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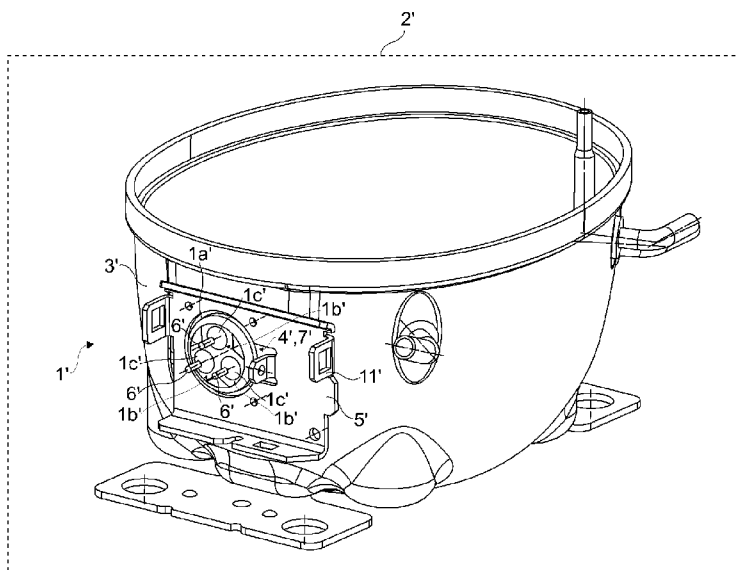
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(54) Title: TERMINAL ASSEMBLY FOR USE IN A HERMETIC COMPRESSOR

Fig. 1



(57) Abstract: The present invention relates to a terminal assembly (1) for use in a hermetically sealed compressor (2) which comprises a metal casing (3) for hermetically accommodating a compressor-kit. The casing (3) has an opening (4) for mounting the terminal assembly (1). The terminal assembly (1) comprises: a metal bracket (5) for mounting, from the outside, onto the metal periphery of the opening (4) by welding, a plurality of terminals (6) which are adapted for connection to a power supply, a passage (7) which is disposed into the bracket (5), wherein the passage (7) lets the terminals (6) pass through the opening (4) into the casing (3). The terminal assembly (1) of the present invention further comprises an electrically insulating seal (8) which hermetically joins the periphery of the passage (7) and the terminals (6) together.

Description**TERMINAL ASSEMBLY FOR USE IN A HERMETIC COMPRESSOR**

[0001] The present invention relates to a hermetically sealed compressor for use in a refrigeration appliance such as a domestic refrigerator. The present invention more particularly relates to the terminal assembly of the hermetically sealed compressor for establishing the electrical connection to a power supply.

[0002] Hermetically sealed compressors which are used in refrigeration appliances are commonly known. Fig. 1 shows a hermetic compressor (2') which is known from the prior art. The hermetic compressor (2') comprises a metal casing (3') for hermetically accommodating the compressor-kit (not shown). The metal casing (3') has an opening (4') onto which the terminal assembly (1') is hermetically mounted. The terminal assembly (1') comprises: a metal bracket (5') which is mounted, from the outside, onto the metal periphery of the opening (4') through welding. The bracket (5') has a retainer (11') for retaining a terminal cover (not shown). The terminal assembly (1') also comprises three glass-to-metal sealed terminals (6') which are disposed on a separate cup-shaped metal member (1a') for establishing the electrical connection to an external electrical power supply (not shown). The cup-shaped metal member (1a') has three through holes (1b'). The three terminals (6') are arranged into the through holes (1b') respectively. The through holes (1b') are sealed through the glass seals (1c') respectively. The cup-shaped metal member (1a') is mounted, from the inside, onto the metal periphery of the opening (4') through welding. The bracket (5a') has a passage (7') that lets the terminals (6') pass through the opening (4') into the casing (3').

[0003] A problem of the prior art hermetic compressor (2') is that the production and the assembly thereof is cost intensive and vulnerable to failures. In particular, the metal bracket (5') and the cup-shaped metal member (1a') which supports the glass-to-metal sealed terminals (6') must be each welded to the casing (3'). There are instances where the glass seals (1c') are damaged during these welding processes. As these damages cannot always be determined with certainty by a visual inspection, a dielectric

strength test must be generally conducted to verify whether the glass seals (1c') function properly. In addition, the cup-shaped metal member (1a') which supports the glass-to-metal sealed terminals (6') is arranged into the opening (4') in the metal casing (3') from the inside, and usually welded prior to the installation of the compressor-kit. Thus, there exists also an additional risk of damaging the glass seals (1c') during the installation work of the compressor-kit. Moreover, even when the terminal assembly (1') passes the dielectric strength test, an undetected micro crack in the glass seals (1c') may subsequently lead to a breakdown of the glass seals (1c') and pose a severe risk to the user, including electric shock or fire.

[0004] An objective of the present invention is to provide a terminal assembly and a hermetically sealed compressor which solves the aforementioned problems of the prior art in a cost-effective way and which enables an improved production and assemblage. Another objective of the present invention is to provide a reliable and cost-effective method of manufacturing the terminal assembly.

[0005] These objectives have been achieved by the terminal assembly as defined in claim 1, the hermetically sealed compressor as defined in claim 9, and the manufacturing method as defined in claim 10. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.

[0006] The terminal assembly according to the present invention is provided, unlike the prior art, without the aforementioned cup-shaped metal member. The terminal assembly of the present invention comprises an electrically insulating seal which hermetically joins the periphery of the passage in the metal bracket with the terminals together.

[0007] A major advantageous effect of the present invention is that the production and the assemblage of the terminal assembly have been considerably simplified. In particular, the provision and the welding process of the aforementioned cup-shaped metal member have been omitted. Thus, in the terminal assembly according to the present invention, only the metal bracket needs to be mounted, from the outside, onto the periphery of the opening in the casing by welding. Thereby, the risk of damaging the

electrically insulating seal during the welding process has been reduced. Moreover, according to the present invention, the metal bracket of the terminal assembly can be mounted onto the opening of the casing even after the installation of the compressor-kit. Thereby, any additional risk of damaging the electrically insulating seal during the installation work can be eliminated or reduced as much as possible. With the present invention, the incidences of any consequential damages due to any undetected defects in the electrically insulating seal can be reduced. In addition, in the terminal assembly of the present invention the relative positions of the terminals to the metal bracket can be accurately adjusted during the production thereof. Thus, the subsequent welding process does not alter, unlike the prior art, these relative positions. Therefore, the risk of any mismatch between the plug and the bracket and any resulting mechanical stresses acting onto the terminals can be eliminated or reduced as much as possible. With the present invention, the production and the assembly costs can be reduced both in labor and material.

- [0008] According to the present invention the number of terminals depends on the type of the hermetic compressor. In an embodiment, the terminal assembly has three terminals. This embodiment is particularly advantageous when establishing a single-phase electrical connection. The terminals are provided in form of pins. Other type of terminals which are known to those skilled in the art can be alternatively used.
- [0009] In another embodiment, the electrically insulating seal comprises a single sealant which jointly seals all the terminals. In this embodiment, the passage of the metal bracket has a single aperture which receives all the terminals. This embodiment is particularly advantageous as the manufacturing process is considerably simplified.
- [0010] In an alternative embodiment, the electrically insulating seal comprises a plurality of sealants each for sealing a respective terminal. In this embodiment, the passage of the metal bracket has a plurality of apertures each for receiving a respective terminal. This embodiment is particularly advantageous as the material costs are considerably reduced.
- [0011] According to the present invention, the electrically insulating seal can be

made from various solid dielectrics such as glass, ceramic or plastic respectively. Other dielectric materials known to those skilled in the art can be alternatively used. In an embodiment, the electrically insulating seal is made from plastic material. This embodiment is particularly advantageous as the sealant can be manufactured by injection moulding or ultrasonic welding.

- [0012] In other alternative embodiments, the electrically insulating seal is formed by injection moulding of plastic material or by ultrasonic welding of one or more plastic workpieces respectively.
- [0013] According to the present invention the metal bracket is not limited to a particular size and the shape. The size and the shape of the metal bracket can be adjusted in accordance with the size and the shape of the hermetic compressor as well as the type of the electrical connection to be made. In another embodiment, the metal bracket has a retainer for holding the releasable components such as a protective terminal cover. In another embodiment, the retainer is further adapted to hold the electric plug of the power supply. These embodiments are particularly advantageous as the hermetic compressor can be more easily and more safely connected to the power supply.
- [0014] Additional advantageous effects of the terminal assembly, the hermetic compressor and the manufacturing method according to the present invention will become more apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:
- [0015] Figure 1 – is a schematic perspective view of a terminal assembly which is mounted onto the opening in the casing of a hermetic compressor according to the prior art;
- [0016] Figure 2 – is a schematic perspective view of a terminal assembly which is to be mounted onto the opening in the casing of a hermetic compressor according to an embodiment of the present invention;
- [0017] Figure 3 – is a schematic perspective view of the terminal assembly of Fig. 2, prior to mounting, from the outside, onto the metal periphery of the opening in the casing by welding;
- [0018] Figure 4 – is a schematic top view of the terminal assembly of Fig. 3;

- [0019] Figure 5 – is a schematic front view of the terminal assembly of Fig. 3;
- [0020] Figure 6 – is a schematic side view of the terminal assembly of Fig. 3;
- [0021] Figure 7 – is a schematic perspective view of the terminal assembly according to an alternative embodiment of the present invention, prior to mounting, from the outside, onto the metal periphery of the opening in the casing by welding;
- [0022] Figure 8 – is a schematic top view of the terminal assembly of Fig. 7;
- [0023] Figure 9 – is a schematic front view of the terminal assembly of Fig. 7;
- [0024] Figure 10 – is a schematic side view of the terminal assembly of Fig. 7.
- [0025] The reference signs appearing on the drawings relate to the following technical features.
1. Terminal assembly
- [0026] 1a' Cup-shaped metal member
- 1b' Through hole
- 1c' Glass seal
2. Compressor
 3. Casing
 4. Opening
 5. Bracket
 6. Terminal
 7. Passage
- [0027] 7a. Aperture
- 7b. Aperture
- 7c. Aperture
- 7d. Aperture
8. Seal
- [0028] 8a. Sealant
- 8b. Sealant
- [0029] 8c. Sealant
- [0030] 8d. Sealant
9. Groove
10. Groove
11. Retainer

- [0031] The terminal assembly (1) is suitable for use in a hermetically sealed compressor (2). The hermetically sealed compressor (2) comprises a metal casing (3) for hermetically accommodating a compressor-kit (not shown). The casing (3) has an opening (4) for mounting the terminal assembly (1) (Fig. 2 to 10).
- [0032] The terminal assembly (1) comprises a metal bracket (5) for mounting, from the outside, onto the metal periphery of the opening (4) by welding, a plurality of terminals (6) which are adapted for connection to an external electrical power supply, a passage (7) which is disposed into the bracket (5), wherein the passage (7) lets the terminals (6) pass through the opening (4) into the casing (3).
- [0033] The terminal assembly (1) of the present invention further comprises an electrically insulating seal (8) which hermetically joins the periphery of the passage (7) and the terminals (6) together.
- [0034] The hermetically sealed compressor (2) of the present invention comprises the terminal assembly (1). The metal bracket (5) is mounted, from the outside, onto the periphery of the opening (4) by welding.
- [0035] In an embodiment, the passage (7) comprises three separate apertures (7a, 7b, 7c) each for letting a respective terminal (6) pass through the opening (4). And the seal (8) comprises three separate sealants (8a, 8b, 8c) which seal the three separate apertures (7a, 7b, 7c) respectively (Fig. 2 to 6).
- [0036] In another embodiment, each separate aperture (7a, 7b, 7c) is circular shaped. And each separate sealant (8a, 8b, 8c) has an annular groove (9) which receives the periphery of the respective separate aperture (7a, 7b, 7c) (Fig. 2 to 6).
- [0037] In an alternative embodiment, the passage (7) comprises a single aperture (7d) for letting all terminals (6) pass through the opening (4) and the seal (8) comprises a single sealant (8d) which seals the single aperture (7d) (Fig. 2, and 7 to 10).
- [0038] In another alternative embodiment, the single aperture (7d) is circular shaped. And the single sealant (8d) has an annular groove (10) which receives the periphery of the single aperture (7d) (Fig. 2, and 7 to 10).

- [0039] In another embodiment, the electrically insulating seal (8) is made from plastic material.
- [0040] In another embodiment, the bracket (5) has a u-shaped cross section (Fig. 2 to 10).
- [0041] In another embodiment, the bracket (5) has a retainer (11) for retaining a terminal cover (not shown).
- [0042] The method of manufacturing the terminal assembly (1) comprises: a step of providing a metal bracket (5) for mounting, from the outside, onto the metal periphery of the opening (4) by welding; a step of providing a plurality of terminals (6) which are adapted for connection to an external electrical power supply; a step of forming a passage (7) into the bracket (5), wherein the passage (7) lets the terminals (6) pass through the opening (4) into the casing (3) (Fig. 2 to 10).
- [0043] The manufacturing method of the present invention further comprises: a step of forming an electrically insulating seal (8) which hermetically joins the periphery of the passage (7) and the terminals (6) together.
- [0044] In another embodiment, the electrically insulating seal (8) is formed from plastic material.
- [0045] In another embodiment, the passage (7) comprises three separate apertures (7a, 7b, 7c) each for letting a respective terminal (6) through the opening (4) and the seal (8) comprises three separate sealants (8a, 8b, 8c) which seal the three separate apertures (7a, 7b, 7c) respectively. In this embodiment, the three separate sealants (8a, 8b, 8c) are formed by injection molding of plastic (Fig. 2 to 6).
- [0046] In an alternative embodiment, the passage (7) comprises a single aperture (7d) for letting all terminals (6) through the opening (4). And the seal (8) comprises a single sealant (8d) which seals the single aperture (7d). In this embodiment, the single sealant (8d) is formed by injection molding of plastic material (Fig. 2, 7 to 10).
- [0047] The sealants (8a, 8b, 8c, 8d) can be alternatively formed by ultrasonic welding of respective plastic workpieces (not shown).
- [0048] In an alternative embodiment, the three separate sealants (8a, 8b, 8c) are formed by ultrasonic welding of respective plastic workpieces. Each

workpiece is provided with a hole for receiving the respective terminal (6).

The workpiece has a shape which matches the respective separate aperture (7a, 7b, 7c). Each terminal (6) is preliminarily fixed into the hole of the respective workpiece. Then, the workpieces are positioned into the respective separate apertures (7a, 7b, 7c) together with the respective terminal (6) and ultrasonically welded to the bracket (5) (Fig. 2 to 6).

[0049] In another alternative embodiment, the single sealant (8d) is formed by ultrasonic welding of a plastic workpiece. The workpiece is provided with three holes for receiving the terminals (6) respectively. The workpiece has a shape which matches the single aperture (7d). The terminals (6) are preliminarily fixed into the holes respectively. Then, the workpiece is positioned into the single aperture (7d) together with the terminals (6) and ultrasonically welded to the bracket (5) (Fig. 2 and 7 to 10).

[0050] In another embodiment, the bracket (5) is provided with a retainer (11) for retaining a terminal cover and the electric cables (not shown) (Fig. 2 to 10).

[0051] A major advantage of the present invention is that the need for using the cup-shaped metal member (1a') has been obviated. Thereby, the related costs and the related manufacturing steps, including the welding process of the cup-shaped metal member (1a') to the casing (3') have been eliminated. The terminal assembly (1) of the present invention is particularly advantageous as it can be mounted from the outside onto the casing (3) by a single welding process even after the installation work of the compressor kit. Thereby, the risk of damaging the electrically insulating seal (8) of the terminal assembly (1) has been considerably reduced. Thus, the incidences of any consequential damages due to any undetected defects in the electrically insulating seals (8) can be reduced. Other additional advantageous effects of the present invention can be taken from the aforementioned particular embodiments.

Claims

1. A terminal assembly (1) for use in a hermetically sealed compressor (2) comprising a metal casing (3) for hermetically accommodating a compressor-kit, wherein the casing (3) has an opening (4) for mounting the terminal assembly (1), the terminal assembly (1) comprising: a metal bracket (5) for mounting, from the outside, onto the metal periphery of the opening (4) by welding, a plurality of terminals (6) which are adapted for connection to a power supply, a passage (7) which is disposed into the bracket (5), wherein the passage (7) lets the terminals (6) pass through the opening (4) into the casing (3), the terminal assembly (1) being **characterized in that** an electrically insulating seal (8) which hermetically joins the periphery of the passage (7) and the terminals (6) together.
2. The terminal assembly (1) according to claim 1, **characterized in that** the passage (7) comprises three separate apertures (7a, 7b, 7c) each for letting a respective terminal (6) pass through the opening (4) and the seal (8) comprising three separate sealants (8a, 8b, 8c) which seal the three separate apertures (7a, 7b, 7c) respectively.
3. The terminal assembly (1) according to claim 2, **characterized in that** each separate aperture (7a, 7b, 7c) is circular shaped and each separate sealant (8a, 8b, 8c) has an annular groove (9) which receives the periphery of the respective separate aperture (7a, 7b, 7c).
4. The terminal assembly (1) according to claim 1, **characterized in that** the passage (7) comprising a single aperture (7d) for letting all terminals (6) pass through the opening (4) and the seal (8) comprises a single sealant (8d) which seals the single aperture (7d).
5. The terminal assembly (1) according to claim 4, **characterized in that** the single aperture (7d) is circular shaped and the single sealant (8d) has an annular groove (10) which receives the periphery of the single aperture (7d).
6. The terminal assembly (1) according to any one of claims 1 to 5, **characterized in that** the seal (8) is made from plastic.
7. The terminal assembly (1) according to claim 1, **characterized in that** the bracket (5) has a u-shaped cross section.
8. The terminal assembly (1) according to any one of claims 1 or 7, **characterized**

in that the bracket (5) has a retainer (11) for retaining a terminal cover.

9. A hermetically sealed compressor (2) comprising a metal casing (3) for hermetically accommodating a compressor-kit, said hermetically sealed compressor (2) being **characterized in that** a terminal assembly (1) as defined in claim 1, wherein the casing (3) has an opening (4) for mounting the terminal assembly (1), and wherein the metal bracket (5) is mounted, from the outside, onto the periphery of the opening (4) by welding.
10. A method of manufacturing a terminal assembly (1) for use in a hermetically sealed compressor (2) comprising a metal casing (3) for accommodating a compressor-kit, wherein the casing (3) has an opening (4) for mounting the terminal assembly (1), the method comprising:
 - a step of providing a metal bracket (5) for mounting, from the outside, onto the metal periphery of the opening (4) by welding;
 - a step of providing a plurality of terminals (6) which are adapted for connection to a power supply;
 - a step of forming a passage (7) into the bracket (5), wherein the passage (7) lets the terminals (6) pass through the opening (4) into the casing (3);
 - a step of forming an electrically insulating seal (8) which hermetically joins the periphery of the passage (7) and the terminals (6) together.
11. The manufacturing method according to claim 10, **characterized in that** the seal (8) is made from plastic.
12. The manufacturing method according to claim 11, **characterized in that** the passage (7) comprising three separate apertures (7a, 7b, 7c) each for letting a respective terminal (6) pass through the opening (4) and the seal (8) comprising three separate sealants (8a, 8b, 8c) which seal the three separate apertures (7a, 7b, 7c) respectively, wherein the three separate sealants (8a, 8b, 8c) are formed by injection molding.
13. The manufacturing method according to claim 11, **characterized in that** the passage (7) comprising three separate apertures (7a, 7b, 7c) each for letting a respective terminal (6) pass through the opening (4) and the seal (8) comprising three separate sealants (8a, 8b, 8c) which seal the three separate apertures (7a, 7b, 7c) respectively, wherein the three separate sealants (8a, 8b, 8c) are formed by ultrasonic welding of plastic workpieces respectively.

14. The manufacturing method according to claim 11, **characterized in that** the passage (7) comprises a single aperture (7d) for letting all terminals (6) pass through the opening (4) and the seal (8) comprises a single sealant (8d) which seals the single aperture (7d), wherein the single sealant (8d) is formed by injection molding.
15. The manufacturing method according to claim 11, **characterized in that** the passage (7) comprising a single aperture (7d) for letting all terminals (6) pass through the opening (4) and the seal (8) comprises a single sealant (8d) which seals the single aperture (7d), wherein the single sealant (8d) is formed by ultrasonic welding of a plastic workpiece.

Fig. 1

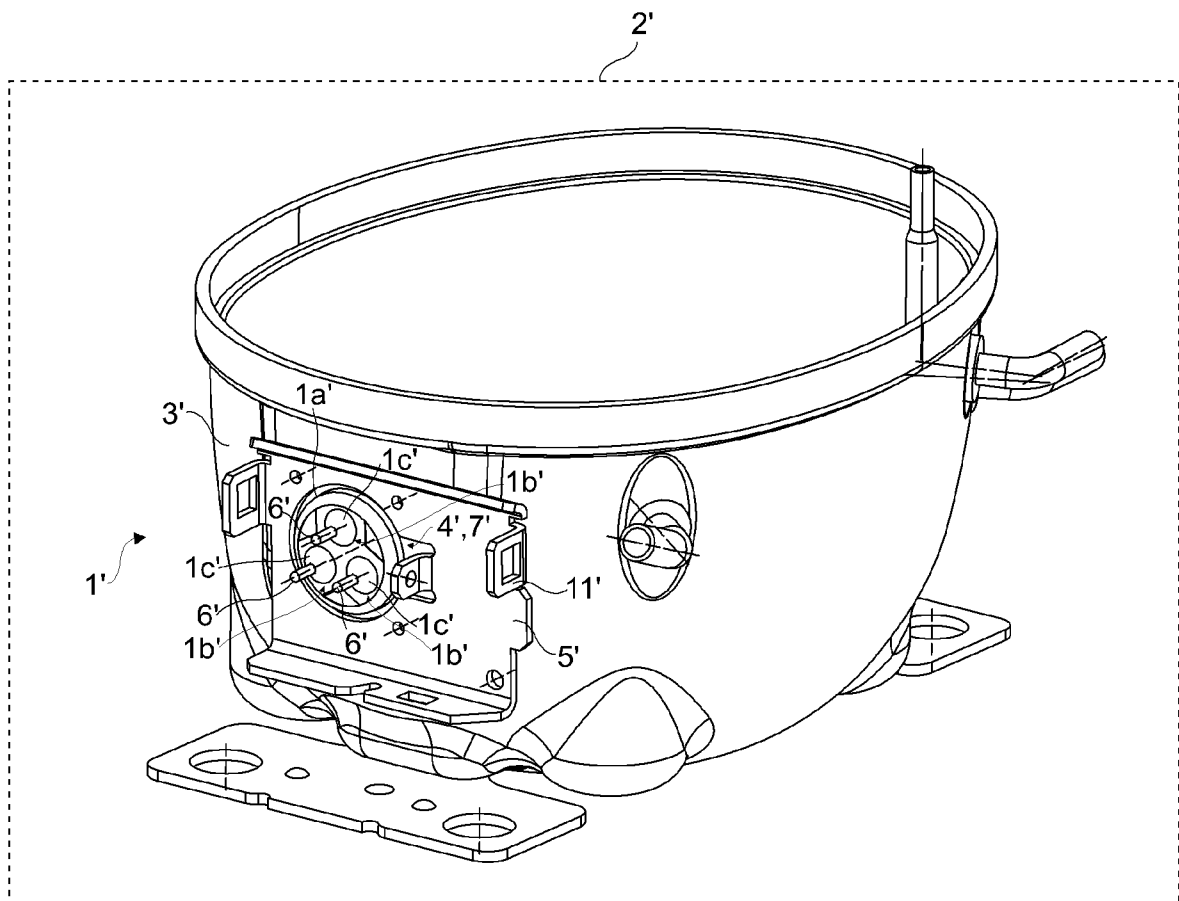


Fig. 2

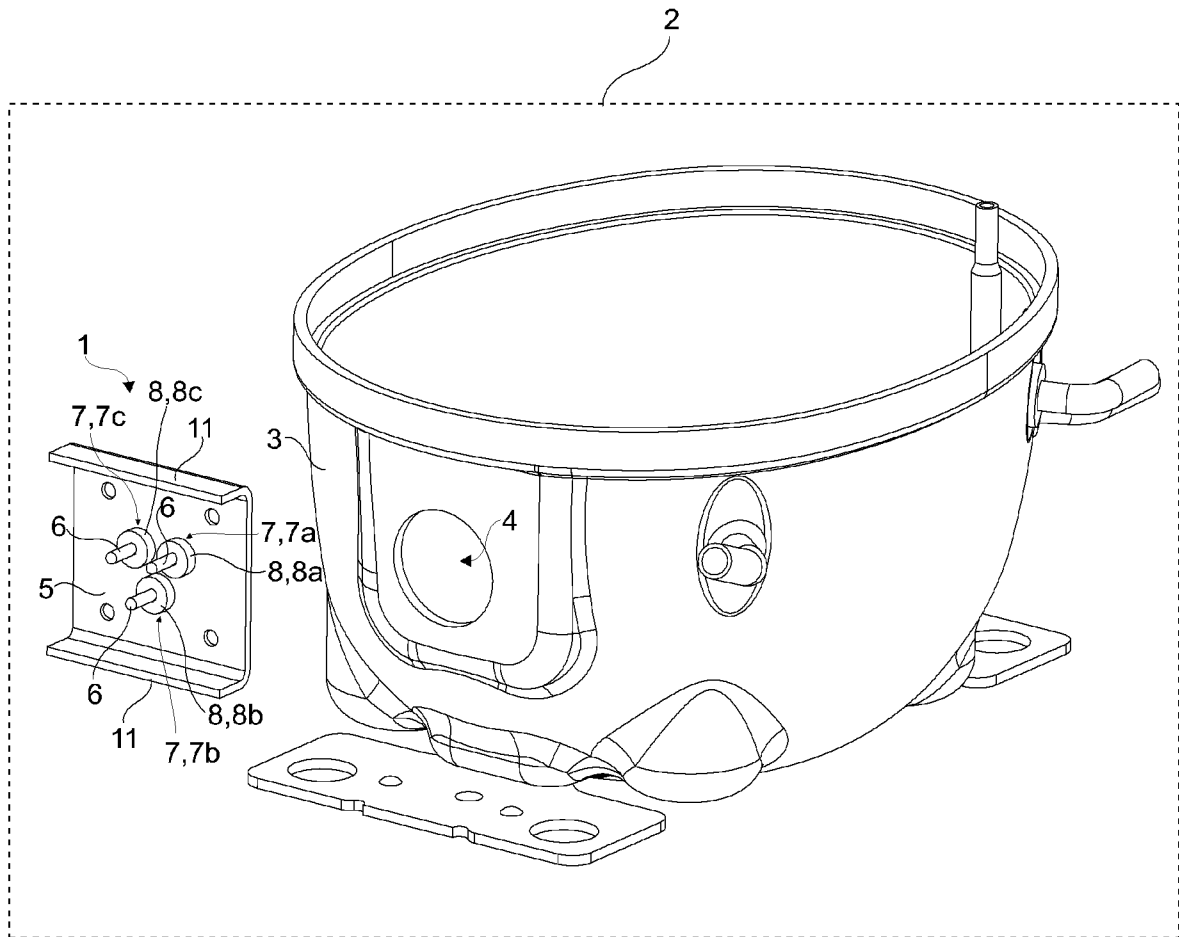


Fig. 3

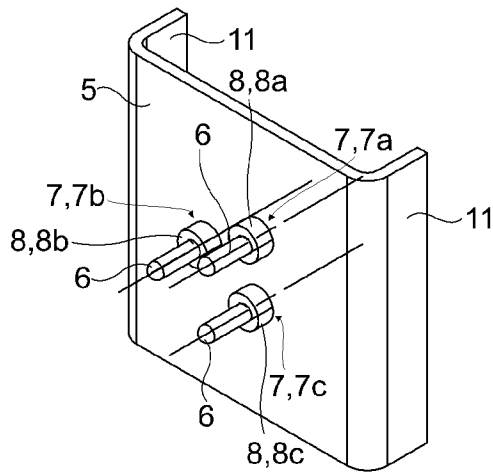


Fig. 4

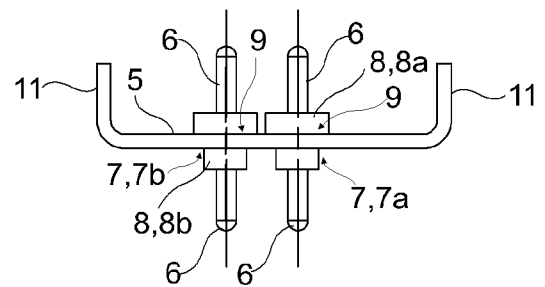


Fig. 5

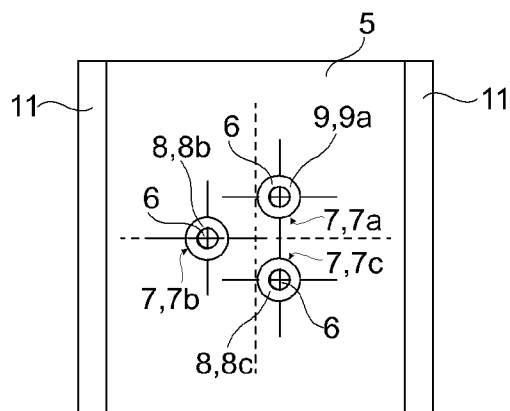


Fig. 6

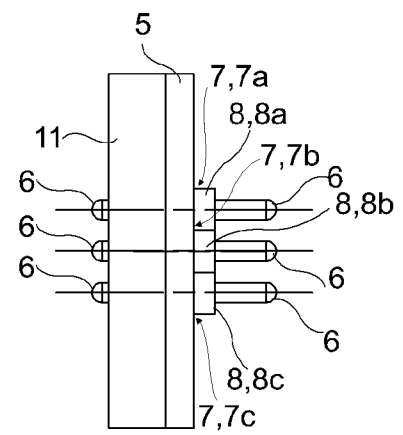


Fig. 7

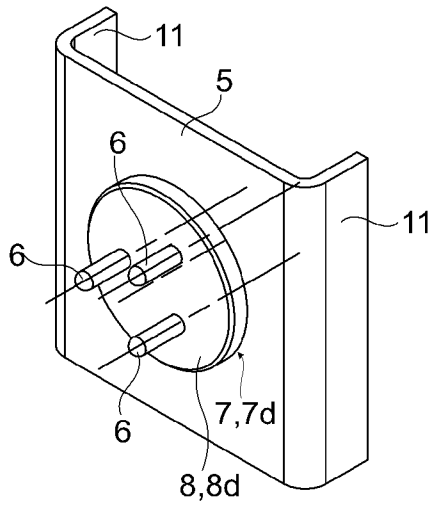


Fig. 8

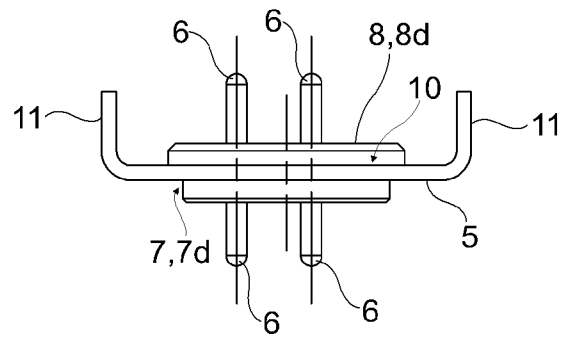


Fig. 9

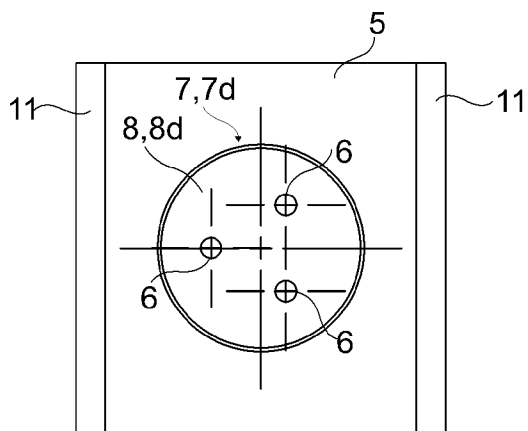
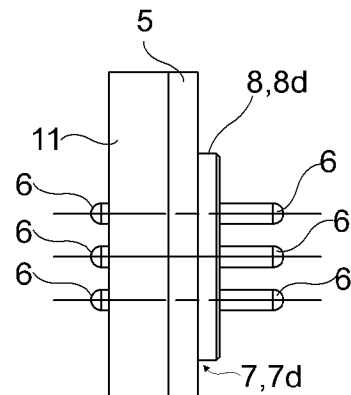


Fig. 10



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/056961

A. CLASSIFICATION OF SUBJECT MATTER
INV. F04B39/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/155741 A1 (HERRICK TODD W [US] ET AL) 24 October 2002 (2002-10-24) paragraphs [0004], [0035] - [0037]; figures 1-4	1-3, 7-10,12, 13
X	US 2014/065000 A1 (TOLBERT JR JOHN R [US] ET AL) 6 March 2014 (2014-03-06) paragraphs [0004], [0043] - [0048]; figures 1-10	1-15
A	EP 1 020 646 A1 (MATSUSHITA ELECTRIC IND CO LTD [JP]) 19 July 2000 (2000-07-19) paragraph [0027]	1,9,10
A	WO 2014/143179 A1 (EMERSON ELECTRIC CO [US]) 18 September 2014 (2014-09-18) paragraph [0024]	1,9,10
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Further documents are listed in the continuation of Box C.



See patent family annex.

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27/11/2015

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/056961

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/208760 A1 (YAP ZER KAI [US] ET AL) 21 October 2004 (2004-10-21) paragraph [0014] -----	1,9,10
A	US 2004/118146 A1 (HALLER DAVID K [US] ET AL) 24 June 2004 (2004-06-24) paragraph [0033] -----	1,9,10
A	JP 2000 002182 A (MATSUSHITA ELECTRIC IND CO LTD) 7 January 2000 (2000-01-07) abstract -----	1,9,10
A	JP 2009 156189 A (IKEMOTO YUKINOBU; SAKAI ITSURO; KANEKO MASABUMI) 16 July 2009 (2009-07-16) abstract -----	1,9,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/056961

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002155741 A1	24-10-2002	US 2002155741 A1	24-10-2002
		US 2005124203 A1	09-06-2005
US 2014065000 A1	06-03-2014	NONE	
EP 1020646 A1	19-07-2000	EP 1020646 A1	19-07-2000
		JP H116479 A	12-01-1999
		US 6164934 A	26-12-2000
WO 2014143179 A1	18-09-2014	NONE	
US 2004208760 A1	21-10-2004	CA 2464230 A1	15-10-2004
		US 2004208760 A1	21-10-2004
		US 2004208762 A1	21-10-2004
US 2004118146 A1	24-06-2004	US 2004118146 A1	24-06-2004
		US 2006147314 A1	06-07-2006
JP 2000002182 A	07-01-2000	JP 3846040 B2	15-11-2006
		JP 2000002182 A	07-01-2000
JP 2009156189 A	16-07-2009	NONE	