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(54) **A MOUNTING ASSEMBLY FOR A REFRIGERATION SYSTEM**

(57) A mounting assembly (102) for a refrigeration system (100) is disclosed. The mounting assembly (102) comprises a plurality of elongated members (204) adapted to be mounted on an evaporator (106) of the refrigeration system (100). Each of the plurality of elongated members (204) is positioned above the evaporator (106) and extends along a length of the evaporator (106) between a first end (106-1) and a second end (106-2). Each of the plurality of elongated members (204) is adapted to mount a compressor (108) of the refrigeration system (100) thereon.

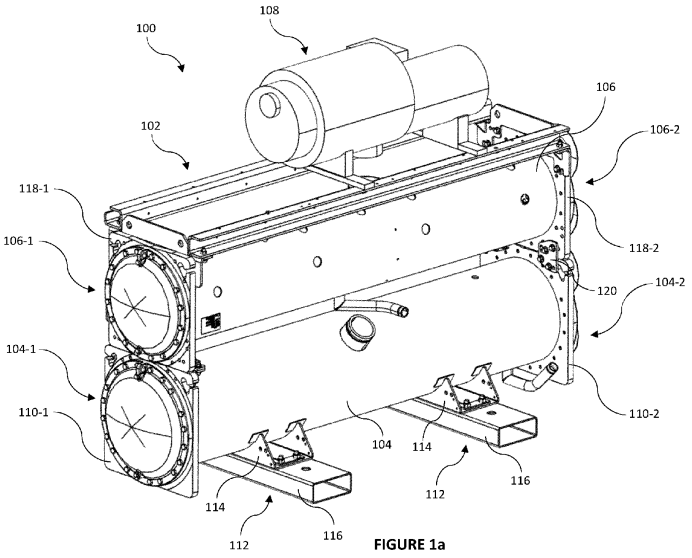

FIGURE 1a

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Description

FIELD OF THE INVENTION

[0001] The disclosure relates to refrigeration systems and more particularly, to a mounting assembly for mounting various sub-components of a refrigeration system.

BACKGROUND

[0002] Refrigeration systems, such as chillers, usually comprise an evaporator, a condenser, and a compressor in fluid communication with each other to remove heat from a liquid coolant via a vapor-compression, adsorption refrigeration, or absorption refrigeration cycles. The evaporator, the condenser, and the compressor along with other sub-components are generally mounted in a specific arrangement with respect to each other based on functional characteristics, constructional characteristics, and space constraints associated with a location at which the refrigeration system is to be installed.

[0003] In most refrigeration systems, the compressor is usually mounted vertically above the evaporator and the condenser is mounted below the evaporator. In order to mount the compressor, a plurality of brackets is directly welded to a shell of the evaporator and subsequently, the compressor is fastened to the aforesaid brackets. However, such an arrangement of the brackets on the evaporator results in an overall increase of vibrations within the refrigeration system. In particular, vibrations between the evaporator and the compressor are directly transmitted via the brackets welded on the shell of the evaporator. This substantially increases the overall noise generated within the refrigeration system during its operation. Further, such vibrations might result in a substantial reduction of the overall service life of the refrigeration system and any associated sub-components.

[0004] Owing to the implementation of welded brackets, the assembling process and dismantling process of the compressor is substantially complex and cumbersome. This also increases the complexity associated with the assembling process or dismantling process when the refrigeration system is positioned in tight spaces. Further, each of the brackets is needed to be positioned at different locations on the shell of the evaporator to mount the compressor. This increases the overall complexity of insulating the shell of the evaporator. In particular, mounting locations of the brackets on the shell act as a constraint for providing insulation on the shell of the evaporator and thus increase overall complexity. Further, the welding process implemented for mounting the brackets substantially increases the overall cost of the evaporator and the refrigerating system.

SUMMARY

[0005] According to a first aspect of the invention a mounting assembly for a refrigeration system is provided. The mounting assembly comprises a plurality of elongated members adapted to be mounted on an evaporator of the refrigeration system. Each of the plurality of elongated members is positioned above the evaporator and extends along a length of the evaporator between a first end and a second end of the evaporator. Each of the plurality of elongated members is adapted to mount a compressor of the refrigeration system thereon.

[0006] Optionally, the mounting assembly comprises a plurality of support brackets adapted to be coupled to the first end and the second end of the evaporator. Each of the plurality of support brackets may be coupled to one of a first tube sheet defining the first end of the evaporator and a second tube sheet defining the second end of the evaporator. The plurality of support brackets may be adapted to be coupled to the plurality of elongated members.

[0007] Optionally, each of the plurality of support brackets comprises a mounting plate adapted to be coupled to one of the first tube sheet and the second tube sheet. The mounting plate may be aligned parallel to one of the first tube sheet and the second tube sheet.

[0008] Optionally, the mounting plate comprises a mounting portion having a first end and a second end distal to the first end. The mounting portion may be adapted to be fastened to one of the first tube sheet and the second tube sheet. Further, the mounting plate may comprise a pair of supporting legs extending from the first end and the second end of the mounting portion. Each of the pair of supporting legs may comprise a plurality of ridges adapted to receive at least one fastening member to support the mounting plate on one of the first tube sheet and the second tube sheet. In the disclosure, the term ‘fastening member’ and ’fastener’ may encompass (amongst others) any threaded fastener known in the art for joining or affixing two or more components.

[0009] Optionally, each of the plurality of support brackets comprises a pair of flanges orthogonally extending from the pair of supporting legs of the mounting plate and adapted to be coupled to the plurality of elongated members.

[0010] Optionally, each of the pair of flanges is adapted to be fastened to at least one end of one of the plurality of elongated members.

[0011] Optionally, each of the plurality of elongated members comprises a mounting wall and a supporting wall opposite to the mounting wall. The mounting wall is adapted to be aligned parallel to one of the pair of flanges and fastened thereof.

[0012] Optionally, the supporting wall is adapted to be fastened to at least one of a component of the refrigeration system and the compressor.

[0013] Optionally, each of the plurality of elongated members is embodied as one of a square beam, a rectangular beam, and a U-profile beam.

[0014] Optionally, the mounting assembly comprises a mounting beam adapted to be coupled to the first tube sheet and the second tube sheet, and positioned verti-

cally below one of the plurality of elongated members. The mounting beam is adapted to be fastened to at least one component of the refrigeration system.

[0015] Optionally, each of the plurality of elongated members transfers vibrations from the compressor to the plurality of support brackets mounted on the first tube sheet and the second tube sheet of the evaporator.

[0016] Optionally, the mounting assembly comprises at least one base member adapted to be coupled to one of tube sheets of a condenser of the refrigeration system. One of the tube sheets may be fastened with one of the first tube sheet and the second tube sheet of the evaporator which is disposed vertically above the condenser.

[0017] According to another aspect of the invention, a refrigeration system is provided. The refrigeration system comprises a condenser having a first set of tube sheets disposed at each end of the condenser. Further, the refrigeration system comprises an evaporator in fluid communication with the condenser and is positioned vertically above the condenser. The evaporator comprises a second set of tube sheets adapted to be coupled to the first set of tube sheets. Further, the refrigeration system comprises a compressor in fluid communication with each of the condenser and the evaporator and is positioned vertically above the evaporator. The refrigeration system comprises a mounting assembly adapted to mount the compressor vertically above the condenser. The mounting assembly comprises a plurality of elongated members adapted to be mounted on the evaporator. Each of the plurality of elongated members is positioned above the evaporator and extends along a length of the evaporator between a first end and a second end of the evaporator. Each of the plurality of elongated members is adapted to mount at least the compressor thereon.

[0018] Optionally, the mounting assembly comprises a plurality of support brackets coupled to the second set of tube sheets defining the first end and the second end of the evaporator, the plurality of support brackets is adapted to be coupled to the plurality of elongated members. Each of the plurality of support brackets may comprise a mounting plate adapted to be coupled to one of the second set of tube sheets. The mounting plate may be aligned parallel to one of the second set of tube sheets.

[0019] Optionally, the mounting plate comprises a mounting portion having a first end and a second end distal to the first end. The mounting portion may be adapted to be fastened to one of the second set of tube sheets. The mounting plate may comprise a pair of supporting legs extending from the first end and the second end of the mounting portion. Each of the pair of supporting legs may comprise a plurality of ridges adapted to receive at least one fastening member to support the mounting plate on one of the second set of tube sheets.

[0020] Optionally, each of the plurality of support brackets comprises a pair of flanges orthogonally extending from the pair of supporting legs of the mounting plate and adapted to be coupled to the plurality of elongated members.

[0021] Optionally, each of the pair of flanges is adapted to be fastened to at least one end of one of the plurality of elongated members.

[0022] Optionally, the mounting assembly comprises a mounting beam adapted to be coupled to the first set of tube sheets and positioned vertically below one of the plurality of elongated members. The mounting beam may be adapted to be fastened to at least one component of the refrigeration system.

[0023] Optionally, each of the plurality of elongated members transfers vibrations from the compressor to the plurality of support brackets mounted on the second set of tube sheets of the evaporator.

[0024] Optionally, the mounting assembly comprises at least one base member adapted to be coupled to one of the first set of tube sheets of the condenser.

[0025] To further clarify the advantages and features of the methods, systems, and apparatuses, a more particular description of the methods, systems, and apparatuses will be rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the disclosure and are therefore not to be considered limiting of its scope. The disclosure will be described and explained with additional specificity and detail with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Certain exemplary embodiments will now be described in greater detail by way of example only and with reference to the accompanying drawings, in which:

Figure 1a illustrates an isometric view of a refrigeration system having a mounting assembly;

Figures 1b, 1c, and 1d illustrate a rear view, a side view, and a top view, respectively, of the refrigeration system depicting the mounting assembly;

Figure 2a illustrates a planar view of the mounting assembly attached to tube sheets of an evaporator;

Figure 2b illustrates an isometric view of the mounting assembly attached to the tube sheets of the evaporator;

Figure 3 illustrates an isometric view of the mounting assembly;

Figure 4 illustrates an exploded view of the mounting assembly;

Figures 5a-5b illustrate isometric views of support brackets of the mounting assembly;

Figure 6 illustrates an isometric view of an elongated member of the mounting assembly;

Figure 7 illustrates an enlarged view of a portion A of the mounting assembly as shown in Figure 2a; and

Figure 8 illustrates a partial isometric view of the refrigeration system depicting the mounting assembly.

[0027] Further, skilled artisans will appreciate that elements in the drawings are illustrated for simplicity and may not have necessarily been drawn to scale. For example, the flow charts illustrate the method in terms of the most prominent steps involved to help to improve understanding of aspects of the disclosure. Furthermore, in terms of the construction of the device, one or more components of the device may have been represented in the drawings by conventional symbols, and the drawings may show only those specific details that are pertinent to understanding the embodiments of the disclosure so as not to obscure the drawings with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

DETAILED DESCRIPTION OF FIGURES

[0028] For the purpose of promoting an understanding of the principles of the invention, reference will now be made to the various embodiments and specific language will be used to describe the same.

[0029] It will be understood by those skilled in the art that the foregoing general description and the following detailed description are explanatory of the disclosure and are not intended to be restrictive thereof.

[0030] Reference throughout this specification to "an aspect", "another aspect" or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrase "in an embodiment", "in another embodiment", "some embodiments", "one or more embodiments" and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

[0031] The terms "comprises", "comprising", or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a process or method that comprises a list of steps does not include only those steps but may include other steps not expressly listed or inherent to such process or method. Similarly, one or more devices or sub-systems or elements or structures or components proceeded by "comprises... a" does not, without more constraints, preclude the existence of other devices or other sub-systems or other elements or other structures or other components or additional devices or additional sub-systems or additional elements or additional structures or additional components.

[0032] Embodiments will be described below in detail with reference to the accompanying drawings.

[0033] **Figure 1a** illustrates an isometric view of a refrigeration system 100 having a mounting assembly 102, according to an embodiment. **Figures 1b, 1c, and 1d** illustrate a rear view, a side view, and a top view, respectively, of the refrigeration system 100 depicting the mounting assembly 102, according to an embodiment. In an embodiment, the refrigeration system 100 may be embodied as a chiller, such as a water-cooled chiller, without departing from the scope of the invention. Referring to Figures 1a, 1b, 1c, and 1d, the refrigeration system 100 may include, but is not limited to, a condenser 104, an evaporator 106, a compressor 108, and a mounting assembly, such as the mounting assembly 102.

[0034] Each of the condenser 104, the evaporator 106, and the compressor 108 may be in fluid communication with each other to define a refrigeration circuit of the refrigeration system 100. The compressor 108 may be adapted to compress a refrigerant to form a compressed refrigerant. Further, in the refrigeration circuit, the condenser 104 may be positioned downstream to the compressor 108 and adapted to extract a portion of heat from the received compressed refrigerant to form a condensed refrigerant. In the refrigeration circuit, the evaporator 106 may be positioned downstream to the condenser 104. The evaporator 106 may be adapted to transfer heat from a medium such as a gas or liquid, to the cooled refrigerant.

[0035] The condenser 104 may include, but is not limited to, a first set of tube sheets 110 disposed at each end of the condenser 104. In the illustrated embodiment, the first set of tube sheets 110 may include a first tube sheet 110-1 defining a first end 104-1 of the condenser 104 and a second tube sheet 110-2 defining a second end 104-2 of the condenser 104. Further, the condenser 104 may be removably mounted on a horizontal surface, such as a floor, via a plurality of base mounts 112. Each of the plurality of base mounts 112 may include, but is not limited to, a bracket 114 and a supporting beam 116. The bracket 114 may be adapted to be fastened to the supporting beam 116 which is to be mounted on the horizontal surface.

[0036] Further, the evaporator 106 may be positioned vertically above the condenser 104. The evaporator 106 may include, but is not limited to, a second set of tube sheets 118 disposed at each end of the evaporator 106. In the illustrated embodiment, the second set of tube sheets 118 may include a first tube sheet 118-1 defining a first end 106-1 of the evaporator 106 and a second tube sheet 118-2 defining a second end 106-2 of the evaporator 106. The evaporator 106 may be positioned vertically above the condenser 104 in a manner that the first set of tube sheets 110-1, 110-2 lineally coincides with the second set of tube sheets 118-1, 118-2. In particular, the first tube sheet 110-1 of the condenser 104 linearly coincides with the first tube sheet 118-1 of the evaporator 106. Similarly, the second tube sheet 110-2 of the condenser linearly coincides with the second tube sheet 118-2 of the evaporator 106. The second set of tube sheets 118-1, 118-2 may be adapted to be coupled to the first set of tube sheets 110-1, 110-2 of the condenser 104. In an embodiment, the second set of tube sheets

118-1, 118-2 may be removably fastened to the first set of tube sheets 110-1, 110-2 via brackets 120.

[0037] In the illustrated embodiment, the compressor 108 may be positioned vertically above the evaporator 106. The refrigeration system 100 may include the mounting assembly 102 to mount the compressor 108 vertically above the evaporator 106. The mounting assembly 102 may be adapted to reduce the overall transmission of vibrations between a shell of the evaporator 106 and the compressor 108 of the refrigeration system 100. Constructional and operational details of the mounting assembly 102 are explained in subsequent sections of the disclosure.

[0038] **Figure 2a** illustrates a planar view of the mounting assembly 102 attached to the second set of tube sheets 118-1, 118-2 of the evaporator 106, according to an embodiment. **Figure 2b** illustrates an isometric view of the mounting assembly 102 attached to the second set of tube sheets 118-1, 118-2 of the evaporator 106, according to an embodiment. **Figure 3** illustrates an isometric view of the mounting assembly 102, according to an embodiment.

[0039] The mounting assembly 102 may include, but is not limited to, a plurality of support brackets 202 and a plurality of elongated members 204. Each of the plurality of support brackets 202 may be adapted to be coupled to one of the first tube sheet 118-1 defining the first end 106-1 of the evaporator 106 and the second tube sheet 118-2 defining the second end 106-2 of the evaporator 106. The plurality of elongated members 204 may be adapted to be coupled to the plurality of support brackets 202. Each of the plurality of elongated members 204 may be adapted to mount the compressor 108 of the refrigeration system 100 thereon. The plurality of support brackets 202 may be mounted on the second set of tube sheets 118-1, 118-2 in a manner that the plurality of elongated members 204, when coupled to the support brackets 202, positioned above the evaporator 106. Constructional aspects of the elongated members 204 and the support brackets 202 are explained in the subsequent section of the disclosure.

[0040] **Figure 4** illustrates an exploded view of the mounting assembly 102, according to an embodiment. In the illustrated embodiment, referring to Figures 2a, 2b, 3, and 4, the plurality of support brackets 202 may include a first support bracket 202-1 and a second support bracket 202-2. The first support bracket 202-1 and the second support bracket 202-2 may be adapted to be mounted on the first tube sheet 118-1 and the second tube sheet 118-2, respectively, of the evaporator 106. In an embodiment, the first support bracket 202-1 may be fastened to a rear surface 206-1 of the first tube sheet 118-1 via fasteners. Similarly, the second support bracket 202-2 may be fastened to a rear surface 206-2 of the second tube sheet 118-2 via fasteners.

[0041] It should be appreciated by a person skilled in the art that the constructional aspects of the first support bracket 202-1 are similar to the constructional aspects of the second support bracket 202-2. However, it should not be construed as limiting, and the first support bracket 202-1 and the second support bracket 202-2 may have different structures/constructional aspects, without departing from the scope of the invention. The first support bracket 202-1 and the second support bracket 202-2 may collectively be referred to as the support brackets 202-1, 202-2 in the subsequent sections of the disclosure.

[0042] **Figures 5a-5b** illustrate isometric views of the support brackets 202-1, 202-2 of the mounting assembly 102, according to an embodiment. In an embodiment, each of the support brackets 202-1, 202-2 may include, but is not limited to, a mounting plate 502 adapted to be coupled to one of the first tube sheet 118-1 and the second tube sheet 118-2. The mounting plate 502 may be aligned parallel to one of the first tube sheet 118-1 and the second tube sheet 118-2 and subsequently, fastened to the respective tube sheet.

[0043] Referring to Figures 2a, 2b, and 5a-5b, mounting plates of the first support bracket 202-1 and the second support bracket 202-2 may be referred to as the first mounting plate 502-1 and the second mounting plate 502-2. In the illustrated embodiment, the first mounting plate 502-1 may be aligned parallel and fastened to the first tube sheet 118-1. In particular, the first mounting plate 502-1 may be positioned on the rear surface 206-1 of the first tube sheet 118-1 and fastened via a plurality of fasteners. Similar to the first mounting plate 502-1, the second mounting plate 502-2 may be aligned parallel and fastened to the second tube sheet 118-2 of the evaporator 106. In particular, the second mounting plate 502-2 may be positioned on the rear surface 206-2 of the second tube sheet 118-2 and fastened via a plurality of fasteners.

[0044] Referring to Figures 5a and 5b, each of the first mounting plate 502-1 and the second mounting plate 502-2 may include, but is not limited to, a mounting portion 504 and a pair of supporting legs 506. The mounting portion 504 may include a first end 504-1 and a second end 504-2 distal to the first end 504-1. The mounting portion 504 may be adapted to be fastened to one of the first tube sheet 118-1 and the second tube sheet 118-2. The mounting portion 504 may include a plurality of holes 507 adapted to receive fasteners to enable mounting of the respective mounting plate, such as the first mounting plate 502-1 and the second mounting plate 502-2, on one of the second set of tube sheets 118-1, 118-2. In the illustrated embodiment, the mounting portion 504, such as a first mounting portion 504', of the first mounting plate 502-1 may be fastened to a peripheral portion of the rear surface 206-1 of the first tube sheet 118-1. Similarly, the mounting portion 504, such as a second mounting portion 504", of the second mounting plate 502-2 may be fastened to a peripheral portion of the rear surface 206-2 of the second tube sheet 118-2.

[0045] Further, the pair of supporting legs 506 may extend from the first end 504-1 and the second end 504-2 of the mounting portion 504. Each of the pair of supporting

legs 506 may include a plurality of ridges 508 adapted to receive at least one fastening member to support the mounting plate, such as 502-1, 502-2, on one of the second set of tube sheets 118-1, 118-2. In the illustrated embodiment, the pair of supporting legs 506 of the first mounting plate 502-1 may be fastened to the rear surface 206-1 of the first tube sheet 118-1. Similarly, the pair of supporting legs 502-1 of the second mounting plate 502-2 may be fastened to the rear surface 206-2 of the second tube sheet 118-2.

[0046] Each of the plurality of support brackets 202-1, 202-2 may include a pair of flanges 510 orthogonally extending from the pair of supporting legs 506 of the mounting plate, such as the first mounting plate 502-1 and the second mounting plate 502-2. The pair of flanges 510 may be adapted to be coupled to the plurality of elongated members 204. Each of the pair of flanges 510 may include at least one hole 512 adapted to receive a fastener to enable the fastening of one of the elongated members 204. Each of the pair of flanges 510 may be adapted to be fastened to at least one end of one of the elongated members 204.

[0047] Referring to Figure 4 and Figures 5a-5b, in the illustrated embodiment, the pair of flanges 510 of the first support bracket 202-1 and the second support bracket 202-1 may be referred to as a first pair of flanges 510-1 and a second pair of flanges 510-2, respectively. The first pair of flanges 510-1 may be adapted to be coupled to one end of the elongated members 204 and the second pair of flanges 510-2 may be adapted to be coupled to another end of the elongated members 204.

[0048] **Figure** 6 illustrates an isometric view of one of the elongated members 204 of the mounting assembly 102, according to an embodiment. Referring to Figures 3, 4, and 6, the plurality of elongated members 204 may include a first elongated member 204-1 and a second elongated member 204-2. Each of the first elongated member 204-1 and the second elongated member 204-2 may include a first connecting end 603 and a second connecting end 604 distal to the first connecting end 603.

[0049] In the illustrated embodiment, the first connecting end 603 of each of the first elongated member 204-1 and the second elongated member 204-2 may be fastened to one of the first pair of flanges 510-1 of the first support bracket 202-1. Similarly, the second connecting end 604 of each of the second elongated member 204-1 and the second elongated member 204-2 may be fastened to one of the second pair of flanges 510-2 of the second support bracket 202-2.

[0050] Further, each of the first elongated member 204-1 and the second elongated member 204-2 may include, but is not limited to, a mounting wall 602 and a supporting wall 606 opposite to the mounting wall 602. The mounting wall 602 may be adapted to be aligned parallel to one of the pair of flanges, such as the first pair of flanges 510-1 and the second pair of flanges 510-2, and fastened thereof. The mounting wall 602 may include a plurality of fastening holes 606 to be aligned with the hole 512 of flanges, such as the first set of flanges 510-1 and the second set of flanges 510-2, for inserting fasteners therein and thereby, fastening the respective elongated member with the support brackets 202-1, 202-2.

[0051] Each of the elongated members 204-1, 204-2 may be positioned above the evaporator 106 and extend along a length of the evaporator 106 between the first end 106-1 and the second end 106-2. In particular, the first connecting end 603 and the second connecting end 604 of each of the elongated members 204-1, 204-2 may be fastened to the flanges 510-1, 510-2 in a manner that each of the elongated members 204-1, 204-2 is positioned spaced apart from the shell of the evaporator 106. Further, a lateral gap 'G' may be defined between the first elongated member 204-1 and the second elongated member 204-2 when coupled to the support brackets 202-1, 202-2.

[0052] **Figure 7** illustrates an enlarged view of a portion A of the mounting assembly 102 as shown in Figure 2a, according to an embodiment. As mentioned earlier, each of the elongated members 204-1, 204-2 may be adapted to mount the compressor 108 of the refrigeration system 100 thereon. Further, in an embodiment, at least one component of the refrigeration system 100 may be fastened to at least one of the elongated members 204-1, 204-2. In one embodiment, the at least one component, such as an economizer subassembly, of the refrigeration system 100 may be fastened to at least one of the elongated members 204-1, 204-2. In another embodiment, the at least one component including, but not limited to, a filter, a drier, and an expansion valve may be fastened to at least one of the elongated members 204-1, 204-2. In yet another embodiment, the at least one component, such as a discharge line, an oil line, and a liquid line, may be fastened to at least one of the elongated members 204-1, 204-2 via brackets (not shown). It should be appreciated by a person skilled in the art that the components, fastened to the mounting assembly 102, of the refrigeration system 100 as explained in various embodiments should not be construed as limiting, and any other component of the refrigeration system 100 can also be fastened to the elongated members 204-1, 204-2 of the mounting assembly 102, without departing from the scope of the invention.

[0053] In the illustrated embodiment, Referring to Figures 6 and 7, the supporting wall 606 may be adapted to be fastened to the at least one of component of the refrigeration system 100 and the compressor 108. In an embodiment, the supporting wall 606 may include a plurality of fastening holes 608 adapted to receive fasteners to enable fastening of the at least one component of the refrigeration system 100 and the compressor 108 on the elongated members 204-1, 204-2.

[0054] In an embodiment, each of the elongated members 204-1, 204-2 may be embodied as one of a square beam, a rectangular beam, and a U-profile beam.

[0055] Each of the elongated members 204-1, 204-2 may be adapted to transfer vibrations from the compres-

sor 108 to the plurality of supporting brackets 202-1, 202-2 mounted on the first tube sheet 118-1 and the second tube sheet 118-2 of the evaporator 106. As mentioned earlier, the elongated member 204-1, 204-2 may be positioned away from the shell of the evaporator 106, and thereby the elongated members 204-1, 204-2 are not in direct contact with the shell of the evaporator 106. This substantially reduces the transmission of vibrations from the compressor 108 to the evaporator 106 or vice versa. The mounting assembly 102 may enable transmission of vibrations from the compressor 108 through the elongated members 204-1, 204-2 to the supporting brackets 202-1, 202-2 and therefore, minimizes the transmission of vibrations between the shell of the evaporator 106 and the compressor 108.

[0056] In one embodiment, the mounting assembly 102 may include, but is not limited to, a mounting beam 702 (as shown in Figure 7) adapted to be coupled to the first set of tube sheets 110-1, 110-2. The mounting beam 702 may be positioned vertically below one of the elongated members 204-1, 204-2. The mounting beam 702 is adapted to be fastened to at least one component of the refrigeration system 100. In an embodiment, the at least one component, such as an electrical cabinet (not shown), may be fastened to the mounting beam 702 and the first elongated tube 204-1. In an embodiment, constructional aspects of the mounting beam 702 may be similar to the construction aspects, as explained earlier, of the elongated members 204-1, 204-2. In an embodiment, the mounting beam 702 may be embodied as one of a square beam, a rectangular beam, and a U-profile beam.

[0057] In an embodiment, the elongated members 204-1, 204-2 may be directly coupled to the second set of tube sheets 118-1, 118-2. In such an embodiment, the support brackets 202-1, 202-2 may be eliminated and the elongated members 204-1, 204-2 may be directly fastened to the second set of tube sheets 118-1, 118-2.

[0058] **Figure 8** illustrates a partial isometric view of the refrigeration system 100 depicting the mounting assembly 102, according to another embodiment. In the illustrated embodiment, the mounting assembly 102 may also include, but is not limited to, at least one base member 802 adapted to be coupled to one of the tube sheets 110-1, 110-2 of the condenser 104 of the refrigeration system 100. In an embodiment, the at least one base member 802 may be removably fastened to one of the tube sheets 110-1, 110-2 via fasteners. As explained earlier, the tube sheets 110-1, 110-2 may be fastened with the first tube sheet 118-1 and the second tube sheet 118-2 of the evaporator 106 which is disposed vertically above the condenser 104. Referring to Figure 8, in the illustrated embodiment, vibrations from the compressor 108 may travel through the support brackets mounted on the second set of tube sheets to the first set of tube sheets, and subsequently to the at least one base member 802. Also, this substantially eliminates transmission of the vibration through a shell of the condenser 104 and thereby, increasing overall service life of the condenser 104 and reducing the noise in the refrigeration system 100.

[0059] As would be gathered, the disclosure offers the mounting assembly 102 for mounting at least the compressor 108 in the refrigeration system 100. As explained earlier, the mounting assembly 102 includes the elongated members 204-1, 204-2 adapted to mount the compressor 108 vertically above the evaporator 106. The elongated members 204-1, 204-2 may be spaced apart from the shell of the evaporator 106 and therefore, minimizes the transmission of vibrations from the shell of the compressor 108. This substantially reduces the overall noise levels of the refrigeration system 100. Further, implementation of the elongated members 204-1, 204-2 eliminates the use of welding mounting brackets directly on the shell of the evaporator 106 for mounting the compressor 108. This substantially simplifies the insulation of the evaporator 106 as mounting locations of the brackets on the shell of the evaporator 106 may not act as a constraint.

[0060] Further, the elongated members 204-1, 204-2 may be removably fastened, via fasteners, to the support brackets 202-1, 202-2 which are further fastened to the first set of tube sheets 110-1, 110-2 of the evaporator 106. This substantially eliminates the use of welding mount brackets on the shell of the evaporator 106 for mounting the compressor 108. Owing to the implementation of the fasteners, the assembling process and disassembling process of the compressor 108 from the refrigeration system 100 becomes substantially easier compared to the refrigeration system 100 employed with welded brackets for mounting the compressor 108.

[0061] Further, the mounting assembly 102 enables preassembly of the compressor 108 and an economizer as a subassembly, thereby improving the manufacturing productivity of the refrigeration system 100. By eliminating the use of welding the mounting brackets on the evaporator 106, the overall construction of the evaporator 106 is simplified and, the overall cost associated with the evaporator 106 and the refrigeration system 100 are substantially reduced. Further, reduced vibration of the evaporator 106 simplifies mounted tubing and other components. For instance, reduction in transmission of the vibration through the shell of the evaporator 106 may enable mounting of various components, in the refrigeration system 100, with a lesser number of support fixtures or brackets. This substantially reduces the overall complexity and cost associated with the refrigeration system 100. Therefore, the mounting assembly 102 of the disclosure is compact, modular, efficient, durable, flexible in implementation, cost-effective, lightweight, and convenient.

[0062] While specific language has been used to describe the subject matter, any limitations arising on account thereto, are not intended. As would be apparent to a person in the art, various working modifications may be made to the method in order to implement the inventive concept as taught herein. The drawings and the fore-

going description give examples of embodiments. Those skilled in the art will appreciate that one or more of the described elements may well be combined into a single functional element. Alternatively, certain elements may be split into multiple functional elements. Elements from one embodiment may be added to another embodiment.

[0063] The following clauses set out features of the invention which may or may not presently be claimed in this application but which may form basis for future amendment or a divisional application.

1. A refrigeration system comprising:

a condenser having a first set of tube sheets disposed at each end of the condenser;
an evaporator in fluid communication with the condenser and positioned vertically above the condenser, the evaporator comprising a second set of tube sheets adapted to be coupled to the first set of tube sheets;
a compressor in fluid communication with each of the condenser and the evaporator and, positioned vertically above the evaporator; and
a mounting assembly adapted to mount the compressor vertically above the condenser, the mounting assembly comprising:

a plurality of elongated members adapted to be mounted on the evaporator,
wherein each of the plurality of elongated members is positioned above the evaporator and extend along a length of the evaporator between a first end and a second end of the evaporator, each of the plurality of elongated members is adapted to mount at least the compressor thereon.

2. The refrigeration system according to clause 1 further comprising:

a plurality of support brackets coupled to the second set of tube sheets defining the first end and the second end of the evaporator, the plurality of support brackets is adapted to be coupled to the plurality of elongated members,
wherein each of the plurality of support brackets comprises:
a mounting plate adapted to be coupled to one of the second set of tube sheets, wherein the mounting plate is aligned parallel to one of the second set of tube sheets.

3. The refrigeration system according to any of clauses 1 or 2, wherein the mounting plate comprises:

a mounting portion having a first end and a second end distal to the first end, wherein the mounting portion is adapted to be fastened to one of the second set of tube sheets; and
a pair of supporting legs extending from the first end and the second end of the mounting portion, wherein each of the pair of supporting legs comprises a plurality of ridges adapted to receive at least one fastening member to support the mounting plate on one of the second set of tube sheets.

4. The refrigeration system according to clause 3, wherein each of the plurality of support brackets comprises a pair of flanges orthogonally extending from the pair of supporting legs of the mounting plate and adapted to be coupled to the plurality of elongated members.

5. The refrigeration system according to clause 4, wherein each of the pair of flanges is adapted to be fastened to at least one end of one of the plurality of elongated members.

6. The refrigeration system according to any of the preceding clauses, wherein the mounting assembly comprises a mounting beam adapted to be coupled to the first set of tube sheets and positioned vertically below one of the plurality of elongated members, wherein the mounting beam is adapted to be fastened to at least one component of the refrigeration system.

7. The refrigeration system according to any of the preceding clauses, wherein each of the plurality of elongated members transfers vibrations from the compressor to the plurality of supporting brackets mounted on the second set of tube sheets of the evaporator.

8. The refrigeration system according to any of the preceding clauses, wherein the mounting assembly comprises at least one base member adapted to be coupled to one of the first set of tube sheets of the condenser.

Claims

1. A mounting assembly (102) for a refrigeration system (100), the mounting assembly comprising:

a plurality of elongated members (204) adapted to be mounted on an evaporator (106) of the refrigeration system,
wherein each of the plurality of elongated members is positioned above the evaporator and extends along a length of the evaporator between a first end (106-1) and a second end (106-2) of the evaporator, and
each of the plurality of elongated members is

adapted to mount at least a compressor (108) of the refrigeration system thereon.

2. The mounting assembly (102) according to claim 1, further comprising:

a plurality of support brackets (202) adapted to be coupled to the first end (106-1) and the second end (106-2) of the evaporator (106),
wherein each of the plurality of support brackets is coupled to one of a first tube sheet (118-1) defining the first end of the evaporator and a second tube sheet (118-2) defining the second end of the evaporator, and the plurality of support brackets is adapted to be coupled to the plurality of elongated members (204).

3. The mounting assembly (102) according to claim 2, wherein each of the plurality of support brackets (202) comprises:
a mounting plate (502) adapted to be coupled to one of the first tube sheet (118-1) and the second tube sheet (118-2), wherein the mounting plate is aligned parallel to one of the first tube sheet and the second tube sheet.

4. The mounting assembly (102) according to claim 3, wherein the mounting plate (502) comprises:

a mounting portion (504) having a first end (540-1) and a second end (504-2) distal to the first end, wherein the mounting portion is adapted to be fastened to one of the first tube sheet (118-1) and the second tube sheet (118-2); and
a pair of supporting legs (506) extending from the first end and the second end of the mounting portion, wherein each of the pair of supporting legs comprises a plurality of ridges (508) adapted to receive at least one fastening member to support the mounting plate on one of the first tube sheet and the second tube sheet.

5. The mounting assembly (102) according to any of claims 2 to 4, wherein each of the plurality of support brackets (202) comprises a pair of flanges (510) orthogonally extending from the pair of supporting legs (506) of the mounting plate (502) and adapted to be coupled to the plurality of elongated members (204), optionally,
wherein each of the pair of flanges is adapted to be fastened to at least one end of one of the plurality of elongated members.

6. The mounting assembly (102) according to claim 5, wherein each of the plurality of elongated members (204) comprises a mounting wall (602) and a supporting wall (606) opposite to the mounting wall, the mounting wall is adapted to be aligned parallel to one of the pair of flanges (510) and fastened thereof, optionally wherein the supporting wall is adapted to be fastened to at least one of a component of the refrigeration system (100) and the compressor (108).

7. The mounting assembly according to any of claims 2 to 6, further comprising a mounting beam (702) adapted to be coupled to the first tube sheet (110-1) and the second tube sheet (110-2), and positioned vertically below one of the plurality of elongated members (204), wherein the mounting beam is adapted to be fastened to at least one component of the refrigeration system (100).

8. The mounting assembly (102) according to any of claims 2 to 7, wherein each of the plurality of elongated members (204) transfers vibrations from the compressor (108) to the plurality of support brackets (202) mounted on the first tube sheet (118-1) and the second tube sheet (118-2) of the evaporator (106).

9. The mounting assembly (102) according to any of claims 2 to 8, further comprising at least one base member (802) adapted to be coupled to one of tube sheets (110-1, 110-2) of a condenser (104) of the refrigeration system (100), wherein one of the tube sheets is fastened with one of the first tube sheet (118-1) and the second tube sheet (118-1) of the evaporator (106) which is disposed vertically above the condenser.

10. The mounting assembly (102) according to any preceding claim, wherein each of the plurality of elongated members (204) is embodied as one of a square beam, a rectangular beam, and a U-profile beam.

11. A refrigeration system (100) comprising:

a condenser (104) having a first set of tube sheets (110) disposed at each end of the condenser;
an evaporator (106) in fluid communication with the condenser and positioned vertically above the condenser, the evaporator comprising a second set of tube sheets (118-1, 118-2) adapted to be coupled to the first set of tube sheets (110-1, 110-2);
a compressor (108) in fluid communication with each of the condenser and the evaporator and, positioned vertically above the evaporator; and
a mounting assembly (102) according to claim 1, adapted to mount the compressor vertically above the condenser, wherein:

the plurality of elongated members are adapted to be mounted on the evaporator,

and
each of the plurality of elongated members is adapted to mount at least the compressor thereon.

12. The refrigeration system (100) according to claim 11, further comprising:

a plurality of support brackets (202) coupled to the second set of tube sheets (118-1, 118-2) defining the first end (106-1) and the second end (106-2) of the evaporator (106), the plurality of support brackets is adapted to be coupled to the plurality of elongated members (204),
wherein each of the plurality of support brackets comprises:

a mounting plate (502) adapted to be coupled to one of the second set of tube sheets, wherein the mounting plate is aligned parallel to one of the second set of tube sheets, optionally wherein each of the plurality of elongated members transfers vibrations from the compressor (108) to the plurality of support brackets mounted on the second set of tube sheets of the evaporator.

13. The refrigeration system (100) according to claim 12, wherein the mounting plate (502) comprises:

a mounting portion (504) having a first end (504-1) and a second end (504-2) distal to the first end, wherein the mounting portion is adapted to be fastened to one of the second set of tube sheets (118-1, 118-2); and
a pair of supporting legs (506) extending from the first end and the second end of the mounting portion, wherein each of the pair of supporting legs comprises a plurality of ridges (508) adapted to receive at least one fastening member to support the mounting plate on one of the second set of tube sheets.

14. The refrigeration system (100) according to claim 13, wherein each of the plurality of support brackets (202) comprises a pair of flanges (510) orthogonally extending from the pair of supporting legs (506) of the mounting plate (502) and adapted to be coupled to the plurality of elongated members (204),
optionally wherein each of the pair of flanges (510) is adapted to be fastened to at least one end of one of the plurality of elongated members (204).

15. The refrigeration system (100) according to any of claims 11 to 14, wherein the mounting assembly (102) comprises a mounting beam (702) adapted to be coupled to the first set of tube sheets (110-1, 110-2) and positioned vertically below one of the plurality of elongated members (204), wherein the mounting beam is adapted to be fastened to at least one component of the refrigeration system; and/or
wherein the mounting assembly comprises at least one base member (802) adapted to be coupled to one of the first set of tube sheets of the condenser (104).

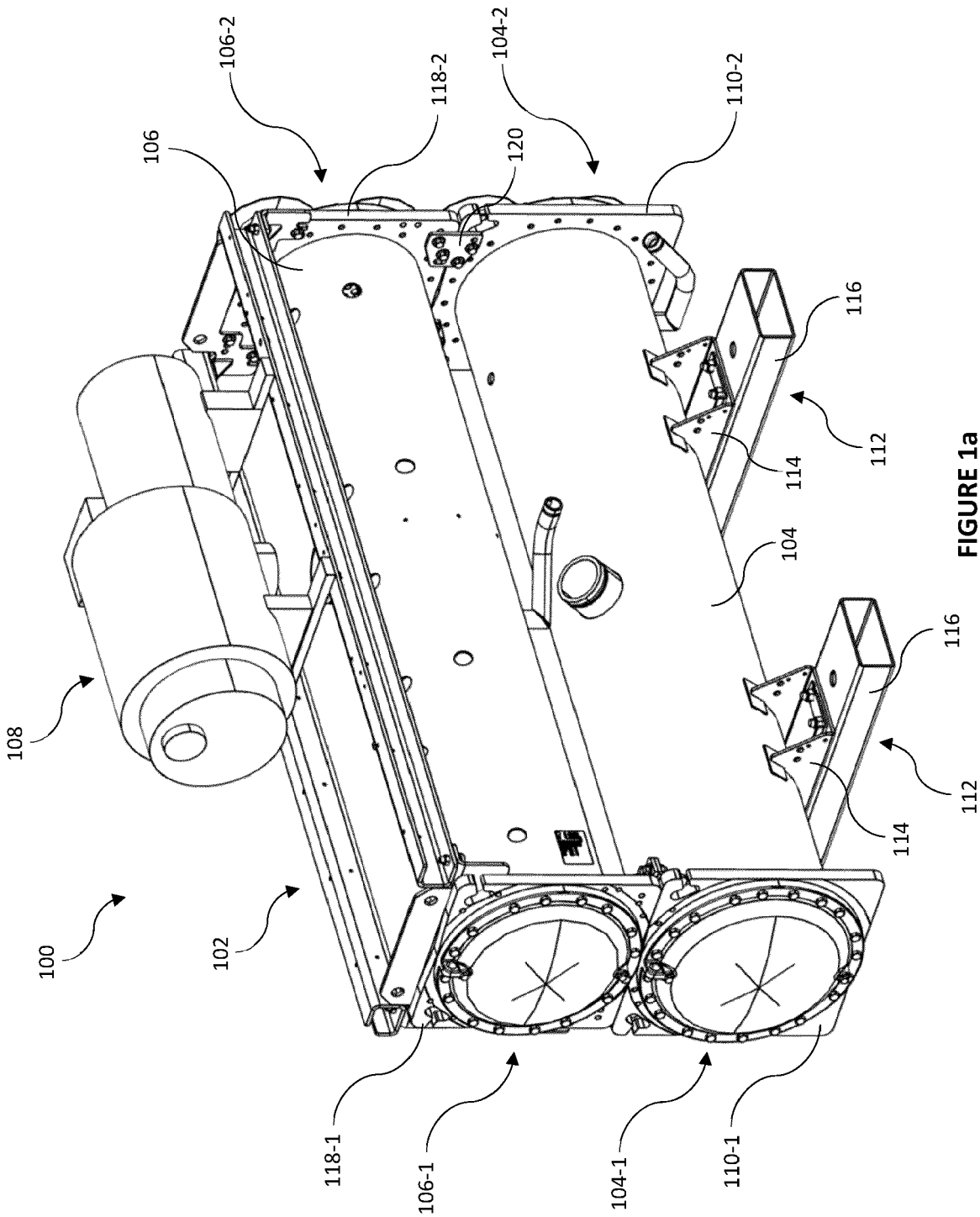
106-2
118-2
104-2
110-2
106
120
116
112
114
104
108
100
102
118-1
106-1
104-1
110-1

FIGURE 1a

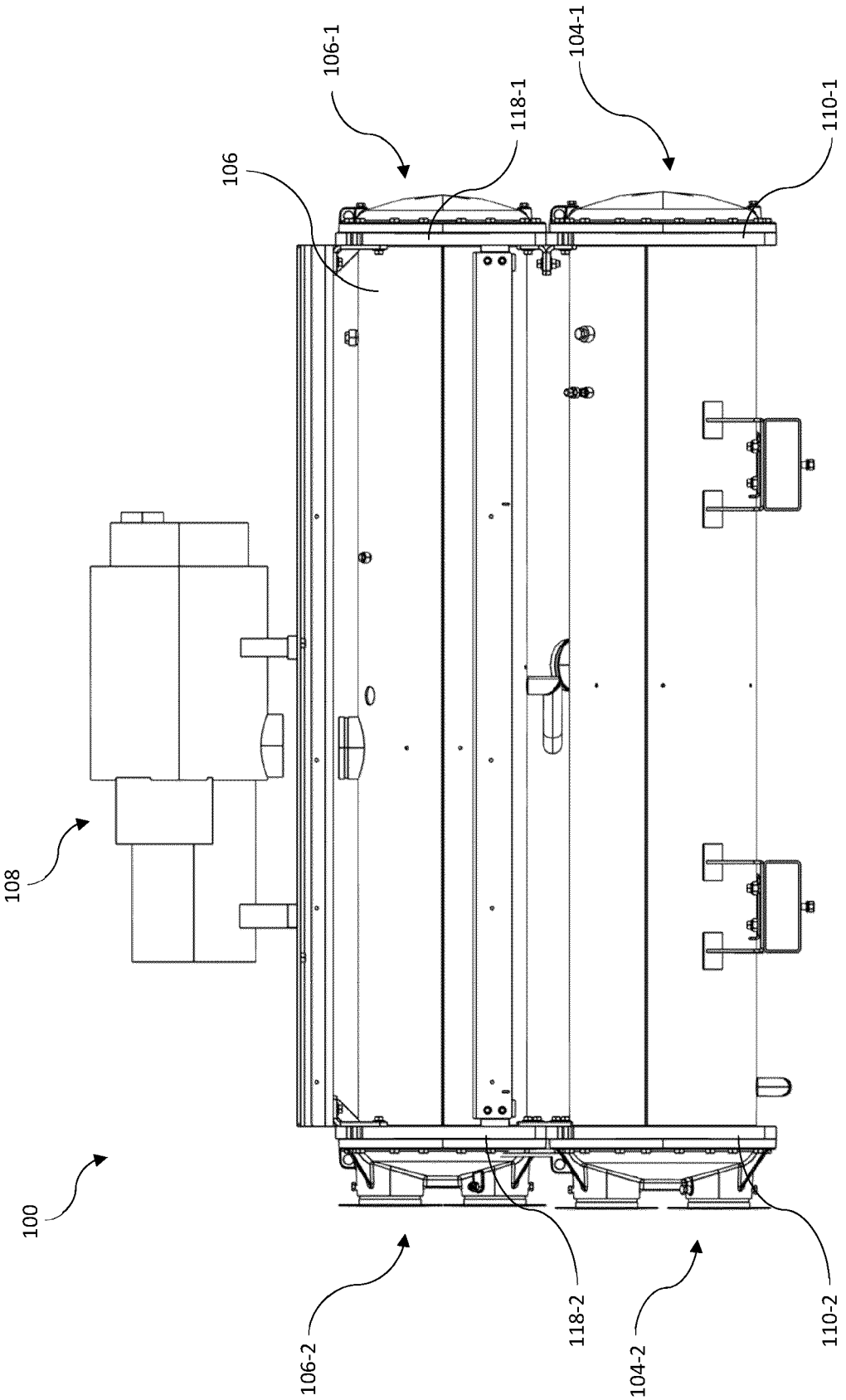

FIGURE 1b

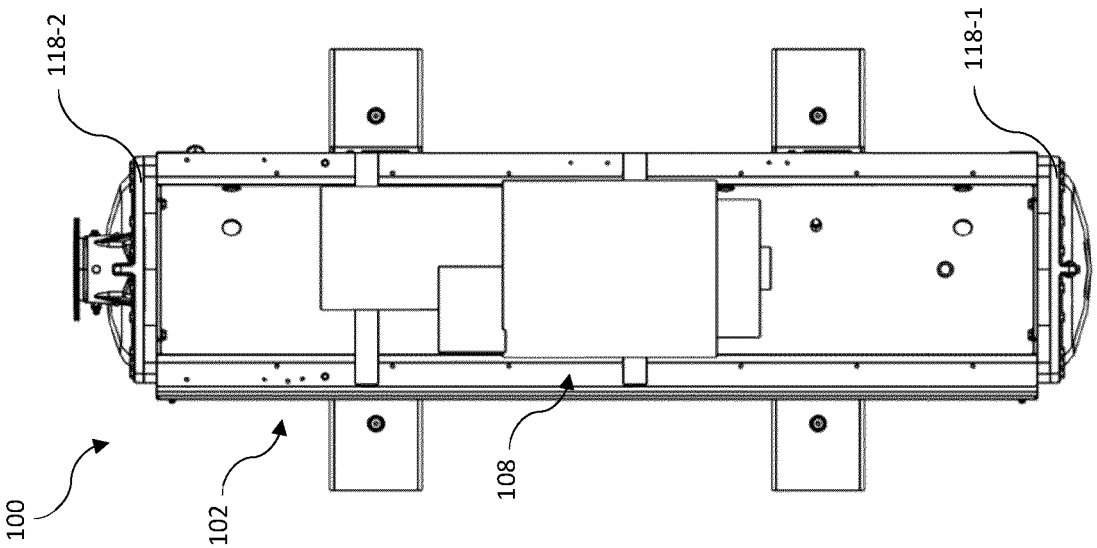

FIGURE 1d

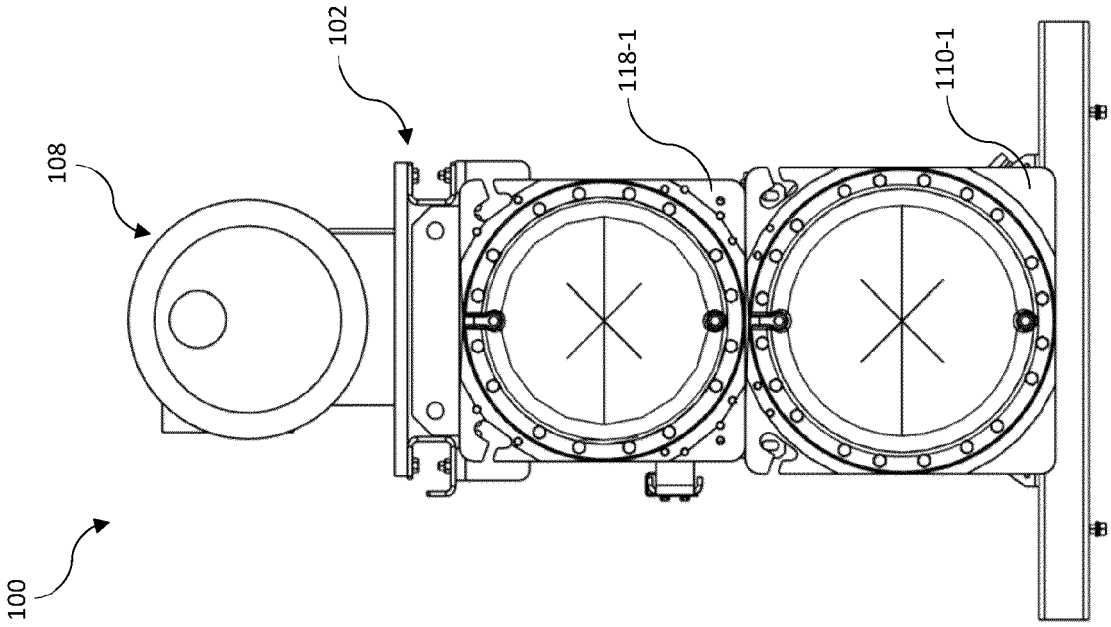

FIGURE 1c

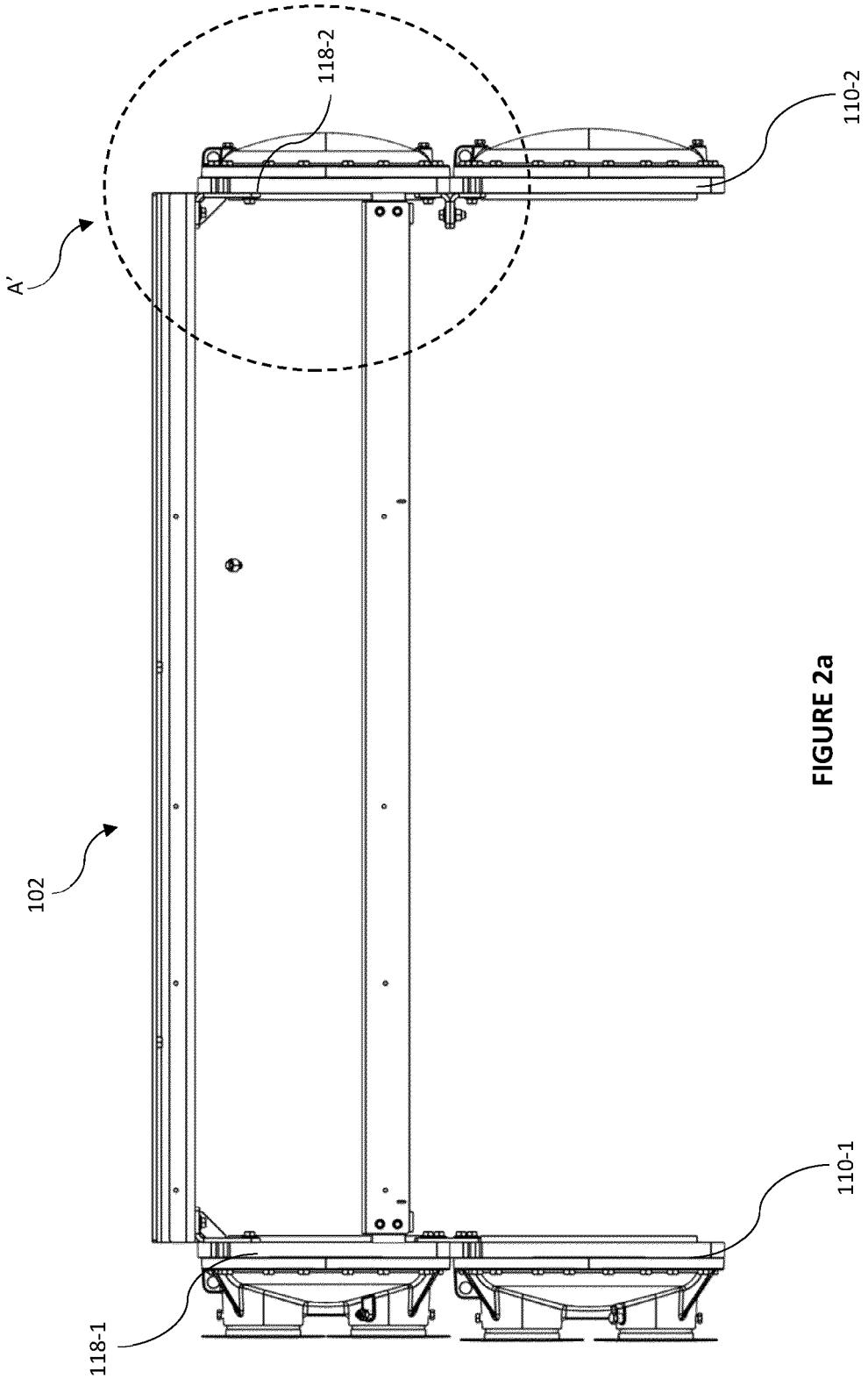

FIGURE 2a

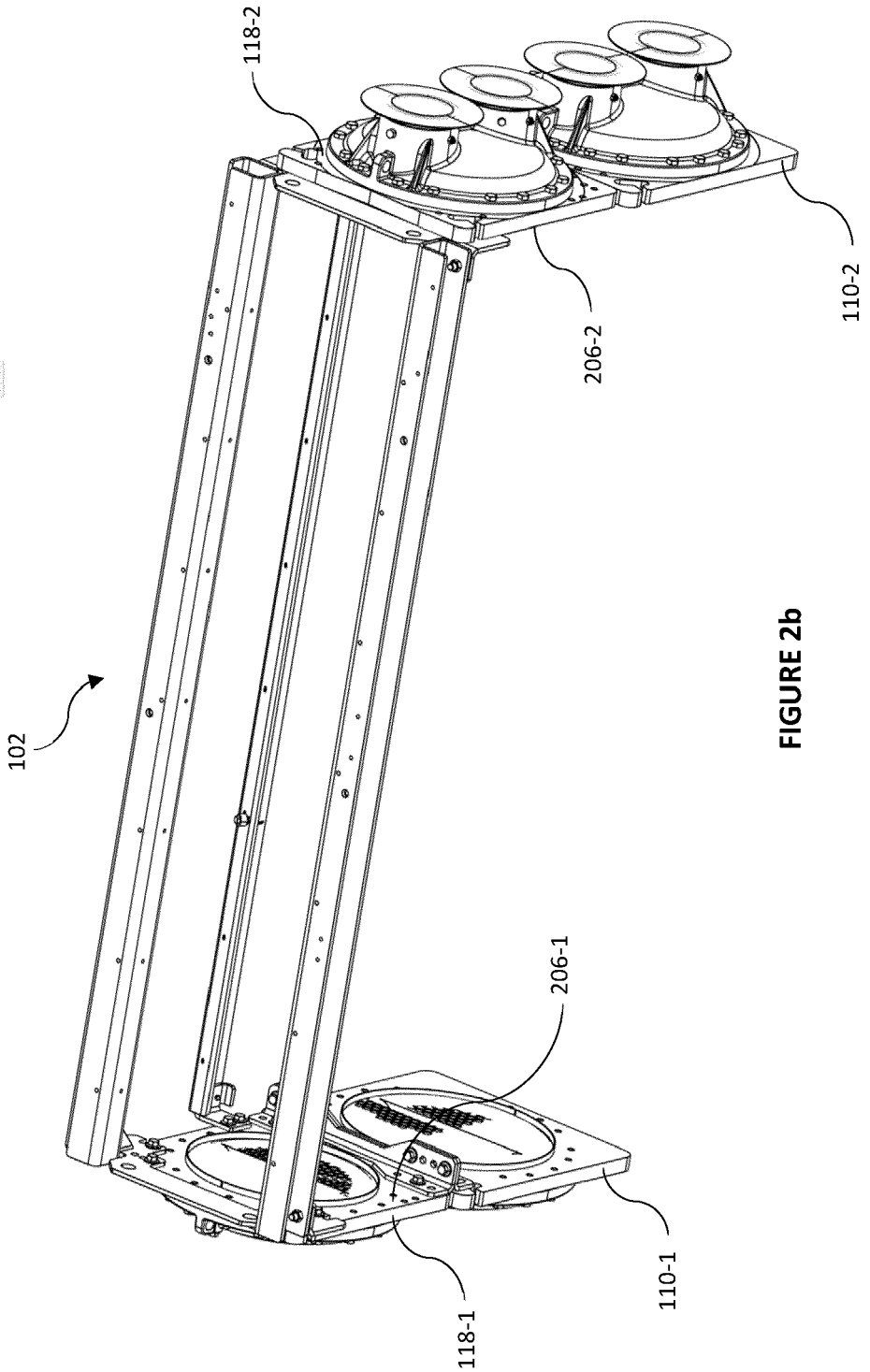

FIGURE 2b

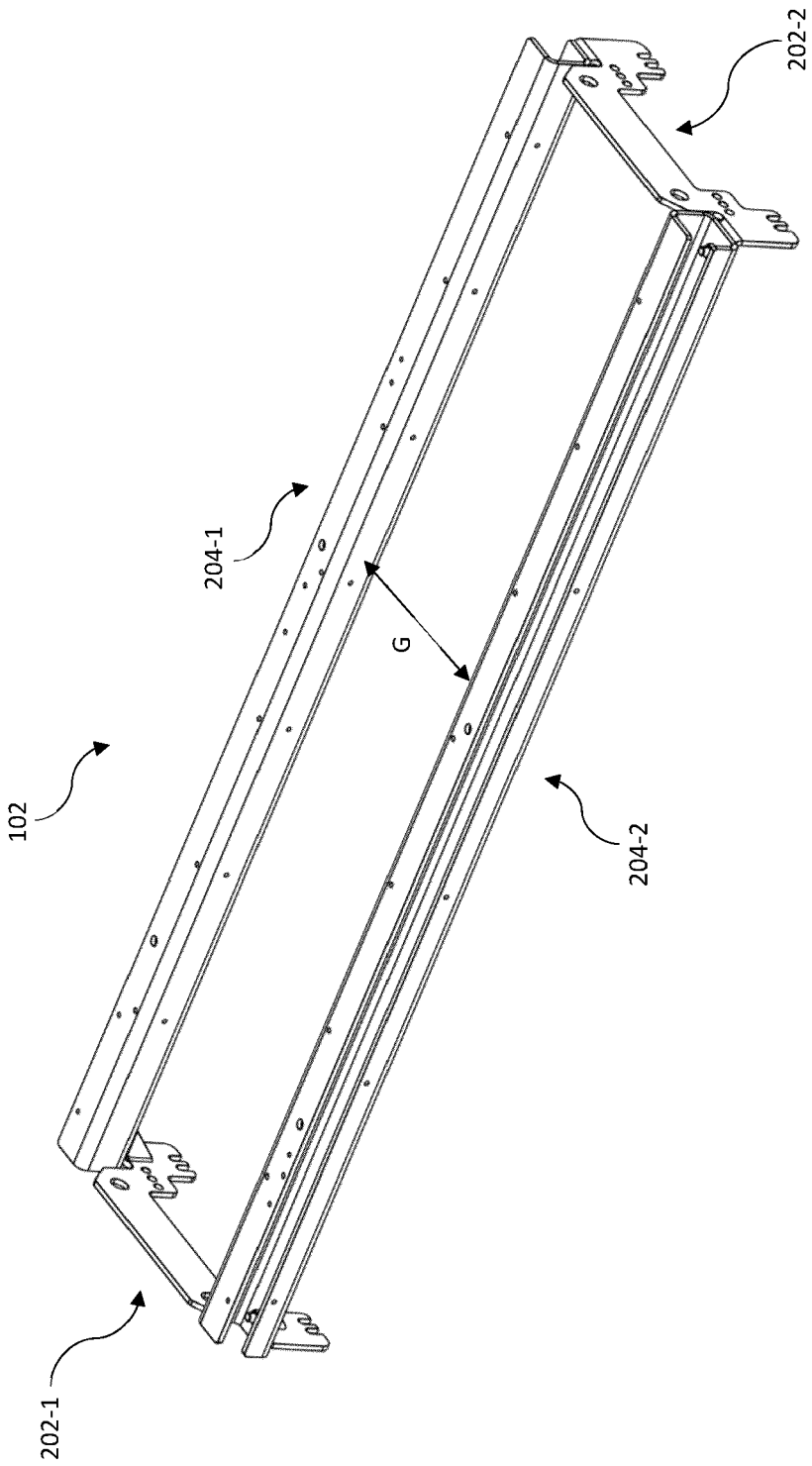

FIGURE 3

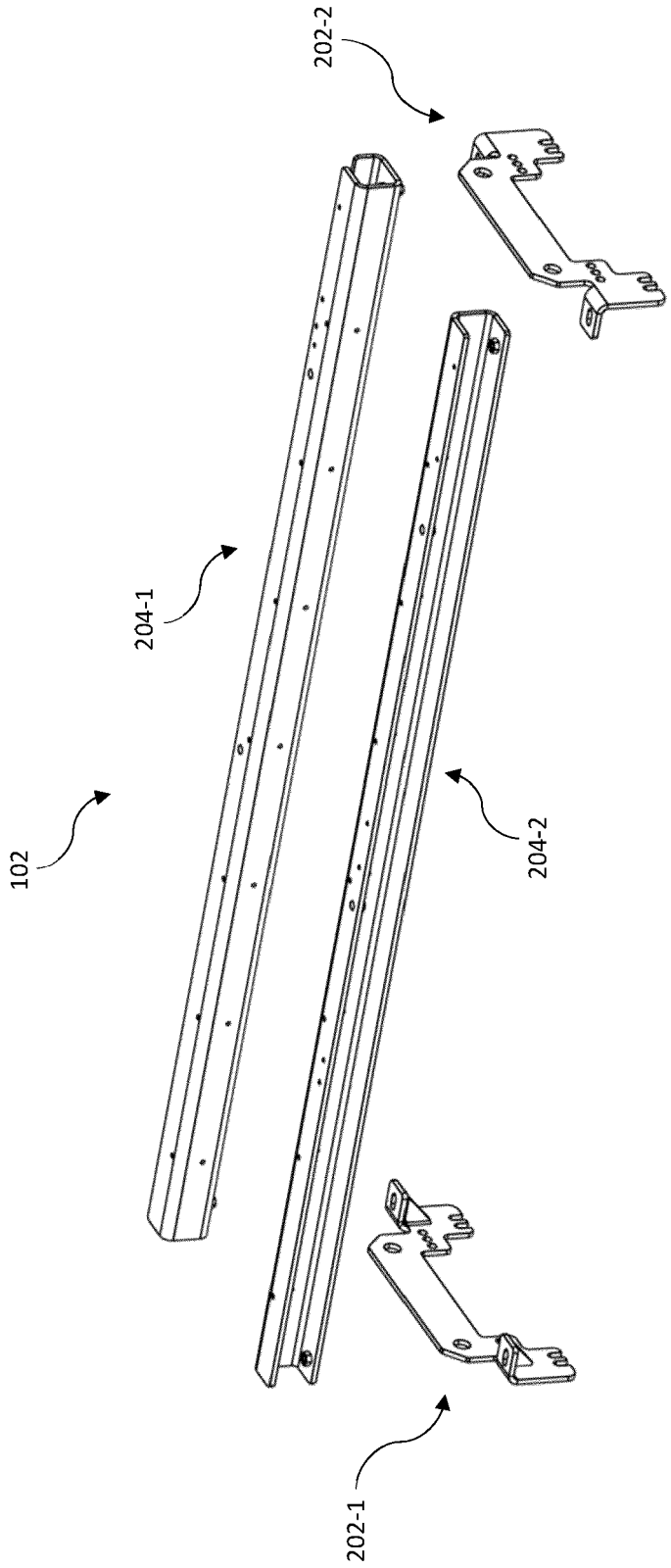

FIGURE 4

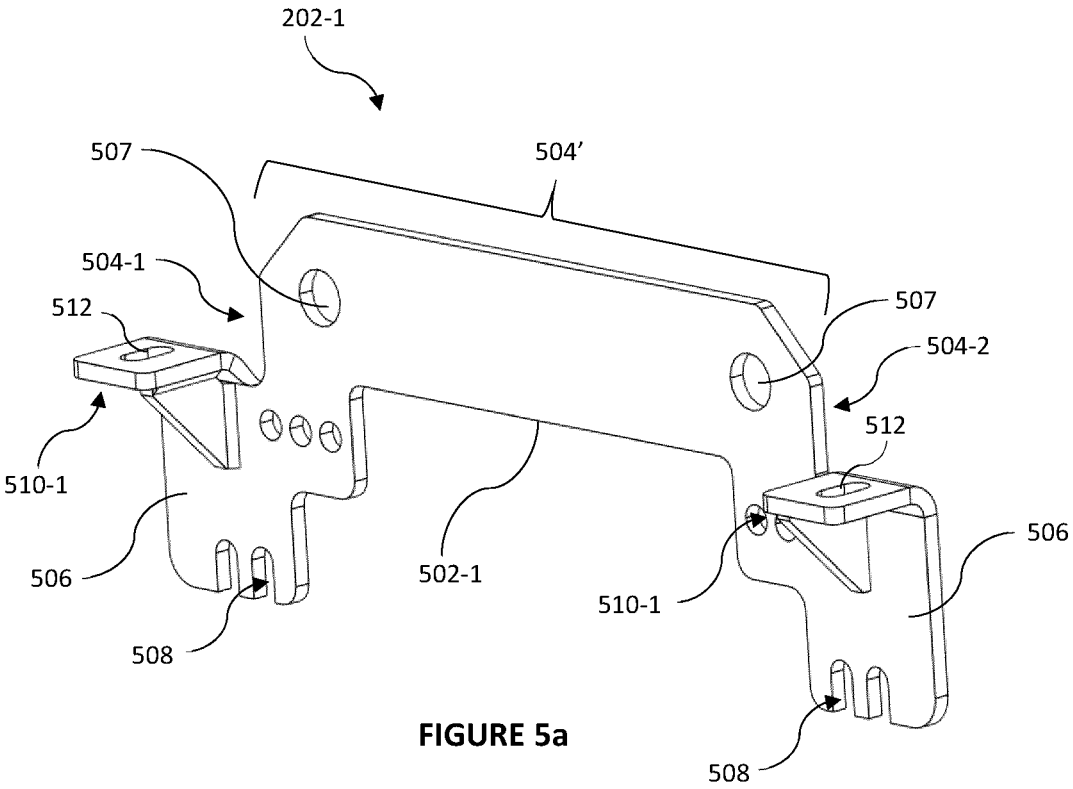

FIGURE 5a

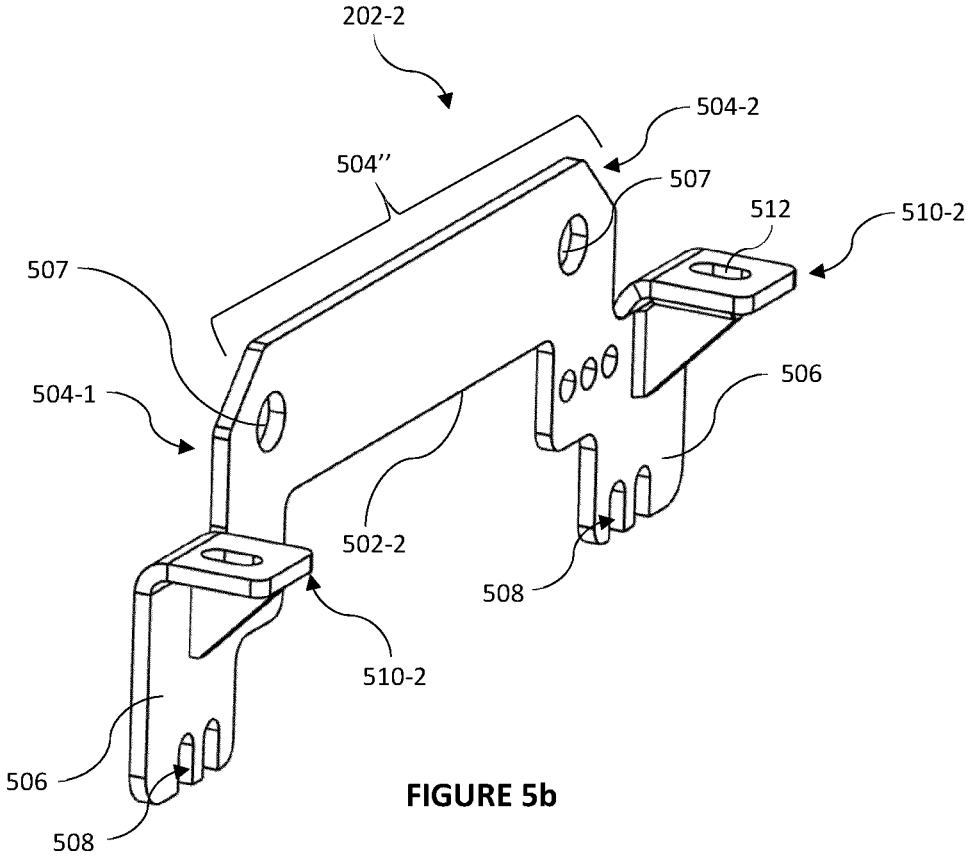

FIGURE 5b

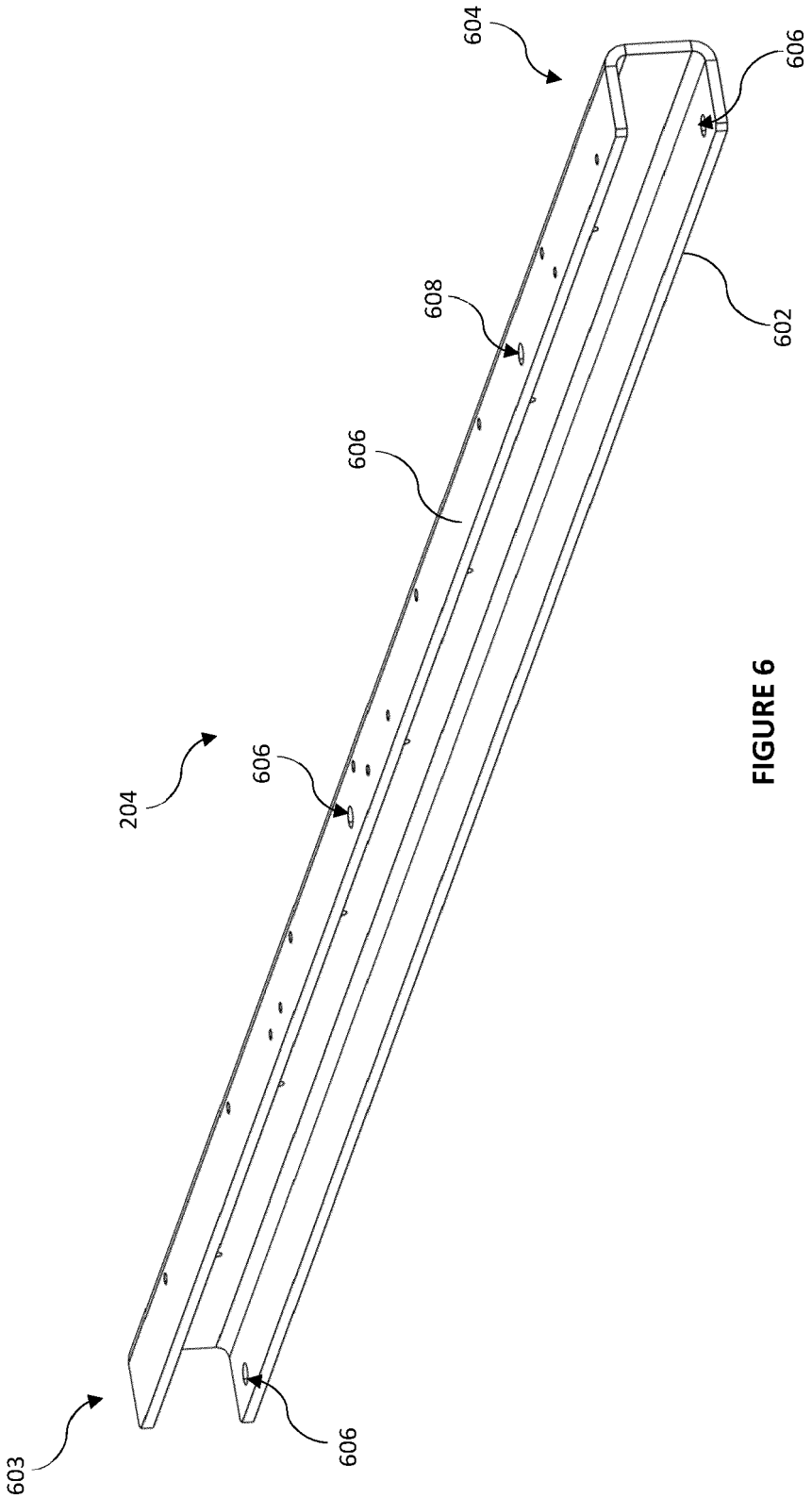

FIGURE 6

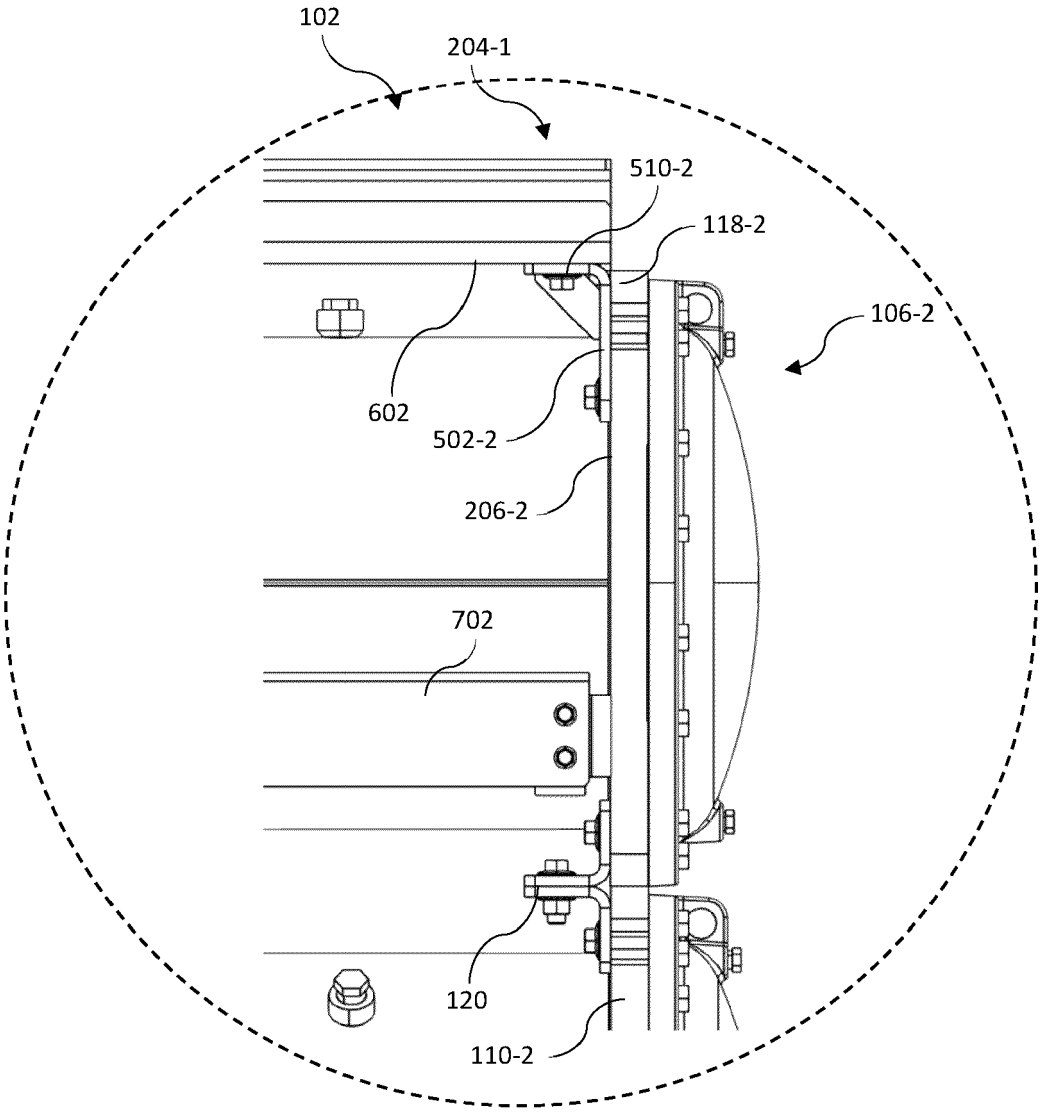

FIGURE 7

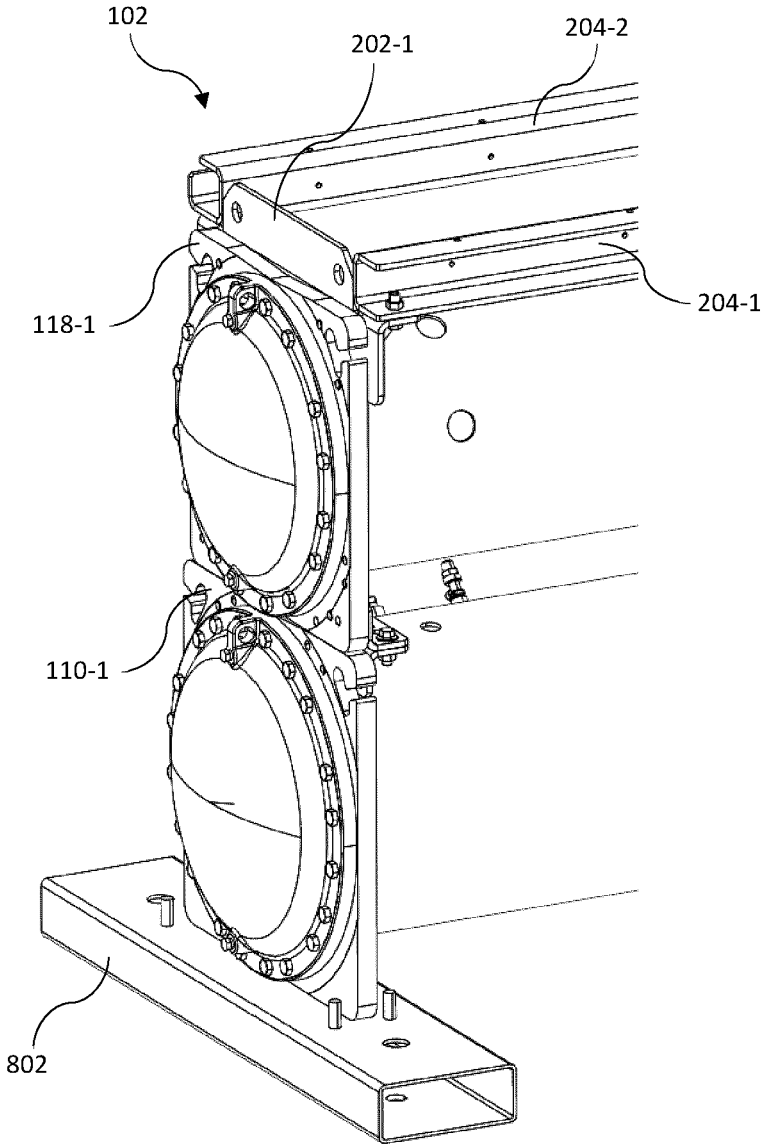

FIGURE 8

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 8798

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 814 226 A1 (TEFA [FR]) 22 March 2002 (2002-03-22) * & associated description; figure 1 *	1-15	INV. F25B31/02 F25B39/02 F25D23/00
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A	US 2016/201973 A1 (LOKHANDE ASHISHKUMAR S [IN] ET AL) 14 July 2016 (2016-07-14) * the whole document *	1-15	

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F25B
F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 April 2024	Gasper, Ralf

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 21 8798

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30-04-2024

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