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(71) Applicant: **DIFFUSION ENVIRONMENTAL SYSTEMS LIMITED**
Diffusion House Central Avenue
East Molesey Surrey(GB)

(72) Inventor: **Howard, David Arthur**
11 Windmill Drive
Leatherhead Surrey KT22 8PR(GB)
Inventor: **Grimmer, Peter Roy**
13 Barbara Close
Shepperton Middlesex(GB)

(74) Representative: **Beresford, Keith Denis Lewis et al**
BERESFORD & Co. 2-5 Warwick Court High Holborn
London WC1R 5DJ(GB)

(54) Acoustic fresh air ventilator.

(57) An acoustic fresh air ventilator is formed in a box (1) in which one or more fans (8, 10) are located. The box is designed to be mounted to a wall (5) with an inlet and/or outlet ducting element (42, 44) extending from the box through the wall. The ducting elements are so arranged as to occupy a minimal space for reducing the size of the hole (70). The box is packed with acoustic packing materials suitably in pieces or bags (30, 32, 36, 38, 40). Conduits (20, 22, 24, 26) between the fan(s) and box sides are preferably formed by the packing material. The fan(s) is/are held in free floating suspension in the acoustic material.

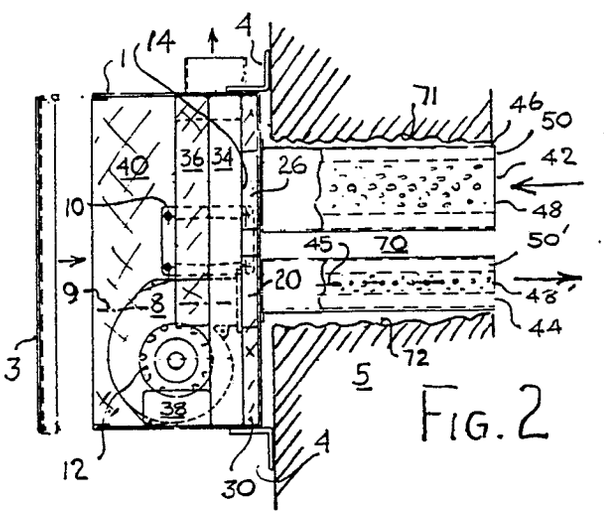

FIG. 2

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ACOUSTIC FRESH AIR VENTILATOR

The present invention relates to an acoustic fresh air ventilator suitable for ventilating a compartment.

Acoustic fresh air ventilators commonly provide a means of introducing fresh air into a compartment through a compartment wall and can include a means for extracting stale air from the compartment. References hereafter to "wall" when relating to a compartment is meant to include the ceiling or even the floor of the compartment. Known acoustic fresh air ventilators often include a fan for forced ventilation. In one such ventilator there is provided a motor driven fan mounted within a box or housing whose sides are provided with a layer of acoustic material, the fan being fixed to one wall and the box is so designed as to be mounted in a hole in a wall of the compartment to be ventilated. There are several disadvantages in this arrangement. Firstly, to obtain useful ventilation, the fan must be about 90mm wide by about 180mm in diameter, resulting in a box of about 220mm by 140mm by 250mm. This allows for acoustic lagging on the interior of the sides of the box of about 15mm thick. The hole to accommodate the box in the wall is necessarily of a similar size to that of the box which results in a hole which is structurally undesirable and may be aesthetically unappealing.

It is one object of the invention to reduce the size of the hole required in the wall of the compartment. A further object of the invention is to improve the acoustic performance of the ventilator.

An acoustic fresh air ventilator according to one aspect of the invention comprises a box mountable to a compartment wall, one or more fans within the box, an inlet, an outlet conduit for the or each fan, at least one said inlet or said outlet extending from the box to a ducting element mounted to the box and extending from the box for extension through the wall, the box being packed with acoustic material.

An acoustic fresh air ventilator according to another aspect of the invention comprises a box mountable to a compartment wall, one or more fans within the box with suitable conduits from the fan(s) to the outside of the box, the box being packed with acoustic material, wherein the or each fan is unattached to the box and is retained in a predetermined position within the box by the acoustic material.

By mounting the box inside the compartment and fitting the or each extending ducting element through the wall, the size of the hole through the wall need be no more than one standard brick size. Furthermore, the box can be provided with thicker acoustic lining than the known ventilator because there is no requirement to limit the box size relative to the hole through the wall. This results in a substantial noise reduction.

In order to even further reduce fan noise, it has been found advantageous to locate the or each fan unmounted to the box but merely retained in the box by the acoustic packing material.

The acoustic material is suitably a mineral wool such as rockwool and is contained or structured in such a way that internal conduits between the box sides and fan(s) are formed by shaping the wool packing.

Preferably this acoustic material is in several pieces or pads so that the pieces or pads can be easily removed and replaced to access the fan(s).

The or each external ducting element is preferably formed as a perforated tube surrounded by acoustic material which is in turn surrounded by a further tube.

One embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a plan view of an acoustic ventilator according to the invention, and

Figure 2 is a cross-section taken at A-A of the ventilator of Figure 1.

In the drawings, there is shown an acoustic ventilator with a six sided box 1. The size of the box containing two fans is 603mm by 405mm by 205mm. One side 3 of the box is a lid which may be riveted, bolted or hinged to one or more of the other sides. The box is provided with wall mounting means comprising brackets 4 for mounting the box to a wall 5.

Within the box are two identical motorised centrifugal fans 8 and 10. Suitably these fans are centrifugal fans with single side inlets 12 and 14 respectively. The fans in the embodiment have a capacity of 86 m^3/h, the fans run up to 2300 rpm and have a self noise level of 51 dBA. The outlets 16 and 18 are substantially square in cross-section and vent into internal conduits 20, 22 which are formed as will be described below within sealed rockwool pads. The fan inlets 24, 26 are also formed within rockwool pads. The fans remain unbolted to the box and are merely located by the acoustic packing within the box. Cabling 28 from the fans extends to an external control either remote or mounted on the exterior of the box. Clearly however, the fan control may be mounted in a suitable place in the box or partially in the box and partially without the box on the lid 3.

The forming of conduits 20, 22, 24 and 26 within the acoustic packing is achieved in the case

of conduits 20 and 26 by providing a base liner pad 30 of rockwool enclosed in a pad of nylon or pervious fibre glass material. This pad is suitably strengthened by glue or an epoxy resin to make the pad rigid and to keep conduits 20 and 26 in a predetermined form. A second pad 32 forms one side 34 of conduit 24 and part of walls 33 of conduit 22. Further pads 36, 38 and 40 form the remaining parts of conduits 22 and 24. In this way, the internal conduits are formed without metal and of acoustic material. The padding material prevents the rockwool from migrating within the box. The rockwool used is a heavy density material of 200 kg/m^3. Any space within the box not occupied by conduits, the fans, or associated electrical elements is therefore filled with acoustic packing which around the fans is generally much thicker than that provided in known prior art assemblies.

Externally, the box has an inlet ducting element 42 and an outlet ducting element 44 formed from metal or plastic external tubes 46 and 46′ with perforated aluminium internal tubes 48 and 48′. Between the external and internal tubes is more acoustic material 50 and 50′. Flexible tubes can be joined to ducting elements 42 and 44 particularly when the ventilator is required for ceiling location.

The ducting elements are mounted to the box as close together as acoustically desirable. The larger inlet element 42 with an external diameter of about 100mm is spaced about 25mm from the smaller outlet element 44 which has an external diameter of about 75mm. The resulting hole 70 defined by wall surfaces 71, 72 need only be about 200mm by 100mm which is within a standard sized building brick of about 225mm by 100mm.

To ensure the size of this hole, the centre 45 of element 44 is offset from centre 9 of the outlet of fan 8. This is necessary due to the near abutment of fan 8 with fan 10. The misalignment of centres 9 and 45 is not deleterious due to the spacing of fan 8 from its box sides by pad 30. Some improvement in misalignment could be achieved by rotating fan 10 through 180 degrees and venting conduit 22 through another side wall. Equally a different handed fan could replace fan 10. The chosen configuration has been chosen for simplicity and acoustic performance.

A further external ducting element 52 is mounted to the box at the outlet of conduit 22 which may be used for coupling the ventilator to an air conditioning unit shown diagrammatically at 60. In this way, conduit 22 communicates directly with the air conditioning unit. Conduit 24 terminates in a perforated plate or area 54 in one side of the box 1.

In a modified packing arrangement the conduits 20, 22, 24 and 26 are cast in two blocks forming the whole of the acoustic packing for the box.

The ventilator of the invention provides a simple but convenient method of introducing fresh air and extracting stale air into and from a compartment without the need to provide a large hole in a wall of the compartment. The acoustic performance is extremely good due to the "floating" of the fan(s) in the ventilator box or housing, without the fan(s) being mounted by bolting or the like to the box. The opportunity has been taken in the embodiment of the invention to eliminate metal conduits within the box or housing which reduces the cost of assembly, manufacture and again improves the acoustic performance.

Claims

1. A ventilator comprising a box having an inlet port and an outlet port, a motorised fan unit having an inlet port and an outlet port disposed in the box, and sound insulating material which packs the box and surrounds and supports the fan unit which is otherwise unsupported, inlet and outlet ducts being formed through the packing material between the inlet ports of the box and fan unit and the outlet ports of the fan unit and box.

2. A ventilator according to claim 1, wherein the acoustic material is a heavy density mineral wool.

3. A ventilator as claimed in claim 1 or 2, wherein the acoustic material is contained in a plurality of shaped pads.

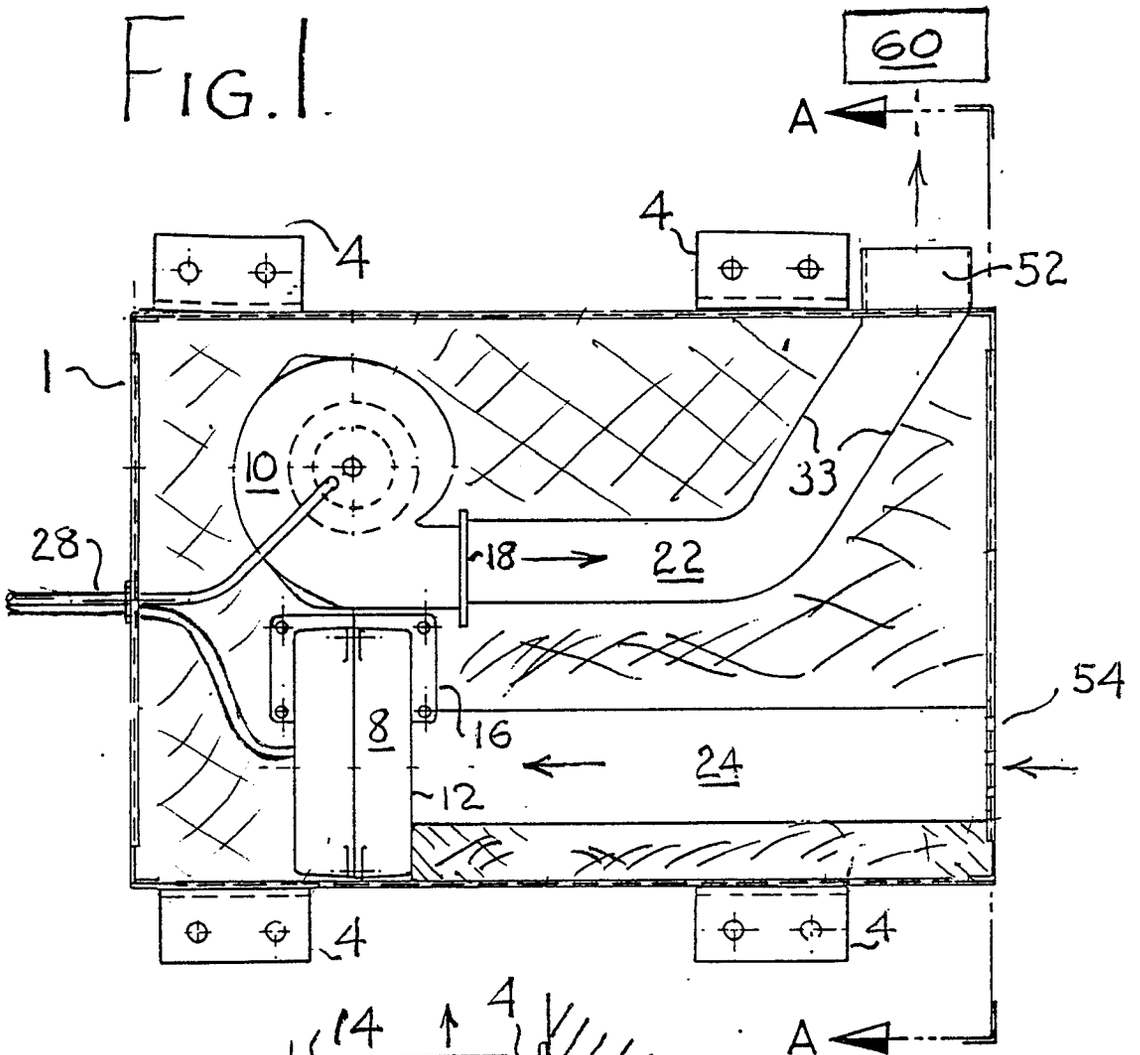
4. A ventilator as claimed in any preceding claim, wherein the box is adapted to be mounted on a wall, at least one of the inlet and outlet ports of the box communicating with a ducting element mounted to the box and projecting therefrom for extension through the wall.

5. A ventilator according to claim 4, wherein the ducting element is formed with a perforate tube defining the air passage way, the tube being surrounded by acoustic material which is in turn surrounded by a further tube.

6. A ventilator as claimed in any preceding claim, and having a further such fan unit similarly mounted in the box.

7. A ventilator according to any preceding claim and an air conditioning unit coupled together.

FIG. 1.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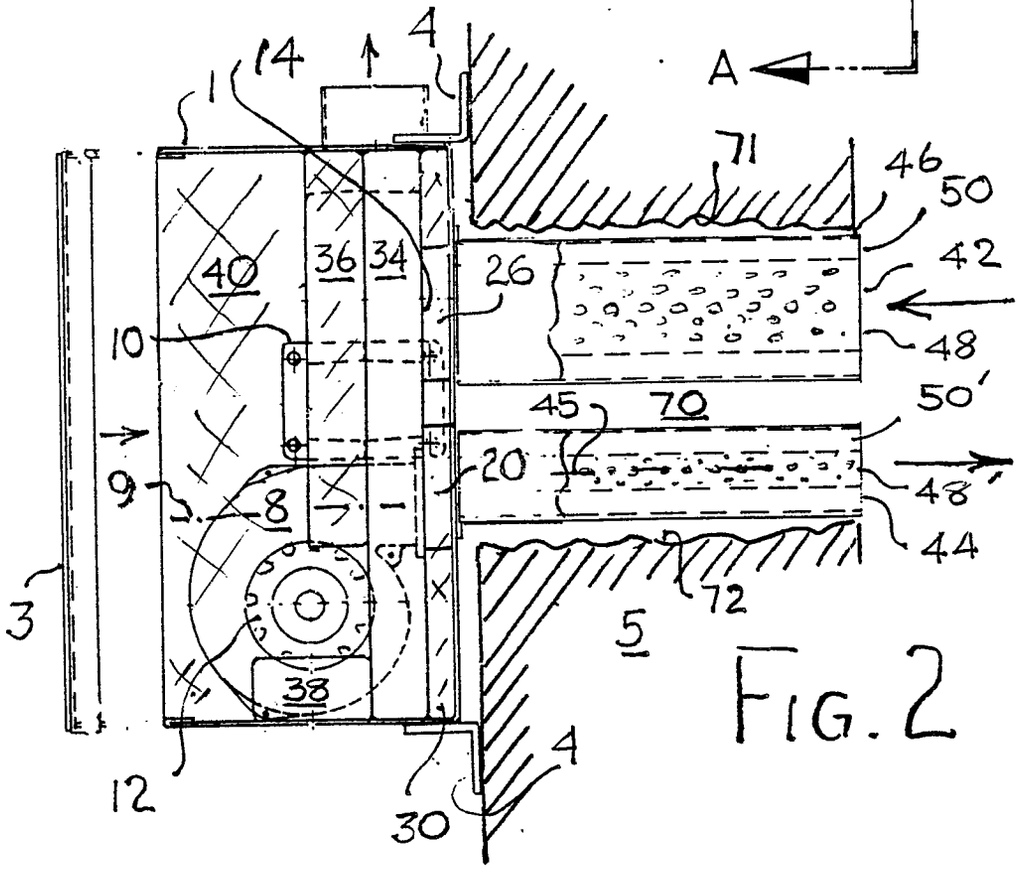
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FIG. 2