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(54) **HEATING, VENTILATION AND/OR AIR-CONDITIONING UNIT DESIGNED TO ACCOMMODATE A CARTRIDGE FOR THE TREATMENT OF AIR BY DIFFUSION OF A VOLATILE TREATING AGENT**

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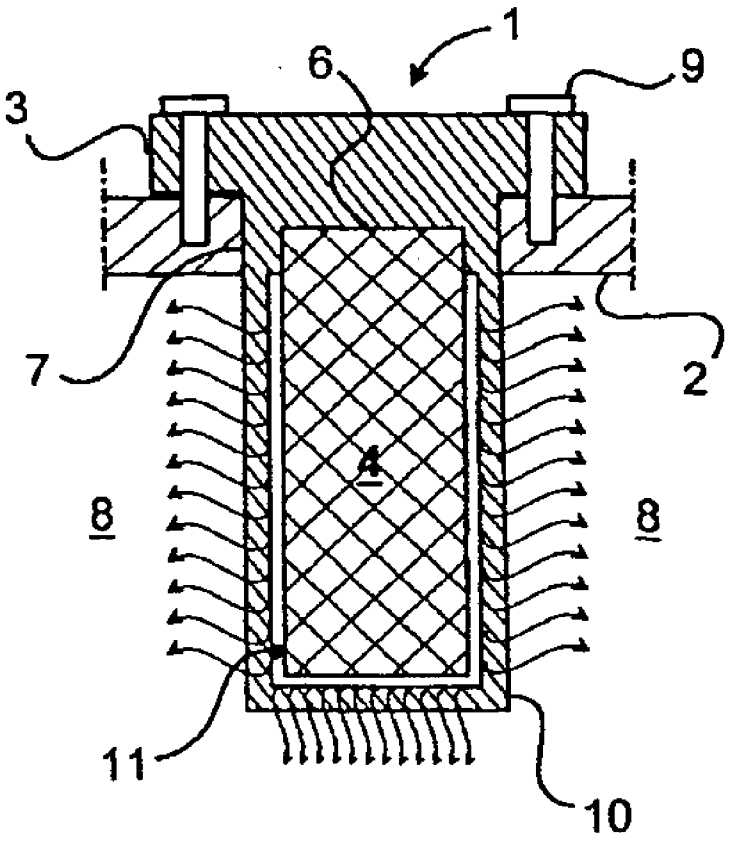
(57) **ABSTRACT**

The subject of the invention is a heating, ventilation and/or air-conditioning unit, especially for a vehicle, which is equipped with means for treating the air by diffusion of a volatile agent. This unit comprises a wall (**2**) bounding an air circuit (**8**), this wall (**2**) having an opening (**7**) therethrough for the passage of a treatment cartridge (**1**). A permeable partition (**10**) defines a diffusion chamber (**11**) for the volatile agent, this partition (**10**) being placed in the internal volume of the air circuit (**8**).



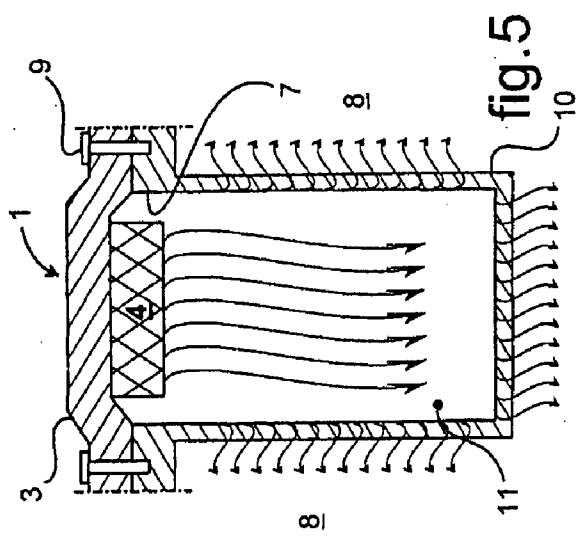


fig.5

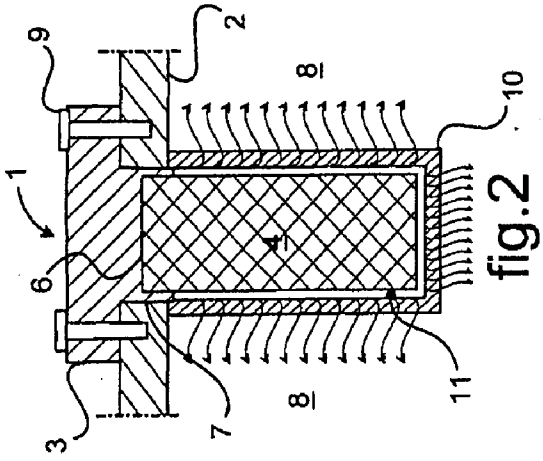


fig.2

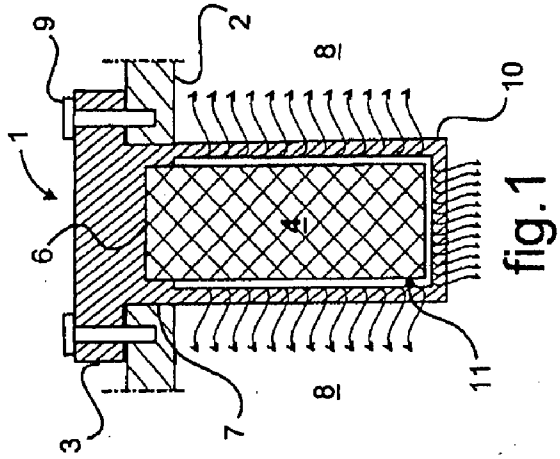


fig.1

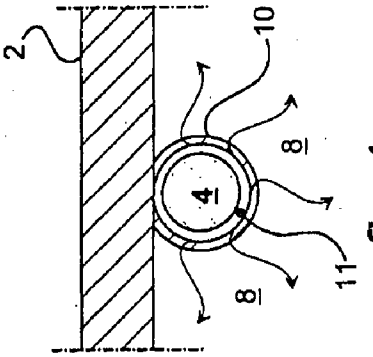


fig.4

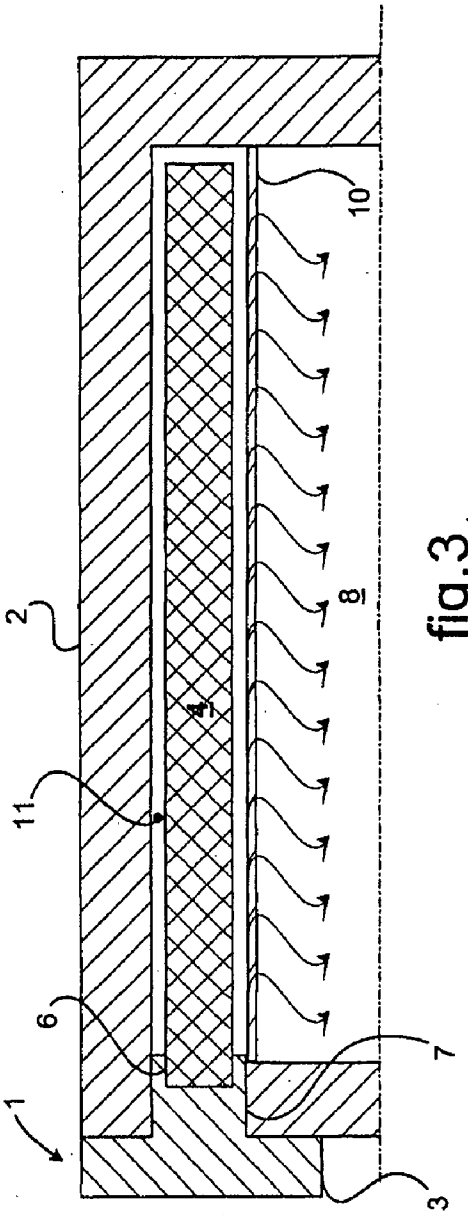


fig.3

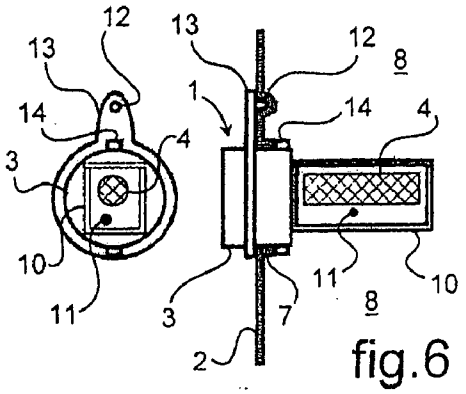


fig.6

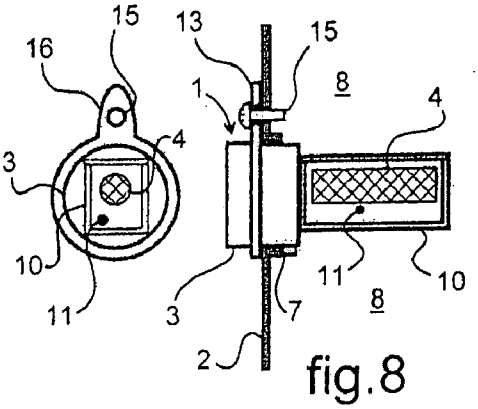


fig.8

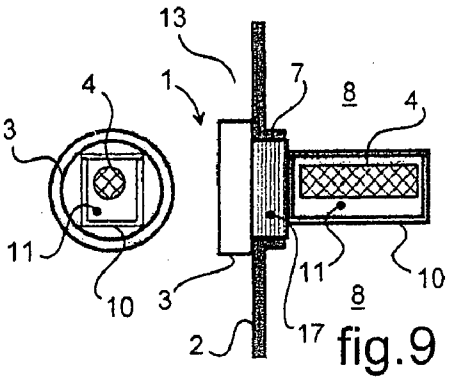


fig.9

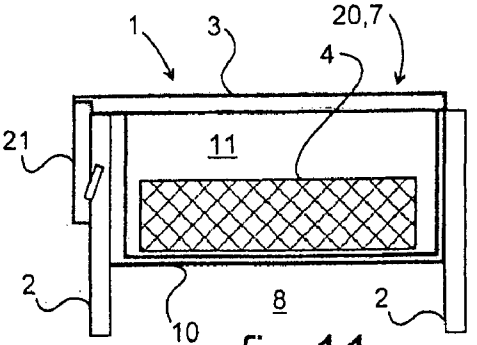


fig.11

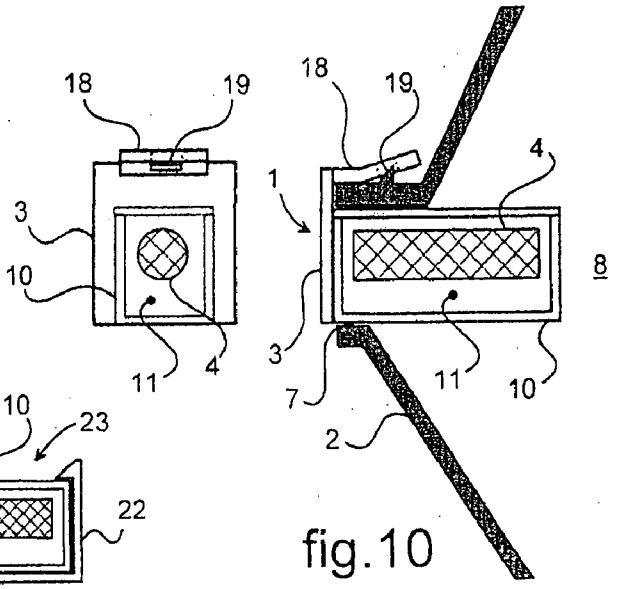


fig.10

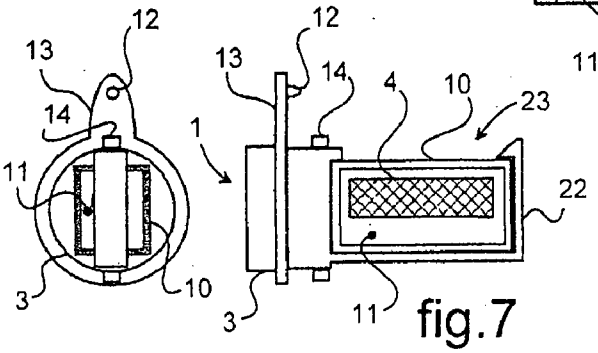


fig.7

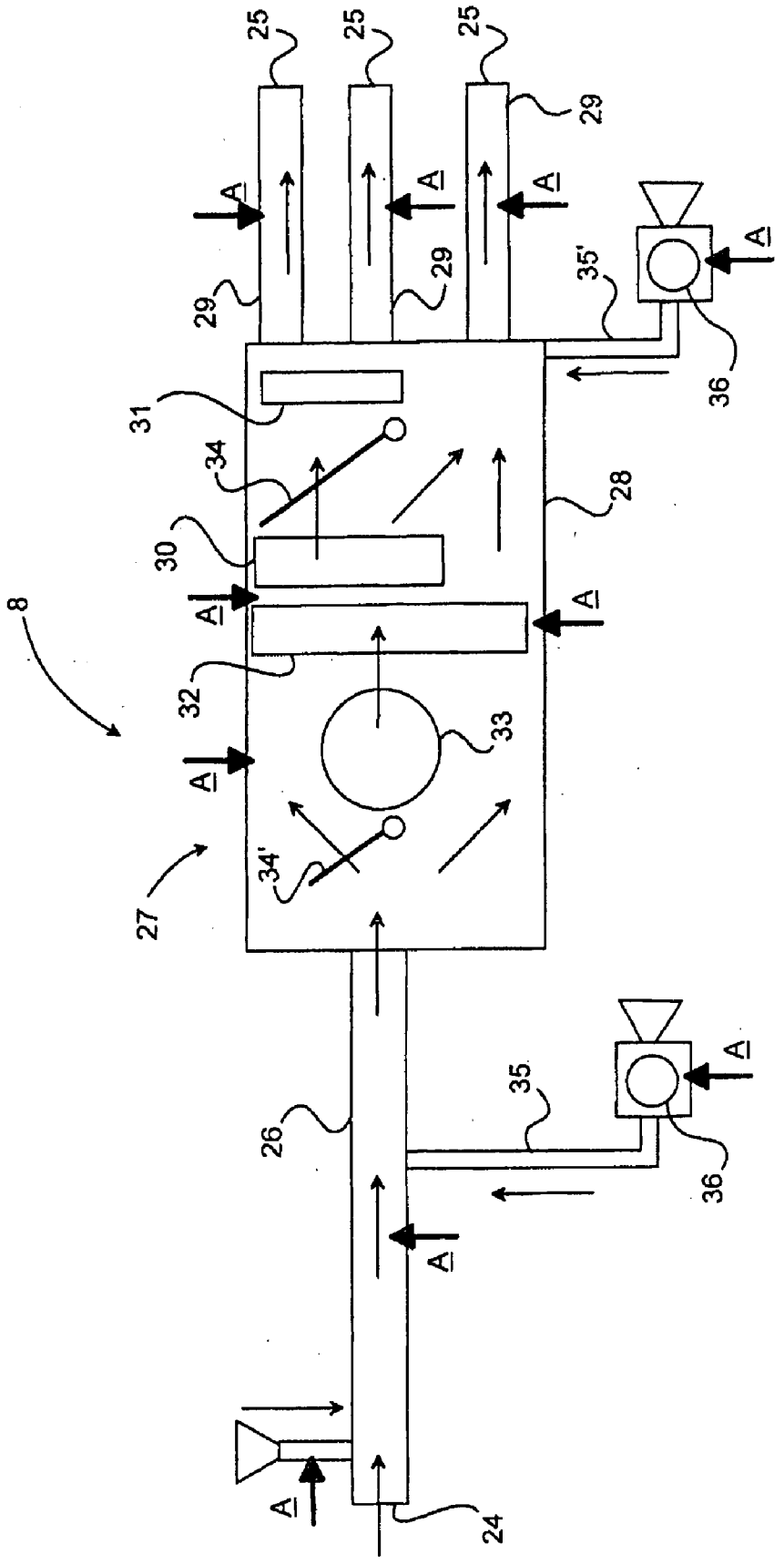

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fig.12

HEATING, VENTILATION AND/OR AIR-CONDITIONING UNIT DESIGNED TO ACCOMMODATE A CARTRIDGE FOR THE TREATMENT OF AIR BY DIFFUSION OF A VOLATILE TREATING AGENT

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to the field of heating, ventilation and/or air-conditioning units, especially for vehicle passenger compartments. The subject of the invention is such a unit, which is designed to accommodate a device for treating the air that flows through it, by diffusion of a volatile treating agent to prevent growth of microorganisms.

PRIOR ART

[0002] It will be recalled that a heating, ventilation and/or air-conditioning unit for a motor vehicle comprises an air circuit between at least one intake vent and at least one discharge vent, various air treatment means being interposed in said circuit. This air intake vent is an external air inlet and/or a recycled air inlet. The means are for example blowing means, for making a stream of air move through the circuit, means for heating and/or cooling the air, and means for purifying the air, such as by particle filtration, by ionization, by photocatalysis or the like. Known from among these treatment means are those employing a volatile treating agent. The treating agent is customarily a product in liquid or gelled form supported by a substrate and intended to prevent the growth of microorganisms, so as to counteract the unpleasant smells that are a source of discomfort to passengers. Such microorganisms grow more particularly in the area of an evaporator that the unit includes. This treating agent therefore has antiseptic properties.

[0003] The problem that arises is how to incorporate into the circuit means for treating the blown air by diffusion of a volatile agent.

[0004] Such an incorporation must not be effected to the detriment of the overall size of the unit, which is desired to be as small as possible, nor must it be a source of an appreciable overcost. Again as regards costs, it is desirable to organize this incorporation so as to allow easy maintenance of the treatment means, especially by facilitating access to them, in order to replace the carrier substrate for the treating agent, or even to replace the treating agent itself when it is exhausted. Again as regards costs, this incorporation must not compromise standardization of the unit, which it is desirable to organize so as to be able to be integrated, without major modifications, into any vehicle and more particularly into vehicles of any platform of one manufacturer and into vehicles of different manufacturers so as to optimize the cost-effectiveness of the effort in designing the unit.

[0005] Moreover, the diffusion of the treating agent into the stream must be uniform and reliable, and in a quantity suitable for providing satisfactory and long-lasting treatment.

[0006] It has been proposed in DE 10 346 182 (Behr GmbH & Co Kg) to have the treatment means in a container for the treating agent, said container being placed inside the air circuit. Replenishment of the treating agent is accomplished via a channel that connects the container to the outside of the circuit. Such arrangements are tricky to implement and are neither satisfactory as regards air flow pressure drops or as regards standardization of the unit.

[0007] It has also been proposed, in JP 2004210087 (Zexel Valeo Climate Control Corp.), to design the treatment means as a cartridge fastened to one wall of the air circuit. This cartridge is formed from a support, which includes a housing for accommodating the substrate, said cartridge being provided with means for fastening it to the external face of a bounding wall of the circuit. This wall includes, in its thickness, a cavity which may or may not open onto the internal volume of the air circuit, for accommodating part of the cartridge, including the housing for accommodating the substrate. However, ways of making the treating agent diffuse deserve to be improved so as to provide a uniform, reliable and long-lasting treatment of the air blown by the circuit. In other words, the arrangement of the cartridge in JP 2004210087 does not provide a satisfactory exchange surface. It should be recalled in this regard that the cartridge or treating agent is in operation even when the blower is stopped, that is to say when there is little or no movement of air in the unit. This is why the surface for exchange with this volume of stationary air assumes major importance. Moreover, it should be noted that the space available in an air-conditioning module is limited so that the incorporation of the treatment agent cartridge lying in the same plane as the wall of the unit is practically impossible if it is desired to maintain satisfactory diffusion for a very long period, for example a year.

SUBJECT OF THE INVENTION

[0008] The object of the present invention is to propose a heating, ventilation and/or air-conditioning unit, especially for a vehicle, designed to accommodate a device for the treatment of air flowing through it by diffusion of a volatile treating agent. More particularly, the aim of the present invention is to propose such a unit in which the ways of incorporating the treatment means, for treating air by diffusion of a volatile agent, allow the treatment means to be easily and inexpensively replenished after the volatile agent has become exhausted, allow uniform diffusion of said volatile agent in sufficient quantity and allow such an incorporation to be made at any point in the air circuit of the unit without compromising either the quality of the treatment obtained or the standardization of the unit, and without incurring an appreciable overcost.

[0009] The unit of the present invention is a heating, ventilation and/or air conditioning unit. This comprises an air circuit between at least one inlet vent and at least one outlet vent. This air circuit defines a volume impermeable to the air of the external environment, this volume being bounded by a wall. This wall can be one wall of a duct or a module that houses means for treating the air, especially heat treatment means. The unit is equipped with means for treating the air by diffusion of a volatile agent, said means being placed in the air circuit so as to purify the air and in particular prevent the growth of microorganisms. More particularly, the unit is of the kind in which the wall bounding the air circuit includes at least one opening for the passage therethrough of a cartridge for treating the air by the emission of a volatile treating agent. This cartridge is of the type comprising a support for a substrate impregnated with the volatile agent.

[0010] According to the present invention, such a unit is principally recognizable in that a permeable partition defining a chamber for diffusion of the volatile agent is placed in the internal volume of the air circuit. The expression "placed in the internal volume" is understood to mean that the permeable partition extends beyond the thickness of the wall of the unit so as to emerge in the internal volume of this unit. It will therefore be understood that this wall includes an emitting surface or partition in contact with the air in at least two mutually intersecting planes.

[0011] These arrangements are such that the treating agent is capable of occupying the internal volume of the chamber located in the air circuit bounded by the wall and of diffusing through the partition into the air circuit. The overall surface of the partition offers both the capability of the treating agent diffusing into the circuit in sufficient quantity and of this diffusion being controlled according to the desired daily amount.

[0012] A direct communication space is especially provided between the substrate and the partition for diffusion of the treating agent into the chamber. This space within which the volatile agent expands prior to its diffusion through the permeable partition may be formed by a peripheral region of the diffusion chamber which is provided around the substrate housed at least partly inside this diffusion chamber. This space may also be formed by at least part of the diffusion chamber, especially the distal part, if not by the entire volume of the diffusion chamber if the substrate is placed outside this volume.

[0013] More particularly, the partition is preferably interposed between the substrate and the volume for flow of the air through the circuit, the diffusion chamber forming a housing for accommodating the substrate.

[0014] According to an alternative embodiment in which the opening is made through the wall along an axis transverse to the direction of flow of the air inside the circuit, the partition lies more particularly as an extension in the vicinity of the periphery of the opening in the wall for passage of the cartridge. It will therefore be understood that the cartridge extends approximately perpendicular to the direction of flow of the air stream.

[0015] According to various embodiments, the partition is provided at least partly on the cartridge, if not completely, or the partition is at least partly provided on the wall of the air circuit, if not completely. The partition can be formed from elementary partitions provided on the cartridge and on the wall respectively. According to various exemplary embodiments, it does not matter whether the partition or the elementary partitions are attached to and/or integrally molded with the wall of the air circuit or the support for the cartridge, according to the cases mentioned above, in order to form a unitary part with these. According to one embodiment, the permeable partition is that of a removable receptacle of the housing for the substrate, which is attached to the support via reversible accommodation means, such as by interlocking, clip-fastening or stapling or by the use of cooperating assembly members, such as by screwing. For example, this support includes a cradle or the like for accommodating the receptacle by interlocking.

[0016] According to various ways of incorporating the cartridge, this is for example fitted into the wall of a module housing at least air heat treatment means or else it is fitted into the wall of a duct located upstream of such a module or else is fitted into the wall of a duct located downstream of such a module. The meaning of the terms "upstream" and "downstream" relates to the direction of flow of the air stream inside the unit.

[0017] Of course, several cartridges may be fitted at any respective point in the air circuit and more particularly into the wall of any duct or module. This is because, and without departing from the scope of the invention, the cartridge may be fitted into the air inlet module of the unit, in or alongside the blower or in the duct for feeding air to the module containing the heat exchangers.

[0018] Likewise, the cartridge may be fitted into an ancillary air feed circuit.

[0019] According to various embodiments, the cartridge is an interchangeable removable cartridge provided with means for reversibly fastening it to the wall or else is a cartridge that is equipped with reversible means for joining it between the support and the substrate, the latter being interchangeable, or else that is provided with means for recharging the substrate with the volatile agent. It is apparent that replenishment of the treating agent can be effected by replacing the cartridge and/or the substrate and/or by recharging the substrate with treating agent.

[0020] More particularly, the means for fastening the cartridge to the wall may be irreversible fastening means, such as adhesive bonding, soldering or welding, integrally molding the support to the wall, or a similar technique, for example. According to another embodiment, the means for fastening the cartridge to the wall may be reversible fastening means, such as by interlocking, by clip-fastening, by screwing, by means of cooperating assembly members or similar techniques, for example.

[0021] The joining means between the support and the substrate may be irreversible joining means, such as by adhesive bonding or a similar technique. According to another embodiment, the joining means between the support and the substrate may be reversible joining means, such as by interlocking, by clip-fastening, by means of cooperating assembly members or similar techniques for example. According to yet another embodiment, the joining means between the support and the substrate are formed from said receptacle for accommodating the substrate, which is attached to the support, the wall of this receptacle constituting said permeable partition.

[0022] Preferably, the substrate is a spongy cohesive body. These arrangements allow the cartridge to be incorporated into the wall in any orientation, without affecting the natural behavior of the substrate.

[0023] It should be noted that the treating agent may also be an odorizing agent.

[0024] The present invention will be better understood on reading the following description of exemplary embodiments, in conjunction with the figures of the appended drawings, in which:

[0025] FIG. **1** is a diagram illustrating a first exemplary embodiment of treatment means with which a heating, ventilation and/or air-conditioning unit is equipped in order to treat the air blown through this unit with a volatile agent;

[0026] FIG. **2** is a diagram illustrating a second exemplary embodiment of treatment means similar to those shown in FIG. **1**;

[0027] FIGS. **3** and **4** are diagrams illustrating a third exemplary embodiment of treatment means similar to those shown in FIGS. **1** and **2**, in longitudinal section and in cross section respectively;

[0028] FIG. **5** is a diagram illustrating a fourth exemplary embodiment of treatment means similar to those shown in the previous figures;

[0029] FIGS. **6** to **10** are illustrations of various examples of the incorporation of a cartridge into a wall of the unit, said cartridge comprising the treatment means shown in the previous figures, shown on end and in longitudinal section in each of these figures;

[0030] FIG. **11** is another example of the incorporation of a cartridge into a wall of the unit, shown in longitudinal section; and

[0031] FIG. **12** is a diagram illustrating various points of incorporation of the treatment means of the invention into a wall of an air circuit of a heating, ventilation and/or air-conditioning unit for a motor vehicle.

[0032] In FIGS. **1** to **4**, means are provided for equipping a heating, ventilation and/or air-conditioning unit of a motor vehicle for treating the air blown through this unit in order to prevent the growth of microorganisms. Such means employ a volatile treating agent that diffuses an active and antiseptic substance into the volume bounded by the air circuit of the unit. This treating agent may incidentally be mixed with an odorizing substance. It is also conceivable to replace the treating agent with an odorizing substance or the like, so as to limit the action of the treatment means to odorizing the air blown by the unit.

[0033] These treatment means comprise a cartridge **1** designed to be fitted into a wall **2** of the unit. This cartridge **1** comprises a support **3** for a substrate **4** impregnated with the volatile treating agent. The substrate **4** consists for example of a permeable sachet or the like containing the treating agent in a liquid or gel state. However, the substrate **4** is preferably a spongy cohesive body, otherwise called a wick, advantageously consisting of a mass that can be formed from a textile material, such as mingled textile fibers, whether natural or artificial, from a mass of cellulose, such as a thick pad of blotting paper of the type formed from a strip or coupon, from a body formed from a mineral or plant-based substrate, optionally parceled and compressed, from a cohesive mass of polymer powder, or from an animal-derived material, such as porous leather. Such an organization of the substrate **4** in the form of a cohesive body gives it a natural strength allowing it to be fitted into the unit in any orientation, especially with respect to gravity. The treating agent is for example allyl isothiocyanate or a similar substance, in the liquid or gelled state.

[0034] The substrate **4** is attached to the support **3** in a removable or irreversible manner. For example, the substrate **4** may be fitted into a housing **6** contained in the support **3**, being preferably but subsidiarily bonded to the inside of this housing **6** as shown in FIGS. **1** to **4**. In FIG. **5**, the substrate **4** is fastened, such as by adhesive bonding or the like, to one face of the support **3**, this face being turned toward the wall **2** of the unit.

[0035] The wall **2** of the unit includes an opening **7** for passage therethrough of the substrate **4** carried by the support **3**. This opening **7** opens both to the outside of the air circuit **8** of the unit, the volume of which is bounded by the wall **2**, and to the inside of the air circuit **8**. These arrangements are aimed at allowing the cartridge **1** to be easily fitted into the wall **2**, while leaving the possibility of the treating agent diffusing substantially into the air circuit **8** when the stream of air stops.

[0036] The cartridge **1** is fastened to the wall **2** by fastening means, such as by means of screws **9**, or by interlocking in the exemplary embodiments illustrated in FIGS. **1** to **5**. Such arrangements not only allow easy incorporation of the cartridge **1** into the unit but also the ability to easily replenish the treating agent after it has been exhausted, either by replacing the cartridge **1** or by replacing the substrate **4** or by recharging the substrate **4** with the treating agent.

[0037] To regulate the diffusion of the treating agent into the air circuit **8** in sufficient quantity without correspondingly increasing the size of the opening **7** made through the wall **2**, a permeable partition **10** is interposed between the substrate **4** and the internal volume bounding the air circuit **8**.

[0038] In FIG. **1** it should be noted that the partition **10** or emitting surface forms an integral part of the support **3** and is molded in common therewith. The support **3** and the partition **10** form a unitary assembly. In contrast, FIG. **2** shows a removable partition **10**, which may either be fastened to the inner face of the wall **2** or to the peripheral wall of the receptacle **6**.

[0039] FIGS. **3** to **5** bring out the difference between FIGS. **1** and **2**. Specifically, the emitting partition **10** forms part of the wall **2**, either by forming a cavity in the form of a "U" open to the external environment, or by forming a substantially tubular cavity on the internal face of the wall **2** of the unit.

[0040] This partition **10** defines a diffusion chamber **11** for the treating agent, which is located inside the air circuit **8**. This results in diffusion of the treating agent into the air circuit **8** through a diffusion surface substantially greater in area than that offered by just the surface of the opening **7**. Furthermore, it is easy to adjust this diffusion by modifying the intrinsic characteristics of the permeable partition **10**, such as its thickness, its dimensions and its area, or its constituent material. As an indication and according to a preferred embodiment, the permeable partition **10** is formed from a plastic, such as for example of the polypropylene type, possibly filled with talc in a proportion of between 0% and 40%, more particularly around 20%, especially for a partition thickness of between 0.5 mm and 2 mm. By way of indication, and for example, the permeable partition **10** has a thickness of around 0.9 mm±20% or an overall area of 4200 mm^2±10%. For such an arrangement of the chamber **11** bounded by the permeable partition **10**, the annual diffusion of the treating agent is around 45 mg/day at a constant temperature of 40° C. It will be appreciated that these indications regarding the dimensions and constituent material of the permeable partition **10**, and the diffusion of the treating agent, may be modified without thereby departing from the scope of the invention.

[0041] In FIGS. **1** to **4**, the substrate **4** is extended beyond the support **3** so as to be placed in the volume bounded by

the wall **2**. In this case, the substrate **4** is housed inside the diffusion chamber **11**. Preferably, a space is provided around the substrate **4**, between the latter and the permeable partition **10**, to allow the treating agent to diffuse into the chamber **11** before it diffuses through the permeable partition **10** into the air circuit. In FIG. **5**, the substrate **4** occupies a space that does not fill the internal air circulation volume bounded by the wall **2**. The treating agent diffuses into the chamber **11** bounded by the permeable partition **10** before it diffuses through the latter into the air circuit **8**.

[**0042**] In FIGS. **6** to **10**, the substrate **4** is attached to the support **3** by means of a receptacle containing the substrate **4**. The wall of this receptacle constitutes the permeable partition **10**.

[**0043**] In a first variant illustrated in FIG. **6** and FIGS. **8** to **10**, this receptacle is irreversibly attached to the support **3** by adhesive bonding.

[**0044**] In the variant illustrated in FIG. **7**, the support comprises a cradle **22** for accommodating a receptacle **23** containing the substrate **4**. This cradle may be apertured so as to expose a large portion of the wall of the receptacle **23** for substantial emission into the circuit **8**.

[**0045**] In FIGS. **6** and **7**, the means for fastening the cartridge **1** to the wall **2** comprise an interlocking pin **12** provided on a tab **13** that forms part of the cartridge **1**. A quarter-lugged connection device **14** advantageously supplements the fastening of the cartridge **1** to the wall **2**.

[**0046**] In FIG. **8**, the means for fastening the cartridge **1** to the wall **2** are of the screwing type and comprise a screw **15** that passes through a tab **16** that forms part of the cartridge **1** and which cooperates with a tap hole that forms part of the wall **2**.

[**0047**] In FIG. **9**, the means for fastening the cartridge **1** to the wall **2** are of the screwing type and comprises an external thread **17** provided on the support **3**, which cooperates with a complementary internal thread provided in the opening **7**.

[**0048**] In FIG. **10**, the means for fastening the cartridge **1** to the wall **2** are of the clip-fastening type, which combine a tab **18** provided with at least one passage for at least one lug **19**. It does not matter whether the tab **18** and the lug **19** are on the cartridge **1** and/or the wall **2** respectively. In the exemplary embodiment illustrated, the cartridge **1** is provided with the tab **18** and cooperates with the lug **19** provided on the wall **2**.

[**0049**] In FIG. **11**, the cartridge **1** is fitted into the outlet **20** of a duct that forms part of the air circuit (visible in FIG. **12** with a duct reference **35** or **35'**). In this case, it will be understood that the opening **7** in the wall **2** is formed by said outlet **20**. According to various alternative embodiments, the means for fastening the cartridge **1** to the wall **2** are of the type operating by clip-fastening, by stapling or by resilient pinching of the wall **2** between two opposing bearing members of the cartridge **1**. In the exemplary embodiment illustrated, the fastening means comprise a staple **21** for keeping the cartridge **1** in place on the wall **2** bordering the outlet **20** of the duct.

[**0050**] In FIG. **12**, a heating, ventilation and/or air-conditioning unit, especially for a vehicle, comprises the air circuit **8** between at least one inlet vent **24** through which air is admitted. This inlet vent is the inlet for external air or the inlet for recycled air. This unit comprises a plurality of outlet vents **25** intended for aerating specific regions of the passenger compartment, or even of a seat or another member of the vehicle. In the schematic exemplary embodiment illustrated, the air circuit **8** comprises especially a duct **26** for supplying air to a heat treatment assembly **27**, which comprises a module **28** housing air heat treatment and/or purification means, and a plurality of ducts **29** for discharging the treated air from the module **28** into the regions and/or members to be aerated.

[**0051**] For example, the module **28** houses heat-transferring members for heat treating the air, such as an evaporator **30** and at least one heat sink **31**. The module **28** also houses at least one particulate filter **32** or the like for purifying the air. This filter **32** is based downstream of a blower **33** that generates a stream of air in the circuit **8**. Flaps **34**, **34'** for distributing the airstream inside the module **28** allow the air to be directed toward at least one or other of the heat-transfer members **30**, **31**. The air circuit, and especially the module **28**, is also capable of housing other air treatment members without departing from the scope of the invention, such as an ionizer, a photocatalytic treatment device, an electrostatic precipitation treatment device and/or any other air treatment device. The organization and arrangement of the members housed in the module **28** have been illustrated as an example, and may be modified without departing from the scope of the invention.

[**0052**] The cartridge may be easily incorporated into the air circuit at any point therein, indicated by the various arrows A. This point of incorporation may be located upstream of the heat treatment assembly **27**, in the region of the supply duct **26**, or in the module **28**, preferably upstream of the evaporator **30**, or else in the discharge ducts **29**. It should be noted that the preferred places for incorporating the cartridge are located in the easily accessible regions of the unit so as to allow easy maintenance of the means for treating the air by diffusion of the volatile agent and especially with a view to replenishing these means with the volatile agent when this has become exhausted. More particularly, these regions are located upstream of the evaporator **30**, in the air inlet region and in the region of the particulate filter **32** or similar air purification device. The cartridge may also be incorporated downstream of a recycling flap **34'** located upstream of the blower **33**.

[**0053**] The unit may also include ancillary circuits **35**, **35'** for supplying secondary air, such as an air intake in the engine compartment or an air intake in the passenger compartment, which is located upstream and/or downstream of the heat treatment assembly **27**. These ancillary circuits **35**, **35'** are ducts at the ends of which a treating agent cartridge is fitted.

1. Heating, ventilation and/or air-conditioning unit comprising an air circuit (**8**) between at least one inlet vent and at least one outlet vent, this air circuit (**8**) being bounded by an air-impermeable volume bounded by a wall (**2**) that includes at least one opening (**7**) for the passage therethrough of a cartridge (**1**) for treating the air by diffusion of a volatile treating agent, characterized in that a permeable partition (**10**) defining a chamber (**11**) for diffusion of the volatile agent is placed in the internal volume of the air circuit (**8**).

2. Unit according to claim 1, characterized in that, when the opening (7) is provided through the wall (2) along an axis transverse to the direction of the air flow inside the circuit (8), the partition (10) lies in the extension of the opening (7) in the wall (2).

3. Unit according to claim 1, characterized in that, when the opening (7) is provided through the wall (2) along an axis corresponding to the direction of air flow inside the circuit (8), the partition (10) lies transversely to the axis of the opening (7).

4. Unit according to any one of the preceding claims, characterized in that the partition (10) is at least partly provided on the cartridge (1).

5. Unit according to any one of claims 1 to 3, characterized in that the partition (10) is provided at least partly on the wall of the air circuit (8).

6. Unit according to claim 5, characterized in that it does not matter whether the partition (10) is attached to and/or integrally molded with the wall (2) of the air circuit (8) in order to form a unitary part.

7. Unit according to claim 4, characterized in that it does not matter whether the partition (10) is attached to and/or integrally molded with a support (3) for the cartridge (1) in order to form a unitary part.

8. Unit according to any one of the preceding claims, characterized in that the partition (10) is interposed between a substrate (4) of the cartridge (1) and the volume in which air flows through the circuit (8), the diffusion chamber (11) forming a housing for accommodating the substrate (4).

9. Unit according to claim 8, characterized in that a receptacle for accommodating the substrate (4) is removeably attached to the support (3), the wall of this receptacle constituting said permeable partition (10).

10. Unit according to any one of the preceding claims, characterized in that the cartridge (1) is fitted into the wall of a module (28) that houses at least air heat treatment means (30, 31).

11. Unit according to any one of the preceding claims, characterized in that the cartridge (1) is fitted into the wall of a duct (26, 35) that is located upstream and/or downstream of a module (28) that houses at least air heat treatment means (30, 31).

12. Unit according to any one of the preceding claims, characterized in that the cartridge (1) is an interchangeable removable cartridge provided with means for reversibly fastening it to the wall (2).

13. Unit according to any one of the preceding claims, characterized in that the cartridge (1) is equipped with reversible means for joining it between a support (3) and a substrate (4), the latter being interchangeable.

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