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(54) **Method for installing a heat exchanging device in a building**

(57) Method for installing a heat exchanging device in a building like e.g. a house, the device comprising a heat exchange module which is arranged for exchanging heat with the open air outside the building, the method comprising steps of (a) providing an opening in a roof of the building, (b) providing a housing having one or more air accession openings, the housing extending outside the roof and covering the roof opening (c) moving the heat exchange device or at least its heat exchange module, from the inside of the building towards the outside through the roof opening, causing that the heat exchange module mainly extends outside the building and is capable to exchange heat with the open air outside the building via the housing's air accession openings, and (d) fixing the heat exchange device or at least its heat exchange module to the roof, the roof opening, the housing or any other part of the building.

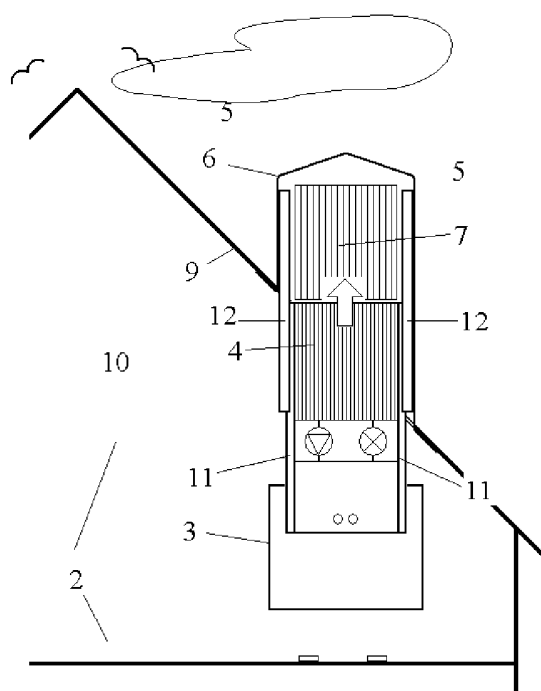


FIG. 1^b

Description

[0001] The present invention concerns a method for installing a heat exchanging device in a building like e.g. a house, the device comprising a heat exchange module which is arranged for exchanging heat with the open air outside the building. Moreover, the invention refers to a heat exchanging device which is arranged for performing this method.

[0002] One aspect of the present invention is to provide a heating/cooling device which can easily be combined with another (e.g. already existing) system e.g. in (dwelling) houses etc. without occupying substantial room.

[0003] Another aspect is to provide a device which can be installed, maintained and repaired without the need for much room and which device can easily be built in and out.

[0004] Yet another aspect of the invention is to provide a device and system having exterior parts (protuding outside the roof) which comply with the desired and/or prescribed aesthetics of the exterior of the house.

[0005] Still another aspect is to provide a device which is capable to provide substantial energy savings when the heat exchanging device has the constitution of a so-called "heat pump" which is very efficient in particular in periods in which the difference between the outside and inside temperature is moderate.

[0006] In order to stimulate the use of such heat pumps (see also http://en.wikipedia.org/wiki/Heat_pump) -meant here are heat pumps which have one heat exchanger exposed to outside air (viz. to extract heat from the outside air and transfer it to the in-house (CH) heating system or vice versa)-a novel configuration has been designed, which is supposed to enable and promote the application of heat pumps as an additional heat source for e.g. domestic use, i.e. in houses and buildings having restricted room to install an additional (heat pump) installation.

[0007] To that end the method according to the invention comprising the following steps:

- providing an opening in a roof of the building;
- providing a housing having one or more air access openings, the housing extending outside the roof and covering the roof opening;
- moving the heat exchange device or at least its heat exchange module, from the inside of the building towards the outside through the roof opening, causing that the heat exchange module mainly extends outside the building and is capable to exchange heat with the open air outside the building via the housing's air accession openings;
- fixing the heat exchange device or at least its heat exchange module to the roof, the roof opening, the housing or any other part of the building.

[0008] The roof of the relevant house thus is provided with an opening which is covered by a housing which has

the functions of:

- protecting the roof opening against rain, wind etc. (the housing thus needs to be proper connected to the surrounding roofing);
- housing the heat exchange module;
- providing aesthetic camouflage of the heat exchange module protruding through the roof (and thus well visible);
- providing -where needed- protection of the exchange module and/or guiding the outside air to (or from) the exchange module).

[0009] The housing may be installed from the inside of the house towards the outside or from the outside (i.e. the outer roof side); the installation of the housing is more or less similar to the installation of a roof window or a dormer window.

[0010] After the housing has been installed and mounted, the heat exchanging device or (when not integrated as one unit) at least the heat exchange module (i.e. the outside air exchange module) can be installed from the inside of the house (e.g. the loft) towards the outside, e.g. by sliding the device or module through the roof opening (covered by the housing) outside and then fixing it to e.g. the roof of roof opening.

[0011] It is, however, preferred, to use a guiding of sliding frame construction, as outlined here:

- providing a frame and fixing it to the roof, the roof opening, the housing or any other part of the building;
- moving the heat exchange device or at least its heat exchange module, from the inside of the building towards the outside through the roof opening, using the frame for guidance;
- fixing the heat exchange device or at least its heat exchange module, to the frame, the roof, the roof opening, the housing or any other part of the building.

[0012] According to this preferred option the use of a (auxiliary) frame is proposed which -in short- may be fastened to the roof (opening) and which is used then to guide the heat exchanging device or the heat exchange module in its motion through the roof opening during installation or de-installation (e.g. for repair or maintenance).

[0013] According to the invention, it is preferred that the heat exchanging device comprises a heat exchange module which is arranged for exchanging heat with the open air outside the building; besides, the preferred device furthermore comprises -or is arranged to cooperate with- a housing, having one or more air accession openings, the housing extending, via an opening in a roof of the building, outside the roof and covering the roof opening; the preferred device, or at least its heat exchange module, furthermore, comprises means for moving it from the inside of the building towards the outside through the roof opening, causing that the heat exchange module

mainly extends outside the building and is capable to exchange heat with the open air outside the building via the housing's air accession openings; and the device, moreover, comprises means for detachably fixing the heat exchange device or at least its heat exchange module, to the roof, the roof opening, the housing or any other part of the building.

[0014] It is preferred that the heat exchanging device either comprises -or is arranged to cooperate with- a frame which is arranged to be fixed to the roof, the roof opening, the housing or any other part of the building, where the device -or at least its heat exchange module- is arranged to be moved from the inside of the building towards the outside through the roof opening, using the frame for guidance and the device, moreover, comprises means for detachably fixing the heat exchange device or at least its heat exchange module, to the frame, the roof, the roof opening, the housing or any other part of the building.

[0015] As mentioned earlier, the heat exchanging device may be a heat pump based system comprising said heat exchange module arranged for exchanging heat with the open air outside the building, as well as a second heat exchange module, interconnected with the first heat exchange module via a high/low pressure refrigerant circuit and arranged for exchanging heat to or from a further climate control system arranged for the distribution and/or generation of heat and/or cold inside the building of house.

[0016] The invention will be elucidated now referencing to some figures which will illustrate the present invention, including an exemplary embodiment of the device according to the invention.

Figures 1a-c illustrate the method according to the invention, performed with an exemplary embodiment of the heat exchange device according to the invention;

[0017] The figures show a heat exchanging device 1 for use in a temperature or climate control system in a building like e.g. a house 2. In the shown embodiment the temperature or climate control system is constituted by a conventional CH system 3 (including its pipes & tubes, radiators etc. which are not shown explicitly here), to which the heat exchanging device 1 -a heat pump which, when used for heating the house 1, is capable to extract heat from the outside air- is attached to cooperate with. The device 1 comprises a (first) heat exchange module 4 arranged for exchanging heat with the open air 5 outside the building, i.e. extracting heat from the open air 5 when the house needs to be heated (in summer the same system may be used for cooling the house via the CH water or air circuit as well).

[0018] The device 1 is arranged to cooperate with a housing 6, having air accession openings 7, which housing extends, via an opening 8 in a roof 9 of the building, outside the roof 9, while covering the roof opening 8. The

device 1, or at least its heat exchange module 4, comprises means for moving it (figure 1b) from the inside of the building (figure 1a) towards the outside through the roof opening (figure 1c), causing that the heat exchange module 4 mainly extends outside the building and is capable to exchange heat directly (i.e. without any use of substantial air channels etc. which are needed in prior art indoor systems) with the open air 5 outside the building via the housing's air accession openings 7.

[0019] The device 1, moreover, comprises means for detachably fixing the heat exchange device or at least its heat exchange module, to the roof, the roof opening, the housing or any other part of the building, which may be formed -as in the embodiment shown in the figures 1a-c by a frame - constituted by sections 11 fixed to the device 1 and a section 12 which is to be fixed to the roof, the roof opening, the housing or any other part of the building. After the frame section 12 has been fixed to the roof (opening) -frame section 12 may be made of one part or mounted from several frame section parts 12 which are assembled before fixing it to the roof (opening). Both frame sections 11 and 12 are fit to slide to each another. In this way the device 1 -or at least its heat exchange module 4- can easily be moved from the inside of the building towards the outside via the roof opening, using the frame structure 11-12 for a smooth guidance.

[0020] After the device 1 has been lifted completely (see figure 1c) the device 1 is detachably fixed by means of the support bar 13 which is fixed to the frame section 12 using some bolts 14.

[0021] As mentioned earlier, the heat exchanging device may be a heat pump based system comprising said heat exchange module arranged for exchanging heat with the open air outside the building, as well as a second heat exchange module, interconnected with the first heat exchange module via a high/low pressure refrigerant circuit and arranged for exchanging heat to or from a further climate control system arranged for the distribution and/or generation of heat and/or cold inside the building of house.

Claims

1. Method for installing a heat exchanging device in a building like e.g. a house, the device comprising a heat exchange module which is arranged for exchanging heat with the open air outside the building, the method comprising the following steps:

- providing an opening in a roof of the building;
- providing a housing having one or more air accession openings, the housing extending outside the roof and covering the roof opening;
- moving the heat exchange device or at least its heat exchange module, from the inside of the building towards the outside through the roof opening, causing that the heat exchange mod-

ule mainly extends outside the building and is capable to exchange heat with the open air outside the building via the housing's air accession openings;

- fixing the heat exchange device or at least its heat exchange module to the roof, the roof opening, the housing or any other part of the building.

2. Method according to claim 1, comprising the steps of:

- providing a frame and fixing it to the roof, the roof opening, the housing or any other part of the building;

- moving the heat exchange device or at least its heat exchange module, from the inside of the building towards the outside through the roof opening, using the frame for guidance;

- fixing the heat exchange device or at least its heat exchange module, to the frame, the roof, the roof opening, the housing or any other part of the building.

3. Heat exchanging device for use in a temperature control system in a building like e.g. a house;

- the device comprising a heat exchange module which is arranged for exchanging heat with the open air outside the building;

- the device either comprising or being arranged to cooperate with a housing, having one or more air accession openings, the housing extending, via an opening in a roof of the building, outside the roof and covering the roof opening;

- the device or at least its heat exchange module, comprising means for moving it from the inside of the building towards the outside through the roof opening, causing that the heat exchange module mainly extends outside the building and is capable to exchange heat with the open air outside the building via the housing's air accession openings;

- the device, moreover, comprising means for detachably fixing the heat exchange device or at least its heat exchange module, to the roof, the roof opening, the housing or any other part of the building.

4. Device according to claim 3,

- either comprising or arranged to cooperate with a frame which is arranged to be fixed to the roof, the roof opening, the housing or any other part of the building;

- the device or at least its heat exchange module being arranged to be moved from the inside of the building towards the outside through the roof opening, using the frame for guidance;

- the device, moreover, comprising means for

detachably fixing the heat exchange device or at least its heat exchange module, to the frame, the roof, the roof opening, the housing or any other part of the building.

5. Device according to claim 3, being a heat pump based system comprising said heat exchange module arranged for exchanging heat with the open air outside the building, as well as a second heat exchange module, interconnected with the first heat exchange module via a high/low pressure refrigerant circuit and arranged for exchanging heat to or from a further climate control system arranged for the distribution and/or generation of heat and/or cold inside the building of house.

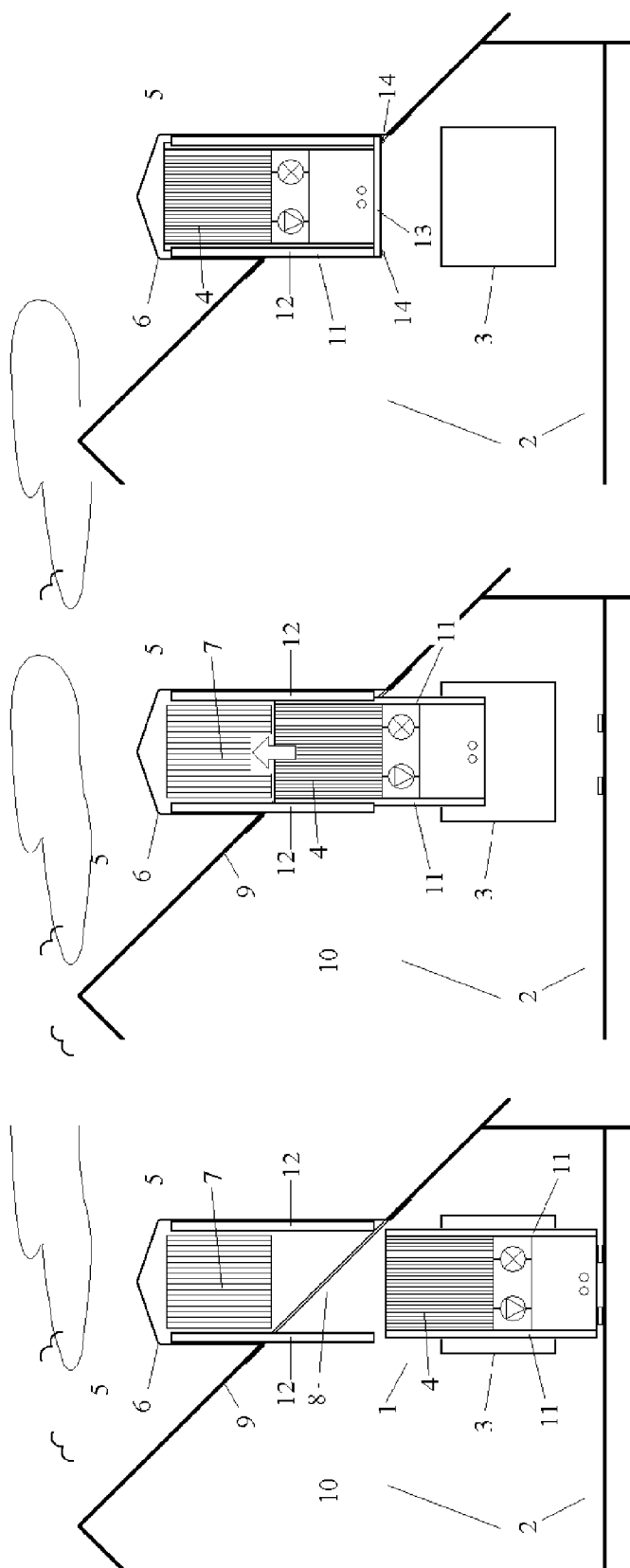


FIG. 1^c

FIG. 1^b

FIG. 1^a



EUROPEAN SEARCH REPORT

 Application Number
EP 09 15 6484

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 25 September 2009	Examiner de Graaf, Jan Douwe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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