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(54) **A HEAT EXCHANGER ASSEMBLY**

(57) A heat exchanger assembly (300) includes a receiver drier (100) and a housing (200) for the receiver drier (100). The receiver drier (100) includes a cut-out

portion (110), while the housing (200) includes a complementary protrusion portion (210) protruding into the cut-out portion (110) of the receiver drier (100).

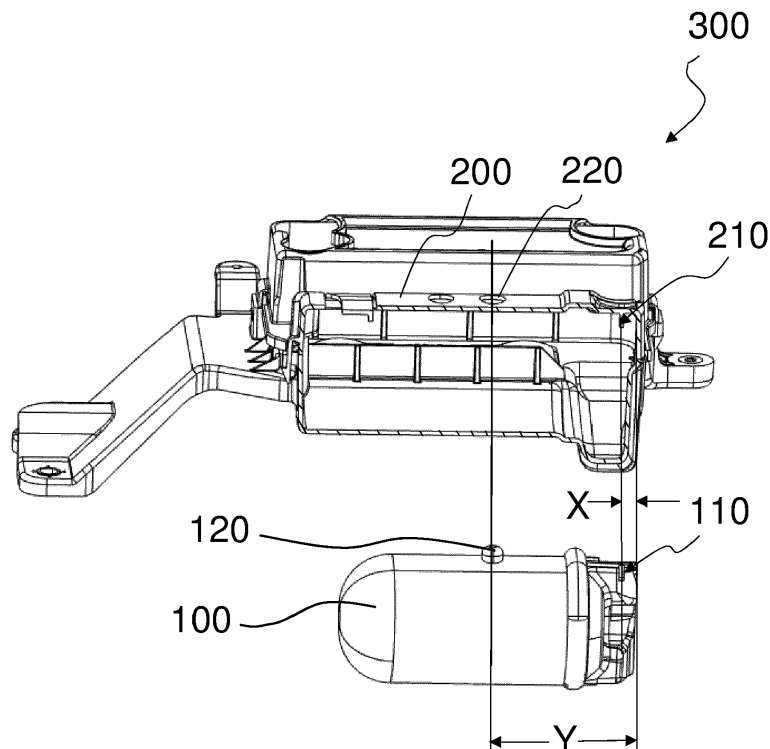


FIG. 2

Description

[0001] The present invention relates to a heat exchanger assembly, particularly a receiver drier - housing assembly, wherein a receiver drier is received in a housing connected to a heat exchanger.

[0002] Conventional air conditioning system, for example, air conditioning system for a vehicle includes a condenser, an evaporator, an expansion device, a compressor and a heater. Generally, the conventional air conditioning system configured with an expansion valve is also configured with a receiver drier that is disposed in a high-pressure section of the air conditioning system/ air conditioning loop. The receiver drier is usually located between a condenser and the expansion valve in the air conditioning loop. The receiver drier traps moisture and debris carried with condensed refrigerant received from the condenser. Accordingly, moisture and debris that is detrimental to critical components such as compressor disposed in the air-conditioning loop is prevented from reaching the compressor. The receiver drier is disposed near the condenser, particularly, the receiver drier is received in a receiver drier housing that is mounted on the condenser.

[0003] However, different configurations of the condensers are used corresponding to different configurations of the air conditioning systems. Accordingly, different configurations / versions of receiver driers are used corresponding to different configurations of the condenser. For example, in a condenser assembly, different sizes of receiver drier are used corresponding to different sizes of the condensers. Generally, a different receiver drier housing is used to receive different configuration, particularly, different size of the receiver drier. However, it is to be ensured that only a particular configuration / variant of receiver drier, for example, a particular size of receiver drier corresponding to a particular condenser size/type is received in the corresponding housing mounted on the condenser during assembly of the air conditioning system. Also, it is to be ensured that a wrong version of the receiver drier is prevented from being received in the housing.

[0004] In case a wrong version of receiver drier corresponding to a particular configuration of the condenser is received in the receiver drier housing, the performance parameters associated with the air conditioning system deviates from intended values, thereby detrimentally affecting the efficiency and the performance of the air conditioning system. Accordingly, it is to be ensured that only right version of the receiver drier corresponding to a particular configuration of the condenser is received in the receiver drier housing and wrong receiver drier is prevented from being received in the housing.

[0005] Accordingly, there is a need for a heat exchanger assembly that obviates the problems faced by the conventional heat exchanger assembly. Particularly, there is a need for a heat exchanger assembly that includes a receiver drier and a housing for the receiver drier. More

particularly, a heat exchanger assembly that not only ensures that a right version of receiver drier is received in a corresponding housing but also ensures that a wrong version of the receiver drier is prevented from being received in the housing. Further, there is a need for a heat exchanger assembly configured with redundant features to ensure only a right version of a receiver drier is received in the corresponding housing and a wrong version is prevented from being received in the housing. Particularly, there is a need for a heat exchanger assembly configured with a failsafe arrangement that involves more than one feature to ensure that only a right version of a receiver drier is received in the corresponding housing while the wrong version is prevented from being received in the housing. More specifically, even when one feature fails, another feature still ensures that only a right version of the receiver drier is received in the corresponding housing and wrong version is prevented from being received in the housing.

[0006] An object of the present invention is to provide a heat exchanger assembly, wherein a receiver drier and corresponding housing of the heat exchanger assembly include complementary features to ensure that only a right version of receiver drier is received in the corresponding housing while a wrong version is prevented from being received in the housing.

[0007] Another object of the present invention is to provide a heat exchanger assembly that is simple in construction and that is configured with redundant features to ensure that only a right version of a receiver drier is received in the corresponding housing while the wrong version is prevented from being received in the housing.

[0008] In the present description, some elements or parameters may be indexed, such as a first element and a second element. In this case, unless stated otherwise, this indexation is only meant to differentiate and name elements which are similar but not identical. No idea of priority should be inferred from such indexation, as these terms may be switched without betraying the invention. Additionally, this indexation does not imply any order in mounting or use of the elements of the invention.

[0009] A heat exchanger assembly includes a receiver drier and a housing for the receiver drier. The receiver drier includes a cut-out portion, while the housing includes a complementary protrusion portion protruding into the cut-out portion of the receiver drier.

[0010] Generally, the cut-out portion is located at one of the ends of the receiver drier with an inlet and/or outlet of the receiver drier.

[0011] In one option, the cut-out portion is located on a side of the receiver drier substantially in-between the ends of the receiver drier.

[0012] Preferably, the cut-out portion is a groove and the protrusion portion is a rib.

[0013] Generally, a region of the receiver drier proximal to the groove is depressed radially inward to enable entry of the receiver drier into the housing such that the groove and the complementary rib are aligned with respect to

each other, the groove and the complementary rib engage with each other when the receiver drier is rotated relative to the housing while being inside the housing.

[0014] Generally, the groove protrudes substantially perpendicularly to the general axis of extension of the receiver drier into the housing.

[0015] Further, the receiver drier includes a protruding pin and the housing includes an aperture, wherein the protruding pin protrudes outside of the housing through the aperture.

[0016] More specifically, the housing includes at least two apertures, wherein the protruding pin protrudes outside of the housing through one of them.

[0017] In accordance with an embodiment of the present invention, the housing includes a first half and a second half connected together to define an enclosure that encloses the receiver drier.

[0018] Generally, the protrusion portion and the aperture are located at the first half of the housing.

[0019] Alternatively, the protrusion portion is located at the first half of the housing, while the aperture is located at the second half of the housing.

[0020] Generally, heat exchanger assembly includes a plate condenser also enclosed by the housing and connected to the receiver drier.

[0021] Specifically, in case of the heat exchanger assembly, the plate condenser is so arranged with respect to the receiver drier that their axes of general extension are parallel to each other.

[0022] Other characteristics, details and advantages of the invention can be inferred from the description of the invention hereunder. A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying figures, wherein:

FIG. 1 illustrates an isometric view of a heat exchanger assembly in accordance with an embodiment of the present invention;

FIG. 2 illustrates a sectional view of a housing depicting internal details thereof and an isometric view of a receiver drier in accordance with an embodiment of the present invention;

FIG. 3a illustrates a sectional view of the housing of **FIG. 2** with the receiver drier of **FIG. 2** received therein;

FIG. 3b illustrates another sectional view depicting internal details of the housing including the rib;

FIG. 4 illustrates an isometric view of the receiver drier of the heat exchanger assembly of **FIG. 1**;

FIG. 5 illustrates an isometric view of the housing of

the heat exchanger assembly of **FIG. 1**;

FIG. 6A illustrates a sectional view depicting interaction between complementary elements of the receiver drier and the housing of **FIG. 1**.

[0023] The present invention relates to a heat exchanger assembly that includes a receiver drier and a housing, wherein the receiver drier and the corresponding housing include complementary engaging elements formed thereon to interact with each other to ensure a right receiver drier variant is received in the corresponding housing and a wrong receiver drier variant is prevented from being received in the housing. However, the present invention can also be extended to a tubular element and a housing of an assembly, wherein the tubular element and the housing are configured with features that ensure a right tubular element variant is received in the corresponding housing and a wrong tubular element variant is prevented from being received in the housing. Also, the tubular element and the housing include features to determine variant of tubular element received in the housing by mere visual inspection of an exterior of the housing without requiring dis-assembly of the housing.

[0024] **FIG. 1** illustrates an isometric view of a heat exchanger assembly **300**, herein after referred to as assembly **300**. The assembly **300** includes a receiver drier **100** and a housing **200**. **FIG. 2** illustrates a sectional view of the housing **200** depicting internal details thereof and an isometric view of the receiver drier **100**. **FIG. 3a** illustrates a sectional view of the housing **200** with the receiver drier **100** received therein. **FIG. 3b** illustrates another sectional view depicting internal details of the housing including a rib **210A**. **FIG. 4** illustrates an isometric view of the receiver drier **100** of the assembly **300**. **FIG. 5** illustrates an isometric view of the housing of the assembly **300**.

[0025] The receiver drier **100** includes a cut-out portion **110** while the housing **200** includes a complementary protrusion portion **210** protruding into the cut-out portion **110** of the receiver drier **100**. Generally, the cut-out portion **110** is located at one of the ends of the receiver drier **100** with an inlet and/or outlet of the receiver drier **100**. Alternatively, the cut-out portion **110** may be located on a side of the receiver drier **100** substantially in-between the ends of the receiver drier **100**. According to the embodiment, the cut-out portion **110** is a groove **110A** and the protrusion portion **210** is the rib **210A**. More specifically referring to **FIG. 2** and **FIG. 6A**, the receiver drier **100** includes at least one groove **110A** and at least one protruding pin **120** that are positioned based on the receiver drier variant. The corresponding housing **200** includes the complementary rib **210A**, and optionally at least one aperture **220** formed thereon. The groove **110A** formed on the receiver drier **100** receives the complementary rib **210A** formed on the corresponding housing **200**. The groove **110A** protrudes substantially perpen-

dicularly to the general axis of extension of the receiver drier **100** into the housing **200**. Further, the protruding pin **120** formed on the receiver drier **100** is received in the aperture **220** formed on the corresponding housing **200**. A region of the receiver drier **100** proximal to the groove **110A** may be depressed radially inward to enable entry of the receiver drier **100** into the housing **200** such that the groove **110A** and the complementary rib **210A** are aligned with respect to each other. The groove **110A** and the complementary rib **210A** then engage with each other when the receiver drier **100** is rotated relative to the housing **200** while being inside the housing **200**. As the groove **110A** on the receiver drier **100** is complementary to the rib **210A** of the corresponding housing **200**, for example, the groove **110A** and the rib **210A** are at same height "X" from base of the receiver drier **100** and the corresponding housing **200** respectively when measured parallel to the general axis of extension of the receiver drier **100**. The receiver drier **100** may include the protruding pin **120** and the housing **200** may include the aperture **220**, wherein the protruding pin **120** protrudes outside of the housing **200** through the aperture **220**. The housing **200** includes at least two apertures **220**, wherein the protruding pin **120** protrudes outside the housing **200** through one of them. This allows to indicate visibly which variant is present within the housing by protruding from a respective aperture **220**. The protruding pin **120** on the receiver drier **100** is complementary to the aperture **220** of the corresponding housing **200**. For example, the protruding pin **120** and the aperture **220** are at same height "Y" from base of the receiver drier **100** and the corresponding housing **200** respectively when measured parallel to the general axis of extension of the receiver drier **100**. The interaction between the protruding pin **120** on the receiver drier **100** and the aperture **220** of the corresponding housing **200** indicates the receiver drier variant received inside the housing as the protruding pin **120** protrudes out of the housing **200** through the aperture **220**.

[0026] The receiver drier is not receivable in housing of another version other than the corresponding housing as the rib **210A** and the groove **110A** configured on the receiver drier and housing do not match or the protruding pin and the aperture configured on the receiver drier and housing do not match. With the groove **110A** formed on the receiver drier capable of receiving the complementary rib **210A** formed on the corresponding housing **200** and the protruding pin **120** of the receiver drier **100** engaging with the aperture **220** formed on the housing **200**, it is ensured that the right receiver drier variant is received in the corresponding housing and wrong version is prevented from being received in the housing. The complementary groove **110A** and the rib **210A** act as poke-yoke features that ensure that the right receiver drier variant is received in the corresponding housing and wrong version is prevented from being received in the housing.

[0027] The housing **200** includes a first half **200A** and a second half **200B** connected together so that they form

an enclosure to receive the receiver drier **100**. Generally, both the protrusion portion **210**, particularly, the rib **210A** and the aperture **220** are located at the first half **200A** of the housing **200** as illustrated in **FIG. 6A**. Alternatively, the protrusion portion **210**, particularly, the rib **210A** is located at the first half **200A** of the housing **200**, while the aperture **220** is located at the second half **200B** of the housing **200**.

[0028] The heat exchanger assembly **300** includes a plate condenser **300A**. The plate condenser **300A** is also enclosed by the housing **200** and is connected to the receiver drier **100**. The plate condenser **300A** is arranged with respect to the receiver drier **100** so that their axes of general extension are parallel to each other.

Claims

1. A heat exchanger assembly (300) comprising a receiver drier (100) and a housing (200) for the receiver drier (100), **characterized in that** the receiver drier (100) comprises a cut-out portion (110), while the housing (200) comprises a complementary protrusion portion (210) protruding into the cut-out portion (110) of the receiver drier (100).
2. The heat exchanger assembly (300) according to claim 1, wherein the cut-out portion (110) is located at one of the ends of the receiver drier (100) with an inlet and/or outlet of the receiver drier (100).
3. The heat exchanger assembly (300) according to claim 1, wherein the cut-out portion (110) is located on a side of the receiver drier (100) substantially in-between the ends of the receiver drier (100).
4. The heat exchanger assembly (300) as claimed in the previous claim, wherein cut-out portion (110) is a groove (110A) and the protrusion portion (210) is a rib (210A).
5. The heat exchanger assembly (300) as claimed in the previous claim, wherein region of the receiver drier (100) proximal to the groove (110A) is depressed radially inward to enable entry of the receiver drier (100) into the housing (200) such that the groove (110A) and the complementary rib (210A) are aligned to each other, the groove (110A) and the complementary rib (210A) engage with each other when the receiver drier (100) is rotated relative to the housing (200) while being inside the housing (200).
6. The heat exchanger assembly (300) according to any of claims 2-5, wherein the groove (110A) protrudes substantially perpendicularly to the general axis of extension of the receiver drier (100) into the housing (200).

7. The heat exchanger assembly (300) as claimed in any of the preceding claims, wherein the receiver drier (100) comprises a protruding pin (120), and the housing (200) comprises an aperture (220), wherein the protruding pin (120) protrudes outside of the housing (200) through the aperture (220). 5
8. The heat exchanger assembly (300) according to claim 7, wherein the housing comprises at least two apertures (220), wherein the protruding pin (120) protrudes outside of the housing (200) through one of them. 10
9. The heat exchanger assembly (300) according to any preceding claim, wherein the housing (200) comprises a first half (200A) and a second half (200B) connected together so that they enclose the receiver drier (100). 15
10. The heat exchanger assembly (300) according to any of claims 8 and 9, wherein both the protrusion portion (210) and the aperture (220) are located at the first half (200A) of the housing (200). 20
11. The heat exchanger assembly (300) according to any of claims 8 and 9, wherein the protrusion portion (210) is located at the first half (200A) of the housing (200), while the aperture (220) is located at the second half (200B) of the housing (200). 25
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12. The heat exchanger assembly (300) according to any preceding claim, wherein it comprises a plate condenser (300A) also enclosed by the housing (200) and connected to the receiver drier (100). 35
13. The heat exchanger assembly according to claim 12, wherein the plate condenser (300A) is arranged with respect to the receiver drier (100) so that their axes of general extension are parallel to each other. 40
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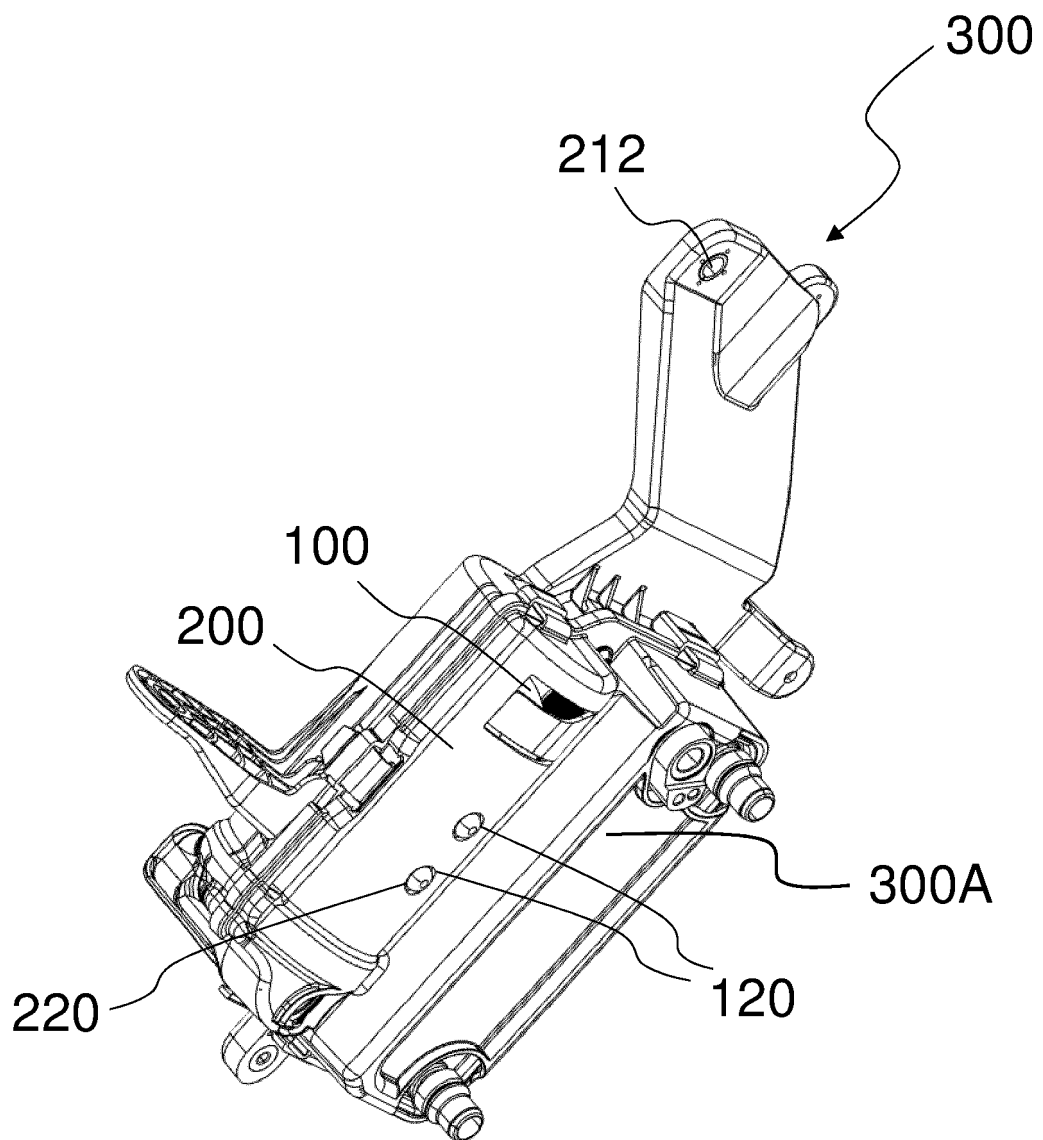


FIG. 1

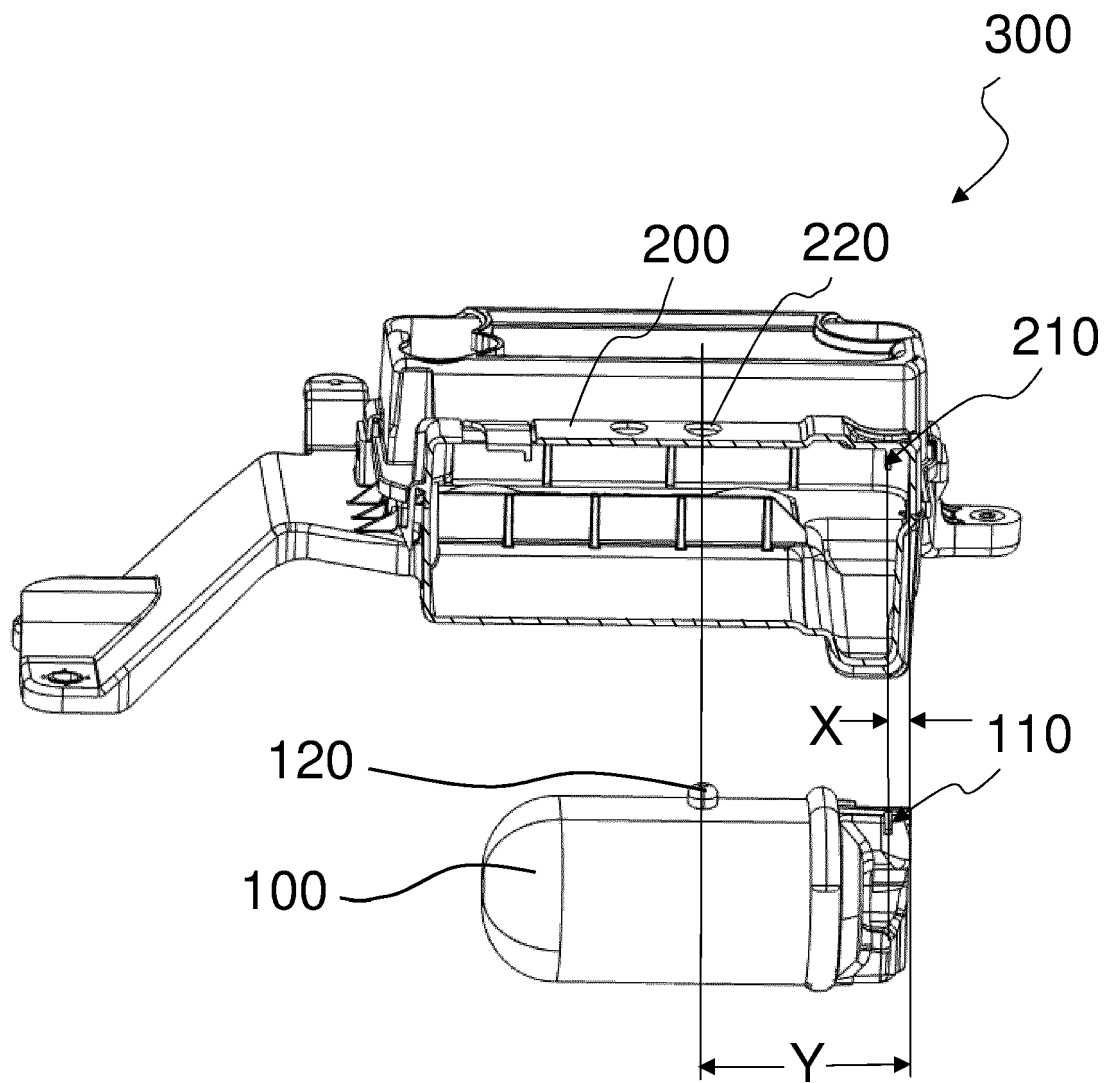


FIG. 2

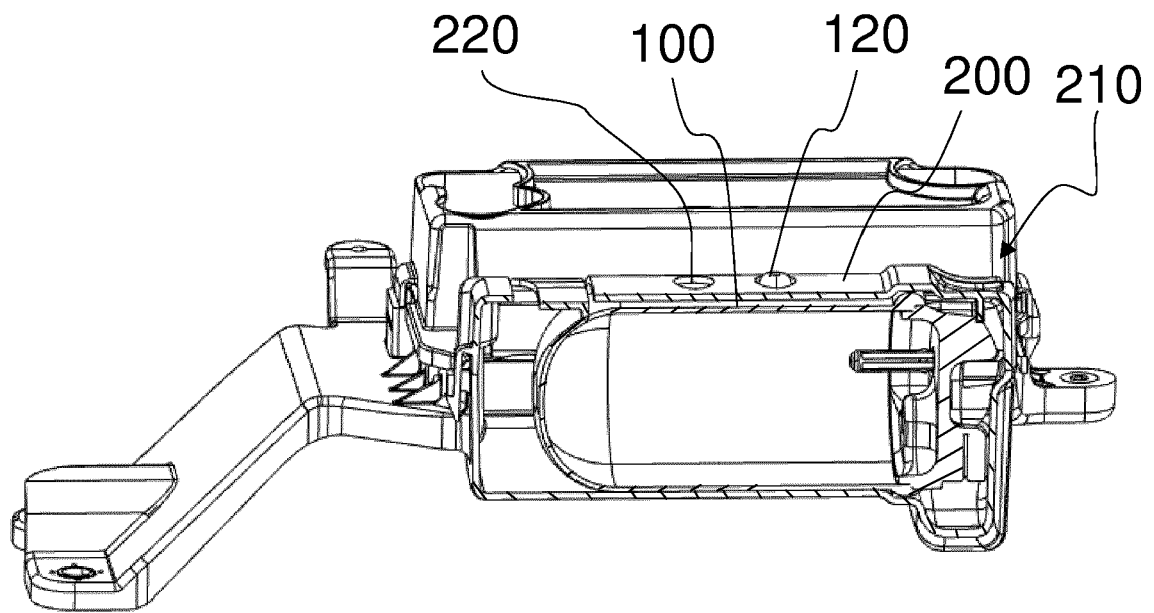


FIG. 3a

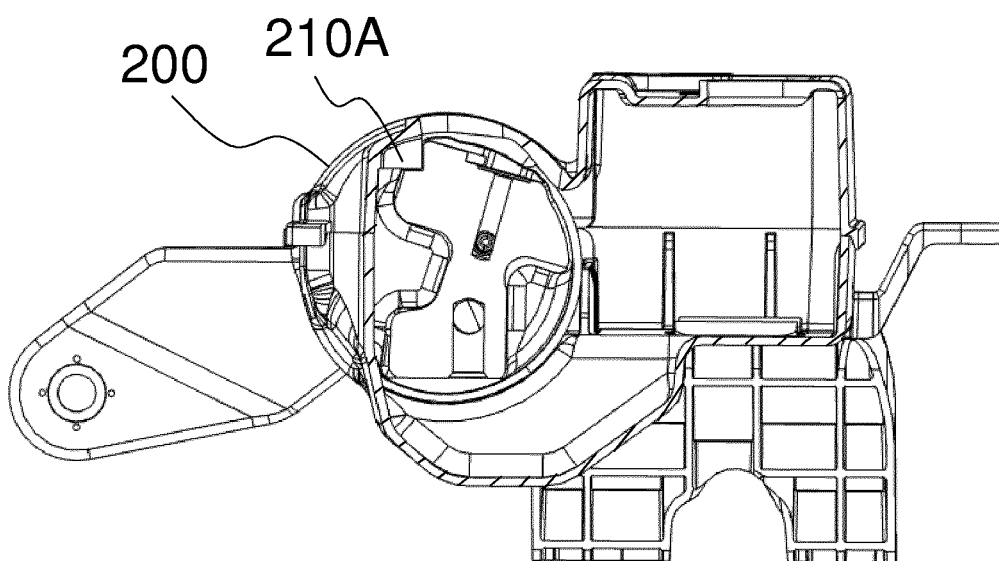


FIG. 3b

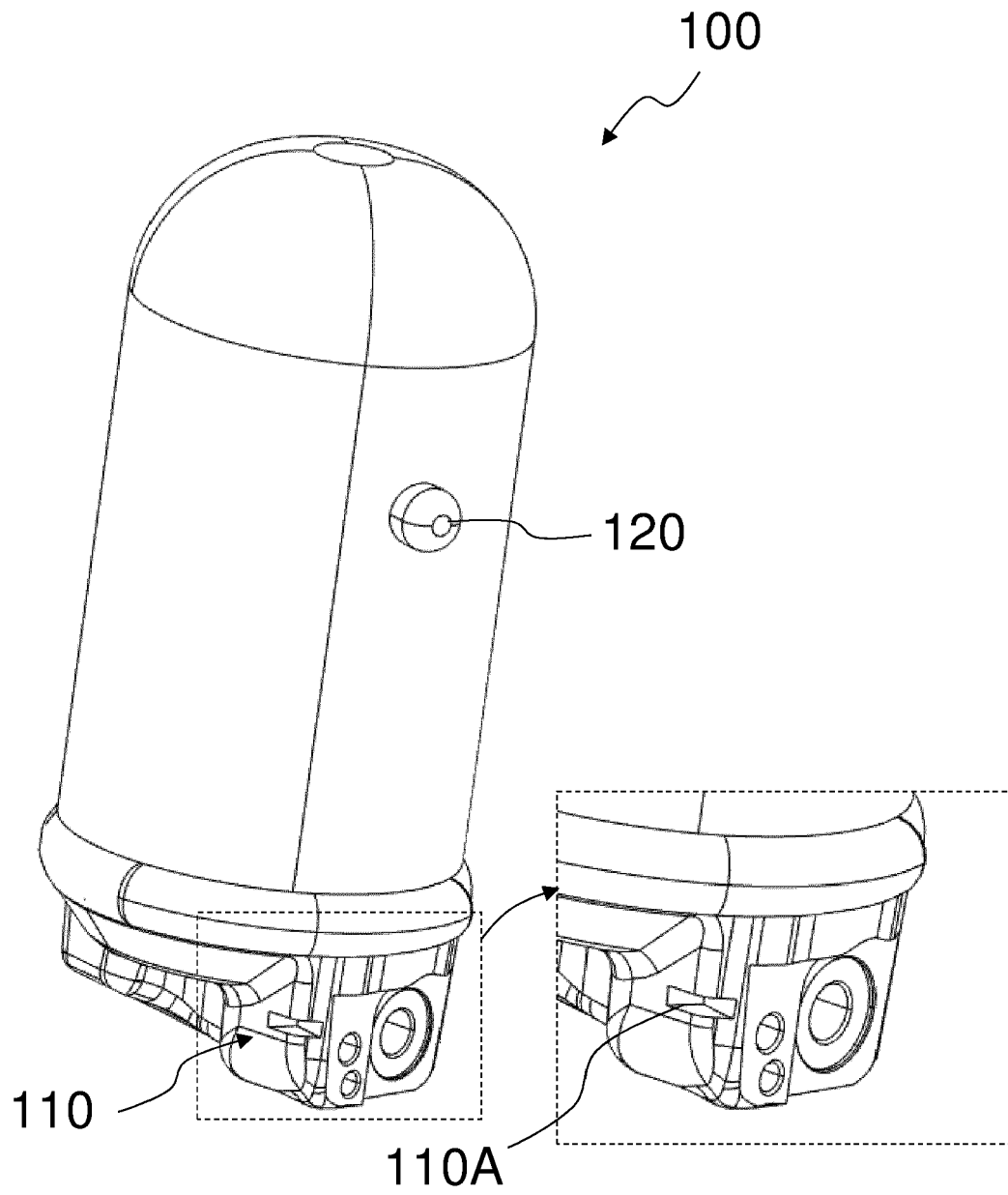


FIG. 4

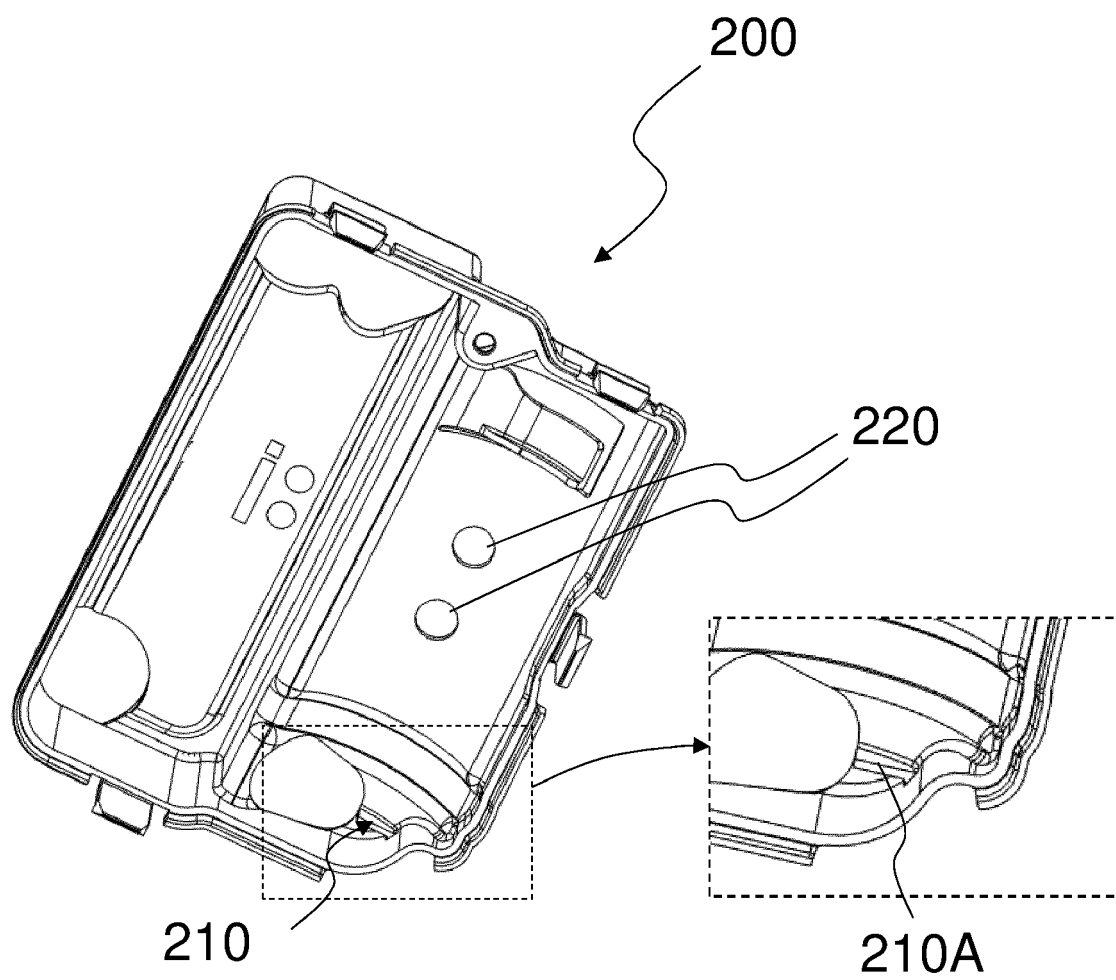


FIG. 5

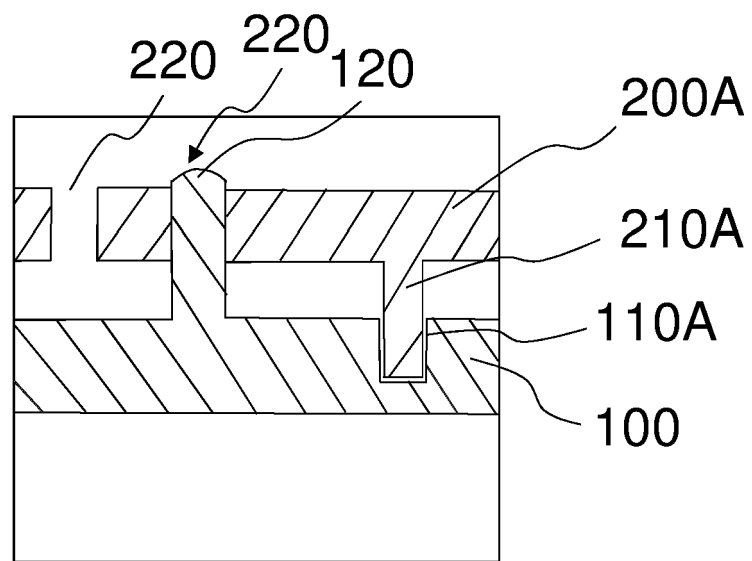


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 20 46 1565

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Y	* paragraphs [0015] - [0023]; figures 1-8 *	5,6,9,12,13	

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F25B F28F F28D
Place of search		Date of completion of the search	Examiner
Munich		19 March 2021	Weisser, Meinrad
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.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82