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(54) Ventilating system

(57) A ventilating unit has a diffuser coupled for delivering air into an accommodation space. The ventilating unit is arranged to draw air in from said roof space and deliver the air to the diffuser for delivery to the accommodation space. Air from the accommodation space is drawn into the diffuser and mixed with the primary air flow from the roof space so as to increase the temperature of the air prior to delivery into said accommodation space. Typically the only means by which the secondary air flow of air into the diffuser from the accommodation space is achieved is by means of the primary air flow over an aperture or slot.

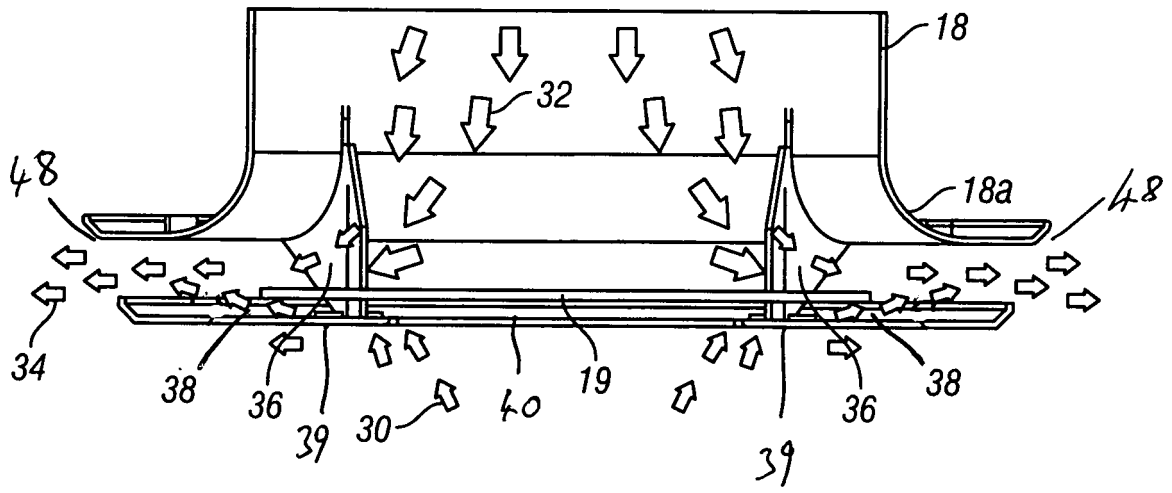

FIG. 3

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Description

[0001] This invention relates to a system for ventilating a dwelling or other building.

[0002] It is known to provide a dwelling with a ventilation system which comprises a fan disposed in the loft or roof space of the building and arranged to discharge air into the living or accommodation space of the building. This places the accommodation space under slight positive pressure, which forces air to flow out of the building through gaps in windows, doors, trickle vents, etc. The effect is that the accommodation space is subjected continuously to a ventilating flow of air, which acts to remove or prevent build-up of condensation and also to remove or prevent the possible build-up of radon gas. Such ventilating systems are often installed in dwellings to overcome the tendency in some buildings for damp conditions to develop or possibly radon gas to accumulate.

[0003] Typically, the ventilating system draws in its air from within the roof space of the dwelling. However, when the temperature is very cold outside the dwelling, the temperature of the air in the roof space is often much colder than that in the dwelling, which can cause cold air to be 'dumped' into the top floor of the building, causing the occupants to feel a cold draught.

[0004] It is therefore an object of the invention to provide a ventilating system for a building in which the problem caused by dumping cold air from the roof space into the accommodation space during cold weather is alleviated.

[0005] In accordance with the present invention, there is provided ventilating system for installation in the roof space of a building, an accommodation space being defined below said roof space, the system comprising a ventilating unit and a diffuser coupled thereto for delivering air into said accommodation space, the ventilating unit being arranged to draw air in from said roof space and deliver said air to said diffuser for delivery thereby to said accommodation space, said system including means for causing air from said accommodation space to be drawn into said diffuser and said diffuser being configured to mix said air from said accommodation space with said air from said roof space so as to increase the temperature thereof prior to delivery thereof into said accommodation space.

[0006] In a preferred embodiment, the system may comprise at least one temperature sensor for sensing the temperature of said air in said roof space, and control means responsive to said at least one temperature sensor for causing said diffuser to draw air in from said accommodation space to raise the temperature of said air from said roof space if required, for example, if the temperature of said air in said roof space is below a predetermined temperature and/or if the temperature of said air in said roof space is less than the temperature of said air in said accommodation space by at least a predetermined amount.

[0007] Beneficially, the system includes a fan for delivering said air from said roof space to said diffuser. An extractor fan may be provided, as part of the ventilating unit or the diffuser, for causing air from said accommodation space to be drawn into said diffuser.

[0008] These and other aspects of the present invention will be apparent from, and elucidated with reference to, the embodiment described herein.

[0009] An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a schematic cross-sectional view of a dwelling having a ventilating system installed in the roof space;

Figure 2 is a schematic diagram of the principal components of a ventilating system according to an exemplary embodiment of the present invention; and

Figure 3 is a schematic diagram of the diffuser of the ventilating system of Figure 2.

[0010] Referring to Figure 1 of the drawings, there is shown the apex roof 10 of a house 1, the apex roof 10 providing a loft or roof space 11 above the ceiling 12 to the accommodation space 13 of the building: typically the accommodation space comprises a number of different rooms. Referring additionally to Figure 2 of the drawings, a ventilating unit 14 in accordance with the present invention is disposed in the roof space 11 of the building 1. The ventilating unit 14 has a number of ducts 15, 16, 18 coupled to it. The ventilating unit 14, in the example shown, comprises an air handling unit 20 comprising an enclosure formed on one side with a single port P3 and on its opposite side two ports P1, P2, each coupled to a manifold M1, M2 respectively.

[0011] The port P3 of the air handling unit 20 is provided with a fan F having an air filter (not shown). The ports P1, P2 of the air handling unit are provided with an electrically controlled damper D for opening and closing the respective port.

[0012] The port P3 of the air handling unit 20 has the duct 18 coupled to it, the duct being coupled at its other end to one or more diffusers 18a on the ceiling 12 of the accommodation space 13 of the building, in order to deliver a flow of air into the accommodation space, with the effect of maintaining a positive air pressure within the building. The fan F serves to deliver fresh, filtered air through the duct 18, the air being drawn into the ventilation unit 14 through inlet duct 15 and/or through inlet duct 16, as will be described below.

[0013] In one exemplary embodiment, the ventilating unit 14 further comprises a controller (not shown) which serves to monitor the temperature of the air available at the inlets to the ducts 15, 16, the air temperature in the accommodation space 13 of the building, the temperature of the air being delivered into the accommodation space 13, and a desired temperature set by a manual

selector provided in the accommodation space. The controller then determines whether to draw inlet air from within the roof space (via inlet duct 15), or from outside the building (via inlet duct 16), or a mixture of the air from both locations: the controller then controls the dampers D of the ports P1, P2 accordingly.

[0014] In general, the ventilating unit 14 serves to deliver warm, air into the accommodation space, during periods of cold or cool ambient conditions. For example, in winter, the unit will serve to draw in air from the roof space (which is warmer than the air outside the building), through duct 15 and the fan F will then deliver this air into the accommodation space through the outlet duct 18: it will be noted that the air in the roof space will be replenished by air entering under the eaves (as indicated at A). However, during very cold ambient conditions, even though the temperature of the air in the roof space is warmer than the air outside the building, it is still likely to be much colder than the air inside the dwelling. In these circumstances, as explained above, cold air can be 'dumped' into the landing of the first floor (in the case of the two-storey private dwelling illustrated in Figure 1), causing the occupants to feel a cold draught which is obviously undesirable.

[0015] Referring additionally to Figure 3, this problem is alleviated by the present invention in that a novel diffuser 18a is employed which draws the air from the area of the accommodation space 13 adjacent the ceiling 12 (which is usually the warmest air in the accommodation space) and mixes it with the cooler air 32 from the roof space 11. This increases the temperature of the air 34 being input into the accommodation space 13 and reduces the 'cold dumping' effect described above. The illustrated diffuser 18 comprises an upper portion 18 comprising a vertical section and a lower substantially horizontal section which extends from the vertical section via a curved section. The diffuser 18a also comprises a lower portion in the form of a plate 19 running substantially parallel to, and spaced apart from, the horizontal section of the upper portion. Plate 19 is held positioned above a perimeter frame 39. Perimeter frame 39 has a central aperture 40 and is spaced from the overlapping edges of plate 19 so as to define an air passage 38 through which air is drawn from adjacent the diffuser into the diffuser. The upper and lower portions of the diffuser are connected together and held in spaced apart relation by a pair of parallel diffuser plates 36.

[0016] The illustrated diffuser 18a is mounted in the ceiling adjacent to the roof space 11 and is coupled to the end of the duct 18 from the ventilating unit 14 for receiving cold air 32 from the roof space 11 of the building. Air 32 entering the diffuser 18a from the roof space 11 via the duct is diffused via diffuser plates 36 and expelled through opposing outlets 48 at each side of the diffuser 18a, as in a conventional diffuser. In addition, however, warm air 30 from the accommodation space below the ceiling is also drawn into the diffuser 18a. This occurs because incoming air 32 from the loft is forced by the plate 19 to pass mainly in the direction 34. This passage of air creates a slight negative pressure above plate 19, thereby pulling warm air from the dwelling into the diffuser from location 30 along the air passage 38 between the plate edges 19 and the perimeter from 39. This warm air is mixed with the air 32 before being expelled through the outlets 48, thereby increasing the temperature of the air 34 being input to the accommodation space and alleviating the above-mentioned 'cold dumping' effect. This effect can be achieved by means of passing the main air flow over any aperture or slot communicating with the air immediately between the diffuser. Such an arrangement provides for a secondary flow of warm air for mixing with the primary air flow, without the requirement for other powered mechanical means such as a fan.

[0017] It will be appreciated by a person skilled in the art that a number of different designs of ventilating unit are available, including those that have additional functionality, such as drawing air heated by an external solar panel on the roof in order to heat the accommodation space and/or heat water for use in the building. Features such as these have been omitted from Figure 2, but it will be understood that a ventilating unit including such features would fall within the scope of the present invention, as claimed.

[0018] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be capable of designing many alternative embodiments without departing from the scope of the invention as defined by the appended claims. In the claims, any reference signs placed in parentheses shall not be construed as limiting the claims. The word "comprising" and "comprises", and the like, does not exclude the presence of elements or steps other than those listed in any claim or the specification as a whole. The singular reference of an element does not exclude the plural reference of such elements and vice-versa. The invention may be implemented by means of hardware comprising several distinct elements. In a device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

Claims

1. A ventilating system for installation in the roof space of a building, an accommodation space being defined below said roof space, the system comprising a ventilating unit and a diffuser coupled thereto for delivering air into said accommodation space, the ventilating unit being arranged to draw air in from said roof space and deliver said air to said diffuser for delivery thereby to said accommodation space, said system including means for causing air from

said accommodation space to be drawn into said diffuser and said diffuser being configured to mix said air from said accommodation space with said air from said roof space so as to increase the temperature thereof prior to delivery thereof into said accommodation space.

2. A system according to clam 1, comprising at least one temperature sensor for sensing the temperature of said air in said roof space, and control means responsive to said at least one temperature sensor for causing air from said accommodation space to be drawn into said diffuser to if it is required to raise the temperature of said air from said roof space.

3. A system according to claim 2, wherein said control means is arranged to cause air from said accommodation space into said diffuser to raise the temperature of said air from said roof space if the temperature of said air in said roof space is below a predetermined temperature.

4. A ventilating system according to claim 2 or claim 3, wherein said control means is arranged to cause air from said accommodation space to be drawn into said diffuser to raise the temperature of said air from said roof space if the temperature of said air in said roof space is less than the temperature of said air in said accommodation space by at least a predetermined amount.

5. A system according to any one of the preceding claims, comprising a fan for delivering said air from said roof space to said diffuser.

6. A system according to any one of the preceding claims, comprising an extractor fan for causing air from said accommodation space to be drawn into said diffuser.

7. A ventilating system according to any preceding claim, wherein the diffuser comprises an air flow ducting arrangement for directing incoming air to exit the diffuser in opposed directions transverse to the direction of air flow into the diffuser.

8. A ventilating system according to any preceding claim, wherein the primary air flow is directed in the diffuser over an aperture or slot which provides an air passage into the diffuser from an area of the accommodation space below the diffuser, the primary air flow over the aperture or slot being the means by which the secondary air flow is drawn into the diffuser from the accommodation space.

9. A ventilating system according to any preceding claim, wherein the diffuser comprises a diffuser plate having edges spaced from and overlapping a peripheral element to define an air flow passage between the accommodation space adjacent the diffuser and the interior of the diffuser.

10. A ventilating system according to any preceding claim, wherein a single means of creating primary air flow in the diffuser also creates the secondary air flow in the diffuser drawn from the accommodation space.

11. A ventilating system according to any preceding claim, wherein the primary air flow through the diffuser is the only means which induces the secondary air flow into the diffuser drawn from the accommodation space.

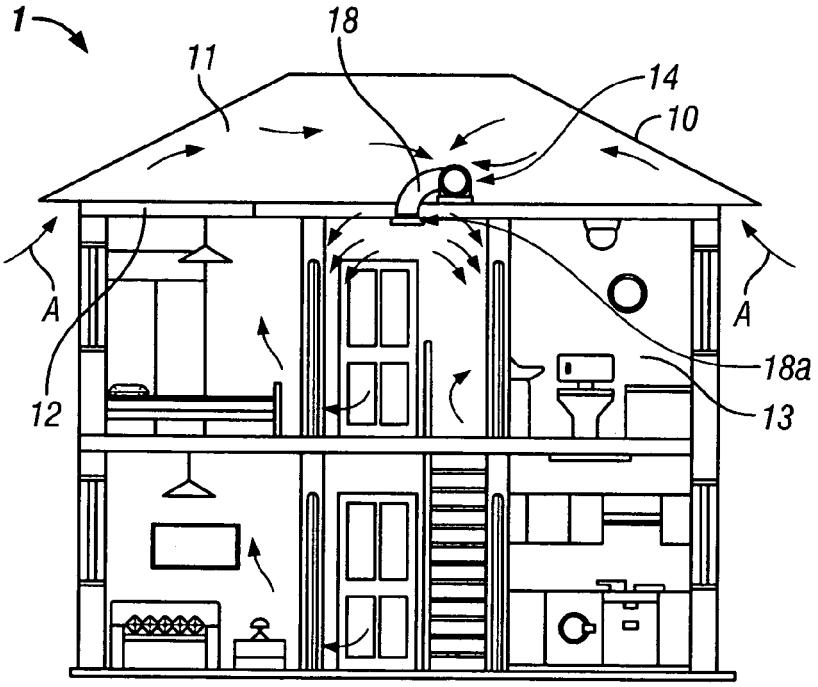

FIG. 1

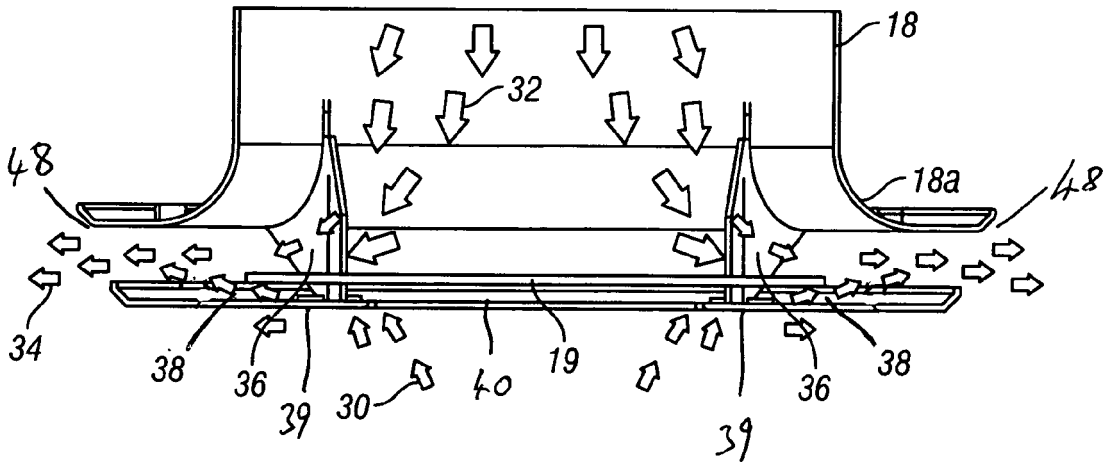

FIG. 3

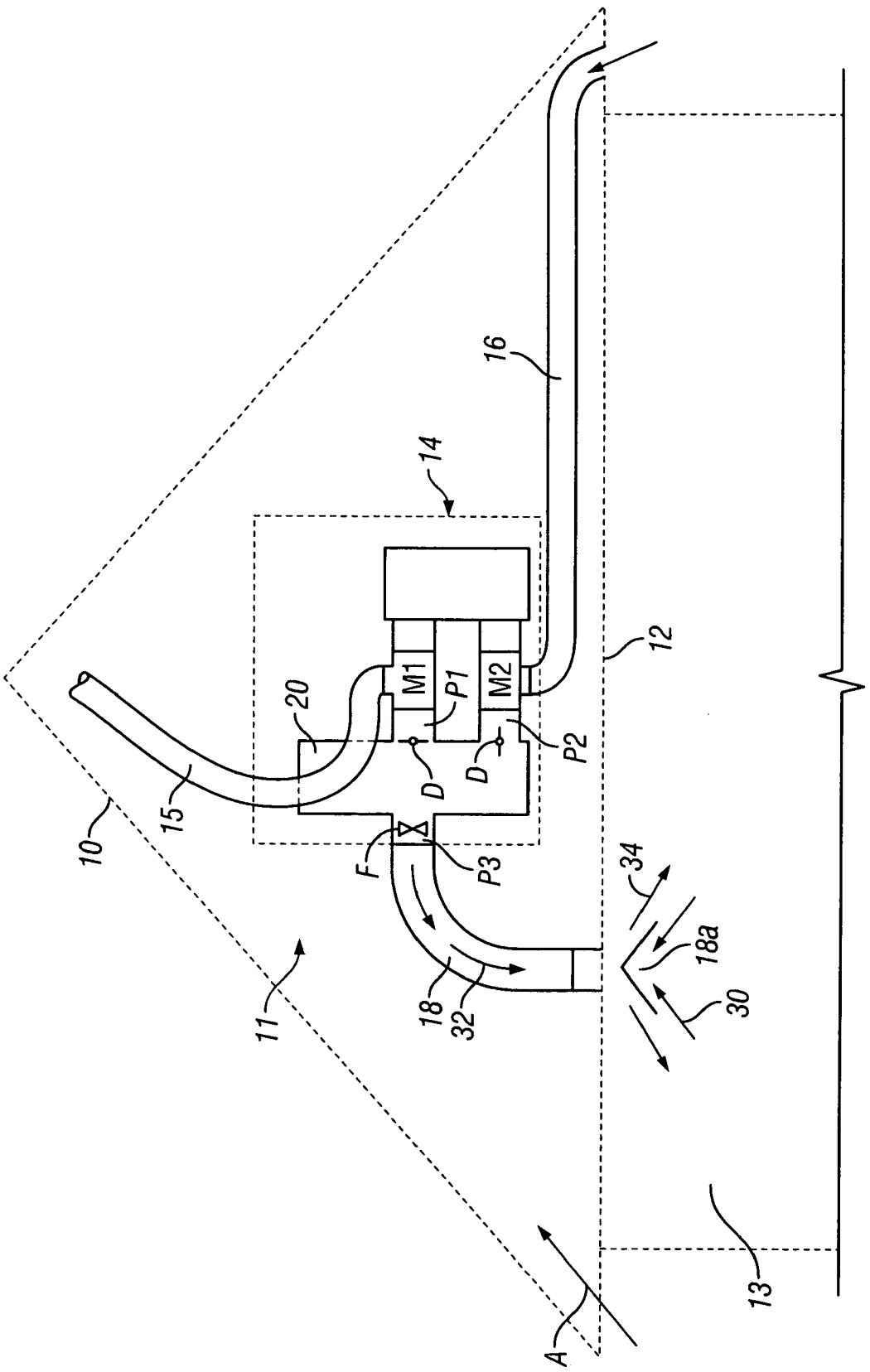

FIG. 2