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- **SZOSTEK, Dawid**
32 050 SKAWINA (PL)
- **STANEK, Lukasz**
32 050 SKAWINA (PL)
- **BELZOWSKI, Michal**
32 050 SKAWINA (PL)
- **WOZEK, Mateusz**
32 050 SKAWINA (PL)

(71) Applicant: **Valeo Autosystemy Sp. z o.o.**
32 050 Skawina (PL)

(74) Representative: **Valeo Systèmes Thermiques**
Service Propriété Intellectuelle
ZA l'Agiot, 8 rue Louis Lormand
CS 80517
La Verrière
78322 Le Mesnil-Saint-Denis Cedex (FR)

(72) Inventors:
• **POKRYWINSKI, Karol**
32 050 SKAWINA (PL)

(54) **A HEAT EXCHANGER ASSEMBLY**

(57) The present invention describes a heat exchanger assembly having a heat exchange component and at least one attachment. The heat exchange component is provided with at least one first bracket and the

attachment is provided with at least one second bracket. Further, the heat exchange component is made of aluminum and the attachment is made of plastic.

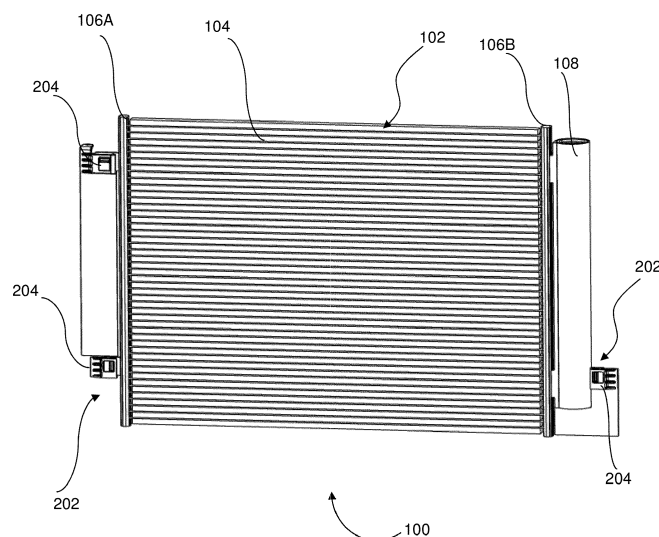


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a heat exchanger assembly. In particular, the invention relates to a heat exchanger assembly comprising a plastic bracket to couple the heat exchanger to a vehicle irrespectively to position of the fixation points in the vehicle.

BACKGROUND OF THE INVENTION

[0002] The heat exchangers are provided in vehicles for various operations, such as conditioning the cabin air, cooling the refrigerant and enabling heat exchange between two fluids etc. The heat exchangers can be configured as radiators, evaporators, charge air cooler and condensers. Based on the requirement, the heat exchangers can be configured as above-mentioned device. The heat exchanger may need to be positioned at different locations in the vehicle. For example, the heat exchanger configured as radiators or charge air coolers are usually placed at an anterior position in the vehicle, so that the ram air may flow on the heat exchanger. Similarly, other types of heat exchangers are coupled in their respective locations in the vehicle.

[0003] To couple the heat exchanger with their respective locations in the vehicle, a bracket is attached to the heat exchanger, and the bracket can be connected to the vehicle. More particularly, the heat exchanger may include fixation points that are adapted to be connected to the bracket. Thereafter, the bracket may be connected to the corresponding fixation points provided in the vehicle. Further, the bracket may block the fluid around the vicinity of the manifold. Preferably, the heat exchanger and the bracket are made of aluminum, as the aluminum is low weight material. As the bracket is made of aluminum, it is cumbersome to design the bracket according to the fixation points provided in the heat exchanger and the vehicle. In case the fixation points are deposed far from the manifold of the heat exchanger, the complex and big bracket is needed to couple the heat exchanger with the vehicle that leads to an issue with sealing the heat exchanger in the corresponding module in the vehicle. As a result, weight and cost of the bracket also increased. Also, it is cumbersome to add additional features such as clips for hoses, protection grid to the heat exchanger having aluminum brackets.

[0004] Accordingly, there remains a need for a bracket assembly made of two different materials to couple a heat exchanger with a vehicle. Further, there remains another need for a heat exchanger assembly having at least two brackets made of heterogeneous materials to couple a heat exchanger with the vehicle irrespectively of the mounting direction. Yet, there remains another need for a bracket adapted to mount a heat exchanger in the vehicle and the bracket blocks the fluid around vicinity of a manifold of the heat exchanger.

[0005] The present invention therefore aims to compensate for the disadvantages of the previous art and to meet the above-mentioned constraints by proposing a bracket made of a plastic material for a heat exchanger, simple in its design and in its operating mode, reliable and economical, which makes it possible to couple the heat exchanger with the vehicle irrespectively of mounting direction.

10 SUMMARY OF THE INVENTION

[0006] 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.

[0007] In view of foregoing, the present invention discloses a heat exchanger assembly having a heat exchange component and at least one attachment. The heat exchange component is provided with at least one first bracket and the attachment is provided with at least one second bracket. Further, the heat exchange component is made of aluminum and the attachment is made of synthetic material, for example, plastic material.

[0008] Further, the heat exchange component includes a stack of heat exchange tubes and a manifold for the heat exchange tubes. Further, the manifold may extend along the stacking direction of the tubes, and the heat exchange component may be configured for a heat exchange between a first fluid travelling within the tubes and the manifold and a second fluid travelling around the tubes and the manifold.

[0009] In one example, the first bracket is located on the manifold of the heat exchange component.

[0010] The heat exchange component further includes a receiver drier, the first bracket being located on the receiver drier.

[0011] In one embodiment, the attachment is a thin elongated plastic wall extending along the extension of the manifold.

[0012] Further, the plastic wall extends along the general direction of extension of the tubes.

[0013] Further, the plastic wall has a portion, which is distanced from the manifold at least by the distance of the second bracket.

[0014] In another embodiment, the plastic wall has a portion, which follows closely the surface of the manifold so that the airflow in the vicinity of the manifold is substantially blocked.

[0015] In another example, the attachment further includes a connection point for further heat exchanger assembly components.

[0016] Generally, the connection between the first bracket and the second bracket is carried out by at least

one of screwing, clipping and clinching.

[0017] In the preferred embodiment, the connection between the first bracket and the second bracket comprises a latching configuration.

[0018] Further, the second bracket includes a pair of spaced first and second arms and the first bracket is adapted to be received in between the pair of spaced first and second arms when the first bracket is coupled with the second bracket.

[0019] Further, the first arm includes a resilient finger and a protruded portion formed on inner side of the resilient finger and extended towards the second arm. The protruded portion of the resilient finger is adapted to couple with the first bracket.

[0020] Further, the first bracket includes a complementary hole adapted to receive the protruded portion of the resilient finger of the second bracket, when the first bracket is coupled with the second bracket.

[0021] In one example, the second bracket is connected to the first bracket in a direction parallel to the extension of the heat exchange tubes.

[0022] In another example, the second bracket is perpendicularly connected to the first bracket with respect to the extension of the heat exchange tubes.

[0023] In one aspect, the heat exchanger assembly is configured for operation as a condenser, the first fluid being a refrigerant and the second fluid being a coolant.

[0024] In another aspect, the heat exchanger assembly is configured for an operation as a radiator, the first fluid being a coolant and the second fluid being air

BRIEF DESCRIPTION OF DRAWINGS

[0025] 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 a perspective view of a heat exchanger assembly, in accordance with an embodiment of the present invention;

Fig. 2 illustrates another perspective view of the heat exchanger assembly without an attachment of Fig. 1 and depicting a first bracket;

Figs. 3, 4 and 5 illustrate schematic views of the attachment with a second bracket of Fig. 1 connected with the manifold of the heat exchange component;

Figs. 6 illustrates a schematic view of the attachment of Fig. 1 connected with the manifold of the heat exchange component, in accordance with another embodiment of the present invention, in which the at-

tachment has a portion which is distanced by at least distance of the second bracket;

Fig. 7 illustrates an exploded view of the attachment having the second bracket to be connected with the first bracket of the heat exchange component of Fig. 6;

Fig. 8 illustrates another schematic view of the attachment connected with the respective manifolds of the heat exchange component of Fig. 7;

Figs. 9 and 10 illustrate perspective views of the second bracket of the attachment of Fig. 1; and

Fig. 11 illustrates a cross-sectional view of the connection between the first bracket and the second bracket of Fig. 1.

DETAILED DESCRIPTION OF EMBODIMENTS

[0026] It must be noted that the figures disclose the invention in a detailed enough way to be implemented, said figures helping to better define the invention if needs be. The invention should however not be limited to the embodiment disclosed in the description.

[0027] The present invention discloses a heat exchanger assembly having an attachment adapted to mount a heat exchanger in a vehicle. The heat exchanger assembly may include at least two brackets, one bracket being defined on the attachment and another bracket being defined on the heat exchanger. Further, one bracket, which is to be mounted on attachment, is made of synthetic material, for example, plastic material, and other bracket which may be made of different type of material, for example metallic material such as aluminum, which is to be defined on the heat exchanger.. As the bracket is made of the synthetic material, it can be designed any shape or direction irrespective of mounting direction of heat exchanger.

[0028] Figs. 1 and 2 illustrate perspective views of a heat exchanger assembly 100, in accordance with an embodiment of the present invention. The heat exchanger assembly 100 may include a heat exchange component 102 and an attachment 202. In this example, Fig. 1 is a schematic view a heat exchanger assembly 100 provided with the attachment 202 and Fig. 2 is a schematic view of the heat exchange component 102 isolated from the attachment 202. The heat exchange component 102 may include a stack of heat exchange tubes 104 and a pair of manifolds 106A-B. The heat exchange tubes 104 are stacked between the pair of manifolds 106A-B for a first fluid. The pair of manifolds 106A-B extends along the stacking direction of the heat exchange tubes 104. The pair of manifolds 106A-B enables the first fluid flow in the heat exchange tubes 104. The heat exchange component 102, also referred to as heat exchanger, may include two fluid flows, particularly, the first fluid flow and

the second fluid flow. In one example, the first fluid flows within the heat exchange tubes 104, hereinafter referred to as tubes 104, and the pair of manifolds 106 and the second fluid flows around the tubes 104 and the pair of manifolds 106A-B.

[0029] The heat exchange component 102 is generally configured for a heat exchange between the first fluid travelling within the tubes 104 and the pair of manifolds 106 and the second fluid travelling around the tubes 104 and the pair of manifolds 106. In case, the heat exchange component 102 is configured for an operation as a radiator, the first fluid being a coolant and the second fluid being air. In another example, the heat exchange component 102 can be configured for an operation as a condenser. In such case, the first fluid can be a refrigerant and the second fluid can be a coolant. Further, the heat exchange component 102 includes a receiver drier 108 fluidically connected to the tubes 104 to receive the first fluid. The receiver drier 108 is connected to a manifold 106B amongst the pair of manifolds 106A-B of the heat exchange component 102.

[0030] The heat exchanger assembly 100 may further comprise at least one first bracket 110 located on the pair of manifolds 106A-B of the heat exchange component 102. In another example, the heat exchange component 102 may comprise one or more first brackets 110 provided on the pair of manifolds 106A-B, particularly, one first bracket 110 may be located on the manifold 106A and another first bracket 110 may be located on the manifold 106B. In case the heat exchange component 102 is provided with the receiver drier 108, the first bracket 110 may be provided on the receiver drier 108. In another example, a set of first brackets 110 may be provided on the manifold 106A and another set of first brackets 110 may be provided on the receiver drier 108 of the heat exchange component 102.

[0031] The heat exchanger assembly 100 may further comprise at least one attachment 202 adapted to be connected to the heat exchange component 102 to mount the heat exchange component 102 at appropriate location in the vehicle. The attachment 202 further comprises at least second bracket 204 adapted to be coupled with the first bracket 110 provided in the heat exchange component 102, so that the attachment 202 is connected to the heat exchange component 102. In one example, the attachment 202 may comprise more than one second bracket 204, corresponding to the number of the first brackets 110 provided on one manifold 106A of the heat exchange component 102. In case, the first brackets 110 are provided on both the manifolds 106A-B or the first brackets 110 are provided on the manifold 106A and the receiver drier 108, the heat exchanger assembly 100 may include more than one attachment 202 having one or more second brackets 204. The heat exchange component 102 may be made of aluminium, as the aluminium offers significant weight savings, and the aluminum alloys have good thermal and corrosion resistance. Further, the first bracket 110 in the heat exchange component 102 is

made of aluminum and the attachment 202 is made of a plastic material.

[0032] Figs. 3, 4 and 5 illustrate schematic views of the attachment 202 of Fig. 1 connected with the manifold 106A of the heat exchange component 102. The attachment 202, as shown in Fig. 3, may include two second brackets 204 adapted to connect to the corresponding first brackets 110 in the heat exchange component 102. As explained above, the attachment 202 is made of a plastic material. In the preferred embodiment, the attachment 202 is a thin elongated plastic wall. The thin elongated plastic wall extends along the extension of the pair of manifolds 106A-B. As shown in Figs. 3 to 5, the plastic wall extends along the general direction "P1" of the extension of the tubes 104. In other words, the attachment 202 being a thin plastic wall is extended along the extension of the manifold 106A and the general direction of extension of the tubes 104.

[0033] Further, the attachment 202 may include a portion 302 that follows closely the surface of the respective manifolds 106A-B so that the first fluid flow, particularly airflow, in the vicinity of the manifolds 106A-B is substantially blocked, thereby the second fluid is effectively directed to the tubes 104 of the heat exchange component 102. In case, the airflow in the vicinity of the manifolds 106A-B passes in between the attachment 202 and the respective manifolds 106A-B, the thermal heat exchange between the first fluid and the second fluid, i.e. airflow may not be optimal, as the second fluid may not effectively reach the tubes 104 of the heat exchange component 102. The attachment 202 may further include at least one connection point 304 to be connected with other heat exchanger assembly components. The connection point 304 may be formed at the both ends of the attachment 202, particularly, at the proximity of the second bracket 204.

[0034] In another embodiment, the second brackets 202 may be formed at the both ends of the attachment 202 as shown in Fig. 3 and the connection point 304 may be provided in between the second brackets 202 formed on the attachment 202 (not shown in Fig.). As shown in Fig. 4, the connection point 304 may perpendicularly protrude out from the attachment 202 in the general direction "P1" of extension of the tubes 104. In this example, the connection point 304 may include apertures to receive any connecting means while mounting the attachment 202 on any other heat exchanger assembly components. In one embodiment, the second bracket 204 is connected to the first bracket 110 in a direction parallel to the extension of the tubes 104. In another embodiment, the second bracket 204 is perpendicularly connected to the first bracket 110 with respect to the extension of the tubes 104.

[0035] Figs. 6, 7 and 8 illustrate schematic views of the attachment 202 of Fig. 1 connected with the manifold 106A of the heat exchange component 102. In this example, Fig. 6 is a perspective view of the attachment 202, in accordance with another embodiment of the present

invention. Fig. 7 is an exploded view of the attachment 202 having the second bracket 204 to be connected with the first bracket 110 of the heat exchange component 102 of Fig. 6. As explained above, the attachment 202 is a plastic wall. According to this embodiment, the plastic wall 202 includes the portion 302 that is distanced from the corresponding manifold 106A at least by the distance "D1" of the second bracket 204. In such case, the receiver drier 108 may be received in between the portion 302 of the attachment 202 and the corresponding manifold 106A. Further, the receiver drier 108 may effectively block airflow around the vicinity of the manifold 106A. As explained with the previous embodiment, the connection point 304 is also present in the present embodiment of the attachment 202 for further heat exchanger assembly components.

[0036] The connection between the first bracket 110 of the respective manifolds 106A-B and the second bracket 204 of the attachment 202 may be carried out by at least one of screwing, clipping and clinching. In other words, the first bracket 110 of the respective manifolds 106A-B is adapted to be connected with the second bracket 204 of the attachment 202 by at least one of screwing, clipping and clinching. In the preferred embodiment, the connection between the first bracket 110 and the second bracket 204 includes a latching configuration. In latch configuration, any of the bracket can be a protruding part and other bracket can be a receiving part. Further, a latch may be formed on any one of the bracket to couple with other bracket. According to the present example, the attachment 202 includes one second bracket 202 as shown in Figs. 6 and 8.

[0037] According to the preferred embodiment, the second bracket 204 may comprise a pair of spaced first and second arms 206A-B, as shown in Figs. 9 and 10, to receive the first bracket 110 of the heat exchange component 102, so that the attachment 202 can be connected to the heat exchange component 102. Figs. 9 and 10 illustrate perspective views of the second bracket 204 of the attachment 202. Particularly, the first arm 206A includes a resilient finger 208 and a protruded portion 210. The protruded portion 210 is formed on the inner side of the resilient finger 208 and extended towards the second arm 206B. As shown in Fig. 11, the protruded portion 210 of the resilient finger 208 is adapted to be coupled with the first bracket 110. Particularly, the protruded portion 210 is adapted to be received in a complementary hole 112 formed in the first bracket 110 when the first bracket 110 is received in between the first arm 206A and the second arm 206B of the second bracket 204 as shown in Fig. 11. Fig. 11 illustrates a cross-sectional view of the connection between the first bracket 110 and the second bracket 204 of Fig. 1. As the second bracket 204 has the resilient finger 208, it is easy to latch the protruded part 210 of the second bracket 204 into the first bracket 110, thereby connecting the attachment 202 with the corresponding manifold 106A-B.

[0038] As the attachment 202 is made of synthetic ma-

terial such as plastic and has the connecting part 304, the heat exchanger assembly 100 can be connected at any orientation irrespectively to the location of the fixation points in the vehicle. Also, the attachment 202 is made of plastic, so the weight and cost of the heat exchanger assembly 100 is reduced. As the attachment 202 is made of plastic, it can be designed in a complex design so that the heat exchange component can be mounted on the vehicle according to fixation points of the vehicle and it is easy to add additional features such as clips into the attachment.

[0039] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of drawings, the disclosure, and the appended claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to the advantage.

Claims

1. A heat exchanger assembly (100) comprising a heat exchange component (102) with at least one first bracket (110) and at least one attachment (202) comprising at least one second bracket (204), wherein the heat exchange component (102) is made of metallic material and the attachment (202) is made of synthetic material.
2. The heat exchanger assembly (100) according to claim 1, wherein the heat exchange component (102) comprises a stack of heat exchange tubes (104) and at least one manifold (106A-B) for the heat exchange tubes (104), the manifold (106A-B) extending along the stacking direction of the heat exchange tubes (104), wherein the heat exchange component (102) being configured for a heat exchange between a first fluid travelling within the heat exchange tubes (104) and the manifold (106A-B) and a second fluid travelling around the heat exchange tubes (104) and the manifold (106A-B).
3. The heat exchanger assembly (100) according to claim 2, wherein the first bracket (110) is located on the manifold (106A-B) of the heat exchange component (102).
4. The heat exchanger assembly (100) according to claim 2 or 3, wherein the heat exchange component (102) further comprises a receiver drier (108), the first bracket (110) being located on the receiver drier (108).
5. The heat exchanger assembly (100) according to any of preceding claims, wherein the attachment (202) is a thin elongated plastic wall extending along

the extension of the manifold (106A-B).

6. The heat exchanger assembly (100) according to the preceding claim, wherein the plastic wall extends along the general direction (P1) of extension of the heat exchange tubes (104). 5
7. The heat exchanger assembly (100) according to claim 5 or 6, wherein the plastic wall has a portion (302) which is distanced from the manifold at least by the distance of the second bracket (204). 10
8. The heat exchanger assembly (100) according to any of claims 5-7, wherein the plastic wall has a portion (302), which follows closely the surface of the manifold (106A-B) so that the airflow in the vicinity of the manifold (106A-B) is substantially blocked. 15
9. The heat exchanger assembly (100) according to any of the preceding claims, wherein the attachment (202) further comprises a connection point (304) for further heat exchanger assembly components. 20
10. The heat exchanger assembly (100) according to any of the preceding claims, wherein the connection between the first bracket (110) and the second bracket (204) is carried out by at least one of screwing, clipping and clinching. 25
11. The heat exchanger assembly (100) according to any of the preceding claims, wherein the connection between the first bracket (110) and the second bracket (204) comprises a latching configuration. 30
12. The heat exchanger assembly (100) according to any of the claims 10 to 11, wherein the second bracket (204) comprises a pair of spaced first and second arms (206A-B) and the first bracket (110) is adapted to be received in between the pair of spaced first and second arms (206A-B) when the first bracket (110) is coupled with the second bracket (204). 35 40
13. The heat exchanger assembly (100) according to claim 12, wherein the first arm (206A) comprises a resilient finger (208) and a protruded portion (210) formed on inner side of the resilient finger (208) and extended towards the second arm (206B), wherein the protruded portion (210) of the resilient finger (208) is adapted to couple with the first bracket (110). 45 50
14. The heat exchanger assembly (100) according to claim 13, wherein the first bracket (110) further comprises a complementary hole (112) adapted to receive the protruded portion (210) of the resilient finger (208) of the second bracket (204), when the first bracket (110) is coupled with the second bracket (204). 55
15. The heat exchanger assembly (100) according to any of the preceding claims, wherein the second bracket (204) is connected to the first bracket (110) in a direction parallel to the extension of the heat exchange tubes (104).

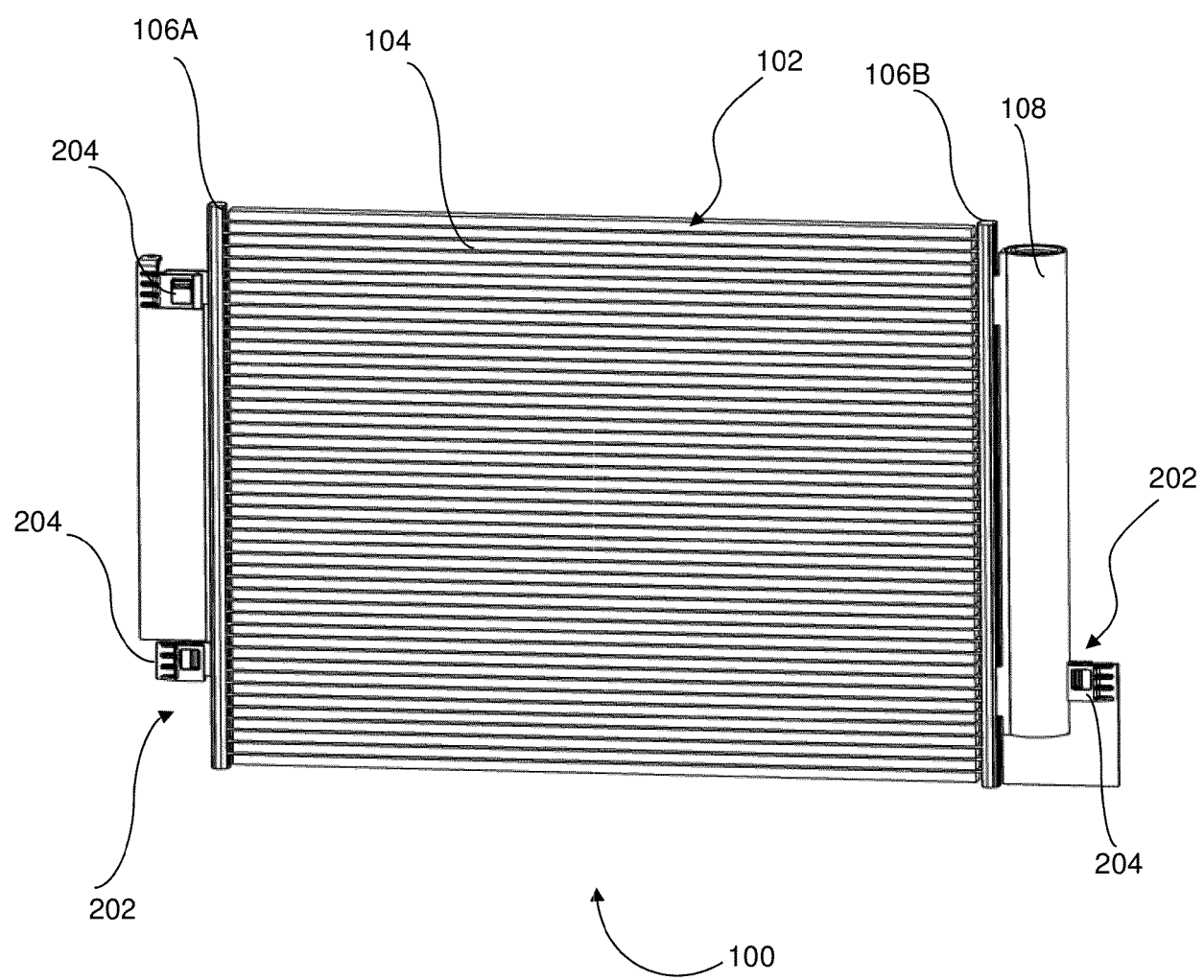


FIG. 1

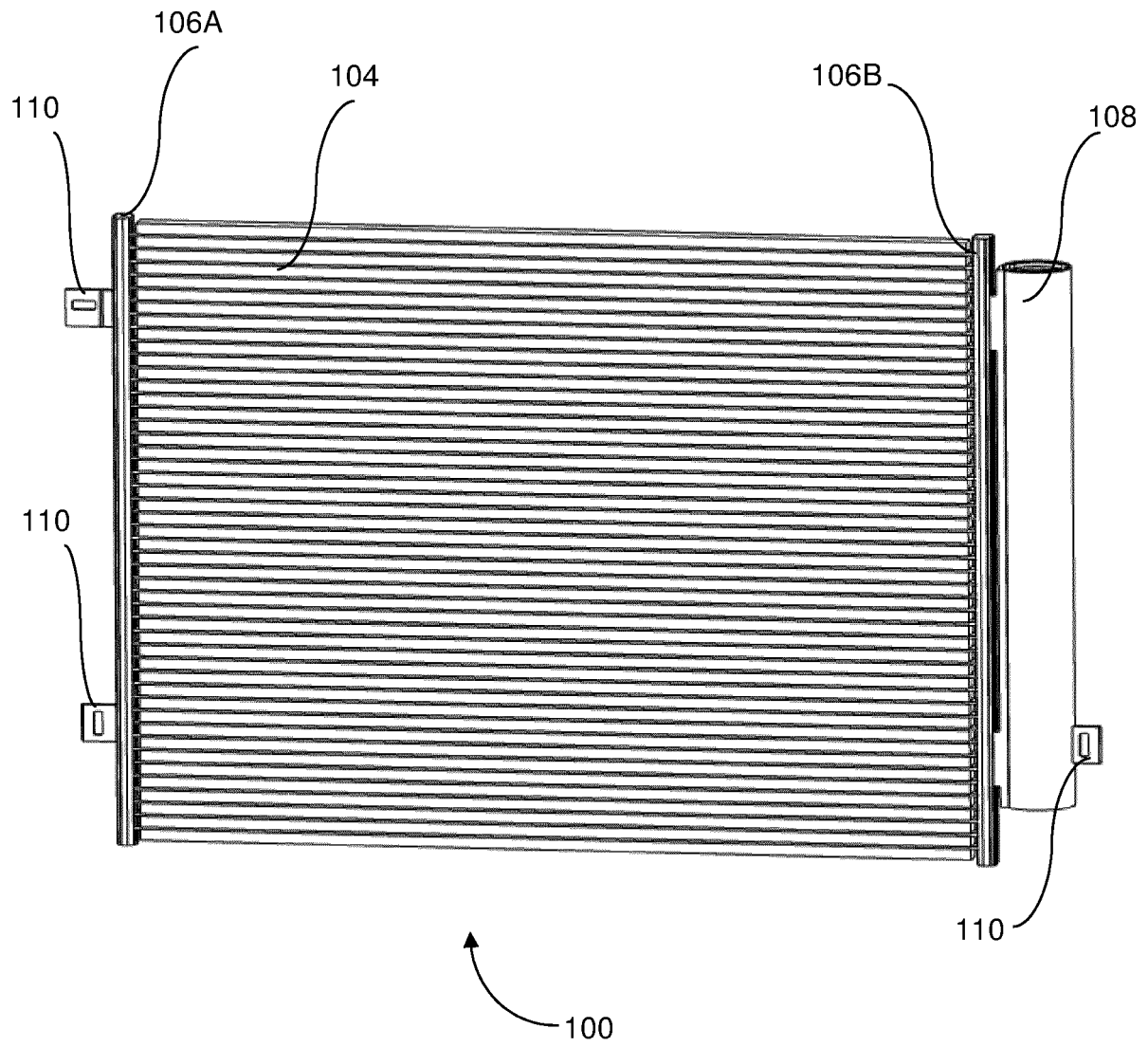


FIG. 2

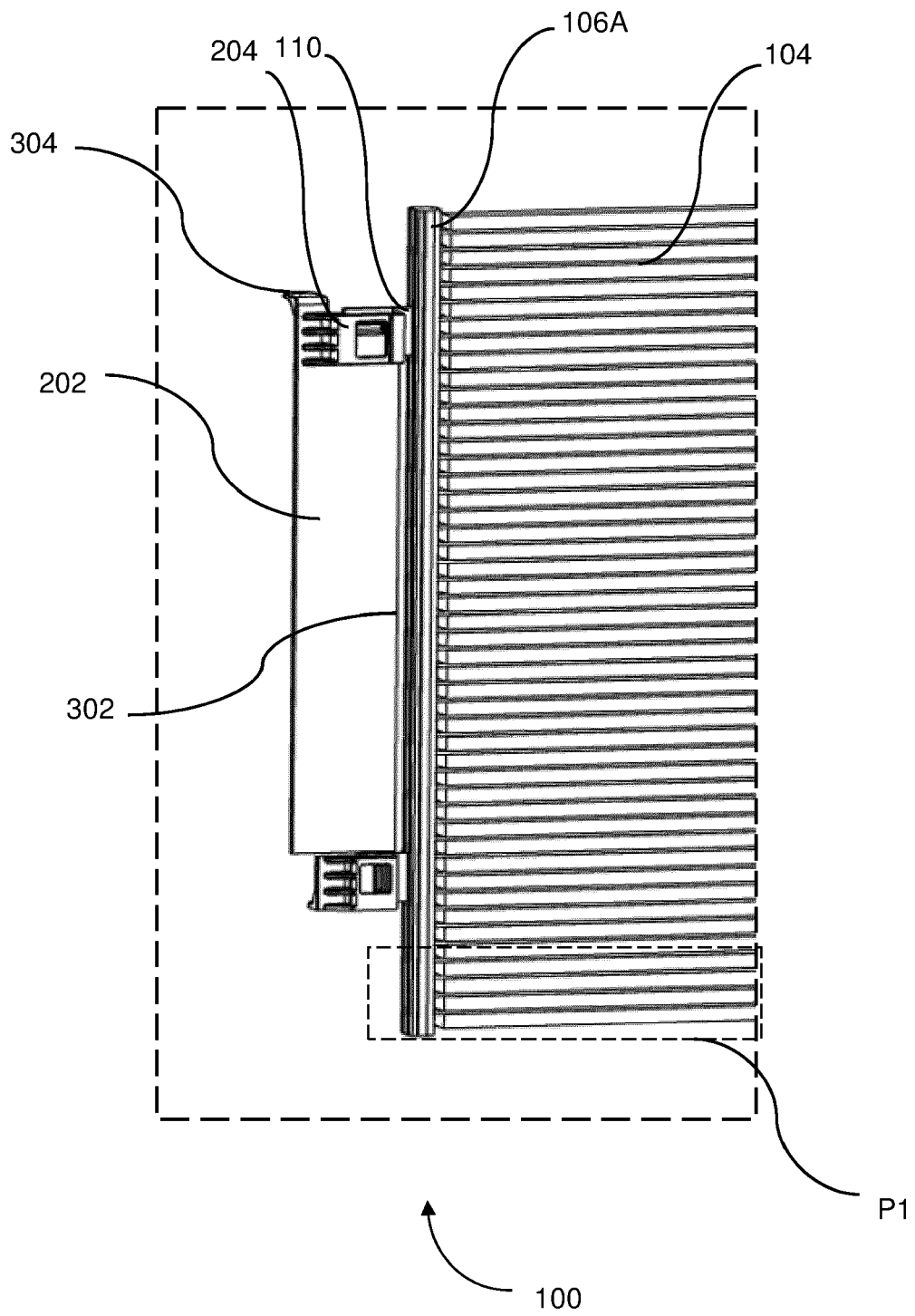


Fig. 3

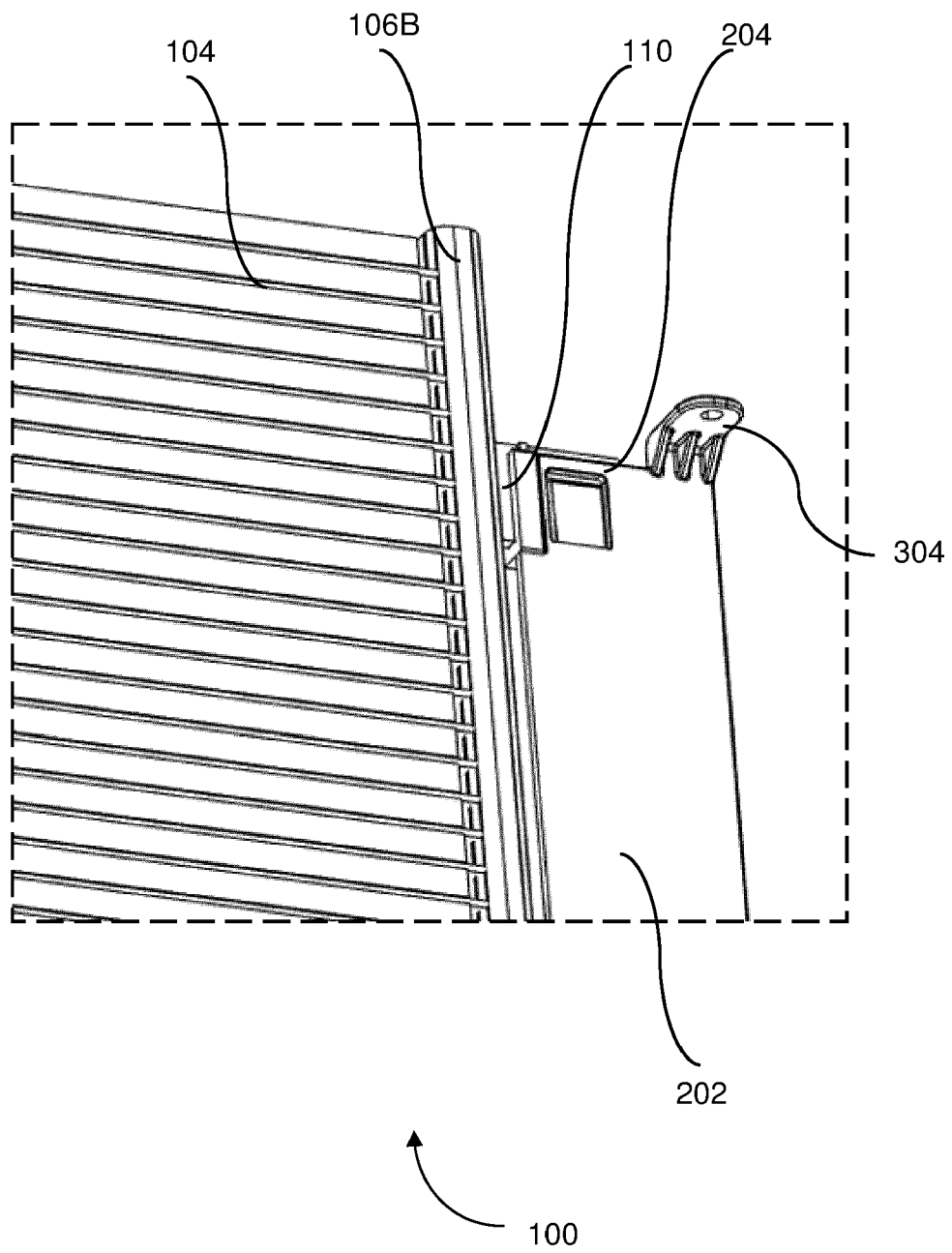


Fig. 4

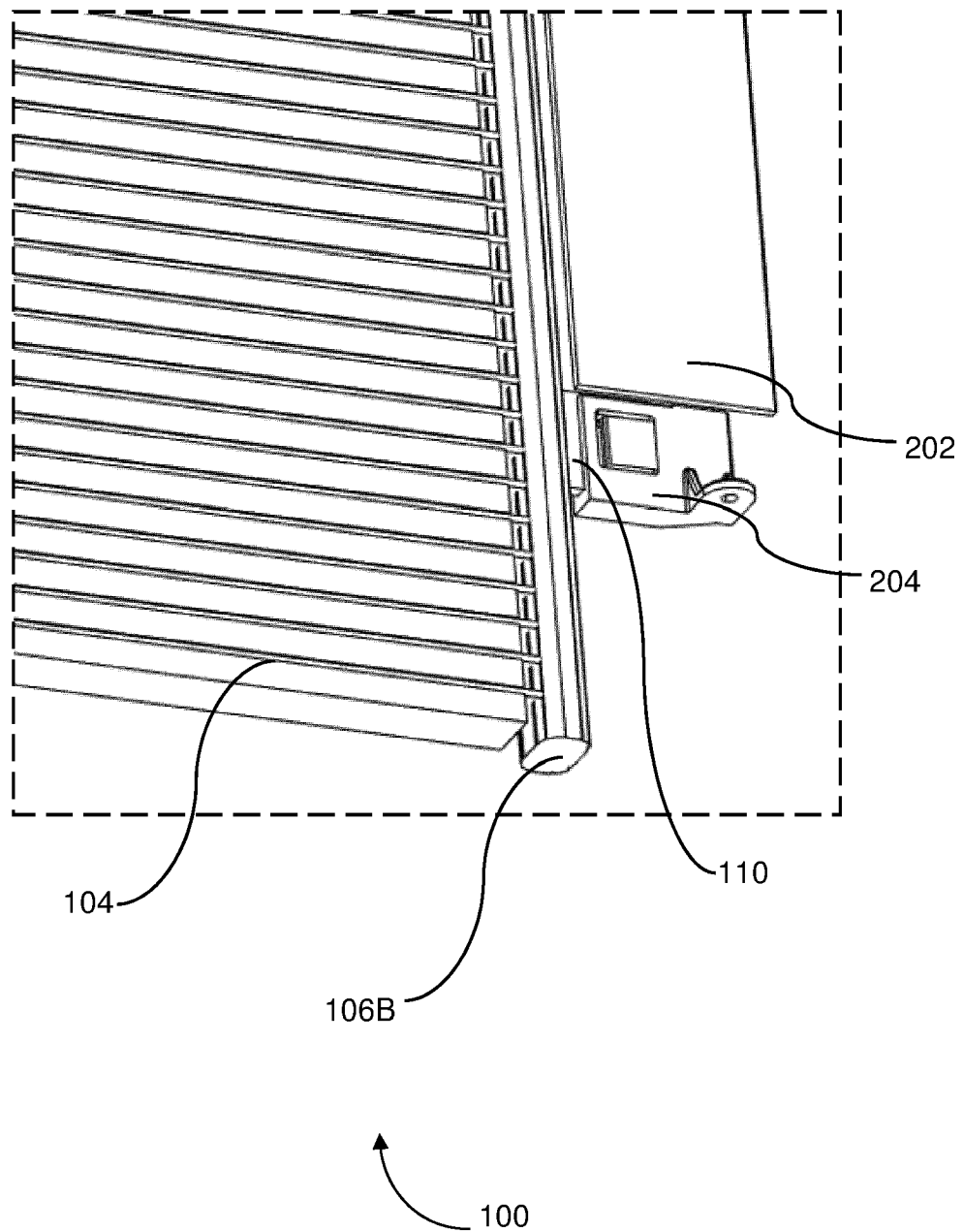


Fig. 5

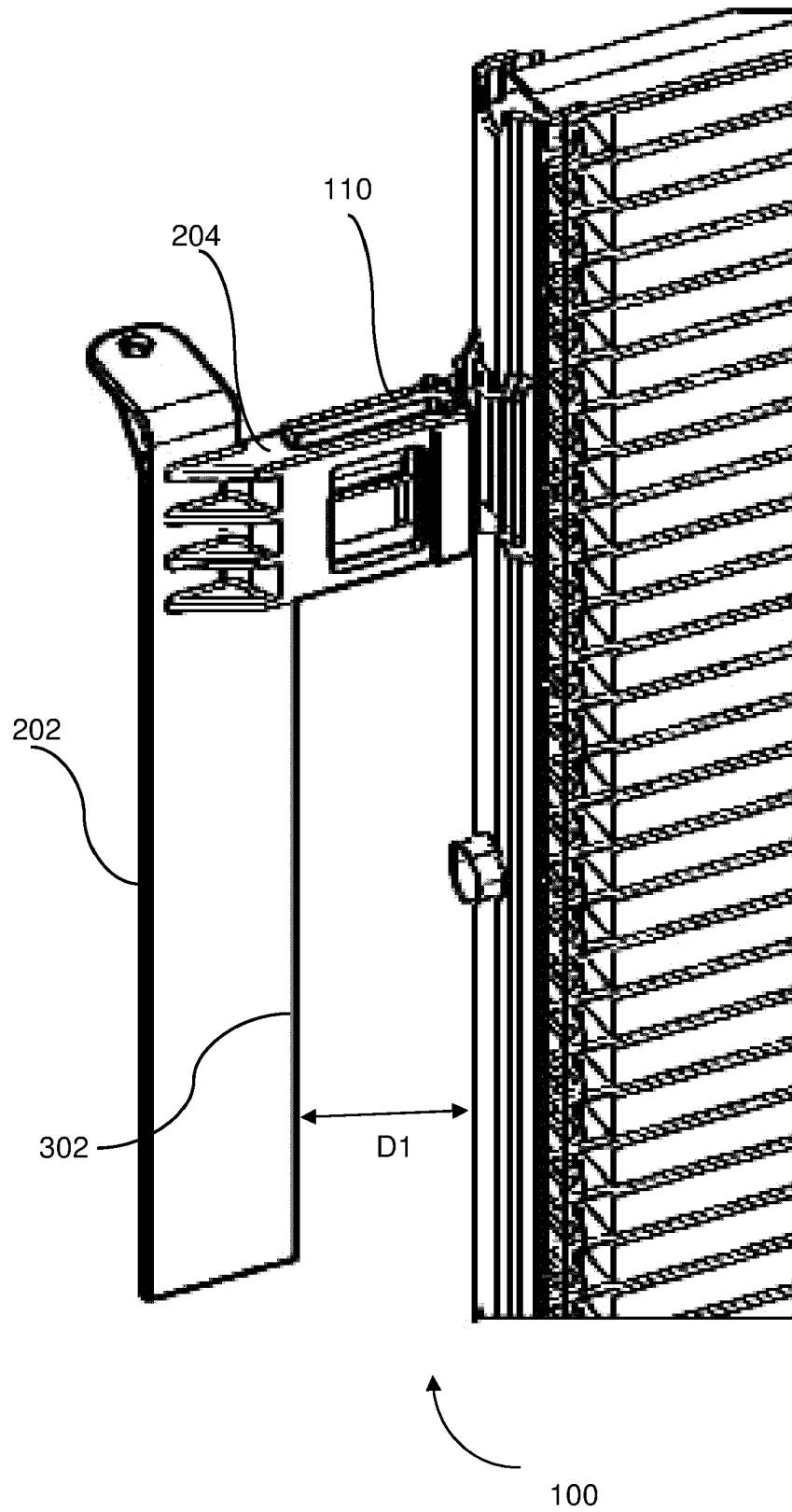


Fig. 6

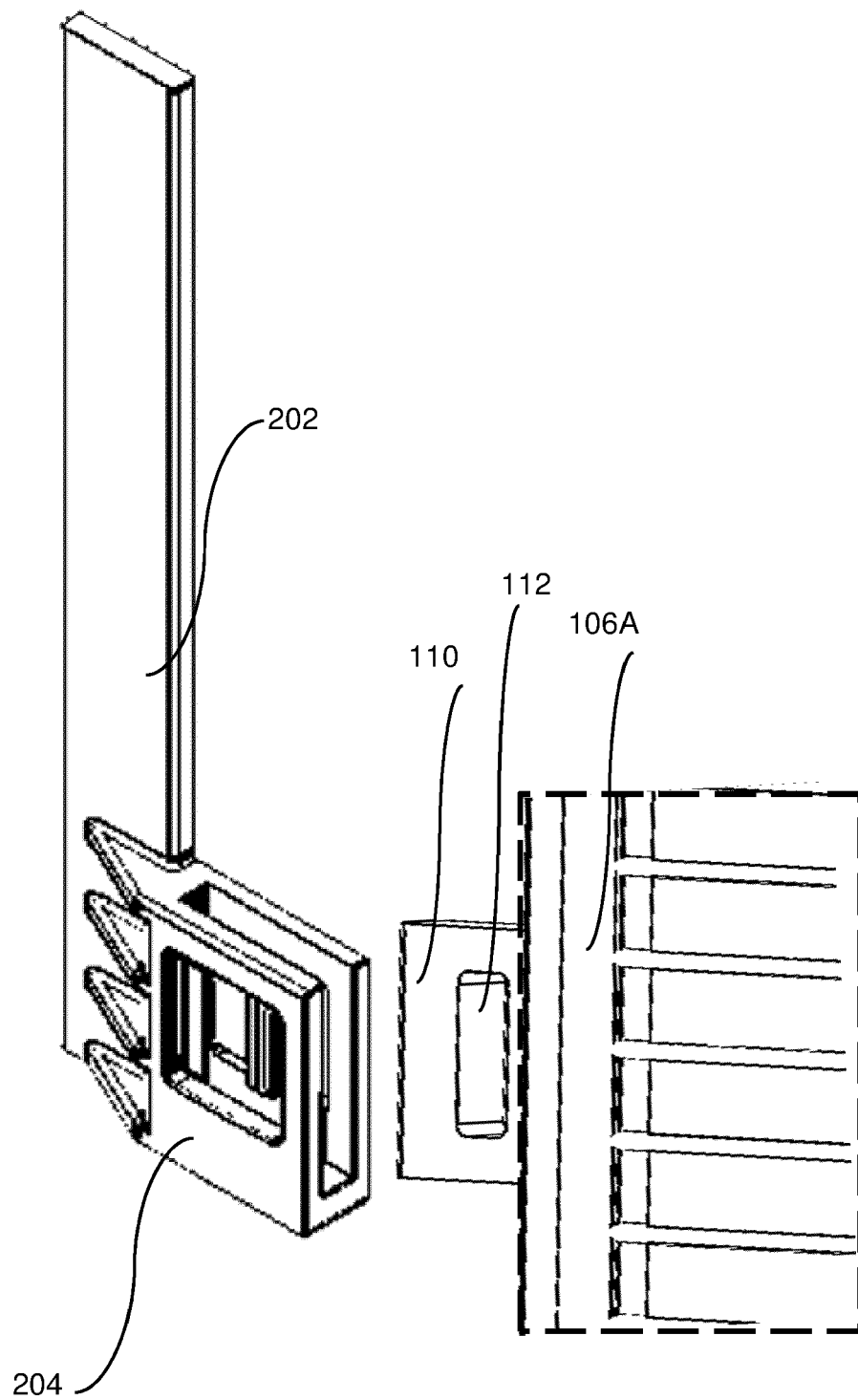


Fig. 7

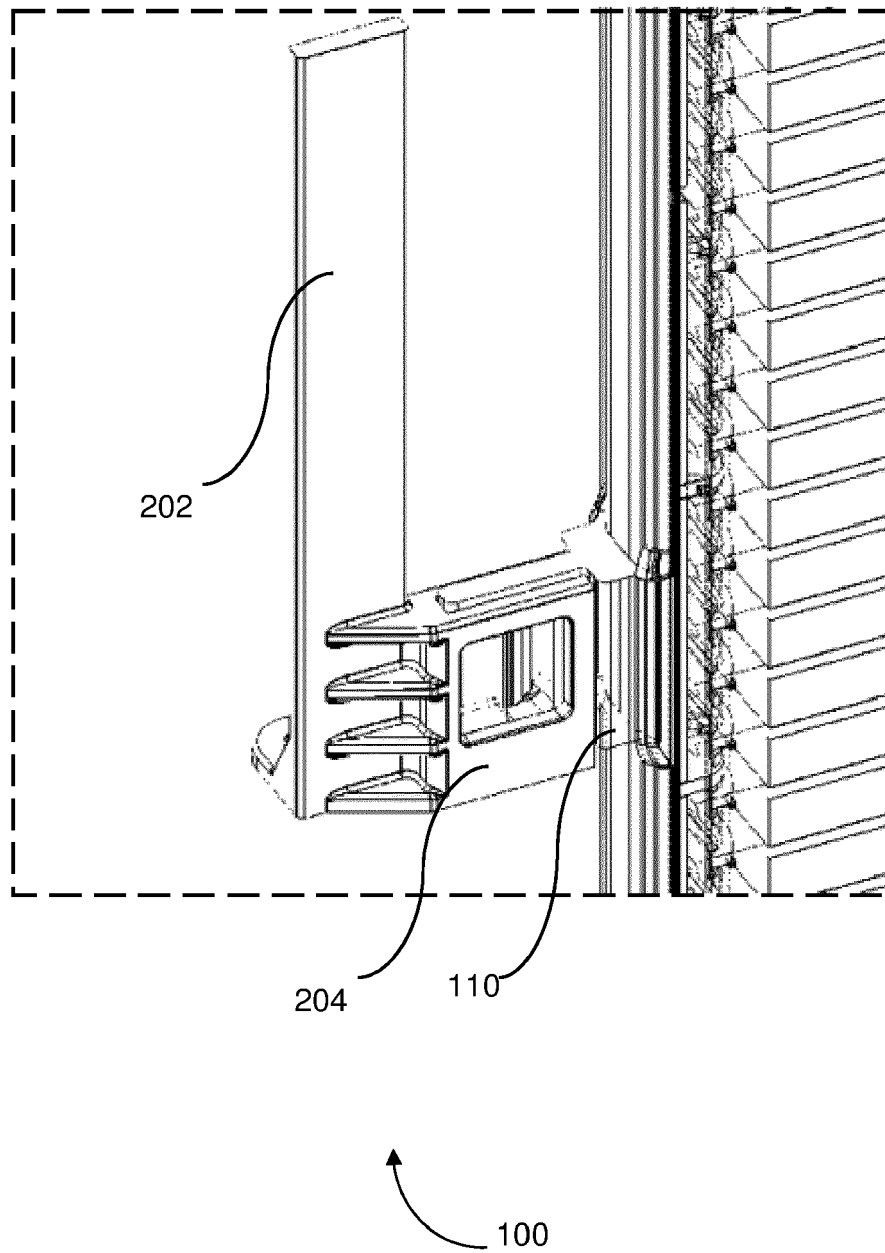


Fig. 8

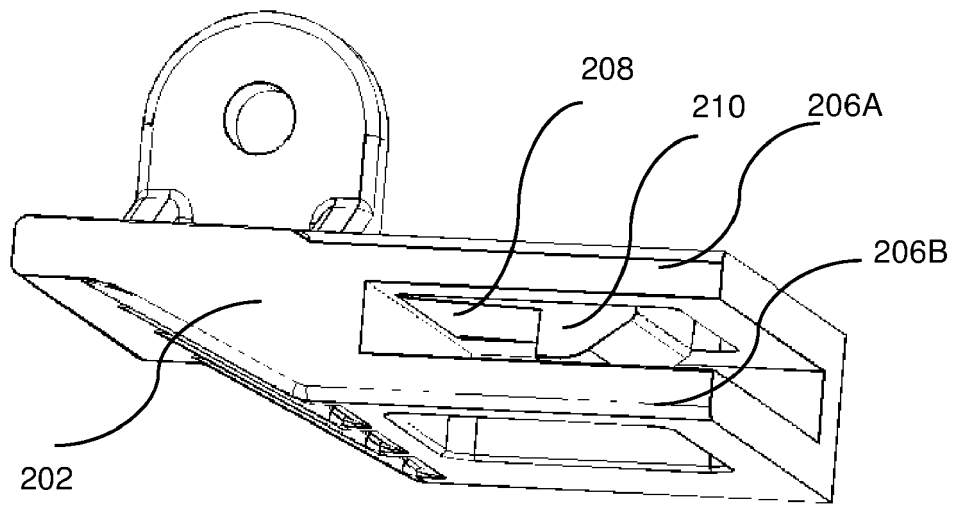


Fig. 9

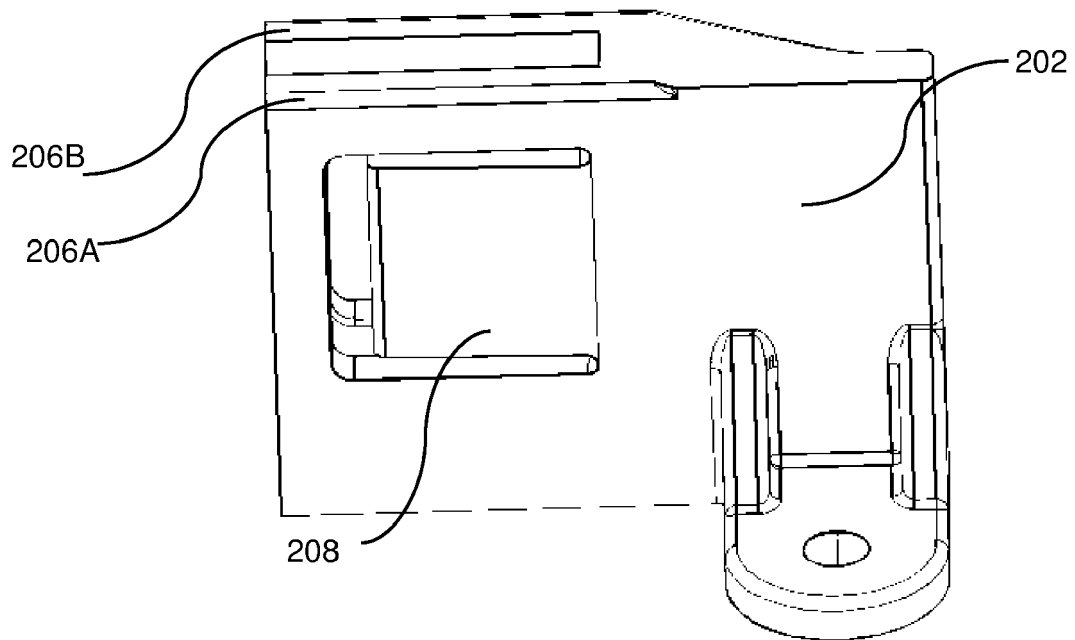


Fig. 10

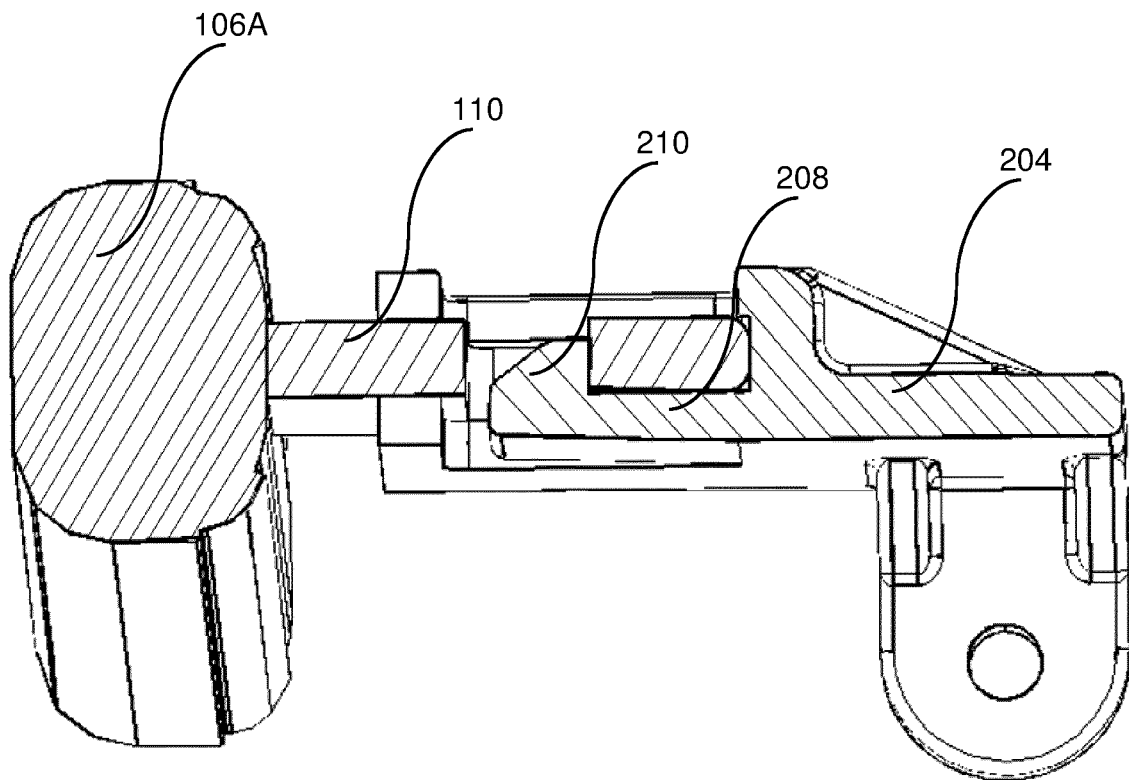


Fig. 11



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Application Number
EP 21 15 9042

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 August 2021	Examiner Vassoille, Bruno
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			

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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