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(54) **BOX-LIKE BODY HOUSING AN APPARATUS FOR MECHANICAL VENTILATION**

(57) A box-like body (10) for housing an apparatus (A) for dual-flow mechanical ventilation with heat recovery, associable with a removable or openable hatch with slits or with a removable or openable blind hatch (11B), has an housing seat, inside which the apparatus (A) is housed and at which air introduction/extraction chambers communicating with the housing seat are obtained; each one of the air introduction/extraction chambers is provided with respective air introduction/extraction openings for connecting the box-like body (10) to a room to be ventilated and to an external environment, whereas the box-like body (10) is provided with canalizations and passages, which are closed in an openable manner, to put the air introduction/extraction chambers in communication with the slits, when they are present; in this manner, it is possible to define different transit configurations for an introduction air flow (I) and an extraction air flow (E), generated by the apparatus (A), respectively to the room to be ventilated and to the external environment, avoiding any direct contact therebetween.

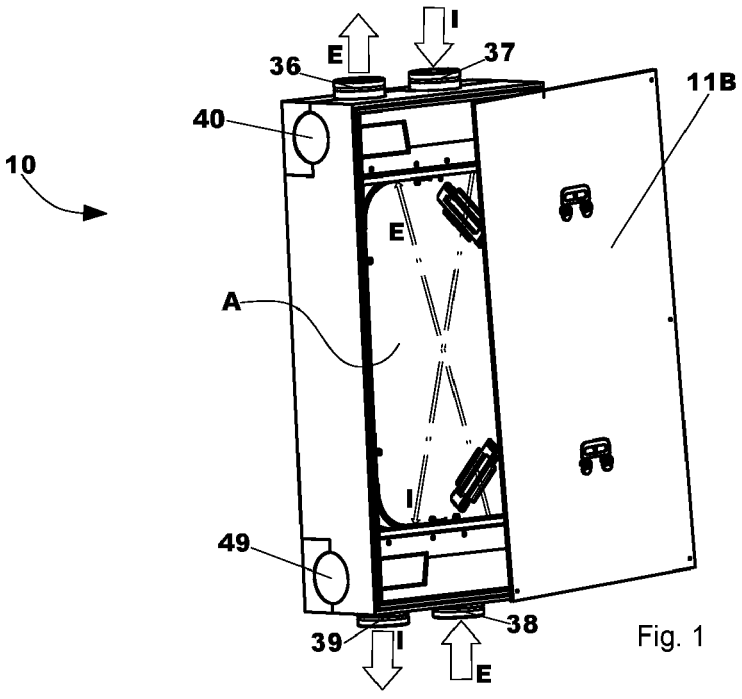

Fig. 1

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Description

Background of the invention

[0001] The present invention relates to a box-like body for housing an apparatus for dual-flow mechanical ventilation with heat recovery of a closed room, for example of an apartment or an office, intended to be installed on a perimeter wall of a facade of a building covered with a thermal coat, in particular in a suitable recess of the wall, maintaining insulation continuity on the facade.

State of the art

[0002] In recent years, machines for dual-flow controlled mechanical ventilation with heat recovery (hereinafter referred to as VMC machines or more simply as VMCs) have entered our homes and offices to ensure the correct air exchange and the lowest possible energy expenditure.

[0003] VMC machines, in particular, are normally installed inside the room to be ventilated.

[0004] For internal installation, VMC machines are in some cases embellished in the form and in the optional, so much so that they become real furnishing elements for the interior, but this embellishment is reflected in the price.

[0005] Further, VMCs can reach rather important dimensions that hardly adapt to today's building market which is significantly shifting towards the construction of multilevel buildings with many increasingly small apartments.

[0006] It would therefore be desirable to find an alternative solution for installing VMC machines that maintains the energy efficiency of the VMC and which, at the same time, enables any required maintenance tasks to be performed easily thereupon.

[0007] Further, it would be desirable for the alternative solution to have great simplicity and be practical to install, in combination with a great flexibility of installation and low cost.

Objects of the invention

[0008] The main object of the present invention is to propose a box-like body for housing an apparatus for dual-flow mechanical ventilation with heat recovery, i.e. a VMC machine, which enables the VMC machine to be installed on a perimeter wall of a facade of a building.

[0009] A further object of the present invention is that the aforesaid box-like body is very simple and practical to install, in combination with a great installation flexibility.

[0010] A further object of the present invention is that the aforesaid box-like body has a low cost.

[0011] A further object of the present invention is that the aforesaid box-like body preserves the energy efficiency of the VMC machine regardless of the place of installation, ensuring the continuity of insulation on the outer facade of the building.

[0012] A further object of the present invention is that the aforesaid box-like body enables the VMC machine to be accessed easily if it is necessary to proceed with a maintenance work.

Short description of the invention

[0013] These objects are achieved by a box-like body for vertical housing of an apparatus for dual-flow mechanical ventilation with heat recovery according to the first claim.

Short description of the drawings

[0014] The invention can be better understood with reference to the attached drawings illustrating an embodiment thereof by way of a non-limiting example, in which:

Fig.1 is a perspective view of a box-like body according to the invention provided with removable ports and caps and associated with a removable or openable blind hatch, the latter being removed so as to show an apparatus for dual-flow mechanical ventilation with heat recovery housed inside the box-like body itself, in a first operating configuration;

Fig.2 shows the box-like body of Fig.1 in a second operating configuration;

Fig.3 is a partially exploded rear perspective view of the box-like body of Fig.1, showing removable ports and removable caps;

Fig.4 is a perspective view of a removable or openable hatch with slits, which can be associated to the box-like body of Fig. 1;

Fig.5 is a perspective view of the box-like body of Fig. 1 with some parts removed;

Fig.6 is a perspective view of the box-like body of Fig.3 in a third operating configuration;

Fig.7 is a perspective view of the box-like body of Fig.6 associated with the removable or openable hatch with slits of Fig.4, the latter having a part removed to enable the apparatus housed inside the box-like body to be seen;

Fig.8 is a perspective view of the box-like body of Fig.1 in a fourth operating configuration;

Fig. 9 is a perspective view of the box-like body of Fig.8 associated with the removable or openable hatch with slits of Fig.4, the latter having a part removed to enable the apparatus housed inside the box-like body to be seen.

Detailed description of the invention

[0015] With reference to Figs. 1-5, the illustrated box-like body, indicated generically by 10, for housing in a vertical position an apparatus A for dual-flow mechanical ventilation with heat recovery, comprises a housing seat 12, inside which the apparatus A is housed and at which

air introduction/extraction chambers 13-16 are obtained, the latter being communicating with the housing seat 12.

[0016] The box-like body 10 is associable both with a removable or openable, for example by an hinge, hatch with slits 11A, shown in Figs.6-9, and with a removable or openable, for example with an hinge, blind hatch 11B, shown in Figs. 1,2. In particular, the removable or openable hatch with slits 11A has two slits 34,35, the first obtained at a lower portion of the removable or openable hatch with slits 64 with respect to the vertical housing direction, referred also as the lower slit 35, and the second obtained at an upper portion of the removable or openable hatch with slits 63 with respect to the vertical housing direction, referred also as the upper slit 34.

[0017] The air introduction/extraction chambers 13-16, as can be seen in Figs.3,5, have respective air introduction/extraction openings 17-28 to connect the box-like body 10 to a room to be ventilated and to an external environment. Further, as represented in Figs.5-9, the box-like body 10 is provided with canalizations 29 and passages 30-33, which are closed in an openable manner, to put the air introduction/extraction chambers 13-16 in communication with the slits 34,35, when the box-like body 10 is associated with the removable or openable hatch with slits 11A.

[0018] The passages 30-33 closed in an openable manner can be for example passages closed by removable caps, or can be made by a predefined wall area suitable for being cut so as to be able to remove the wall area and, in this manner, open the passage. Similarly, the canalizations 29 closed in an openable manner can be provided for example with removable walls, or can have walls 67,68 provided with a predefined area suitable for being cut so as to be able to remove the wall area and, in this manner, form the passage.

[0019] The box-like body 10 has doors 50-53 to put the air introduction/extraction chambers 13-16 in communication with the housing seat 12. The doors 50-53, in particular, are aligned with respective air introduction/extraction openings of the apparatus A once the apparatus A has been housed inside the housing seat 12.

[0020] In the embodiment represented in the figures, the number of air introduction/extraction chambers 13-16 is equal to the number of air introduction/extraction openings of the apparatus A, and is equal to the number of passages 30-33; in particular, the air introduction/extraction chambers 13-16 are four and each one has, respectively, one or more, for example three, air introduction/extraction openings 17-28 orthogonal to one another; more in particular, as can be seen in Fig.5, of the four air introduction/extraction chambers 13-16, two are upper, i. e. positioned at an upper portion of the box-like body 65 with respect to the vertical housing direction, whereas the other are lower, i.e. positioned at a lower portion of the box-like body 66 with respect to the vertical housing direction; the housing seat 12 is arranged between the two upper chambers and the two lower chambers, i.e. between the upper portion of the box-like body 65 and the lower portion of the box-like body 66.

[0021] In detail, when the box-like body 10 is associated with the removable or openable panel with slits 11A, the two passages 30,33 are suitable for respectively connecting the upper chamber 14 with the upper slit 34 and the lower chamber 15 with the lower slit 35, whereas the other two passages 31,32 are suitable for respectively putting, via canalizations 29, the other upper chamber 13 in communication with the lower slit 35 and the other lower chamber 16 in communication with the upper slit 34. As shown in Fig.5, the canalizations 29 are provided with two walls 67,68 provided with a cuttable area, one separating the canalizations 29 from the second upper chamber 13 and the other separating the canalizations 29 from the second lower chamber 16.

[0022] The box-like body 10, as can be seen in Figs. 3,5, is provided with outlets 54,56 to convey the condensation formed inside the box-like body 10 to the outside or to enable the transit of a pipe to discharge the condensation, and with outlets 55,57 for the passage of electric cables or for the transit of pipes inside which electric cables run.

[0023] In addition, as represented in Fig.5, the box-like body 10 is provided with a trimmable frame 62 in order to modify the depth h of the box-like body 10 itself so as to adapt the box-like body 10, for example, to the depth of a recess present on an outer perimeter wall of a room to be ventilated.

[0024] As shown in Fig.3, the box-like body 10 further features several fixing holes 58-61 to fix the box-like body 10 to a wall or a ceiling of a room, or to a facade of a building. Furthermore, the box-like body 10 is made of an insulating material, for example polypropylene (PP), so as not to degrade the energy performance of the house or the room to be ventilated if the box-like body 10, and thus the apparatus A, is installed outside, and so as to avoid dispersion of the VMC itself.

[0025] The box-like body 10 thus made enables different passage configurations to be defined for an introduction air flow I and an extraction air flow E, generated by the apparatus A, with reference to the room to be ventilated and to the external environment, avoiding direct contact therebetween.

[0026] First of all, reference is made to the box-like body 10 combined with the removable or openable blind hatch 11B, illustrated in Figs. 1,2. In this case, as there are no slits 34,35, the passages 30-33 and canalizations 29 remain closed, and the connection of the box-like body 10 to the room to be ventilated and to the external environment is made only through the air introduction/extraction openings 17-28.

[0027] Depending on the geometry of the ventilation ducts, the air introduction/extraction openings 17-28 chosen for the connection are provided with respective removable ports 36-39, whereas the others are kept closed by removable caps 40-49. In particular, in the present exemplary embodiment, three different possible air introduction/extraction openings 17-28 are available for each

air introduction/extraction chamber 13-16, enabling, in this manner, to choose the passage configuration of the air flows which is better suited to the ventilation ducts of the room to be ventilated.

[0028] In this case, therefore, the paths that the introduction air flow I and the extraction air flow E follow inside the box-like body 10 reflect those inside the apparatus A, as can be seen in Figs. 1,2.

[0029] In particular, two different paths are possible for the air flows inside the box-like body 10: a first path, illustrated in Fig.1, in which the box-like body 10, and thus the apparatus A, is connected to the external environment via the two lower chambers 15,16, whereas the connection with the room to be ventilated is made via the two upper chambers 13,14; and a second path, illustrated in Fig.2, in which, on the other hand, the box-like body 10 is connected to the external environment via the two upper chambers 13,14 and, on the other hand, the connection with the room to be ventilated is made via the two lower chambers 15,16. It should in fact be noted how the extraction air flow E and the introduction air flow I are reversed in Fig.2 with respect to Fig.1.

[0030] When the box-like body 10 is associated with the removable or openable blind hatch 11B, it is possible to install the apparatus A both inside and outside the room to be ventilated. In particular, by installing the box-like body 10 outside the room to be ventilated, only the ventilation ducts suitable for connecting the box-like body 10, and thus the apparatus A housed inside, to the room to be ventilated will be necessary, given the direct connection of the box-like body 10 with the external environment.

[0031] Otherwise, when the box-like body 10 is associated with the removable or openable hatch with slits 11A, as illustrated in Figs.6-9, the apparatus A can be arranged only outside the room to be ventilated because the connection with the external environment, made via the suitably opened passages 30-33 and canalizations 29, is conveyed by the slits 34,35.

[0032] The box-like body 10 is, on the other hand, again connected to the room to be ventilated by the air introduction/extraction openings 17-28. In particular, depending on the geometry of the ventilation ducts, the air introduction/extraction openings 17-28 chosen for the connection are provided with respective removable ports 36-39, whereas the others are kept closed by removable caps 40-49. In particular, three different possible air introduction/extraction openings 17-28 are available for each air introduction/extraction chamber 13-16, enabling to choose the transit configuration of the air flows which is better suited to the ventilation ducts of the room to be ventilated.

[0033] Also in this case, two different paths for the air flows inside the box-like body 10 are possible. In particular, the box-like body 10 can be connected to the room to be ventilated via the two upper chambers 13,14 (which can be seen in Fig.5), as illustrated in Figs.6,7, or by the two lower chambers 15,16 (which can be seen in Fig.5), as illustrated in Figs.8,9; nevertheless, the introduction air flow I must necessarily enter inside the box-like body 10 through the upper slit 34, whereas the extraction air flow E has to exit the box-like body 10 through the lower slit 35; for this reason, the paths that the introduction air flow I and the extraction air flow E follow inside the box-like body 10 do not reflect, in this case, those inside the apparatus A.

[0034] In particular, the first path illustrated in Figs.6,7 should be considered, in which the box-like body 10 is connected to the room to be ventilated by the two upper chambers 13,14 (which can be seen in Fig.5).

[0035] In this case, the passages will be opened which, respectively, put the lower chamber 15 in communication with the lower slit 35 and put the lower chamber 16 in communication with the upper slit 34, whereas the others will remain closed; moreover, the lower wall 68 which separates the canalizations 29 from the lower chamber 16 will be cut out.

[0036] Doing so, the introduction air flow I enters inside the upper slit 34 and flows through the canalizations 29 to the second lower chamber 16, through which it enters inside the apparatus A, whereas the extraction air flow E exits the lower slit 35 passing through the lower chamber 15.

[0037] Otherwise, now attention must be directed to the second path, illustrated in Figs.8,9, in which the box-like body 10 is connected to the room to be ventilated via the two lower chambers 15,16 (which can be seen in Fig. 5).

[0038] In this case, the open passages and the passages which remain closed are reversed with respect to the preceding case and the same thing happens for the walls 67,68. In detail, the passages are opened which, respectively, put the upper chamber 14 in communication with the upper slit 34 and the upper chamber 13 in communication with the lower slit 35, whereas the upper wall 67 which separates the canalizations 29 from the upper chamber 13 is cut out.

[0039] In this manner, the introduction air flow I enters inside the upper slit 34 and flows inside the apparatus A through the upper chamber 14, whereas the extraction air flow E, passing through the upper chamber 13, flows along the canalizations 29 to the lower slit 35, through which it exits.

[0040] In conclusion, the box-like body 10 for the vertical housing of an apparatus A for dual-flow mechanical ventilation with heat recovery which has just been described has excellent installation flexibility thanks to the possibility of defining different configurations for the transit of the introduction air flow I and of the extraction air flow E. Furthermore, the box-like body 10 is also easy and practical to install thanks to the presence of several fixing holes 58-61 and of a trimmable frame 62.

[0041] Using an insulating material to make the box-like body 10 enables the energy efficiency of the apparatus A to be maintained regardless of the place of installation, in particular it ensures a great energy efficiency

of the apparatus A housed internally even when the box-like body 10 is installed outside the room to be ventilated.

[0042] In addition, the costs of the box-like body 10 according to the invention can be contained by making it in an insulating material that is inexpensive, for example by making it in PP.

[0043] Lastly, the box-like body 10 enables the apparatus A to be accessed easily if it is necessary to proceed with a maintenance task thanks to the fact that the hatch that is fitted to the box-like body 10, without or with slits, is removable or openable.

[0044] Variants on the configuration of the box-like body 10 and on the configuration and number of the components thereof are possible.

Claims

1. Box-like body (10) for housing an apparatus (A) for dual-flow mechanical ventilation with heat recovery, the box-like body (10) being associable with a removable or openable hatch with slits (11A) or with a removable or openable blind hatch (11B), and comprising an housing seat (12), inside which the apparatus (A) is housed and at which air introduction/extraction chambers are obtained (13-16) communicating with the housing seat (12) itself, wherein each of the air introduction/extraction chambers (13-16) is provided with respective air introduction/extraction openings (17-28) to connect the box-like body (10) to a room to be ventilated and to an external environment, and wherein the box-like body (10) is provided with canalizations (29) and passages (30-33), which are closed in an openable manner, to put the air introduction/extraction chambers (13-16) in communication with the slits (34,35), when present, so as to define different passage configurations for an introduction air flow (I) and an extraction air flow (E), generated by the apparatus (A), respectively to the room to be ventilated and to the external environment, avoiding any direct contact therebetween.

2. Box-like body (10) according to claim 1, associated with the removable or openable blind hatch (11B), wherein the air introduction/extraction openings (17-28) that are suitable for connecting the box-like body (10) to the room to be ventilated and to the external environment are provided with respective removable ports (36-39), whereas the other air introduction/extraction openings (17-28) are kept closed by removable caps (40-49), and wherein, moreover, all the passages (30-33) and the canalizations (29) are kept closed.

3. Box-like body (10) according to claim 1, associated with the removable or openable hatch with slits (11A), wherein removable ports (36-39) are supplied only to the air introduction/extraction openings (17-28) that are suitable for connecting the box-like body (10) to the room to be ventilated, whereas the other air introduction/extraction openings (17-28) are kept closed by removable caps (40-49), and the connection with the external environment is made via the suitably opened passages (30-33) and canalizations (29).

4. Box-like body (10) according to any one of the preceding claims, wherein the passages (30-33) which are closed in an openable manner are chosen from within a group containing passages that are closable by removable caps and passages made by a predefined wall area suitable for being cut.

5. Box-like body (10) according to any one of the preceding claims, wherein the canalizations (29) closed in an openable manner are chosen from within a group containing canalizations having removable walls and walls (67,68) provided with a predefined area suitable for being cut.

6. Box-like body (10) according to any one of the preceding claims, provided with doors (50-53) to put the air introduction/extraction chambers (13-16) in communication with the housing seat (12), the doors (50-53) being aligned with respective air introduction/extraction openings of the apparatus (A) once the apparatus (A) has been housed inside the housing seat (12).

7. Box-like body (10) according to the preceding claim, wherein the number of air introduction/extraction chambers (13-16) is equal to the number of air introduction/extraction openings of the apparatus (A), and is equal to the number of passages (30-33).

8. Box-like body (10) according to the preceding claim, wherein the introduction/extraction chambers (13-16) are four, each one comprising respectively one or more air introduction/extraction openings (17-28) that are orthogonal to one another.

9. Box-like body (10) according to the preceding claim, wherein the main direction of extent of the box-like body is parallel to the main direction of extent of the removable or openable hatches, when they are associated, which in turn is parallel to the housing direction.

10. Box-like body (10) according to claim 1 associated with the removable or openable hatch with slits (11A), wherein the apparatus (A) is housed in a vertical position, and wherein the slits (34,35) of the removable or openable hatch with slits (11A) are two, the first obtained at a lower portion of the removable or openable hatch with slits (64) with respect to the vertical housing direction and the second obtained

at an upper portion of the removable or openable hatch with slits (63) with respect to the vertical housing direction.

11. Box-like body (10) according to any one of the preceding claims, wherein outlets (54,56) are provided to convey the condensation formed inside the box-like body (10) to the exterior and outlets (55,57) are provided for the transit of electric cables.

12. Box-like body (10) according to any one of the preceding claims, wherein the box-like body (10) is provided with one or more fixing holes (58-61) to fix the box-like body (10) to a wall or ceiling of a room, or to an outer wall of a building.

13. Box-like body (10) according to any one of the preceding claims, wherein the box-like body (10) is provided with a trimmable frame (62) so as to modify the depth (h) of the box-like body (10) itself.

14. Box-like body (10) according to any one of the preceding claims, made of an insulating material.

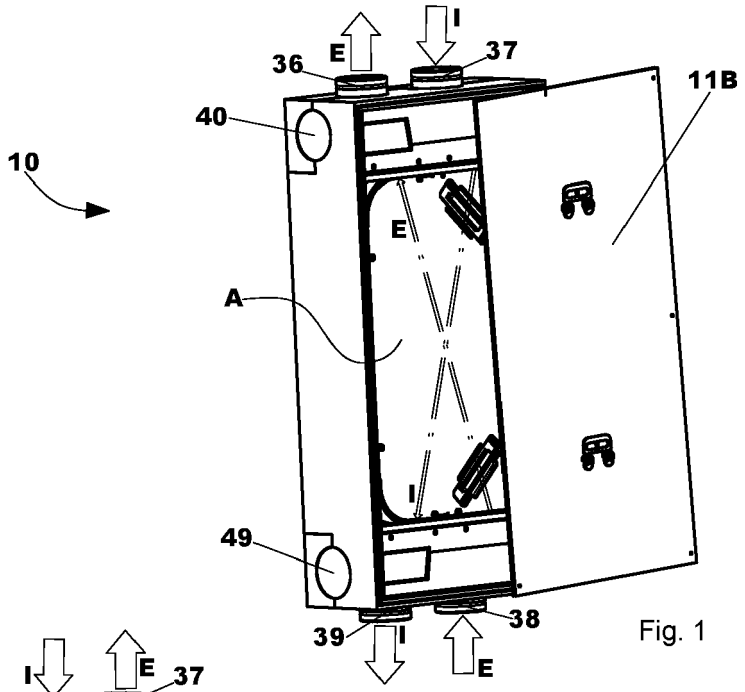

Fig. 1

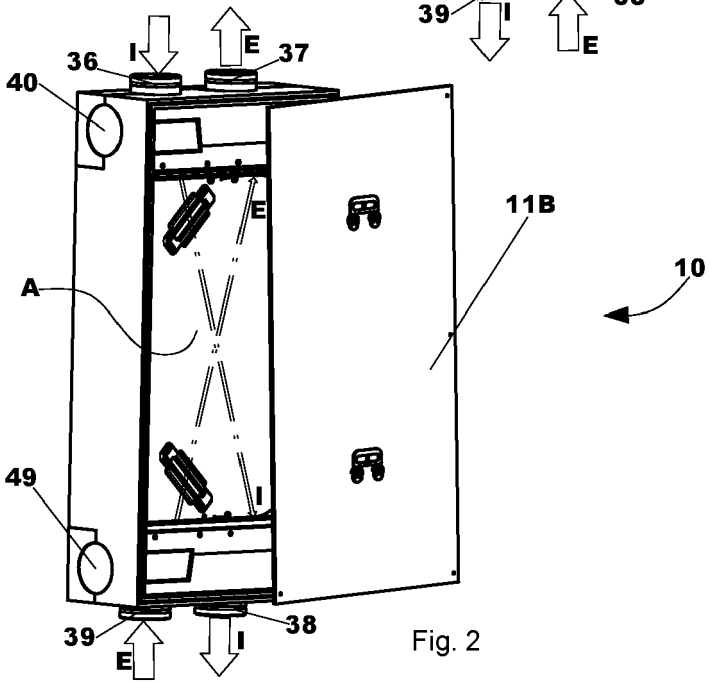

Fig. 2

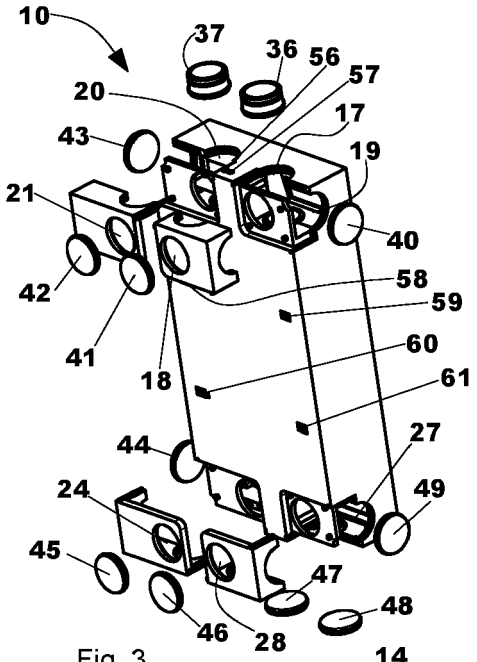

Fig. 3

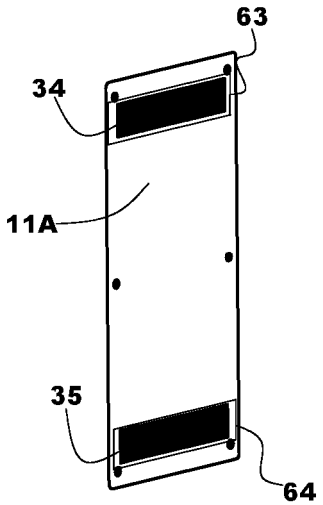

Fig. 4

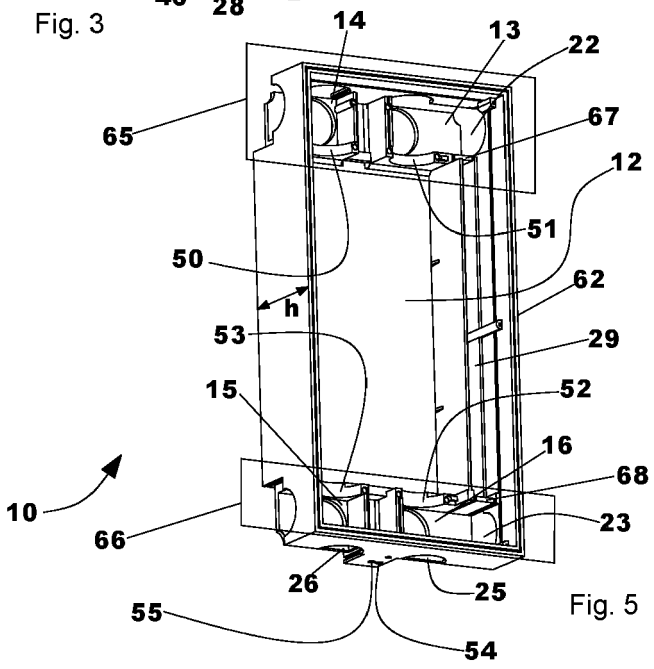

Fig. 5

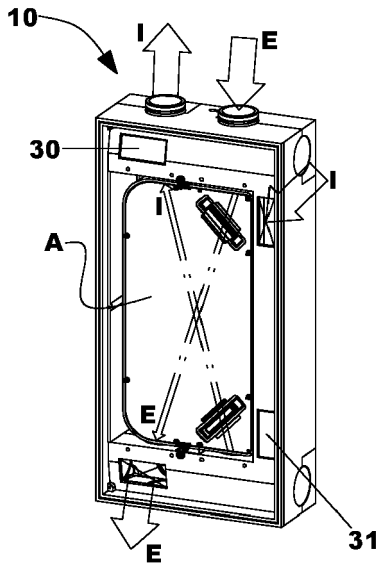

Fig. 6

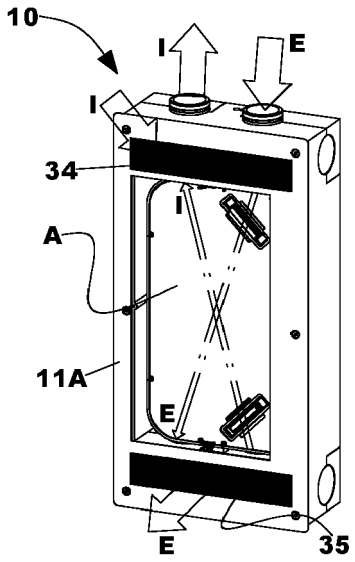

Fig. 7

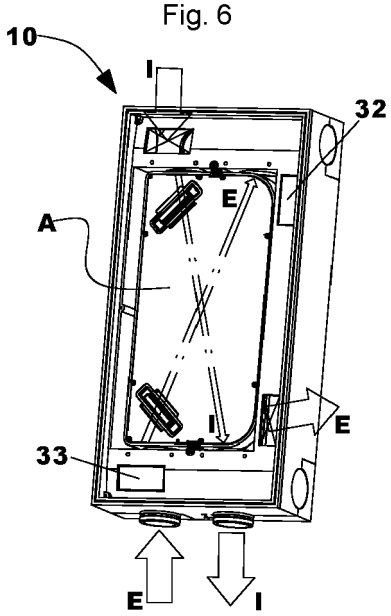

Fig. 8

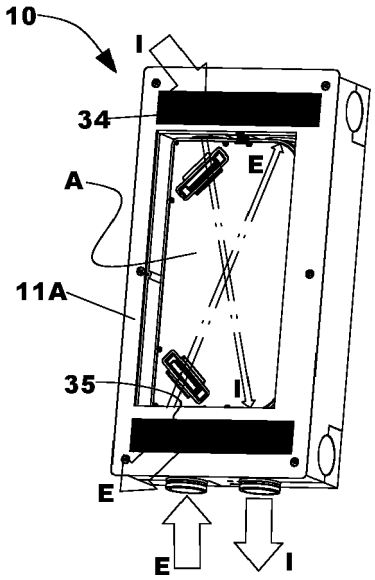

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 22 19 6824

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	KR 2022 0045403 A (LG ELECTRONICS INC [KR]) 12 April 2022 (2022-04-12) * abstract; figures 1-14 *	1,14 2-13	INV. F24F12/00 F24F13/20
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TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 February 2023	Decking, Oliver

CATEGORY OF CITED DOCUMENTS

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