body **20**, mounting brackets **21** and fan unit supports **23**.

The body **20** is an elongate tubular part having a wall **24** of sheet metal, or the like, and is concentric with the central longitudinal axis of the structure. In accordance with the preferred form of the invention, the body **20** is tapered or conical in configuration and when vertically disposed, the top or rear portion **25** is the small end, whereas the bottom or front end portion **26** is the large end. The end portions **25** and **26** terminate in planes normal to the central axis. The body **20** is adapted to be received in the wall or ceiling **10** and is adapted to be connected with a cylindrical duct **11** and therefor the end portion **25** is a circular portion of limited longitudinal extent adapted to telescopically receive the duct **11**, while the end portion **26** is provided with a radial flange **27** that meets or finishes substantially flush with the exterior face **28** of the wall or ceiling **10**.

The mounting brackets **21** of the mounting X are adjustable parts adapted to secure the mounting X in working position with the flange **27** flush with the exterior face **28** of the wall or ceiling **10**. As shown, there may be two brackets **21** at diametrically opposite sides of the body **20**, and each is an L-shaped part having an inner leg **29** adjustably carried on the wall **24** of the body, and an outer leg **30** that projects radially from the body

20 near the lower end portion 26 thereof. Suitable threaded studs 31 project outwardly from the body 24, which studs 31 are engaged in elongate slots or openings 31 in the inner legs 29 of the brackets so that the brackets are movable longitudinally of the body 20. Suitable washers and nuts 32 are provided to secure the brackets 21 in the desired adjusted position. The outer legs 30 are provided with a plurality of perforations 33 that are adapted to receive nails or like fasteners, for securing the legs to the building structure, for example, to a rafter 15.

The fan unit supports 23 of the mounting X are provided to secure the fan unit Y in working position within the mounting X and involve one or more like supports 23, preferably two like supports 23 at diametrically opposite sides of the body 20. Each support 23 is in the nature of a bracket and is characterized by a flat ear 37 that projects radially inwardly from the wall 24 of the body at the end portion 26 thereof. The ears 37 are in a plane normal to the axis of the structure, and in the preferred form of the invention the ears carry depending studs 38 that project downwardly or forwardly from the ears. The ears 37 and studs 38 are adapted to receive parts of the fan unit Y as hereinafter described.

In addition to the foregoing, the mounting X also includes an electrical power supply that involves a suitable junction box 39 carried by the wall 24, which box receives an electrical conduit 40 and wires 40'. In accordance with the invention I have provided a receptacle 41 in the wall 24 of the body 20, which receptacle is accessible from the interior of the mounting X. In practice, the box 39 is at the exterior of the body 20 and covers the receptacle 41 where suitable electrical connections are made for operation of the motor of the fan.

The fan unit Y of the present invention is provided to circulate air through the body 20 of the mounting X and is a self-contained unit involving a tubular housing 45, a frame 46 carried by the housing, a motor 47 supported in the frame 46, a fan 48 driven by the motor 47, and a seal 22.

The housing 45 is an elongate tubular part adapted to be carried within the mounting X and has a cylindrical wall 50 of sheet metal or the like, and is concentric with the central longitudinal axis of the structure. The housing 45 has upper and lower end portions 51 and 52, which are circular in form and terminate in planes normal to said axis. The upper end portion 51 has a smooth exterior diameter that slidably fits into the seal 22, there being a reinforcing ring 53 that is provided to retain the wall 50 so that it is held in true cylindrical form. The lower end portion 52 of the wall 50 is preferably flared outwardly and, as shown, terminates below or forward of the lower or forward end portion 26 of the mounting X. The outward flare that I have provided forms a bell-shaped end portion 52 particularly adapted to receive flow of air into the fan unit Y.

In accordance with this invention the fan unit Y is provided with mounting projections 53 at the lower or forward end portion thereof, which projections extend laterally and radially outward from the wall 50. When there are two ears 37 as above described, there are two projections 53 and each is provided with an opening for receiving a stud 38. In practice, resilient grommets 55 of rubber or like material are carried in the said openings to cushion the mounting of the fan unit Y in the mounting X. As illustrated in Fig. 4 of the drawings, suitable thumb screws or wing nuts 56 are threaded onto the studs 38 to hold the fan unit Y in working position with the upper end portion thereof in sealing engagement with the seal 22 above described.

The frame 46 is a spider-type frame and is provided to support the motor 47 centrally within the housing 45. In the arrangement shown in the drawings, the motor 47 is located at the lower or front portion of the housing 45, while the fan 48 is located at the top or rear portion of the housing 45. It is preferred that the frame 46 be located remote from the fan 48 to insure quietness of operation, in which case the frame 46 is at the lower end portion 52 of the housing 45 and is characterized by a plurality of circumferentially spaced arms 59.

The arms 59 extend radially between a central hub 60 and a peripheral ring 61. The hub 60 and ring 61 are concentric with the central axis of the structure, and the arms 59 are thin fin-like parts that offer little resistance to the flow of air through the unit Y. The parts 59, 60 and 61 are preferably integral and are formed of a single body of material, such as a casting, and the frame 46 formed of these parts is secured to the lower end portion 52 of the unit Y in any suitable manner. It is preferable that the ring 61 be carried in a recess 62 in the lower end portion 52, and that the lower outer margin or periphery, or portion thereof, of the ring be turned or bent over the lower or forward edge of the body 50 as clearly shown in Fig. 4 of the drawings.

The hub 60 of the frame 46 is circular in form and is preferably cup-shaped to receive the motor 47 to have clearance therefrom. A circular seat 54 is provided at the periphery of the hub 60, which seat 54 is in a plane normal to and concentric with the central longitudinal axis.

The motor 47 may be any suitable motor, preferably a typical electric motor, and has a cylindrical case 65 having flat ends 66 with bearing bosses 67 projecting therefrom. A motor shaft 68 projects concentrically from one end 66 of the case 65 to drive the fan Y that I have provided. In the case illustrated, the motor axis is coincidental with the central longitudinal axis of the entire structure, and the shaft 68 extends upwardly or rearwardly from the upper or rear end 66 of the motor. Tie rods 70 extend axially through the motor 47 to hold the case 65 thereof together, the case being sectional. In practice, the rods 70 are longer than the case 65 and project from the lower or forward end 66 thereof, and are received in openings in the hub 60. Suitable nuts 71 are threaded onto rods 70 thereby securing the motor on the seat 65 in the hub 60.

The seal 22 that I have provided is adapted to engage between the mounting X and fan unit Y hereinafter described, to stop flow of air between the mounting and the fan unit. As shown, a recess 35 is provided adjacent the upper end portion 25 of the body 20, and an annular sealing ring 36 of cork or resilient rubber-like material engages in the recess and with the periphery of the fan unit Y. The inner diameter of the sealing ring 36 is preferably coincidental with the inner diameter of the end portion 25 of the body 20 and is preferably carried thereby to have sealing engagement in the recess.

The fan 48 that I have provided is carried and driven by the electric motor 47 and includes a sectional hub construction made up of inner and outer hub sections 73 and 74, and is the subject matter of my co-pending application Serial No. 417,965, entitled "Fan Construction." A plurality of impellers 75 are provided which extend around the hub in a continuous series, and each involves a center portion 76 carried by the hub sections, and a blade portion 77 which projects radially from the center portion. A coupling means is provided at the center of the structure for connecting the fan to the shaft 68 and includes, a split collar 78 which projects from the center of the hub, and a clamp collar 79 which engages the split collar and is clamped thereto by operating screws 80. By clamping the coupling means the fan is held tightly on the motor shaft 68. Cooling means is also provided which includes blades 81 that include flow of air from the end of the motor to the exterior of the structure. The fan structure is assembled and pressed or held together by means of cement or the like, which is applied to the joints or seams where the parts of the structure meet.

The blade portions **77** have arcuate ends **82** curved concentric with the fan axis and with the central axis of the housing **45**, while the hub sections **73** and **74** and the central portions of the impellers **75** are of a diameter corresponding to the diameter of the motor case **65**. It will be apparent that an unobstructed passage or annulus **89** is thereby provided that extends continuously through the unit Y.

The grill Z is provided to decoratively cover the lower or forward end of the structure above described. The grill Z is the subject matter of my co-pending application Serial No. D. 29,958, entitled "Ventilating Grill" and involves, cupped- or channel-shaped parts including a part **90** that covers the hub **60**, an outer ring part **91** that covers the ring **61** and the lower flange **27** of the housing and arms **92** that cover the arms **59**. A threaded thumb screw **93** or the like, is provided at the center of the part **90** and is threadedly engageable in an opening **94** in the hub **60** as clearly illustrated in Fig. 4 of the drawings. Further, a nut is threaded onto the screw **93** and may be used to apply pressure to the upper part or inner face of the part **90**, if it is necessary to pull the grill Z from the other structure. The outer periphery of the grill Z has an upwardly facing edge **95** engageable with the face **28** of the wall or ceiling **10**, and the inner edge of the ring-part **91** over-laps or extends inward from the periphery of the body **50** so that moisture condensation or grease is drained into the cupped-up or channel-shaped ring part **91**.

From the foregoing it will be apparent that I have provided an extremely practical fan construction, and in accordance with the present invention the motor **47** is provided with a power line **96** which is adapted to be engaged with the receptacle. The end of the power line **96** is provided with a suitable electrical connecting part or plug **97** adapted to be inserted into the receptacle **41** so that the fan unit Y may be quickly disconnected electrically from the mounting X when it is desired to remove the unit for cleaning, repairing or replacement. It will also be apparent that it is a simple matter to remove the grill Z for cleaning by simply loosening the single thumb screw **93** accessible at the center thereof.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A ventilating fan including, a mounting having an elongate tubular body engaged in an opening in a wall structure in fixed position therein, said body having supports projecting inwardly therefrom, and a fan unit removably carried within the mounting and comprising, an elongate cylindrical housing secured to the supports to occur concentric with and extend longitudinally of the body, a frame carried at one end of the housing and having a central hub and legs extending between the hub and the housing, and a motor and fan supported by the hub of the frame and positioned within the housing on the central axis of the housing to circulate air therethrough.

2. A ventilating fan for installation in an opening in a wall structure of a building, including, a mounting comprising, an elongate tubular body enlarged at one end thereof, adjustable mounting brackets carried by the body at the exterior of the body, there being studs fixed to and projecting outwardly from the body through elongate openings in the brackets and fasteners on the studs securing the brackets in position on the body, a radially inwardly facing seal at the other end of the body, supports fixed to and projecting radially inwardly at said end of the body, the brackets being engageable with the wall structure to adjustably position the mounting body in the opening, and a fan unit removably carried in the mounting and comprising, an elongate cylindrical housing secured to



the supports to occur within the body and engage the seal, a frame carried at one end of the housing and having an outer ring secured to the housing, a central hub, and legs extending between the hub and the ring, and a motor and fan supported by the hub of the frame and positioned within the housing on the central axis of the housing to circulate air therethrough.

3. A ventilating fan for installation in an opening in a wall structure of a building including, a mounting comprising, an elongate tubular body enlarged at one end thereof, mounting means releasably securing the body in the wall opening, an annular seal at the other end of the body, supports fixed to and projecting radially inwardly at said end of the body, an elongate cylindrical fan unit, means releasably securing the fan unit to the supports to occur within and extend longitudinally of the body and in engagement with the annular seal and adapted to circulate air through the body and the wall structure, and a grill secured to the fan unit to occur adjacent said enlarged end of the body and adapted to engage the adjacent surface of the wall structure outwardly of the opening therein.

4. A ventilating fan for installation in an opening in a wall structure of a building including, a mounting comprising, an elongate tubular body enlarged at one end thereof, mounting means releasably securing the body in the wall opening, a seal at the other end of the body, supports fixed to and projecting radially inwardly at said enlarged end of the body, an elongate fan unit, means releasably securing the fan unit to the supports to occur within and extend longitudinally of the body and in engagement with the seal and adapted to circulate air through the body and the wall structure, and a grill secured to the fan unit to occur adjacent said end of the body and adapted to engage the adjacent surface of the wall structure outwardly of the opening therein, said mounting means releasably securing the body in the wall opening including, L-shaped mounting brackets having inner legs adjacent the exterior of the body to extend longitudinally thereof and having longitudinally disposed slot-like openings therein, outer legs projecting radially from said inner legs to occur adjacent the wall structure and having fastener receiving openings therein, studs carried by the body to project radially outwardly therefrom and through the slot-like openings in the inner legs of the brackets and nuts threadedly engaged on the stud and adapted to releasably hold the bracket in tight clamped engagement on the body.

5. A ventilating fan for installation in an opening in a wall structure of a building including, a mounting comprising, an elongate tubular body enlarged at one end thereof, mounting means releasably securing the body in the wall opening, a seal at the other end of the body, supports fixed to and projecting radially inwardly at said enlarged end of the body, an elongate fan unit, means releasably securing the fan unit to the supports to occur within and extend longitudinally of the body and in engagement with the seal and adapted to circulate air through the body and the wall structure, and a grill secured to the fan unit to occur adjacent said end of the body and adapted to engage the adjacent surface of the wall structure outwardly of the opening therein, said means releasably securing the fan unit to the supports including, mounting projections on the fan unit to project radially outwardly therefrom and overlying the supports, and screw fasteners extending through and releasably securing the said projections and supports together.

6. A ventilating fan for installation in an opening in a wall structure of a building including, a mounting comprising, an elongate tubular body enlarged at one end thereof, mounting means releasably securing the body in the wall opening, an annular radially inwardly disposed seal at the other end of the body, supports fixed to and projecting radially inwardly at said end of the body, an elongate cylindrical fan unit, means releasably securing

the fan unit to the supports to occur within and extend longitudinally of the body and in engagement with the annular seal and adapted to circulate air through the body and the wall structure, and a grill secured to the fan unit to occur adjacent said enlarged end of the body and adapted to engage the adjacent surface of the wall structure outwardly of the opening therein, said mounting means releasably securing the body in the wall opening including, L-shaped mounting brackets having inner legs adjacent the exterior of the body to extend longitudinally thereof and having longitudinally disposed slot-like openings therein, outer legs projecting radially from said inner legs to occur adjacent the wall structure and having fastener receiving openings therein, studs carried by the body to project radially outwardly therefrom and through the slot-like openings in the inner legs of the brackets and



nuts threadedly engaged on the stud and adapted to releasably hold the bracket in tight clamped engagement on the body, said means releasably securing the fan unit to the supports including, mounting projections on the unit to project rotatably outwardly therefrom and overlying the supports, and screw fasteners extending through and securing the said projections and supports together.

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