March 4, 1958 W. W. McLEAN 2,825,500

VENTILATING APPARATUS

Filed March 9, 1956 2 Sheets-Sheet 1

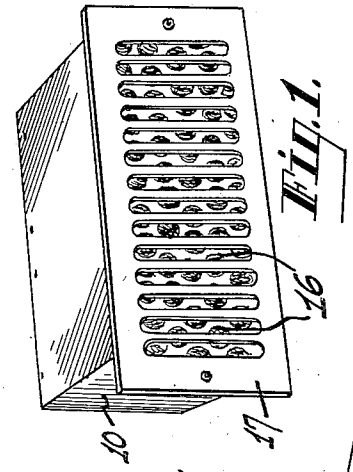


Fig. 1.

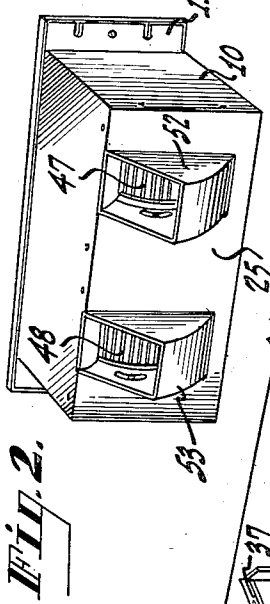


Fig. 2.

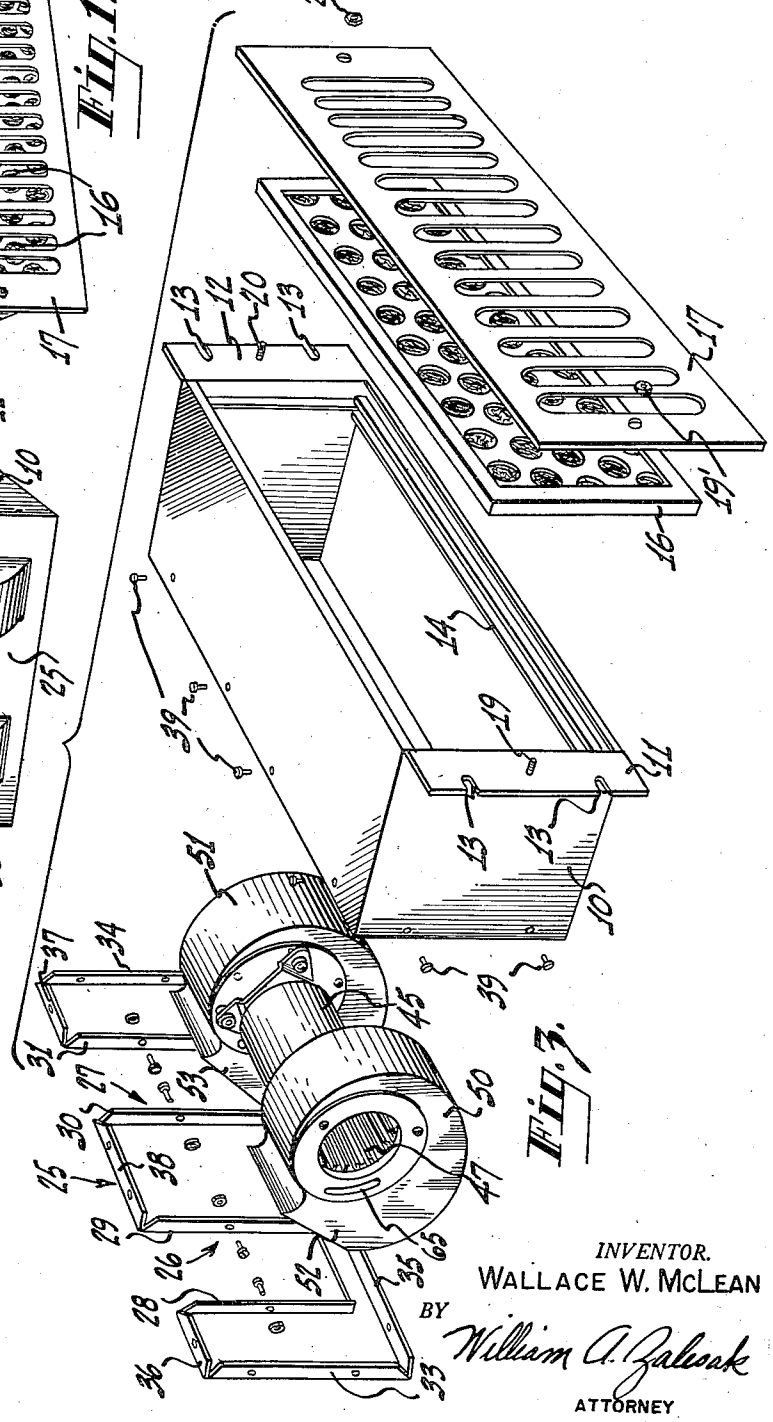


Fig. 3.

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VENTILATING APPARATUS

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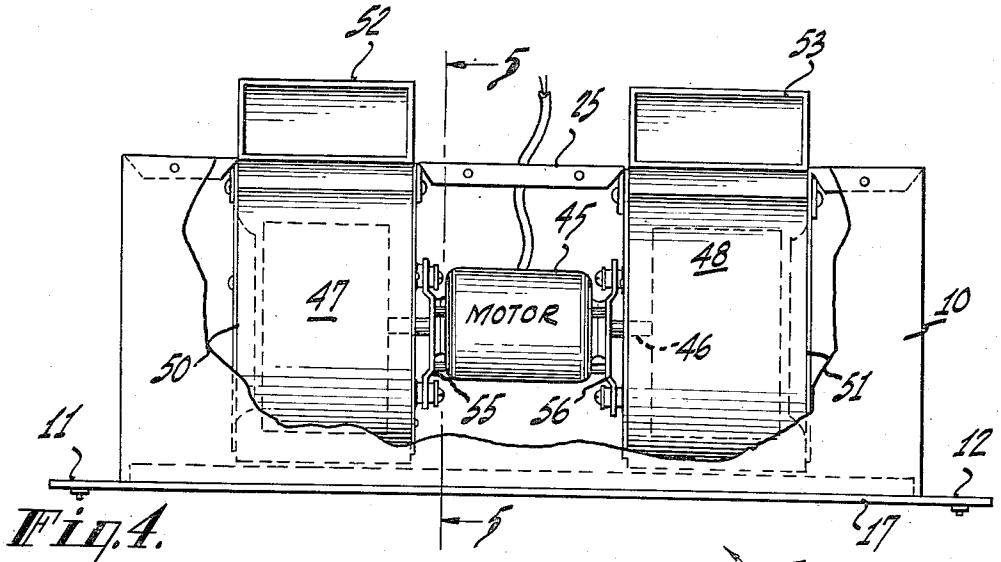


Fig. 4.

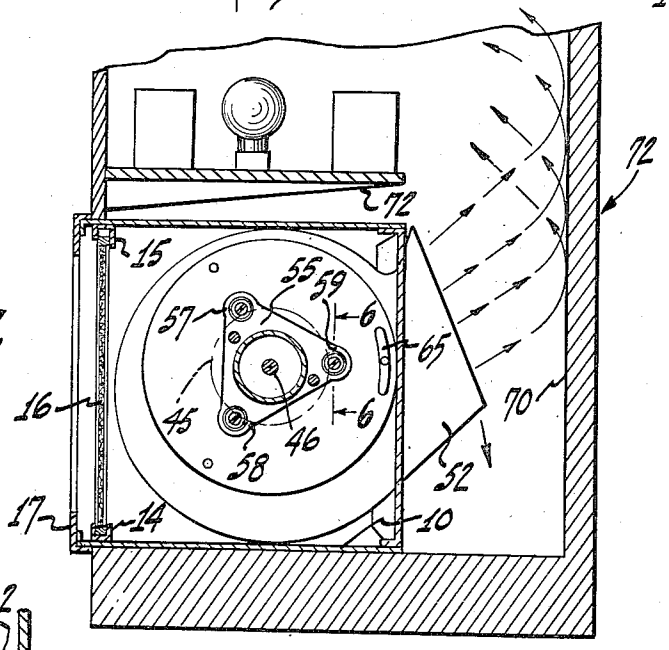


Fig. 5.

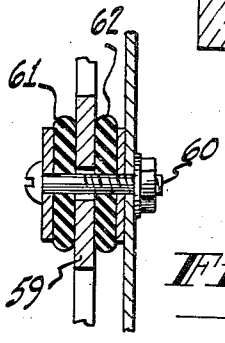


Fig. 6.

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VENTILATING APPARATUS

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Application March 9, 1956, Serial No. 570,452

4 Claims. (Cl. 230—117)

My invention relates to ventilating apparatus more particularly to a ventilating unit especially adapted to cool racks containing electrical equipment but also useful for other applications.

In apparatus of the kind described, it is desirable to provide a packaged unit which can be readily mounted as a unit and removed as a unit from the rack. It must provide filtered air with a minimum of noise and it is desirable that the filter elements be removable without the need for removing the unit from the rack. It should be of simple construction to facilitate assembly but must also be rugged. The fan or fans should deliver an optimum amount of air, but the fans and their driving unit though firmly supported should be supported in such a way as to transmit the minimum amount of noise and vibration to the casing or housing in which the fans and motor are mounted.

It is an object of my invention to provide an improved ventilating apparatus of unit construction and particularly suitable for use in rack equipment.

Another object of my invention is to provide such an apparatus which is simple in construction, rugged and highly effective in operation.

A still further object of my invention is to provide such an apparatus which has novel and improved means for supporting the fan and motor assembly for insuring noiseless operation.

Another object of my invention is to provide a construction whereby the filter position is such as to assist in noise suppression, but at the same time permits ready replacement of the filter element without removing the unit from the rack.

According to my invention I provide an elongated housing or casing having a panel member extending along one side. This panel is provided with a pair of spaced rectangularly shaped openings having stiffening ribs along the vertical edges which also serve as supporting members for the fan assembly. The fan assembly includes a motor having its shaft extending from opposite ends. A fan of squirrel cage design is mounted at each end. The motor and fan sub-assembly is then secured to the fan scrolls enclosing each fan by a noise and shock isolating support. The scrolls are in turn fastened to the ribs of the panel and extend through the apertures. The filter element is replaceably supported on the opposite side of the casing and is covered by a quickly detachable grill. The whole unit can then be readily and easily secured to a rack by means of brackets in the form of flaps provided with openings for receiving fastening bolts.

Reference is now made to the drawing in which

Figure 1 is a front perspective of a ventilating apparatus made according to my invention.

Figure 2 is a perspective of the reverse side of Figure 1 and is the side mounted within the rack cabinet.

Figure 3 is an exploded perspective of apparatus made according to my invention.

Figure 4 is a top plan view with parts broken away to show details of construction.

Figure 5 is a section taken along the line 5—5 of Figure 4.

Figure 6 is a section taken along the line 6—6 of Figure 5.

Referring to Figures 1, 2, and 3, apparatus made according to my invention includes an elongated box like housing 10, one side of which is provided with the end flaps or supporting elements 11 and 12 which position and support the unit in a rack housing. The unit is supported by means of bolts not shown which extend through the slots 13. A lower channel member 14 and an upper channel 15 (see Figure 5) receive the filter 16, the filter and casing being closed by the grill 17 secured to the flaps 11 and 12, and supported on the screws 19 and 20. Nuts 19' and 20' secure the grill in place. This side of the unit faces outwardly of the rack housing.

The back panel 25 is provided with a pair of elongated rectangularly shaped openings 26 and 27 into which the fan scrolls or casings fit. I provide strengthening ribs or flanges folded back from the openings to provide supporting lips or frames 28, 29, 30, and 31 for the fan or blower unit. These ribs serve a dual function. They rigidify or stiffen the panel 25 and also provide the supporting means for the fan unit. This helps to prevent vibration of the panel and thus helps to reduce noise. The other lips or flanges 33, 34, 35, 36, 37, and 38 provide means for securing the panel 25 to the other side of the housing 10 by means of the screws 39. When the panel is in place it also rigidifies the complete housing.

The fan assembly which is supported in the housing includes an electric motor 45, having a shaft 46 extending from opposite sides of the motor. A squirrel cage type fan 47, 48 is mounted at each end of the shaft 46. In accordance with my invention I isolate all moving parts from the casing in order to insure that all vibration and noise is prevented from being transmitted from the motor and fans to the casing and housing in which the unit is mounted. This insures quiet operation.

Each fan is provided with a fan scroll or casing 50 and 51 which encloses the fan. Casing 50 is provided with the bell mouthed orifice 52 and casing 51 is provided with the orifice 53. These orifices assure quiet air movement and large air delivery.

To fasten the motor and fans to the casings I utilize a vibration isolating fastening means (see Figures 4, 5, and 6). Secured to the motor housing are the brackets 55 and 56, having the arms 57, 58, and 59. Through each of these arms I extend a screw 60 which in turn extends into the casings and are isolated from the casings by means of bushings such as 61 and 62, which may be of rubber or any other material which will isolate vibration. Thus while the casings are secured to the motor and fans, nevertheless they are separated therefrom by the fastening means so far as noise and vibration are concerned.

The above described fan assembly is secured to the panel 25. While rigidly secured to the panel, it nevertheless can be supported at any desired angle to obtain the desired cooling effects. The scrolls or fan housings are provided with arcuate shaped slots such as 65. This permits adjustment, angularly, of the scrolls so that the orifices can be set at any desired angle to direct air as desired. As shown in Figure 5, the back 70 of the rack housing 71 may be used as a baffle to direct air over racks such as 72 supporting the equipment to be cooled.

My invention provides a unitary ventilating apparatus of simple design which delivers an optimum amount of air, filtered by means of a filter which can be readily inserted in place without removing the unit from its supporting rack merely by removing the grill. The multiple blower unit delivers the optimum amount of air with the minimum of noise.

The blower or fan assembly is arranged so that the

assembly operation takes a minimum of time and yet insures noise and vibration isolation from the cabinet walls. The panel in which the fan assembly is mounted provides a simple and effective support eliminating the need for bracket construction. The motor brackets or spiders with their resilient fastening members insure noise and vibration isolation. This arrangement also makes it possible to use a scroll of most effective shape yet permits adjustment of delivery angle to get optimum cooling effects.

Since the filter is positioned between the blowers and the outside of the rack housing noise of the blowers is practically inaudible since the filters also act as sound absorbers. The filters can be observed from the outside of the rack casing so that it can be readily determined when to change filters. Furthermore, the filter occupies the full area of one side of the casing thus providing optimum filter performance.

Since the two fans are attached to a common shaft, the loads for the fans can be equalized, and because each fan has its own orifice air can be directed through ducts if desired to localize the cooling action of one of the fans.

I claim:

1. A ventilating apparatus including an elongated housing having a panel member extending along one side thereof and open on the other side from said one side, said panel having a pair of spaced rectangularly shaped openings extending from one edge of said panel, lips on said panel extending normally of said openings and serving as supporting brackets, a fan assembly including a motor having a shaft extending from opposite ends thereof, a fan mounted at each end of said shaft, a fan scroll having an inlet and an outlet and surrounding each of said fans, a spider element secured to the motor on each side thereof and coaxial with said shaft and resilient elements connected between the spiders and said scrolls for securing said fan assembly together, said scrolls having their outlets extending through said openings and being connected to said lips, oppositely disposed channels extending along the walls of said housing on said other side of said housing, a filter element received therein, and a grill covering said filter element on the outside of said housing.

2. A ventilating apparatus including an elongated housing having a panel member extending along one side thereof, said panel having a pair of spaced rectangularly shaped openings extending from one edge of said panel, lips on said panel extending normally of said openings and serving as supporting brackets, a fan assembly including a motor having a shaft extending from opposite ends thereof, a fan mounted at each end of said shaft, a fan scroll having an inlet and an outlet surrounding each of said fans, a spider element secured to the motor on each side thereof and coaxial with said shaft and resilient elements connected between the spiders and said scrolls for securing said fan assembly together, said scrolls having their outlets extending through said openings and connected to said lips, said housing being apertured on the side opposite said panel.

3. A ventilating apparatus including an elongated rectangularly shaped housing having a detachable panel member extending along one side thereof and secured thereto and open on the other side from said panel, said panel having a pair of spaced rectangularly shaped openings extending from one edge of said panel, lips on said panel extending normally of said openings and serving as supporting brackets, a fan assembly including a motor having a shaft extending from opposite ends thereof, a fan mounted at each end of said shaft, a fan scroll having an inlet and an outlet surrounding each of said fans, a spider element secured to the motor on each side thereof and coaxial with said shaft and resilient elements connected between the spiders and said scrolls for securing said fan assembly together, said scrolls having their outlets extending through said openings and connected to said lips, oppositely disposed channels extending along walls of said housing adjacent the open side on the other side of said housing and a filter element received therein, said housing having mounting flaps at opposite ends thereof on the filter side of said housing for mounting said apparatus within a rack housing.

4. A ventilating apparatus including a rectangularly shaped elongated housing having a detachable panel member extending along one side thereof and open from the other side of said panel, said panel having a pair of spaced rectangularly shaped openings therein, vertical lips on said housing extending normally and inwardly of said openings and serving as supporting brackets and providing stiffening ribs, a fan assembly including a motor having a shaft extending from opposite ends thereof, a fan mounted at each end of said shaft, a fan scroll having an inlet and an outlet surrounding each of said fans, a spider element secured to the motor on each side thereof and coaxial with said shaft and resilient securing elements connected between the legs of the spiders and said scrolls for securing said fan assembly together, said scrolls having their outlets extending through said openings and connected to said lips, said scrolls having arcuate shaped slots therein, and said housing having fastening means thereon extending through said slots to permit rotation of said scrolls relative to said lips, opposite disposed channels extending along the other side of said housing, a filter element removably received therein, and a protective grill covering said filter element and closing the other side of said housing.

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