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(54) **Ventilating Unit**

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Unité de ventilation

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(56) References cited:

WO-A-86/04667	CH-A- 668 829
DE-A- 3 632 268	GB-A- 1 431 671
US-A- 1 442 831	US-A- 1 559 767
US-A- 5 257 958	

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Description

[0001] The present invention relates to a ventilating unit for use on the inner side of an outside wall of a building according to the preamble of claim 1.

[0002] Such a ventilating unit is disclosed in US-A-1,442,831. The known ventilating and heating unit comprises a damper in the passageway. This damper is adjustable by means of a bar system and can be held in position through notches in a foot-bar of the bar-system.

[0003] The object of the invention is to provide a ventilating unit which enhances comfort and which is furthermore capable of effecting an energy saving.

[0004] In order to accomplish that objective, the ventilating unit comprises the features of claim 1.

[0005] According to the invention there is provided a natural and comfortable ventilation wherein the control unit and the control means causes a substantially constant ventilation flow, which reduces any nuisance caused by draught. Since the inflowing air is heated before it enters the room to be ventilated, any nuisance caused by draught that can be perceived is reduced even more. The direct heating of the air by means of the heating element makes it possible to achieve an energy saving. Since the unit can be built into an outside wall of the building, a complicated system of tubes is not needed, which makes it possible to keep costs low and reduce the risk of sick building syndrome, which is caused by long, contaminated ventilation ducts, in which germs can accumulate and develop.

[0006] Preferably the ventilating unit is provided with a temperature sensor which is connected to the control unit, which sensor may be mounted near the upper side of the heating element, for example, where the ventilating air can flow past the sensor.

[0007] In this manner the ventilating unit can be controlled not only on the basis of the pressure difference between the outer side and the inner side of the outside wall, but also on the basis of the temperature. It is possible to arrange thereby that the temperature of the outflowing air above the heating element must not fall below a preset value, which value is preferably adjustable, between 12°C and 20°C, for example. If the temperature falls below the preset value, the amount of outside air that is admitted will be reduced until the preset temperature is reached again.

[0008] Furthermore it is possible to use the outside temperature as a measure for the control precision. When the outside temperature is low, a high control precision may be selected, whilst the control precision will be lower when the outside temperature is high. This aspect makes it possible to reduce the amount of adjusting movements of the control means, which saves energy and prolongs the life of the moving components of the control means. Another possibility is to make this a "sliding" influence, wherein control can be made dependent of the number of movements of the control means in a preceding period.

[0009] The control means preferably comprise a valve which is mounted in the passageway, and which is capable of shutting off said passageway or releasing it partially or completely. It is advantageous if the valve can also be manually controlled. When the valve is closed, the control system will be disabled. On the other hand it is possible to put the valve in the open position, but in that case it is preferred to provide a frost protection device, which closes the control means if the exit temperature falls below 3°C, for example, in order to protect the heating element, which generally works with water, against freezing.

[0010] The invention will be explained in more detail hereafter with reference to the drawing, which is a very diagrammatic representation of an embodiment of the invention.

Fig. 1 is a ground plan of a house which is fitted with a number of ventilating units according to the present invention.

Fig. 2 is a larger-scale front view of a ventilating unit according to the invention, which is installed between an outside wall and a heating element.

Fig. 3 is a side view of the unit of Fig. 2.

Fig. 4 is a view which corresponds with Fig. 3, without the outside wall, however, wherein the air flow through the ventilating unit and the heating element is shown.

Fig. 5 is a larger-scale perspective view of a separate ventilating unit.

[0011] Fig. 1 is a ground plan of a house, in which the present invention is used. The house has two outside walls 1, on which heating elements 2 are mounted in the various rooms. Said heating elements may be independent heating elements, but generally they will form part of a central heating system, and in that case the heating elements 2 will consist of radiators, in which water heated by a boiler provides the supply of heat. A passage 3 has been formed in the outside wall 1 at the location of each heating element 2, which passage functions to pass outside air through the outside wall 1 into the interior of the house for the purpose of ventilating the house. Each passage 3 gives way to a ventilating unit 4, which is disposed between outside wall 1 and heating element 2 in this case. The exhaust of air takes place via exhaust channels 12, which may or may not be fitted with an exhaust fan.

[0012] As is shown in particular in Figs. 2, 3 and 4, ventilating unit 4 is provided with a passageway 5, which extends between passage 3 in outside wall 1 and the bottom side of the associated heating element 2 when the ventilating unit 4 is installed. Heating element 2 is internally provided with a vertical passage 6, so that rising air can be heated from two side over a long distance before it enters the room of the house or other type of building.

[0013] In order to achieve a comfortable regulation of

the amount of outside air that is admitted through passage 3, ventilating unit 4 is fitted with a (preferably electronic) control unit 7 (Fig. 5), to which control means, in this case in the form of a valve 8, are connected. The valve may be capable of stepless operation, or it may close or open the passageway 5 of ventilating unit 4 partially or entirely in a number of steps. Preferably the control unit is set for controlling valve 8 on the basis of the pressure difference between the inner side and the outer side of outside wall 1 of the house, in order to obtain a constant flow of outside air when pressure differences vary.

[0014] In this embodiment passageway 5 of ventilating unit 4 comprises an upward portion 5' and a downward portion 5", and slide valve or rotary valve 8 is provided near the transition between the two portions 5' and 5". The valve is driven by means of an electric motor 9, which is connected to control unit 7, or by another drive unit for adjusting the valve 8.

[0015] Ventilating unit 4 is fitted with a sensor 10, which is capable of measuring the pressure difference between the two sides of the outside wall, on the basis of which pressure difference valve 8 is controlled so as to obtain a desired air flow, for example a more constant or less constant air flow.

[0016] As it is important that the temperature of the air which enters via heating element 2 is sufficiently high, it is preferred to have the control of valve 8 also take place on the basis of the temperature of the inflowing air. Ventilating unit 4 is to that end provided with a temperature sensor 11, which is mounted near the place where the heated air exits heating element 2, in this case near the upper side of heating element 2. This temperature sensor 11 makes it possible to ensure that the temperature of the outflowing air will not fall below a preset value, whereby said preset value may for example be a temperature selected from a possible range of 12 - 20°C, for example 15 to 16°C. Usually no draught problems occur with exit temperatures within this range.

[0017] The power for the electric motor 9 and the control unit 7 may be taken from the existing electricity grid, but it is also possible to use a separate direct current power supply, a battery or a solar cell, for this purpose. If more than one ventilating unit 4 is used, said units may be coupled, and if said units are used in combination with a central heating system, they may also be coupled to the boiler, so that the temperature control of the central heating system takes place in cooperation with the control of the heating unit. All this depends on the particular use. In newly built houses or in office buildings more central facilities can be provided than in existing houses, where one or more ventilating units according to the invention are added later on, for example when carrying out a renovation project. Of course several variations and additions are possible on the basis of the present principle. Thus, manual influencing will preferably be possible, in order to provide a possibility of interfering with the control system according to the cir-

cumstances. Furthermore a filter for filtering the inflowing air may be incorporated in ventilating unit 4, said filtering may take place electrostatically, for example, but also mechanically or otherwise. The generation of a ventilating flow may take place in a natural manner, but on the other hand it is possible to build in exhaust fans so as to effect mechanical ventilation. The ventilating unit may be fitted with means which ensure that the valve will be closed if the supply voltage is cut off, this in order to prevent an undesirable inflow of air and freezing of the water in heating element 2. Said means may comprise a capacitor, for example.

[0018] From the foregoing it will be apparent that the invention provides a ventilating unit which is capable of providing comfortable and energy-saving ventilation of houses and other buildings, without large investments being required, whilst the ventilating unit can also be built into existing buildings without any difficulty.

[0019] The invention is not limited to the embodiment described above and illustrated in the drawing, which can be varied in several ways within the framework of the invention as defined in the claims.

25 Claims

1. A ventilating unit for use on the inner side of an outside wall (1) of a building, which ventilating unit comprises a passage (3) for passing outside air through the outside wall, a passageway (5), adapted to extend between the passage (3) in the outside wall and the bottom side of a heating element (2) when the ventilating unit is installed, and control means (8) mounted in said passageway (5) for admitting air through the passageway, **characterized in that** said ventilating unit (4) is provided with a control unit (7) for controlling said control means (8) to maintain the amount of outside air that is admitted through the passage substantially constant when the pressure difference between the inner side and the outer side of the outside wall varies.
2. A ventilating unit according to claim 1, provided with a temperature sensor (11), which is connected to the control unit (7).
3. A ventilating unit according to claim 2, wherein said temperature sensor (11) can be mounted near the upper side of the heating element (2), where the ventilating air can flow past the sensor.
4. A ventilating unit according to any one of the preceding claims, wherein said control means (8) are mounted within the ends of the passageway (5), and wherein said control means (8) preferably comprise a sensor (10) for measuring the amount of air flowing through.

5. A ventilating unit according to claim 4, wherein said passageway (5) comprises a first, upwardly extending portion (5'), seen from the outer side of the outside wall (1), and a second, downwardly extending portion (5''), and wherein said control means (8) are preferably provided at the transition between said two portions (5', 5'').
6. A ventilating unit according to any one of the preceding claims, wherein said control means (8) comprise a valve, which is preferably also manually adjustable, whilst a sensor (10) that may be provided will be mounted before the valve, seen in the direction of flow.
7. A ventilating unit according to any one of the preceding claims, wherein the heating element (2) is internally provided with a vertically passage (6), to the bottom side of which the passageway (5) can be connected.
8. A ventilating unit according to any one of the preceding claims, wherein the control precision of the control unit (7) depends on the outside temperature.
9. A ventilating unit according to any one of the claims 2 - 8, which is provided with a frost protection device, which is arranged for closing the control means (8) if the temperature sensor (11) measures a temperature which is lower than a preset minimum value.
10. A ventilating unit according to any one of the preceding claims, wherein the control unit (7) can be connected to a thermostat of the heating element (2), preferably to the thermostat of a central heating system of which the heating element forms part.

Patentansprüche

1. Belüftungseinheit zur Verwendung an der Innenseite einer Außenwand (1) eines Gebäudes, wobei diese Belüftungseinheit eine Durchlassöffnung (3) zum Durchleiten von Außenluft durch die Außenwand, einen Gang (5), der so vorgesehen ist, dass er sich zwischen der Durchlassöffnung (3) in der Außenwand und der Bodenseite eines Heizelements (2) erstreckt, wenn die Belüftungseinheit installiert ist, sowie Steuermittel (8) umfasst, die in dem genannten Gang (5) montiert sind, um Luft durch den Gang durchzulassen, **dadurch gekennzeichnet, dass** die genannte Belüftungseinheit (4) mit einer Steuereinheit (7) ausgestattet ist, um die genannten Steuermittel (8) zu steuern, um die Außenluftmenge, die durch die Durchlassöffnung durchgeleitet wird, im wesentlichen auf konstantem Niveau zu halten, wenn die Druckdifferenz zwi-

schen der Innenseite und der Außenseite der Außenwand schwankt.

2. Belüftungseinheit nach Anspruch 1, die mit einem Temperaturfühler (11) versehen ist, der mit der Steuereinheit (7) verbunden ist.
3. Belüftungseinheit nach Anspruch 2, wobei der genannte Temperaturfühler (11) in der Nähe der Oberseite des Heizelements (2) montiert sein kann, wo die Belüftungsluft an dem Fühler vorbeifließen kann.
4. Belüftungseinheit nach einem der vorhergehenden Ansprüche, wobei die genannten Steuermittel (8) innerhalb der Enden des Gangs (5) montiert sind und wobei die genannten Steuermittel (8) vorzugsweise einen Sensor (10) zum Messen der Luftdurchflussmenge umfassen.
5. Belüftungseinheit nach Anspruch 4, wobei der genannte Gang (5), von der Außenseite der Außenwand (1) betrachtet, einen ersten, sich nach oben erstreckenden Abschnitt (5') und einen zweiten, sich nach unten erstreckenden Abschnitt (5'') umfasst, und wobei die genannten Steuermittel (8) vorzugsweise an dem Übergang zwischen den zwei Abschnitten (5', 5'') vorgesehen sind.
6. Belüftungseinheit nach einem der vorhergehenden Ansprüche, wobei die genannten Steuermittel (8) ein Ventil umfassen, das vorzugsweise manuell einstellbar ist, während ein Sensor (10), der vorgesehen sein kann, in Fließrichtung vor dem Ventil montiert ist.
7. Belüftungseinheit nach einem der vorhergehenden Ansprüche, wobei das Heizelement (2) im Innern mit einem vertikalen Durchgang (6) versehen ist, an dessen Bodenseite der Gang (5) angeschlossen werden kann.
8. Belüftungseinheit nach einem der vorhergehenden Ansprüche, wobei die Steuergenauigkeit der Steuereinheit (7) von der Außentemperatur abhängig ist.
9. Belüftungseinheit nach einem der Ansprüche 2 - 8, die mit einer Frostschutzvorrichtung ausgestattet ist, die angeordnet ist, um die Steuermittel (8) abzusperren, wenn der Temperaturfühler (11) eine Temperatur unterhalb eines voreingestellten Mindestwertes misst.
10. Belüftungseinheit nach einem der vorhergehenden Ansprüche, wobei die Steuereinheit (7) mit einem Thermostat

des Heizelements (2) verbunden sein kann, vorzugsweise mit dem Thermostat eines zentralen Heizungssystems, vom dem das Heizelement einen Teil bildet.

Revendications

1. Unité de ventilation destinée à être utilisée sur la face interne d'un mur extérieur (1) d'un bâtiment, laquelle unité de ventilation comprend un passage (3) destiné à faire passer l'air extérieur par l'intermédiaire du mur extérieur, un passage (5), adapté pour s'étendre entre le passage (3) dans le mur extérieur et la face inférieure d'un élément de chauffage (2) lorsque l'unité de ventilation est installée, et les moyens de régulation (8) montés dans ledit passage (5) destiné à faire passer de l'air à travers le passage, **caractérisé en ce que** ladite unité de ventilation (4) est équipée d'une unité de régulation (7) destinée à réguler lesdits moyens de régulation (8) afin de maintenir constante la quantité d'air extérieur passé à travers le passage lorsque la différence de pression entre la face interne et la face externe du mur extérieur varie.
2. Unité de ventilation selon la revendication 1, équipée d'un capteur de température (11), lequel est raccordé à l'unité de régulation (7).
3. Unité de ventilation selon la revendication 2, dans laquelle ledit capteur de température (11) peut être monté à côté de la face supérieure de l'élément de chauffage (2) où l'air de ventilation circulait au-delà du capteur.
4. Unité de ventilation selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens de régulation (8) sont montés à l'intérieur des extrémités du passage (5), et dans laquelle lesdits moyens de régulation (8) comprennent de préférence un capteur (10) destiné à mesurer la quantité d'air y circulant.
5. Unité de ventilation selon la revendication 4, dans laquelle ledit passage (5) comprend une première partie (5') s'étendant vers le haut, vu depuis la face externe du mur extérieur (1), et une seconde partie (5'') s'étendant vers le bas, et dans laquelle lesdits moyens de régulation (8) se trouvent de préférence au niveau de la transition entre lesdites deux parties (5', 5'').
6. Unité de ventilation selon l'une quelconque des revendications précédentes, dans laquelle lesdits moyens de régulation (8) comprennent une soupape, laquelle est de préférence également ajustable manuellement, tandis qu'un capteur (10) qui peut

être prévu sera monté avant la soupape, vu dans le sens de circulation.

7. Unité de ventilation selon l'une quelconque des revendications précédentes, dans laquelle l'élément de chauffage (2) est pourvu d'un passage vertical (6) à l'intérieur, sur la face intérieure duquel le passage (5) peut être raccordé.
8. Unité de ventilation selon l'une quelconque des revendications précédentes, dans laquelle la précision de la régulation de l'unité de régulation (7) dépend de la température extérieure.
9. Unité de ventilation selon l'une quelconque des revendications 2 à 8, laquelle est équipée d'un dispositif antigel, lequel est disposé de telle sorte qu'il ferme le moyen de régulation (8) si le capteur de température (11) mesure une température inférieure à une valeur minimum prédéterminée.
10. Unité de ventilation selon l'une quelconque des revendications précédentes, dans laquelle l'unité de régulation (7) peut être raccordée à un thermostat de l'élément de chauffage (2), de préférence au thermostat d'un système central de chauffage dont l'élément de chauffage fait partie.

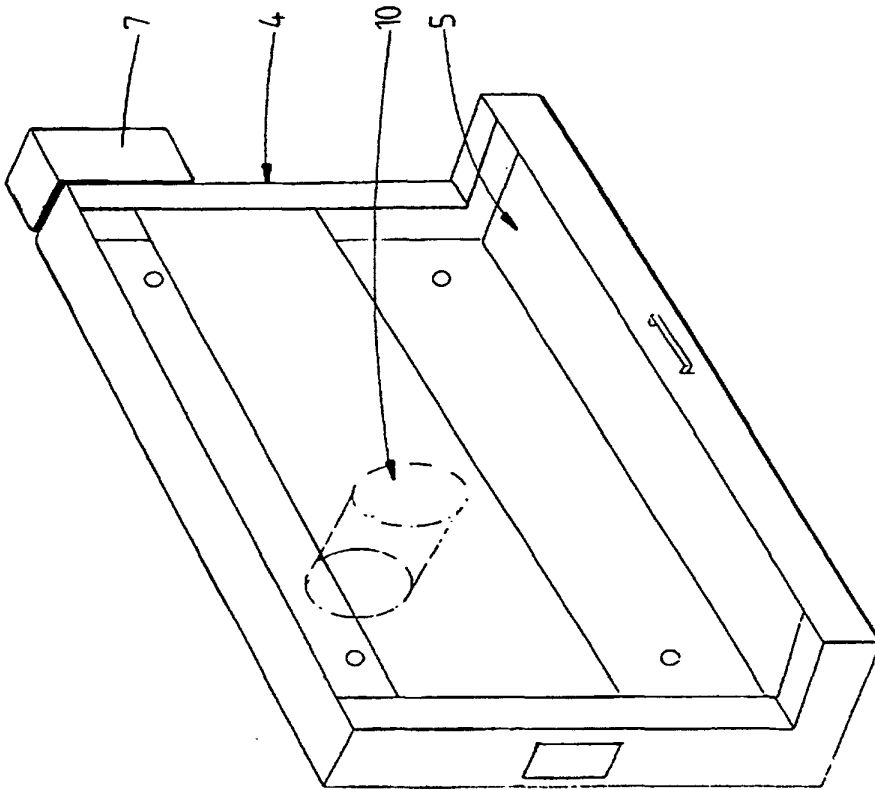


fig.5

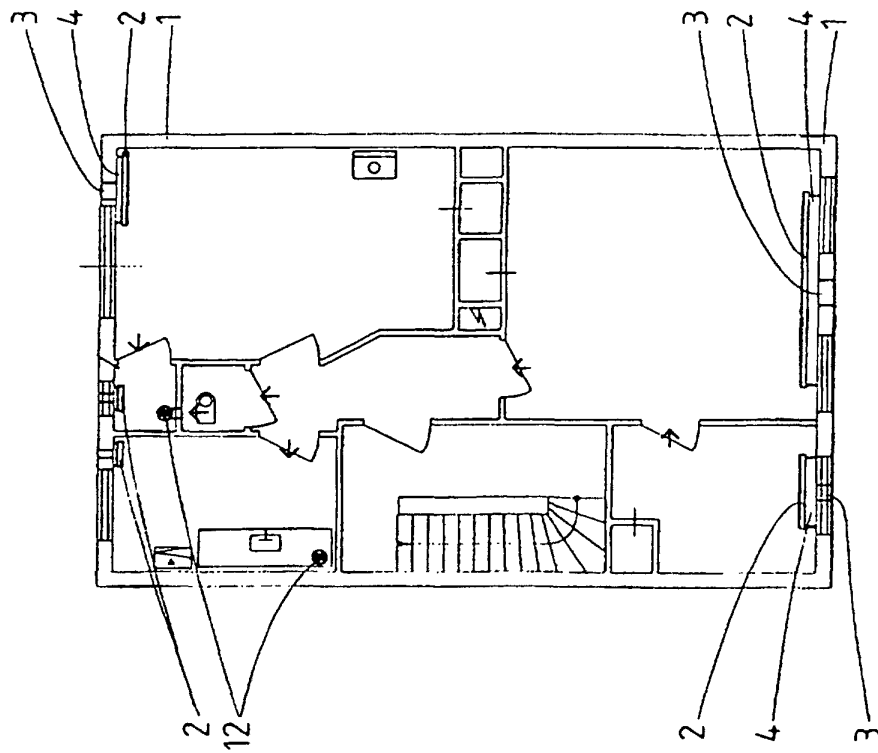


fig.1

