Aug. 30, 1932. R. A. ILG ET AL 1,874,043

UNIT FOR HEATING AND VENTILATING SYSTEMS

Filed Oct. 4, 1928 2 Sheets-Sheet 1

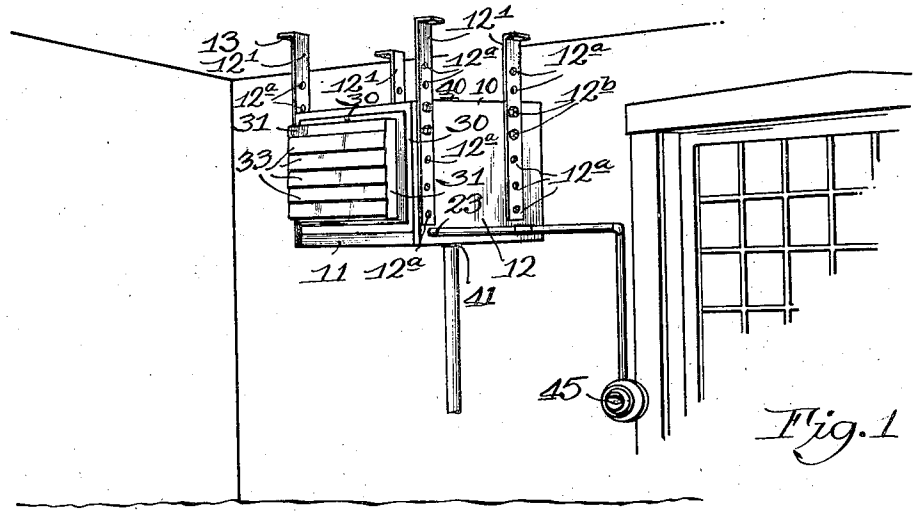


Fig. 1

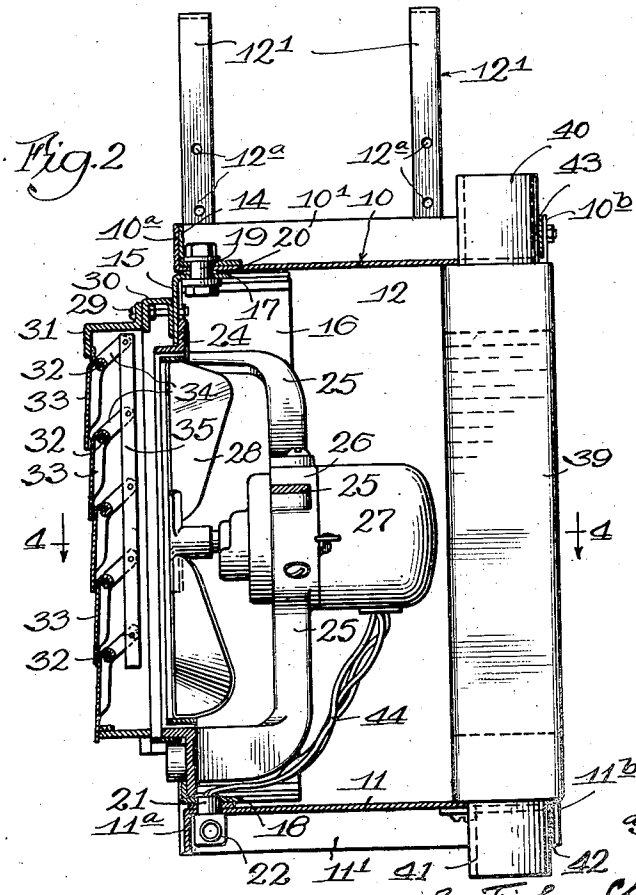


Fig. 2

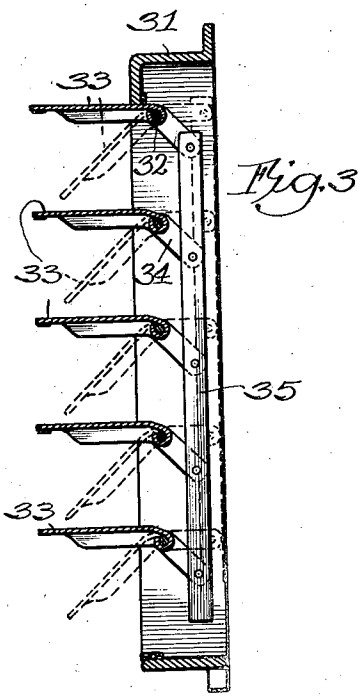


Fig. 3

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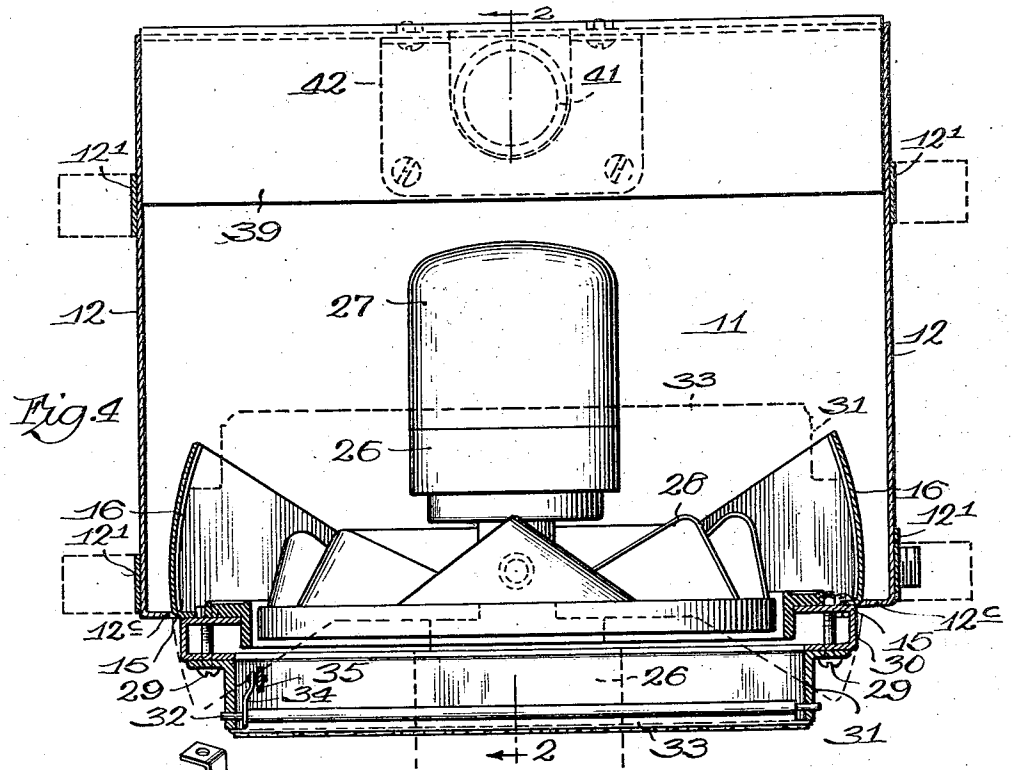


Fig. 4

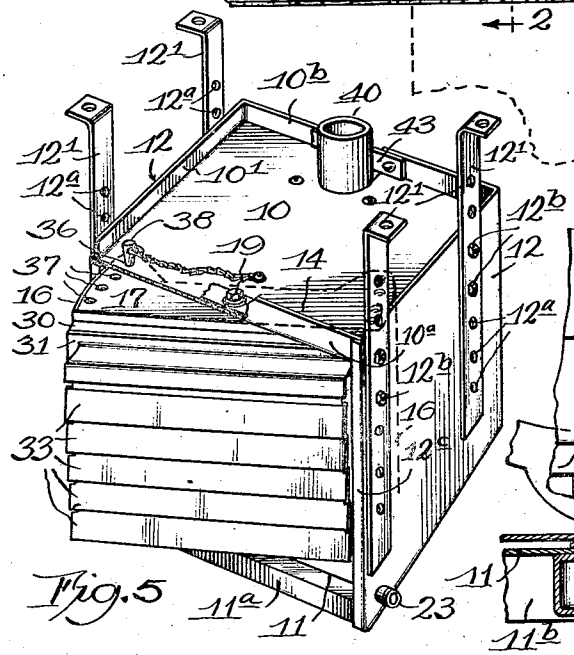


Fig. 5

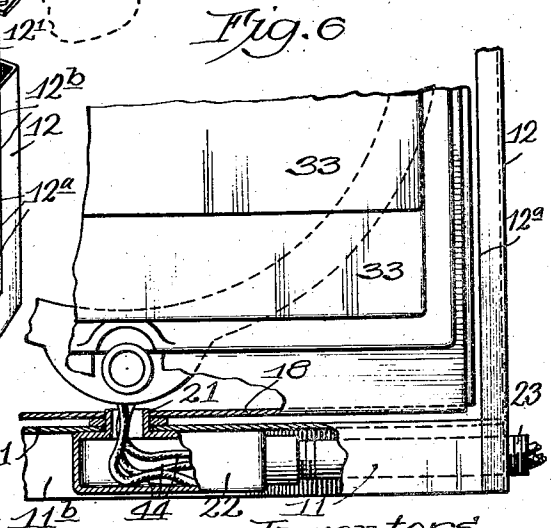


Fig. 6

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1,874,043

UNITED STATES PATENT OFFICE

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UNIT FOR HEATING AND VENTILATING SYSTEMS

Application filed October 4, 1928. Serial No. 310,211.

This invention relates to ventilating appliances of the forced draft type, and, in its chief intended application, consists of a ventilating and air distributing unit of the general character disclosed in Letters Patent to John M. Frank No. 1,295,151, dated February 25, 1919, and to Robert A. Ilg No. 1,618,379, dated February 22, 1927, although certain features of the invention may be usefully employed independently of any air modifying agent.

Among the objects of the present invention are, to provide, in a ventilating and air modifying appliance of the general nature disclosed in the aforesaid patent, an improved deflector mechanism in front of the fan whereby the fan discharge opening will be automatically closed when the fan is idle and will be automatically opened and kept open by the fan blast when the fan is in operation; to provide in an appliance employing a fan and a variable speed motor for driving the same, an improved deflector mechanism in front of the fan through the operation of which the direction of the fan blast will be changed according to the speed of the fan, whereby, under a relatively slow running of the fan, the blast will be propelled downwardly toward the floor, and under a relatively high speed of the fan the blast will be propelled more nearly horizontally; to provide a novel mounting of the fan-supporting frame and the deflector frame and deflector by which the direction of the blast may be varied in a horizontal plane, with improved means for locking the fan and shutter assembly in angularly adjusted position; to provide, in association with such means for angularly adjusting the motor fan and deflector mechanism, means whereby the entire assembly may be swung through a half circle to bring the motor into convenient accessibility for inspection, oiling, repairs, and the like, to provide a vertically adjustable supporting means for the unit; and, generally, to provide an improved and more efficient ventilating appliance of the character described than has heretofore been known.

Still other objects and attendant advantages of the invention will be apparent to persons familiar with this class of devices as the same becomes better understood by reference to the following detailed description, taken in connection with the accompanying drawings in which we have illustrated one practical and useful embodiment of the invention, and wherein—

Fig. 1 is a perspective elevation showing the appliance suspended from the ceiling of a room, with the deflector in closed position;

Fig. 2 is a central vertical front to rear section of the same on the line 2—2 of Fig. 4;

Fig. 3 is a vertical section through the deflector frame and vanes showing the latter in fully opened position, and also in a partly opened position in dotted lines;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 2;

Fig. 5 is a perspective elevation showing the fan and deflector assembly adjusted to an angular position and locked therein;

Fig. 6 is a fragmentary view partly in vertical section through the bottom walls of the casing and pivoted fan-supporting and motor-supporting frame, showing the wiring leads to the motor extending through the hollow lower pivot of the frame.

Referring to the drawings, 10 designates the top wall, 11 the bottom wall, and 12 the side walls of a rectangular sheet-metal housing or casing. As shown in Fig. 1, the casing is provided with means by which it may be suspended at varying heights from the ceiling of the room; the means herein shown comprising hanger strips 12′ each having a longitudinal row of bolt holes 12^a and bolts 12^b that engage with holes in the side walls 12 of the casing. For stiffness and strength the bottom and top walls 11 and 10 may be formed with vertical side flanges 11′ and 10′ respectively that are spot-welded or otherwise secured to the side walls 12. The top wall 10 also has upstanding front and rear flanges 10^a and 10^b, respectively, and inside the former is nested a stiffening angle strip 14. The bottom wall 11 is likewise formed with downturned front and rear flanges 11^a and 11^b, respectively.

In the front portion of the rectangular casing above described is pivotally mounted a power-driven fan and deflector assembly

comprising, as herein shown, the following parts. A supporting frame for said assembly consists of a sheet-metal front panel 15 formed with a large circular opening to accommodate the motor-supporting ring and with rearwardly extending wing portions 16 (Fig. 4) that are transversely curved on centers coinciding with the pivotal axis of the structure so as to have free sliding engagement with inwardly bent front flanges 12^c of the side walls 12 when the structure is swung on its pivotal axis. On the upper and lower edges of the panel 15 are rearwardly turned flanges 17 and 18 respectively suitably connected at their ends with the side or wing flanges 16. The top flange 17, the top wall 10, and the horizontal limb of the reinforcing angle strip 14 are formed with alined holes to receive an upper pivot bolt 19, a spacing washer 20 lying between the flange 17 and the wall 10. The bottom flange 18 and the bottom wall 11 are similarly formed with alined holes to receive a hollow pivot stud 21 (Figs. 2 and 6) that, in the construction shown, is formed integral with a hollow housing member 22 for the circuit lines of the motor, said housing 22 being spot-welded or otherwise secured to the flange 11^a and connected to and forming a continuation of a tubular housing 23 extending through one of the side walls 12.

Fitted in the central opening of the panel 15 and suitably attached to the latter is a motor-supporting frame comprising a ring 24, arms 25, and a ring or band 26 in which is mounted the electric motor conventionally illustrated at 27. Fast on the armature shaft of the motor 27 is the propeller fan 28.

Fastened to the outer face of the panel 15 by bolts 29 is a spacing frame 30, and secured by the same bolts 29 to the front of the spacing frame 30 is a rectangular deflector frame 31. Journaled in and between opposite sides of the frame 31 are a series of uniformly spaced spindles 32, secured on which spindles are a group of thin sheet-metal deflector blades or vanes 33, these latter being formed with rearwardly extending arms 34 that are connected for operation of the shutters in unison by a link 35, which also serves as a counter-weight to partly balance the weight of the vanes.

In the top wall 10 of the casing is formed a hole 36 (Fig. 5) adapted to register with any of a group of spaced holes 37 formed in the top member 17 of the motor and fan supporting frame, adjacent to one end of said top member. A similar hole 36 and group of holes 37 are provided on the opposite side of the wall 10 and frame member 17, as indicated in Fig. 5; and by means of a removable pin 38 passed through the hole 36 and one of the holes 37, the fan and motor assembly can be locked in an angularly adjusted position to either side of the central or straight-ahead position, whereby the fan blast can be directed either straight-forwardly or to either side. It will also be observed that the described structure permits the motor and fan supporting frame to be swung through a half circle, thus bringing the motor 27 outside the casing where it is in convenient position for inspection, adjustment, oiling or repairs.

In the rear of the casing we have conventionally shown at 39 an air modifying element consisting of a radiator through which the air is drawn by the fan. The radiator 39 may be supplied at its upper end with a tapped intake boss 40 that may receive a steam supply pipe when it is desired to warm the air or a refrigerant supply pipe when it is desired to cool the air; and on the lower end of the radiator 39 is a tapped outflow boss 41. As herein shown the top and bottom walls 10 and 11 of the casing are slotted to admit the bosses 40 and 41 and the radiator is secured in place by removable locking strips 42 and 43 attached to the inner sides of the casing flanges 11^b and 10^b (Fig. 2).

At 44 we show the circuit wires for the motor 27 extending from a switch 45 (Fig. 1) mounted in conveniently accessible position on the wall of the room. said circuit wires extending through the housing members 23 and 22 and the hollow pivot stud 21 to the motor.

Preferably the motor 27 is a motor of the variable speed type and equipped with a switch 45 which may be set low, intermediate, high speeds and "off" positions. With a motor and switch of this type in combination with a deflector mechanism which is opened by the fan blast and closes automatically by gravity, it is possible to vary the direction of the blast in a vertical plane by the speed of the motor itself. Manifestly, a low speed of the motor and fan only partially opens the deflector vanes, as illustrated by dotted lines in Fig. 3, and directs the air downwardly toward the floor, and a better effect is secured at the floor level by the dropping of the deflector vanes when the fan is operated at low speed. When it is desired to throw the air blast to higher points in the room, this can be done by simply stepping up the motor through proper manipulation of the switch, the highest speed of the motor opening the vanes practically horizontally, as shown by full lines in Fig. 3, and projecting the air blast substantially horizontally and for a greater distance. To effect angular variations in a horizontal plane of the air blast, the motor and fan frame can be set to the desired position and locked therein by the pin 38. When it is necessary to get at the motor, the motor and fan frame can be instantly turned through a half circle; and it will be observed that by leading the motor

circuit wires through the pivotal joint of the frame, such shifting of the motor does not stretch or strain the circuit leads.

While we have herein shown our invention as embodied in a ventilating appliance which includes an air modifying element, yet it will be understood that for many purposes such air modifying element may be dispensed with without affecting the benefits and advantages resulting from the described structure and mounting of the fan and shutter mechanism. In other respects also the details of structure may be variously modified within the spirit and purview of the appended claims.

We claim—

1. The combination of a casing having openings for the flow of air therethrough, a frame member pivotally mounted on said casing midway between the side walls of the latter to swing on a vertical axis, a propeller fan and fan motor mounted on said frame member, an air modifying element disposed across the path of air flowing through said casing, and a group of horizontally pivoted deflector vanes mounted on said frame member opposite said fan, said vanes closing by gravity and adapted to be opened by the fan blast.

2. The combination of a casing having top, bottom and side walls and an open front, a frame member pivotally mounted in said top and bottom walls midway between said side walls to swing on a vertical axis, a propeller fan and fan motor mounted on said frame member, an air modifying element disposed across the path of air flowing through said casing, a deflector frame attached to said frame member, a group of deflector vanes horizontally pivoted in said deflector frame opposite said fan, said vanes closing by gravity and adapted to be opened by the fan blast, and means for locking said first-named frame member in various angularly adjusted positions.

3. The combination of a casing having top, bottom and side walls and an open end, a frame member pivotally mounted in said top and bottom walls midway between said side walls, and a propeller fan and fan motor mounted on said frame member, said fan and its motor being capable of swinging through the open end of said casing to expose the motor outside the latter.

4. The combination of a casing having top, bottom and side walls and an open end, a frame member pivotally mounted in said top and bottom walls midway between said side walls and having wings in sliding engagement with end edges of said side walls, a propeller fan and fan motor mounted on said frame member, and means for locking said frame member in various angularly adjusted positions.

5. The combination of a casing having top, bottom and side walls and an open end, a frame member pivotally mounted in said top and bottom walls midway between said side walls and having wings in sliding engagement with the end edges of said side walls, a propeller fan and fan motor mounted on said frame member, an air modifying element disposed across the path of air flowing through said casing, and means for locking said frame member in various angularly adjusted positions.

6. The combination of a casing having top, bottom and side walls and an open front, a frame member pivotally mounted in the front portion of said top and bottom walls midway between said side walls and having wings in sliding engagement with the front edges of said side walls, a horizontal wall connecting the upper ends of said wings below the top wall of the casing, one of said horizontal and top walls having a hole and the other an arcuate row of holes adapted to register with said hole in various angular positions of said pivoted frame member, a locking pin engageable with said holes, and a propeller fan and fan motor mounted on said frame member.

7. The combination with an outer frame member, of an inner frame member vertically pivoted on said outer frame member, a propeller fan and variable speed motor therefor mounted on said inner frame member, a deflector frame mounted on the front of said inner frame member, and a group of deflector vanes horizontally pivoted in said deflector frame, said vanes adapted to open under the blast of the fan and direct said blast more or less downwardly according to the speed of the fan, and to close by gravity when the fan is idle.

8. In a ventilating appliance of the character described, the combination of a casing having top, bottom and side walls and open front and rear, a frame member pivotally mounted in said top and bottom walls midway between said side walls to swing on a vertical axis, a variable speed fan and fan motor mounted on said frame member, an air modifying element disposed across the path of air flowing through said casing, a deflector frame attached to said frame member, a group of deflector vanes horizontally pivoted in said deflector frame opposite said fan, said vanes closing by gravity and adapted to be opened more or less by the fan blast according to the speed of the fan, and means for locking said first-named frame member in various angularly adjusted positions.

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