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(54) **VENTILATION SYSTEM WITH CONTROLLED MECHANICAL VENTILATION UNIT AND ELECTRICAL JUNCTION BOX**

(57) The invention relates to a ventilation system comprising a controlled mechanical ventilation (CMV) unit, which comprises an electrical junction box (1) for connection to the mains of the CMV unit (2), the electrical junction box (1) with a plurality of connectors (3) therein to connect the wiring of the mains, the electrical junction box (1) being attachable on an outer face of the CMV unit (2) so that the connectors (3) are inserted into internal connection pins (4) of the CMV (2), the pins (4) being connected to the electrical/electronic components of the CMV (2) and all the electrical components of the CMV (2) being connected to the mains.

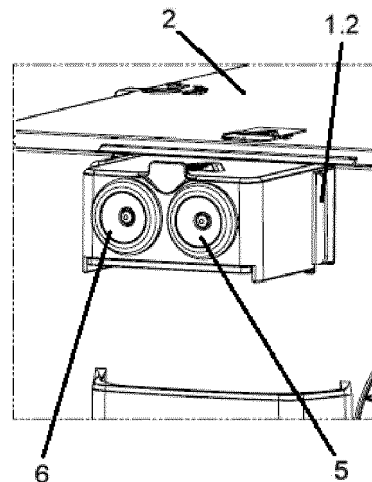


FIG. 4

Description

Technical field

[0001] The present invention relates to ventilation systems comprising a controlled mechanical ventilation (CMV) unit, proposing an electrical junction box to externally make the electrical connection, so that a functionality that facilitates the assembly conditions is achieved, improving the speed and safety of the electrical connections in the CMV unit.

State of the art

[0002] Ventilation systems that use a controlled mechanical ventilation (CMV) unit are currently known. These systems are those in which the movement of the air expelled from a building is generated by the action of a fan.

[0003] The air is extracted through the CMV unit from which the air is drawn from each room with independent ducts. This CMV unit can be attached to the ceiling, wall or more commonly in false ceilings where access for the installation thereof is difficult.

[0004] The CMV unit comprises a fan and circuits that must be powered electrically, such that it is necessary to connect the wiring of the mains grid during installation.

[0005] Conventionally, this wiring connection is made directly at the installation point of the CMV unit, so that first the CMV and the ducts are attached and then the wiring is connected to the CMV itself. This operation of connecting the power wiring of the electrical and/or electronic components of the CMV is complicated, especially when it is installed in a false ceiling. Access makes connecting tasks difficult, it being necessary to use tools that sometimes do not have enough room to manoeuvre.

[0006] These difficulties mean that sometimes the installation is not performed correctly, causing the installation to operate poorly and even causing problems related to installation safety.

[0007] In light of the described disadvantages of the currently existing solutions, it is clear that a solution is needed that enables the electrical connections to be made quickly and reliably even for locations that are difficult to access.

Object of the invention

[0008] In order to fulfil this aim and resolve the aforementioned technical problems to date, in addition to providing additional advantages that can be derived later, the present invention relates to a ventilation system comprising a controlled mechanical ventilation (CMV) unit; this system comprises an electrical junction box for connection to the mains of the CMV unit, the electrical junction box with a plurality of connectors therein to connect the wiring of the mains, the electrical junction box being attachable on an outer face of the CMV unit so that the

connectors are inserted into internal connection pins of the CMV, the pins being connected to the electrical/electronic components of the CMV, so that all the electrical components of the CMV are connected to the mains.

[0009] This configuration facilitates the connection of the mains wires as compared to known CMVs where the electrical connection is made in the CMV unit itself. In this case, the mains wiring is connected externally, in other words, the operator must open the electrical junction box and connect the wires to the connectors comprised in said box in a place where they can work comfortably. Once the mains wires have been attached, the installer only needs to attach the junction box to the CMV, the electrical components of the CMV being connected to the mains by inserting the connectors of the box into internal connection pins arranged in a face of the CMV, all the electrical/electronic components of the CMV being connected to said connection pins.

[0010] In this way, connection errors are reduced due to better visibility and accessibility, since the operator can directly attach the junction box, previously connected to the mains, to the CMV unit. This junction box is suitable for controlled mechanical ventilation units, although it can also be used in other ventilation systems such as heat recovery units, ventilation boxes, fans, etc.

[0011] The electrical junction box will have a preferably prismatic configuration with a rectangular base and dimensions that enable it to be handled with one hand, so that to assemble it, it can be installed with just one hand even in places that are difficult to access.

[0012] Preferably, the junction box is configured to fit into a cavity of the CMV unit for the attachment thereof. This cavity comprises the internal connection pins on which the internal wiring of the CMV will be attached, so that the junction box fits into said cavity that will act as a guide for the insertion of the connectors into the connection pins of the CMV. In other words, on the outer portion of the box the connectors will have a female connection in correspondence with the pins of the CMV unit for the connection thereof, which, given the guidance provided by the cavity, will be correctly aligned.

[0013] Said fit will preferably be made laterally, in other words, the cavity of the CMV is arranged on a lateral outer face of the CMV, so that there is an adjustment between the box and the cavity enabling insertion being attached by fitting. This configuration facilitates the assembly especially in false ceilings.

[0014] Moreover, this fit more reliably ensures the connection, being vibrationproof, and reducing the possible risks associated with improper electrical installation.

[0015] According to one design option, the junction box fits partially into the cavity of the CMV unit so that it is manually removable by grasping the part of the box protruding from the CMV unit with one's fingers. This configuration facilitates the insertion and removal of the junction box for the installation and maintenance thereof.

[0016] According to one aspect of the invention, the electrical junction box can be attached to the CMV by

means of a snap-fit. The elements involved in this snap-fit attachment can be arranged on the outer face of the CMV or in the cavity itself, such that by means of clipping, for example, the junction box previously connected to the mains is permanently attached to the CMV simply and quickly and without the need for tools.

[0017] Preferably, for the snap-fit attachment, the junction box comprises at least one resilient securing tongue for releasably attaching it to the CMV. Thanks to this configuration, the junction box can be attached and removed if necessary due to malfunction, maintenance or in order to include more connections.

[0018] Preferably, the box comprises two tongues on side walls of the box and on opposite sides, so that with the action of only one hand it will be possible to act on them to release the snap-fit attachment. Even more preferably, said tongues will be attachable to the cavity of the CMV comprising the connection pins, attaching said tongues by means of corresponding projections in said cavity.

[0019] The junction box comprises an access cover for accessing the inside in order to connect the wires to the connectors, said cover preferably being on the upper face of the box to facilitate better access and installation.

[0020] According to a feature of the invention, the connectors of the electrical junction box are manually operable, quick connect connectors by means of a spring for retaining the wires.

[0021] This wire retention system ensures the secure attachment of the mains wires by means of a quick connection that reliably facilitates the connection of the mains wires in the junction box.

[0022] Preferably, the electrical junction box of the ventilation system object of the invention comprises at least two equal inlets or wire lead-throughs, both indistinctly suitable for the inlet of wire harness or corrugated tube and preferably being comprised on a front face of the junction box. Moreover, the box comprises therein retention means for retaining the corrugated wire, and other retention means for retaining wire harness for each inlet arranged between the inlets and the connectors, to avoid pulling the connected wires and to more reliably ensure the connection to the mains.

[0023] With this configuration, the corrugated tube or wire harness installation options are covered, or both at the same time, corrugated tube being understood as that which has a corrugated surface and comprises free-form wiring therein and wire harness being understood as that which comprises the different wires forming a set covered with insulating material. This aspect is important because the connectors on the market only envisage connection with wire and not with corrugated tube. Moreover, it will be possible to indistinctly introduce wire harness or corrugated tube into both inlets, avoiding errors and minimising installation times.

[0024] Additionally, there are preferably five connectors comprised within the electrical junction box. Thus, all the connection possibilities required by a CMV unit

are covered, providing a versatile junction box that will be valid for any CMV.

Description of the figures

[0025]

Figure 1 shows a perspective view of the electrical junction box, of the ventilation system object of the invention, with the cover open.

Figure 2 shows a perspective view of the electrical junction box with the cover closed.

Figures 3 to 4 show a detailed view of the CMV unit without the electrical junction box and with the electrical junction box already installed in the cavity of the CMV.

Figure 5 shows a plan cross-sectional view of the box already installed in the cavity of the CMV.

Figure 6 shows a plan view of the box with the cover open and the corrugated tube and the wire harness with the wiring connected.

Figure 7 shows an elevation cross-sectional view of the box already installed in the cavity of the CMV.

Detailed description of the invention

[0026] In view of the mentioned figures and in accordance with the adopted numbering, a preferred exemplary embodiment of the invention may be observed therein, which comprises the parts and elements that are indicated and described in detail below.

[0027] Figure 2 shows the electrical junction box (1) in an exemplary embodiment of the ventilation system wherein the box (1) comprises two inlets or wire lead-throughs (5, 6), both being suitable for wire harness (9) or corrugated tube (10). This box (1) comprises a casing (1.1) with two tongues (1.2) on the sides and on opposite sides of the casing (1.1), and with a cover (1.3) in the closed position.

[0028] To install the ventilation system, first the CMV unit (2) is installed in the corresponding location thereof, attaching the ducts necessary for extracting air to the same. Subsequently, an operator takes the electrical junction box (1) which, given the rectangular configuration and the dimensions thereof, fits in only one hand. Next, externally in a more comfortable place for the operator, said operator must open the cover (1.3) exposing connectors (3).

[0029] Then, the operator introduces the corrugated tube (10) or wire harness (9) containing the connection wires to the mains grid (13) (and/or to the data network). If a wire harness (9) is available for connecting to the mains, it is introduced through one of the two inlets (5, 6); in the practical example of Figure 6, the wire harness (9) is introduced through the inlet (5) and is arranged inside the box (1) fixing the movement thereof with wire harness retention means (12). These wire harness retention means (12) are in the form of a clamping flange,

so that the wires (13) of the wire harness (9) are connected to the corresponding connectors (3) and then passed underneath the flange that is tightened by means of the two screws (14) so that it is retained and prevents the wires (13) already connected to the connectors (3) from coming loose as a result of being pulled by the wire harness (9).

[0030] According to another possible option, when corrugated tube (10) is available, it is introduced through one of the two inlets (5, 6); in the practical example of Figure 6, through the inlet (6). The wires (13) are connected to the corresponding connectors (3) and then the corrugated tube (10) is retained with retention means (11) that preferably comprises a projection or wall with a semicircular window that is introduced into the space comprised between two rings of the corrugated tube (10) for retaining it. This ensures a reliable, strain-proof connection of the corrugated tube with the mains wire (13). Optionally, the retention means (12) could additionally be used, in turn clamping the wires (13) as is done with the wires (13) of the wire harness (9).

[0031] For the connection of the mains wires (13) to the connectors (3), the use of quick connect connectors is envisaged. As can be seen in Figure 7, these connectors (3) comprise an actuation tab (3.1) that, with the action of the finger, is moved to press a contact spring (3.2) and enable the wire to enter, and afterward cease to exert pressure on the tab (3.1) so that the contact spring (3.2) retains the wire and maintains the electrical contact. In this way, it is not necessary to use tools for connecting the mains wires.

[0032] These connectors (3) are preferably five in number, so that the maximum connection possibilities required by a CMV unit are covered. In this sense, the usual connections are:

- 2 terminals (N + L), neutral connection plus phase for the versions that do not require ground.
- 3 terminals (N + L + ground), neutral connection, plus phase, plus ground.
- 3 terminals (N + LS + HS), neutral connection plus phase with high speed activator for a switch external to the box.
- 4 terminals (N + LS + HS + Ground), the same as the previous one for versions that need ground (Brushless Motor).
- 5 terminals (N + LS + HS + GROUND + F), the same as the previous one with product failure output (an alarm signal, usually an LED light, which warns of a product failure).

[0033] In this way, a versatile electrical junction box (1) is available for any type of connection of the CMV (2).

[0034] Once the mains wires (13) are correctly retained in the electrical junction box (1), the operator can connect them to the CMV (2) simply by inserting them with only one hand into a cavity (2.1) of the CMV (2).

[0035] Thus, as can be seen in Figure 3, the CMV (2)

comprises on one of the faces thereof a cavity (2.1) of rectangular configuration in correspondence with the outer geometric shape of the casing (1.1) of the box (1). Internal connection pins (4) are projected at the bottom of this cavity (2.1). Said connection pins (4) are connected to a power strip in which the wires corresponding to the electrical components of the CMV (2) are connected.

[0036] The box (1) is inserted laterally into the cavity (2.1) so that with the correspondence between the geometry of the casing (1.1) and the cavity (2.1), a guide is achieved that facilitates the insertion of the connectors (3) into the connection pins (4), so that the electrical connection to the mains of all the components of the CMV (2) would be installed in an easy and safe way.

[0037] According to one aspect of the invention, the casing (1.1) of the electrical junction box (1) comprises a resilient securing tongue (1.2) on two opposite sides of the casing (1.1), preferably on the sides. These tongues (1.2) comprise protrusions (7) in correspondence with projections (8) of the cavity (2.1) of the CMV (2), so that the snap-fit attachment of the box (1) is achieved. This attachment ensures the connection, preventing the wires from loosening and establishing a faulty contact due to vibrations as can happen in the solutions of the state of the art. Moreover, the longitudinal dimension of the junction box (1) is greater than the cavity (2.1) such that the junction box partially protrudes from the cavity (2.1) and, due to the tongues (1.2), once the box is attached (1), it is possible to act on the ends of said tongues (1.2) by pressing them with only one hand against the box (1) and thus releasing the electrical junction box (1) if necessary. Figure 4 shows the box (1) already installed in the CMV (2) with a portion of the box (1) protruding from the cavity (2.1).

[0038] Preferably, the ratio between the portion of the box (1) fitted in the cavity (2.1) and the length of the box (1) is between 0.25 and 0.75. In other words, as shown in Figure 5, $0.25 > E/L > 0.75$. This ratio will be enough to ensure the stability of the box (1) inside the cavity (2.1) and in turn enable easy removal.

[0039] Therefore, the ventilation system object of the invention, which comprises the CMV (2) and the electrical junction box (1) that can be inserted and removed without tools, provides a versatile and easy-to-install solution that ensures electrical connections of the electrical and/or electronic components of the CMV in a safer way.

Claims

1. A ventilation system comprising a controlled mechanical ventilation (CMV) unit, **characterised in that** it comprises an electrical junction box (1) for connection to the mains of the CMV unit (2), the electrical junction box (1) with a plurality of connectors (3) therein to connect the wiring of the mains, the electrical junction box (1) being attachable on an outer face of the CMV unit (2) so that the connectors

(3) are inserted into internal connection pins (4) of the CMV (2), the pins (4) being connected to the electrical/electronic components of the CMV (2) and all the electrical components of the CMV (2) being connected to the mains.

2. The ventilation system according to claim 1, **characterised in that** the junction box (1) is configured to fit into a cavity (2.1) of the CMV unit (2) which comprises the internal connection pins (4), for attaching it to the CMV unit (2). 5
3. The ventilation system according to claim 2, **characterised in that** the electrical junction box (1) partially fits into the cavity (2.1) of the CMV unit (2) so that it is manually removable by grasping the part of the junction box (1) protruding from the CMV unit (2) with one's fingers. 10
4. The ventilation system according to the preceding claim, **characterised in that** the ratio between the portion of the box (1) fitted in the cavity (2.1) and the length of the box (1) is between 0.25 and 0.75. 15
5. The ventilation system according to any one of the preceding claims, **characterised in that** the electrical junction box (1) can be attached to the CMV (2) by means of a snap-fit. 20
6. The ventilation system according to the preceding claim, **characterised in that** the electrical junction box (1) externally comprises at least one resilient securing tongue (1.2) for releasably attaching it to the CMV (2). 25
7. The ventilation system according to any one of the preceding claims, **characterised in that** the electrical junction box (1) has an access cover (1.3) for accessing the inside in order to connect the wires to the connectors (3). 30
8. The ventilation system according to any one of the preceding claims, **characterised in that** the connectors (3) of the electrical junction box (1) are manually operable, quick connect connectors by means of a spring for retaining the wires. 35
9. The ventilation system according to any one of the preceding claims, **characterised in that** the electrical junction box (1) comprises at least two wire inlets (5, 6) indistinctly suitable for corrugated tube (10) and wire harness (9), comprising respective retention means (11, 12) arranged between the inlets (5, 6) and the connectors (3) to avoid pulling the wires (13) connected to the connectors (3). 40
10. The ventilation system according to the preceding claim, **characterised in that** the corrugated tube re-

tention means (11) comprise a projection with a semicircular window in correspondence with the cross section of the corrugated tube (10) to fit between two rings of the corrugated tube (10).

11. The ventilation system according to claims 8 or 9, **characterised in that** the wire harness retaining means (12) comprise an adjustable clamping flange for retaining the connected wires (13). 45

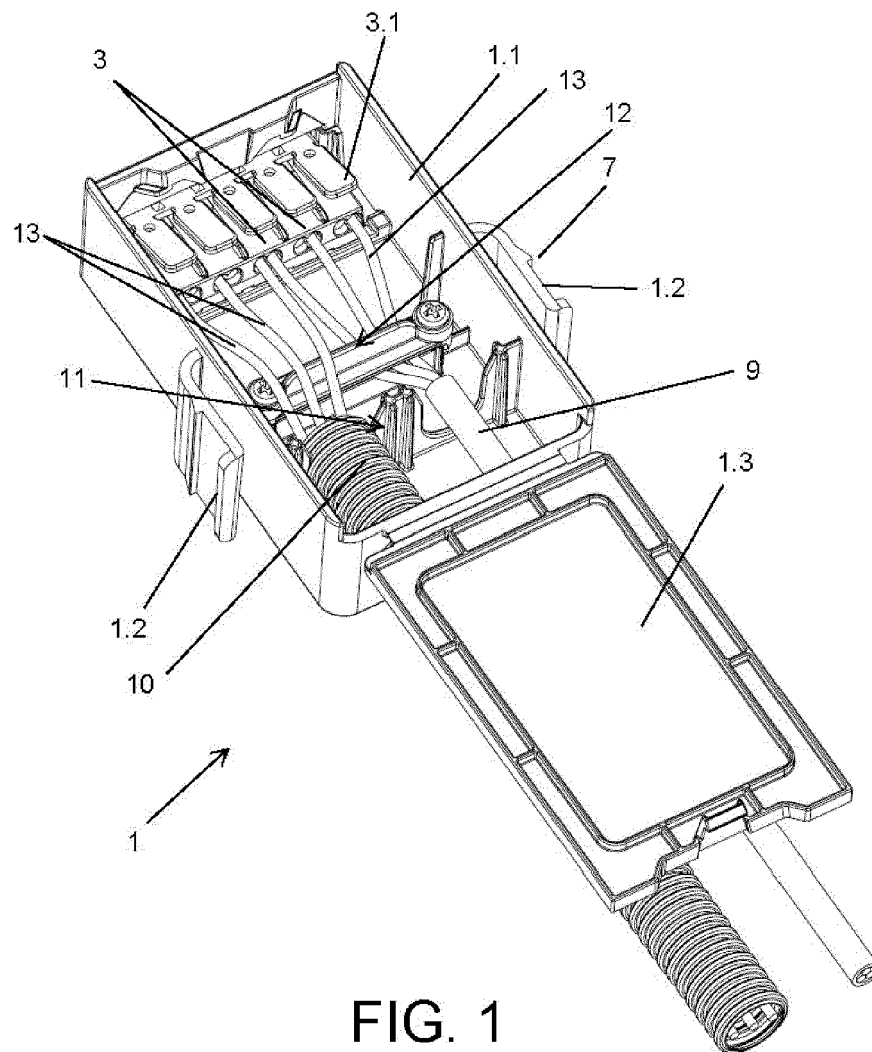
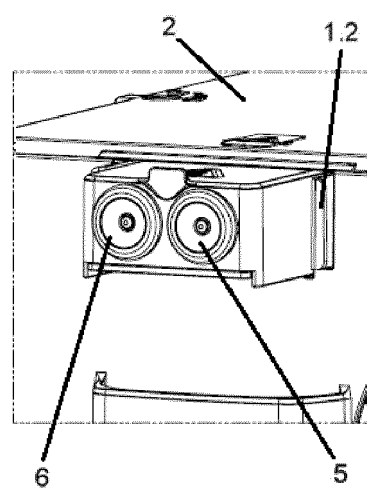
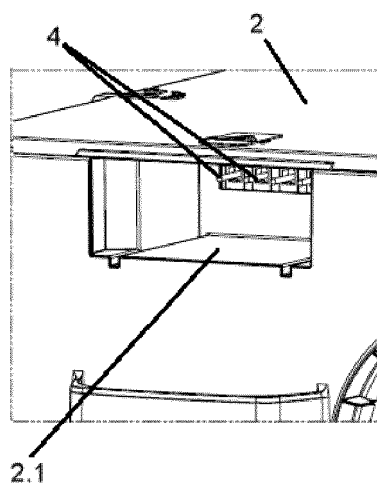
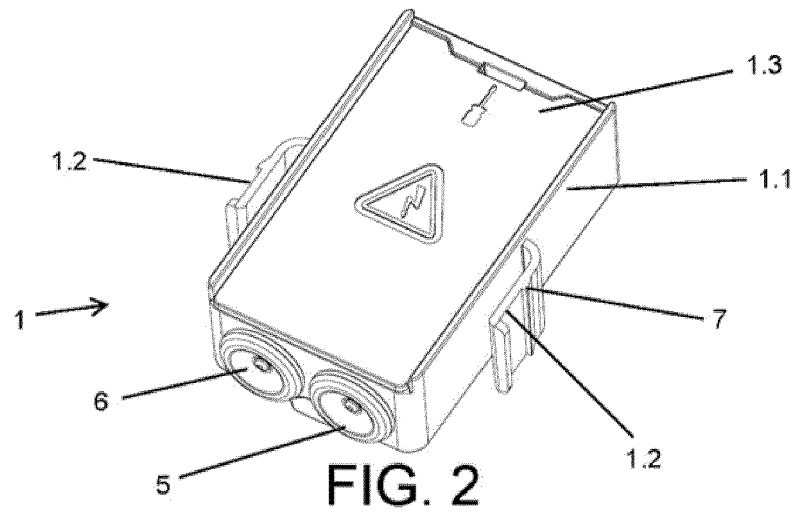
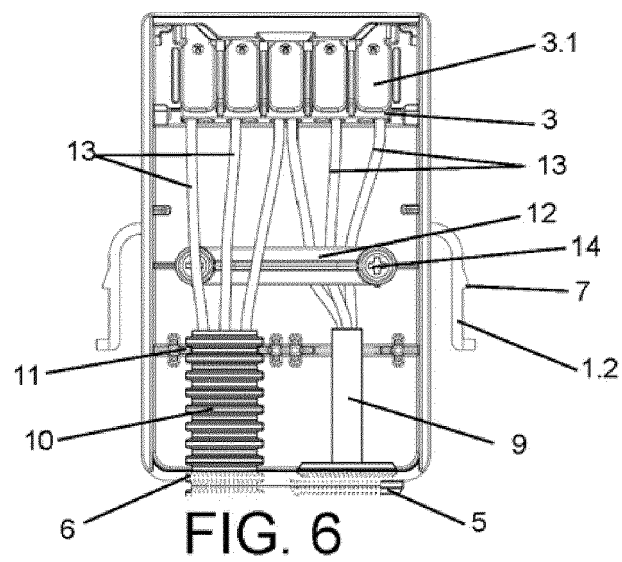
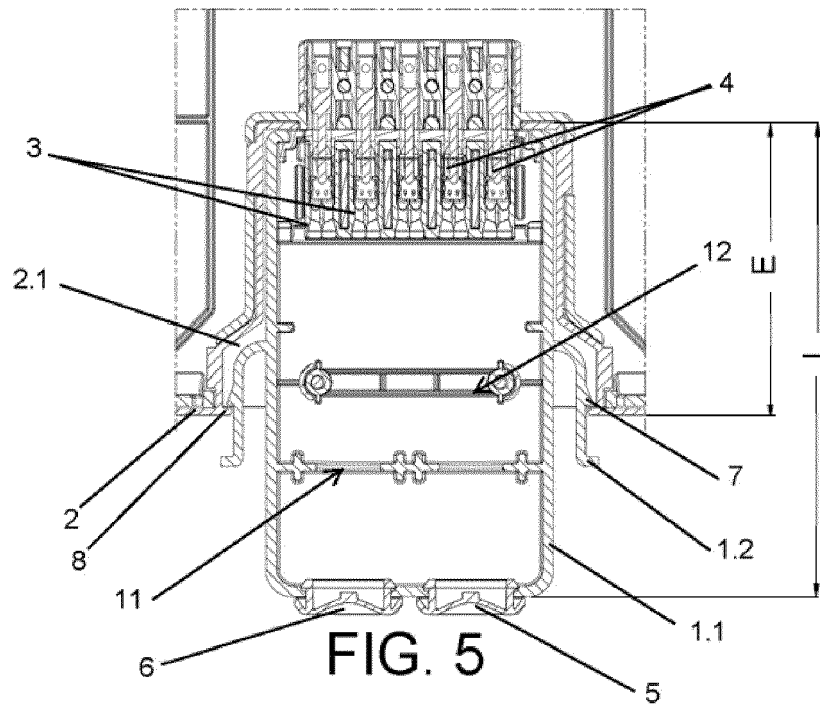
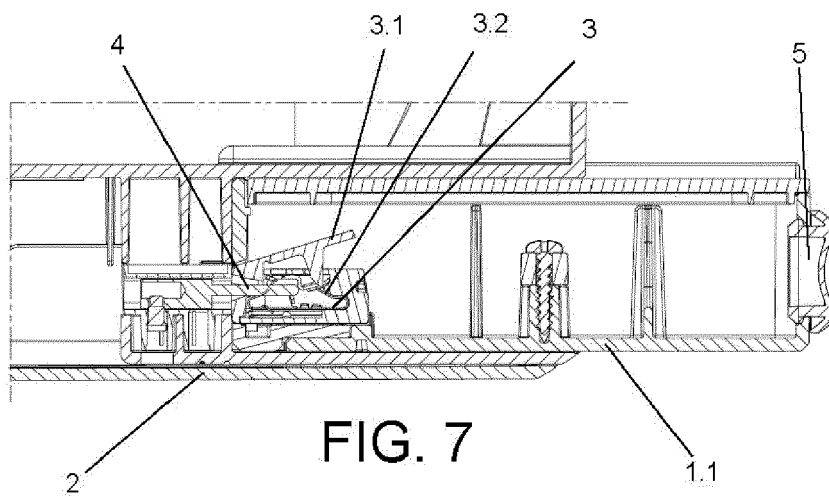


FIG. 1









EUROPEAN SEARCH REPORT

Application Number

EP 21 38 2969

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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Y	* paragraph [0014] - paragraph [0031]; claims 1-3; figures 1-3 *	2-11	ADD. F24F7/00
Y	JP 3 806536 B2 (SANYO ELECTRIC CO) 9 August 2006 (2006-08-09) * paragraph [0032] - paragraph [0069]; claims 1-4; figures 1-8 *	1-11	
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A	* paragraph [0025] - paragraph [0065]; claims 1-9; figures 1-3 *	2-11	
A	JP H04 95218 U (DAIKIN INDUSTRIES LTD) 18 August 1992 (1992-08-18) * abstract; figures 2, 4, 6, 7 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 March 2022	Examiner Silex, Anna
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 38 2969

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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