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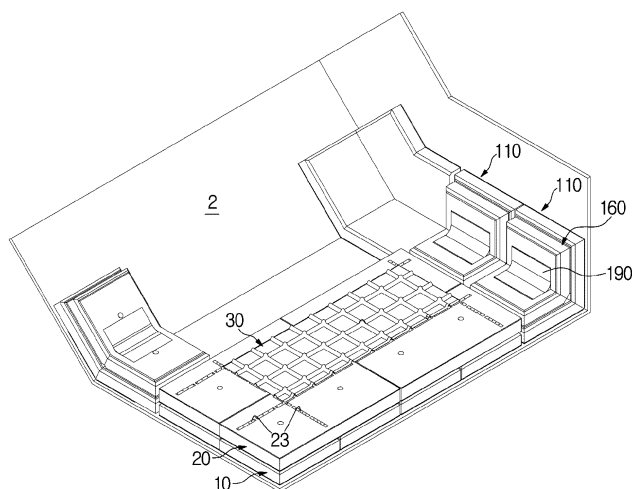
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(54) **BARRIER STRUCTURE FOR CORNER PORTION OF CARGO HOLD AND METHOD FOR INSTALLING BARRIER FOR CORNER PORTION OF CARGO HOLD**

(57) Disclosed herein are a barrier structure for a cargo hold corner and a method of installing a barrier of a cargo hold corner. A barrier structure for a cargo hold corner includes at least one lower corner insulation board including a first corner insulation board and a second corner insulation board each manufactured to be separated as a single body and installed at a corner of a cargo

hold, wherein: the first corner insulation board and the second corner insulation board have a shape in which a lower protective plate, a lower insulation member, and a lower auxiliary panel are stacked; and an incline of the second corner insulation board is attached to an incline of one side of the first corner insulation board to form an interface therebetween.

[Fig. 1]



Description

[Technical Field]

[0001] The present disclosure relates to a barrier structure of a cargo hold corner and a method of installing a barrier of a cargo hold corner.

[Background Art]

[0002] A barrier structure of a cargo hold of a ship that transports a cryogenic fluid (for example, liquefied natural gas (LNG)) generally has a structure in which a first barrier, an upper insulation board, a second barrier, and a lower insulation board are coupled to each other. That is, when a small amount of cryogenic fluid leaks from the first barrier, the second barrier prevents a secondary leak of the cryogenic fluid.

[0003] A lower insulation board, a second barrier, and an upper insulation board manufactured depending on a shape of a corner of a cargo hold are installed at the corner. In this case, a lower corner insulation board is generally manufactured in an integrated type and installed at the corner, and an upper corner insulation board is also manufactured in an integrated type and installed on a second barrier disposed on an upper side of the lower corner insulation board. The art related with the above refers to Korean Laid-open Patent Application No. 10-2008-0081314 (Published on March 03, 2010).

[0004] However, the lower corner insulation board is manufactured through a method of bonding a plywood lower protective plate to a foam lower insulation member, and exhibits vulnerability to thermal stress caused by a cryogenic fluid, and peel stress, shear stress, and the like caused by deformation of a hull. That is, the lower corner insulation board cannot endure a load generated when it expands and contracts under various load conditions, and is accordingly deformed or damaged

[Disclosure]

[Technical Problem]

[0005] Therefore, it is an aspect of the present disclosure to provide a barrier structure of a cargo hold corner which efficiently responds to various load conditions, and a method of installing a barrier of a cargo hold corner.

[0006] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.

[Technical Solution]

[0007] In accordance with one aspect of the present invention, a barrier structure for a cargo hold corner includes at least one lower corner insulation board including a first corner insulation board and a second corner

insulation board each manufactured to be separated as a single body and installed at a corner of a cargo hold, wherein: the first corner insulation board and the second corner insulation board have a shape in which a lower protective plate, a lower insulation member, and a lower auxiliary panel are stacked; and an incline of the second corner insulation board is attached to an incline of one side of the first corner insulation board to form an interface therebetween.

[0008] The barrier structure may further include at least one second curved barrier having a curved corner disposed around the interface and having both ends coupled by a fastening member over upper sides of the first corner insulation board and the second corner insulation board.

[0009] The barrier structure may further include a supporting member disposed on an upper side of the lower corner insulation board to support the second curved barrier around the interface and having a rear edge formed to correspond to a coupling angle between the first corner insulation board and the second corner insulation board and an upper end having a shape corresponding to a shape of a corner of the second curved barrier.

[0010] The barrier structure may further include a second joint barrier disposed between the lower corner insulation boards to cover a space between the second curved barriers and connected to the second curved barrier and a second flat barrier, wherein the second flat barrier is disposed over the lower flat insulation board installed on a flat part of the cargo hold and the lower corner insulation board to be connected to the second curved barrier.

[0011] The barrier structure may further include an upper corner insulation board manufactured in an integrated type and disposed on an upper side of a second corner barrier to correspond to the lower corner insulation board.

[0012] The barrier structure may further include a fixing piece inserted into an upper groove of the lower auxiliary panel and coupled by the fastening member; a coupling bolt vertically coupled to a coupling groove of the fixing piece and configured to protrude toward an inner hole of the upper insulation board; a washer coupled to the coupling bolt and supported by the upper auxiliary panel; and a nut coupled to the coupling bolt and tightened to apply force downward from an upper portion of the washer, wherein the upper insulation board has a structure in which the upper auxiliary panel, an upper insulation member, and an upper protective plate are stacked.

[0013] In accordance with another aspect of the present invention, a method of installing a barrier of a cargo hold corner includes (a) installing at least one lower corner insulation board, which includes a first corner insulation board and a second corner insulation board installed on one side of the first corner insulation board at a predetermined coupling angle therewith, at a corner of a cargo hold; (b) installing a second barrier on the lower corner insulation board; and (c) installing an upper corner insulation board on the second barrier, wherein the first corner insulation board and the second corner insulation

board are manufactured to be separated as a single body, and the upper corner insulation board is manufactured in an integrated type.

[0014] Operation (b) includes coupling, by the fastening member, a second curved barrier curved to correspond to the coupling angle between the first corner insulation board and the second corner insulation board over upper sides of the first corner insulation board and the second corner insulation board; disposing a second flat barrier to be connected to the second curved barrier over a lower flat insulation board installed on a flat part of the cargo hold and the lower corner insulation board; and disposing a second joint barrier on the lower corner insulation board to cover a space between second curved barriers and connect the second curved barrier to the second flat barrier.

[0015] The method may further include after operation (a), disposing, on the upper side of the lower corner insulation board, a supporting member including a rear edge formed to correspond to the coupling angle between the first corner insulation board and the second corner insulation board, and a concave upper end corresponding to a shape of a corner of the second curved barrier.

[0016] Operation (a) includes installing the first corner insulation board and the second corner insulation board so that an incline of the second corner insulation board is attached to an incline of one side of the first corner insulation board to form an interface therebetween, wherein, in the coupling of the second curved barrier, a curved corner of the second curved barrier is disposed around the interface.

[0017] The first corner insulation board and the second corner insulation board have a structure in which a lower protective plate, a lower insulation member, and a lower auxiliary panel are stacked; the upper insulation board has a structure in which an upper auxiliary panel, an upper insulation member, and an upper protective plate are stacked; and a fixing piece coupled by the fastening member is provided in the upper groove of the lower auxiliary panel, wherein operation (c) includes: fastening a washer to a coupling bolt vertically coupled to a coupling groove of the fixing piece to protrude toward an inner hole of the upper insulation board to be supported by the upper auxiliary panel; and pressing a nut downward by fastening the nut to an upper portion of the washer.

[Advantageous Effects]

[0018] As is apparent from the above description, a barrier structure of a cargo hold corner and a method of installing a barrier of a cargo hold corner according to the embodiment of the present disclosure can efficiently respond to various load conditions.

[0019] Also, a barrier structure of a cargo hold corner can efficiently respond to thermal stress caused by a cryogenic fluid and peel stress, shear stress, and the like caused by deformation of a hull by including a lower cor-

ner insulation board including a first corner insulation board and a second corner insulation board manufactured to be separated as a single body and installed in a corner of a cargo hold in transverse and longitudinal directions.

[0020] Effects of the present disclosure are not limited to the above-described effects, and other unmentioned effects may be clearly understood by those skilled in the art from the above description.

[Description of Drawings]

[0021] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating a barrier structure of a cargo hold according to an embodiment of the present invention.

FIG. 2 is a perspective view illustrating a portion of the barrier structure of FIG. 1, which shows a lower insulation board and a second barrier installed in a corner part and a flat part.

FIG. 3 is a perspective view illustrating a lower corner insulation board manufactured separately to be installed at a cargo corner part of FIG. 2.

FIG. 4 is a perspective view illustrating the lower corner insulation board of FIG. 3 which is installed at a cargo corner part.

FIG. 5 is a cross-sectional view illustrating the lower corner insulation board of FIG. 4 which is fixed to an inner hull wall by stud bolts.

FIG. 6 is a perspective view illustrating a supporting member installed on the lower corner insulation board of FIG. 4.

FIG. 7 is a perspective view illustrating a second curved barrier disposed on the supporting member of FIG. 6.

FIG. 8 is a perspective view illustrating a second flat barrier and a second joint barrier installed to be connected to the second curved barrier of FIG. 7.

FIG. 9 is a cross-sectional view illustrating an upper corner insulation board installed on the second barrier of FIG. 8 by a coupling bolt.

[Modes of the Invention]

[0022] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with refer-

ence to the accompanying drawings. The accompanying drawings set forth hereinafter are proposed for illustrative purposes to sufficiently explain the spirit of the present disclosure to those having ordinary knowledge in the related art to which the present disclosure pertains. The following embodiments of the present disclosure are not restricted to the description below, and may be embodied with other variations. Parts irrelevant to the description have been omitted in the drawings in order to clearly explain the present disclosure. Further, widths, lengths, thicknesses, or the like of components may be exaggerated in the drawings for convenience. Like reference numerals denote like elements throughout the specification.

[0023] Referring to FIGS. 1 and 2, a barrier structure of a cargo hold for storing a cryogenic fluid, for example, liquefied natural gas (LNG), according to an embodiment of the present disclosure includes a lower corner insulation board 110, a second corner barrier, an upper corner insulation board 160, and a coupling device.

[0024] Referring to FIGS. 2 and 3, the lower corner insulation board 110 includes a first corner insulation board 110a and a second corner insulation board 110b each manufactured to be separated as a single body. The first corner insulation board 110a is disposed on a bottom surface of a corner of a cargo hold, and the second corner insulation board 110b is disposed on a side of the corner of the cargo hold. An interface B is formed at one portion of the first corner insulation board 110a that forms an incline G1 toward the side of the cargo hold by being attached to an incline G2 of the second corner insulation board 110b. The first corner insulation board 110a and the second corner insulation board 110b may be disposed at various angles, for example, 90°, 135°, or the like, depending on a shape of the corner of the cargo hold. In the following embodiment, the first corner insulation board 110a and the second corner insulation board 110b will be described as being disposed at a 90° angle as an example to facilitate understanding.

[0025] Each of the first corner insulation board 110a and the second corner insulation board 110b may have a structure in which a lower protective plate 111, a lower insulation member 112, and a lower auxiliary panel 113 are stacked. A lower flat insulation board 10 installed at a flat part of the cargo hold has the same structure as the structure of the first and second corner insulation boards 110a and 110b. The lower protective plate 111 may be manufactured of plywood or the like. The lower insulation member 112 may be adhered to an upper side of the lower protective plate 111 by an adhesive, for example, glue or the like, and may be manufactured of polyurethane foam (PUF), reinforced polyurethane foam (RPUF), and the like to protect a hull from the cryogenic fluid. The lower auxiliary panel 113 on an upper side of the lower insulation member 112 may be manufactured of, for example, plywood or the like. The lower insulation member 112 and the lower auxiliary panel 113 have chamfered upper edges C in an inclined shape so that a portion at which wrinkles of the second barrier intersect

is appropriately disposed at a corresponding portion.

[0026] Referring to FIGS. 4 and 5, the lower corner insulation board 110 may be fixed to an inner hull wall 2 by a mastic 3, a stud bolt 4, and the like. The stud bolt 4 is vertically fixed to the inner hull wall 2 and is inserted into an inner hole S1 formed in the lower corner insulation board 110. A lower portion of the stud bolt 4 may be welded and attached to the inner hull wall 2. A washer 5 fastened to the stud bolt 4 is supported by the lower protective plate 111, and a nut 6 is fastened to an upper portion of the washer 5 to pressure the nut downward. A plug member 7, for example, made of a foam material, may be disposed in an inner hole S1 of the lower insulation board 110 in which the stud bolt 4 is installed.

[0027] As shown in FIG. 6, a supporting member 130 is disposed on an upper side of the lower corner insulation board 110 around the interface B. The supporting member 130 is disposed over the first corner insulation board 110a and the second corner insulation board 110b to be attached thereto around the interface B to support a second curved barrier 121 disposed at an upper portion of the supporting member 130. The supporting member 130 includes a rear edge 130a corresponding to a coupling angle between the first corner insulation board 110a and the second corner insulation board 110b and a concave upper end 130b corresponding to a shape of a corner 121a of the second curved barrier 121. The supporting member 130 is tightly disposed inside a gap between the corner 121a of the second curved barrier 121 and the lower corner insulation board 110 to more stably couple the lower corner insulation board 110 and the second curved barrier 121, thereby effectively responding to a load applied under various conditions.

[0028] The second corner barrier includes the second curved barrier 121 and a second joint barrier 123 (see FIG. 8).

[0029] Referring to FIG. 7, the second curved barrier 121 is disposed on the supporting member 130, and the curved corner 121a is disposed around the interface B. The second curved barrier 121 has flat parts 121b extending from both sides of the corner 121a, and a degree of curvature of the corner 121a may be pre-designed or the corner 121a may be pre-manufactured depending on a coupling angle between the first corner insulation board 110a and the second corner insulation board 110b. In the embodiment of the present disclosure, the second curved barrier 121 may be manufactured so that an angle between the flat parts 121b is 90°. In the second curved barrier 121, both ends of the flat parts 121b are coupled to upper sides of the first corner insulation board 110a and the second corner insulation board 110b by fastening members R1, which include a rivet and the like. Therefore, the first corner insulation board 110a and the second corner insulation board 110b may be effectively coupled by the second curved barrier 121 disposed on the upper portion of the supporting member 130 so that the inclines G1 and G2 (see FIG. 3) of the first corner insulation board 110a and the second corner insulation board 110b are

attached to each other.

[0030] Referring to FIGS. 2 and 8, second flat barriers 122 connected to second curved barriers 121 are disposed on the lower flat insulation boards 10 installed on the flat part of the cargo hold and the lower corner insulation board 110. The lower flat insulation board 10 may include strip members 12 in an upper groove in horizontal and vertical directions. The lower flat insulation board 10 is not shown in FIG. 8 for convenience of description.

[0031] The second flat barrier 122 may cover an upper side of the lower flat insulation board 10 and/or a space between the lower flat insulation boards 10. Also, the second flat barrier 122 is disposed to connect the second curved barriers 121 disposed at both of the lower corner insulation boards 110 with the periphery thereof, thereby covering the upper sides of the lower corner insulation board 110 and the lower flat insulation board 10 of the corner and the flat part of the cargo hold and/or a space between the lower corner insulation board 110 and the lower flat insulation board 10. The second flat barrier 122 may be installed and coupled to the stud bolt 5 provided on the upper side of the lower flat insulation board 10 to cover the upper side of the lower flat insulation board 10 and/or a space between the lower flat insulation boards 10. In this case, the stud bolt 5 may be provided at each of the centers of the upper sides of the lower flat insulation boards 10 arranged in a square shape, and the second flat barrier 122 may cover upper sides of at least two lower flat insulation boards 10. Also, the second flat barrier 122 is installed and coupled to the stud bolt 5 provided on the upper side of the lower flat insulation board 10 and a coupling bolt 170 provided on the lower corner insulation board 110 to cover the cargo hold corner and the upper sides of the lower corner insulation board 110 and the lower flat insulation board 10 of the corner and the flat part of the cargo hold and/or a space between the lower corner insulation board 110 and the lower flat insulation board 10. The coupling bolt 170 will be described in FIG. 9 in detail, and the stud bolt 5 provided on the upper side of the lower flat insulation board 10 and the coupling bolt 170 provided at the lower corner insulation board 110 may be manufactured in the same shape.

[0032] The second joint barrier 123 covers a space between the second curved barriers 121 and is disposed over a space between the lower corner insulation boards 110 to connect the second curved barrier 121 with the second flat barrier 122. The second joint barrier 123 may be provided in a shape that is curved at an angle corresponding to the second curved barrier 121. Portions at which the second curved barrier 121, the second flat barrier 122, and the second joint barrier 123 overlap each other may be welded and joined.

[0033] Referring to FIGS. 1 and 9, the upper corner insulation board 160 is manufactured in an integrated type and is disposed on an upper portion of the second barrier to correspond to the lower corner insulation board 110. The upper corner insulation board 160 may have a

shape in which a shock absorbing layer 161, an upper auxiliary panel 162, an upper insulation member 163, and an upper protective plate 164 are stacked. An upper flat insulation board 20 installed at a plate part of the cargo hold also has the same shape as the upper corner insulation board 160. A first corner barrier 190 may be installed on an upper side of the upper corner insulation board 160. The first corner barrier 190 may be connected to a flat part first barrier 30 installed at an upper side of the upper flat insulation board 20. In this case, the upper flat insulation board 20 may be manufactured in a rectangular shape to cover at least two lower flat insulation boards 10 on a lower side thereof. As described above, the second flat barrier 122 is interposed between the upper flat insulation board 20 and the lower flat insulation board 10, and a size ratio of the upper flat insulation board 20 to, for example, the lower flat insulation board 10 may be 1:2. The upper flat insulation board 20 may be installed and coupled to the stud bolt 5 described above. The upper flat insulation board 20 may include strip members 23 that may slide in the upper groove in the horizontal and vertical directions to respond to thermal stress.

[0034] As shown in FIG. 9, the coupling device described above includes the coupling bolt 170 and a fastening unit 180. A fixing piece 140 (see FIG. 3) coupled by a fastening member R2, such as a rivet, is provided in an upper groove 113a of the lower auxiliary panel 113. A space may be formed between the fixing piece 140 and the upper groove 113a of the lower auxiliary panel 113 so that thermal stress may be effectively responded. The fixing piece 140 may be manufactured of, for example, a metal material.

[0035] In this case, the coupling bolt 170 is vertically coupled to a coupling groove 140a of the fixing piece 140 to protrude toward an inner hole S2 of the upper corner insulation board 160. A periphery W of a through hole of the second flat barrier 122 coupled to the coupling bolt 170 may be welded to the fixing piece 140 in a round welding method. The coupling groove 140a of the fixing piece 140 may have a groove shape with a predetermined depth.

[0036] The fastening unit 180 includes a washer 181 coupled to the coupling bolt 170 protruding toward the inner hole S2 of the upper insulation board 160 and supported by the upper auxiliary panel 162, and a nut 182 coupled to the coupling bolt 170 and tightened to apply force downward from an upper portion of the washer 181. An upper end of the inner hole S2 of the upper corner insulation board 160 may be closed by a cover (not shown).

[0037] Hereinafter, a process of installing a barrier of a cargo hold corner will be described.

[0038] Referring to FIGS. 3 and 4, first, the first corner insulation board 110a is installed in a transverse direction so that the incline G1 faces a side of a cargo hold, the second corner insulation board 110b is installed in a longitudinal direction to be attached to the incline G1, and then the incline G2 of the second corner insulation board

110b is attached to the incline G1 of the first corner insulation board 110a. In his case, the stud bolt 4 vertically fixed to the inner hull wall 2 is inserted into each inner hole S1 of the first and second corner insulation boards 110a and 110b so that the first corner insulation board 110a and the second corner insulation board 110b may be installed. According to the above manner, the lower corner insulation boards 110 may be installed in parallel.

[0039] Referring to FIG. 6, the supporting member 130 is disposed over the first corner insulation board 110a and the second corner insulation board 110b around the interface B.

[0040] Referring to FIG. 7, the second curved barrier 121 is disposed on an upper portion of the supporting member 130, and both ends thereof are coupled by the fastening member R1 over upper sides of the first corner insulation board 110a and the second corner insulation board 110b. In this case, the curved corner 121a of the second curved barrier 121 is disposed around the interface B. The first corner insulation board 110a and the second corner insulation board 110b manufactured to be separated as a single body may be effectively coupled to each other by the second curved barrier 121, and can efficiently respond to thermal stress caused by a cryogenic fluid and peel stress, shear stress, and the like caused by deformation of a hull. In this case, the washer 5 and the nut 6 are fastened to the stud bolt 4 described above, plug members 7 are inserted into the inner holes S1 of the first corner insulation board 110a and the second corner insulation board 110b, a work of covering the inner holes S1 with a cover 8, and so on may be performed. The above works may be performed after the first corner insulation board 110a and the second corner insulation board 110b are installed at the stud bolt 4 vertically fixed to the inner hull wall 2 described above.

[0041] Referring to FIG. 8, the second flat barrier 122 is disposed on an upper side of the lower flat insulation board 10 (see FIG. 2) to be connected to the second curved barrier 121. The lower flat insulation board 10 is not shown in FIG. 8 for convenience of description.

[0042] Next, the second joint barrier 123 is installed over a space between the lower corner insulation boards 110 to cover a space between the second curved barriers 121 and connected to the second curved barrier 121 and the second flat barrier 122. Peripheral portions at which the second curved barrier 121, the second flat barrier 122, and the second joint barrier 123 overlap each other may be welded and joined.

[0043] Referring to FIGS. 1 and 9, the upper corner insulation board 160 is disposed on the second barrier to correspond to the lower corner insulation board 110.

[0044] Next, the washer 181 and the nut 182 are each fastened to the coupling bolt 170 protruding toward the inner hole S2 of the upper corner insulation board 160, and the nut 182 is tightened while the washer 181 is supported by the upper auxiliary panel 162 to apply pressure downward. An upper end of the inner hole S2 may be covered by a cover (not shown).

[0045] A work of installing the first corner barrier 190 on the upper corner insulation board 160 may be performed.

[0046] The work of installing the barrier of the cargo hold corner described above may be sequentially performed with a work of installing a flat barrier. That is, a lower insulation board, a second barrier, an upper insulation board, and a first barrier may be installed sequentially.

[0047] Specific embodiments of the present disclosure have been illustrated and described above. However, the disclosure is not limited to the aforementioned specific exemplary embodiments, and those skilled in the art may variously modify the disclosure without departing from the gist of the disclosure claimed by the appended claims within the scope of the claims.

Claims

1. A barrier structure for a cargo hold corner, comprising at least one lower corner insulation board including a first corner insulation board and a second corner insulation board each manufactured to be separated as a single body and installed at a corner of a cargo hold, wherein:

the first corner insulation board and the second corner insulation board have a shape in which a lower protective plate, a lower insulation member, and a lower auxiliary panel are stacked; and an incline of the second corner insulation board is attached to an incline of one side of the first corner insulation board to form an interface therebetween.

2. The barrier structure according to claim 1, further comprising at least one second curved barrier having a curved corner disposed around the interface and having both ends coupled by a fastening member over upper sides of the first corner insulation board and the second corner insulation board.
3. The barrier structure according to claim 2, further comprising a supporting member disposed on an upper side of the lower corner insulation board to support the second curved barrier around the interface and having a rear edge formed to correspond to a coupling angle between the first corner insulation board and the second corner insulation board and an upper end having a shape corresponding to a shape of a corner of the second curved barrier.
4. The barrier structure according to claim 2, further comprising a second joint barrier disposed between the lower corner insulation boards to cover a space between the second curved barriers and connected to the second curved barrier and a second flat barrier,

wherein the second flat barrier is disposed over the lower flat insulation board installed on a flat part of the cargo hold and the lower corner insulation board to be connected to the second curved barrier.

5. The barrier structure according to claim 4, further comprising an upper corner insulation board manufactured in an integrated type and disposed on an upper side of a second corner barrier to correspond to the lower corner insulation board.

6. The barrier structure according to claim 5, further comprising:

a fixing piece inserted into an upper groove of the lower auxiliary panel and coupled by the fastening member;

a coupling bolt vertically coupled to a coupling groove of the fixing piece and configured to protrude toward an inner hole of the upper insulation board;

a washer coupled to the coupling bolt and supported by the upper auxiliary panel; and a nut coupled to the coupling bolt and tightened to apply force downward from an upper portion of the washer,

wherein the upper insulation board has a structure in which the upper auxiliary panel, an upper insulation member, and an upper protective plate are stacked.

7. A method of installing a barrier of a cargo hold corner, comprising:

(a) installing at least one lower corner insulation board, which includes a first corner insulation board and a second corner insulation board installed on one side of the first corner insulation board at a predetermined coupling angle therewith, at a corner of a cargo hold;

(b) installing a second barrier on the lower corner insulation board; and

(c) installing an upper corner insulation board on the second barrier,

wherein the first corner insulation board and the second corner insulation board are manufactured to be separated as a single body, and the upper corner insulation board is manufactured in an integrated type.

8. The method according to claim 7, wherein operation (b) includes:

coupling, by the fastening member, a second curved barrier curved to correspond to the coupling angle between the first corner insulation board and the second corner insulation board

over upper sides of the first corner insulation board and the second corner insulation board; disposing a second flat barrier to be connected to the second curved barrier over a lower flat insulation board installed on a flat part of the cargo hold and the lower corner insulation board; and

disposing a second joint barrier on the lower corner insulation board to cover a space between second curved barriers and connect the second curved barrier to the second flat barrier.

9. The method according to claim 8, further comprising, after operation (a), disposing, on the upper side of the lower corner insulation board, a supporting member including a rear edge formed to correspond to the coupling angle between the first corner insulation board and the second corner insulation board, and a concave upper end corresponding to a shape of a corner of the second curved barrier.

10. The method according to claim 8, wherein operation (a) includes installing the first corner insulation board and the second corner insulation board so that an incline of the second corner insulation board is attached to an incline of one side of the first corner insulation board to form an interface therebetween, wherein, in the coupling of the second curved barrier, a curved corner of the second curved barrier is disposed around the interface.

11. The method according to claim 8, wherein:

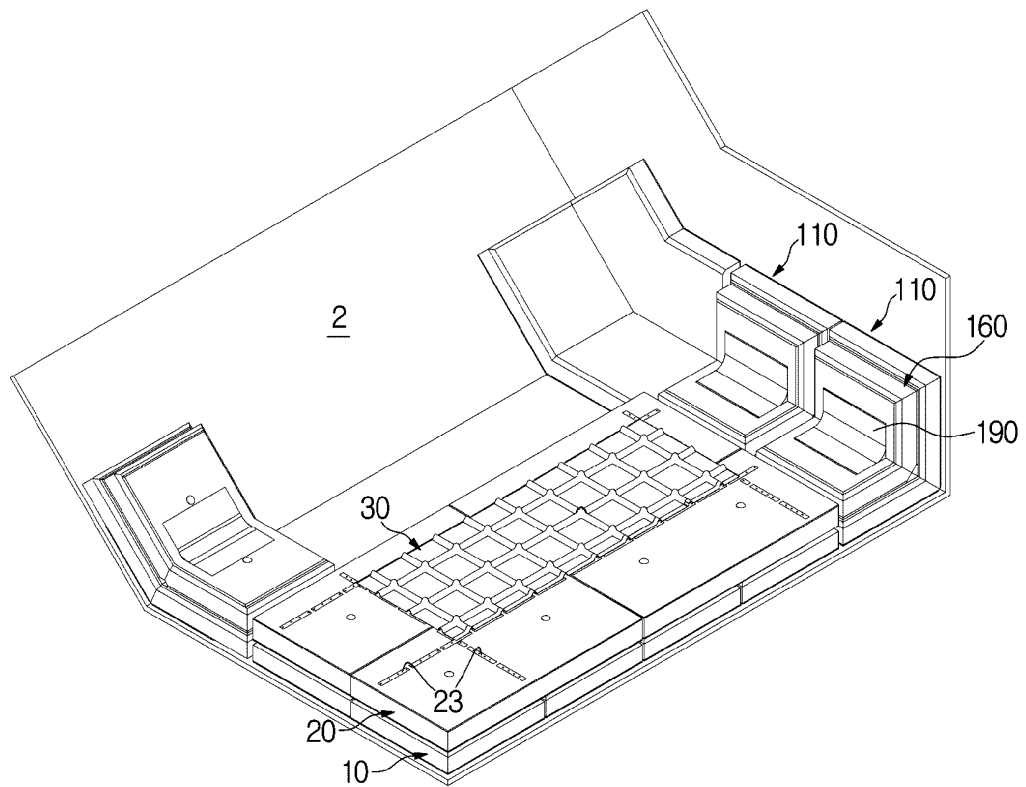
the first corner insulation board and the second corner insulation board have a structure in which a lower protective plate, a lower insulation member, and a lower auxiliary panel are stacked; the upper insulation board has a structure in which an upper auxiliary panel, an upper insulation member, and an upper protective plate are stacked; and

a fixing piece coupled by the fastening member is provided in the upper groove of the lower auxiliary panel,

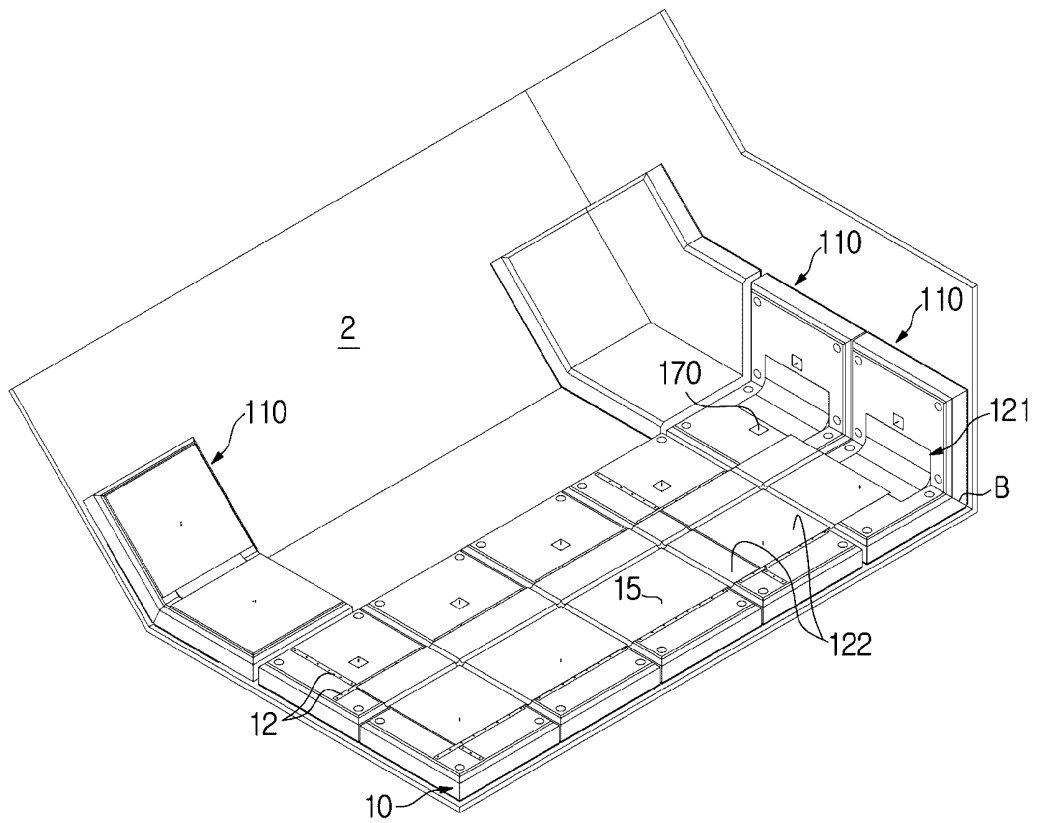
wherein operation (c) includes:

fastening a washer to a coupling bolt vertically coupled to a coupling groove of the fixing piece to protrude toward an inner hole of the upper insulation board to be supported by the upper auxiliary panel; and pressing a nut downward by fastening the nut to an upper portion of the washer.

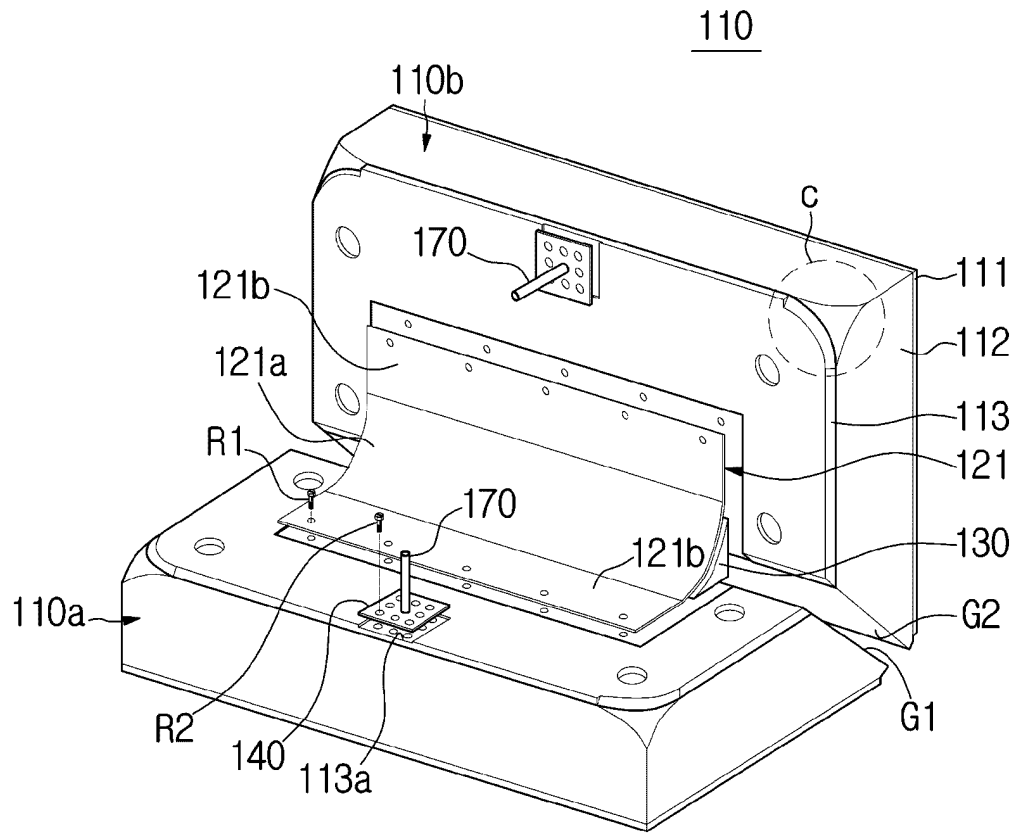
[Fig. 1]



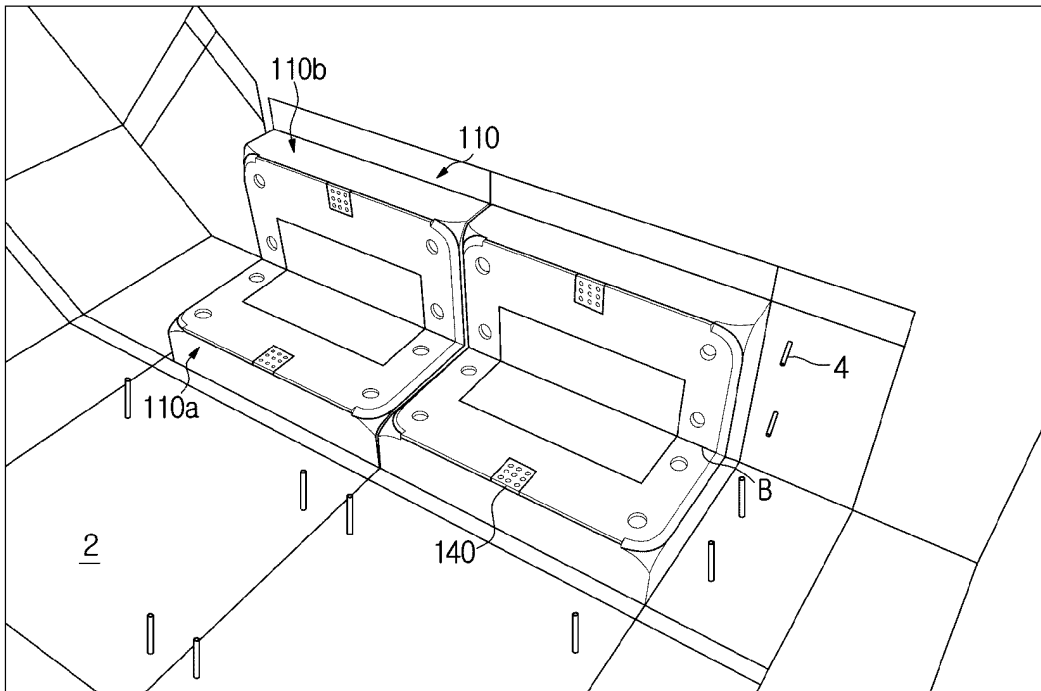
[Fig. 2]



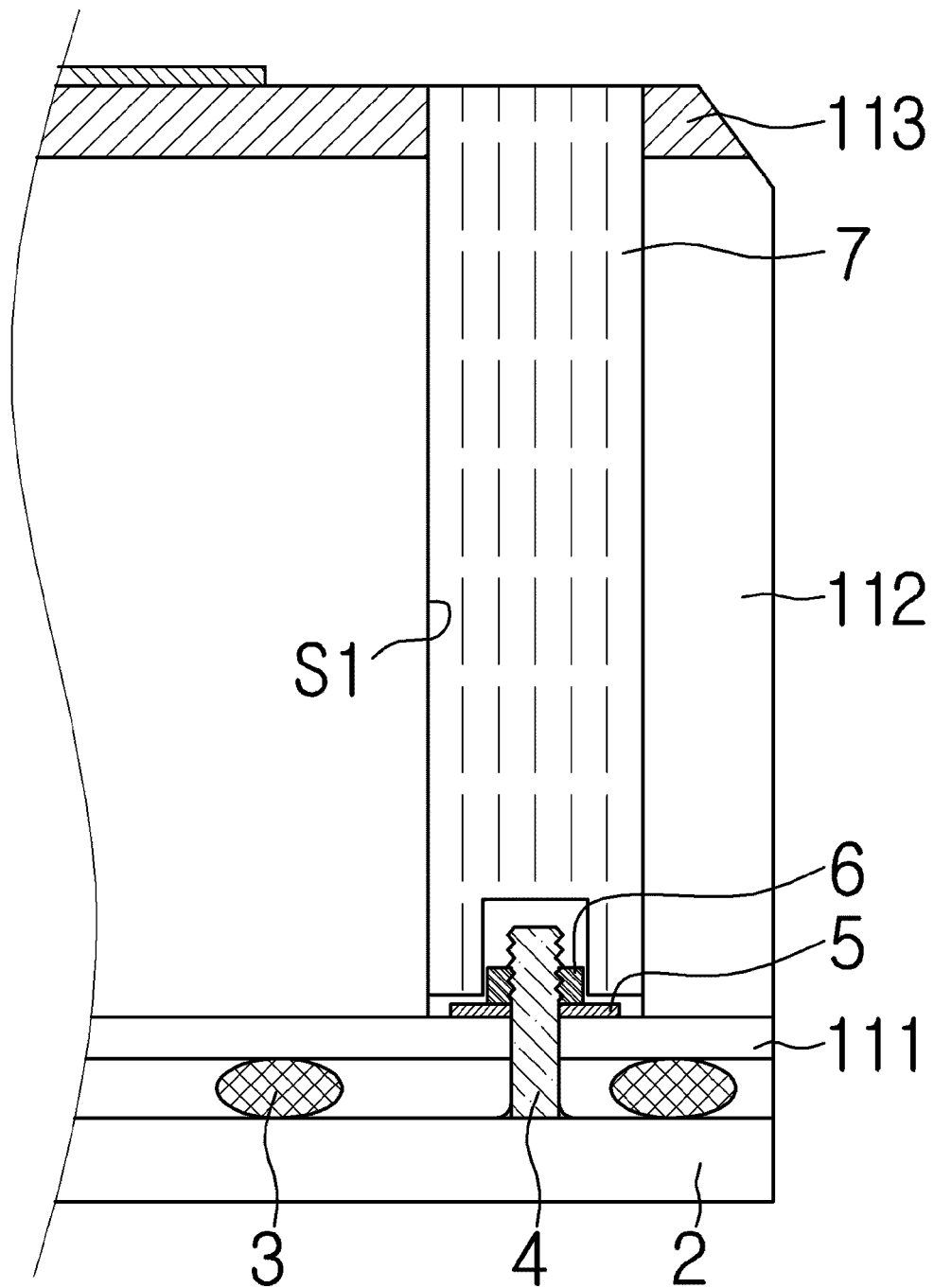
[Fig. 3]



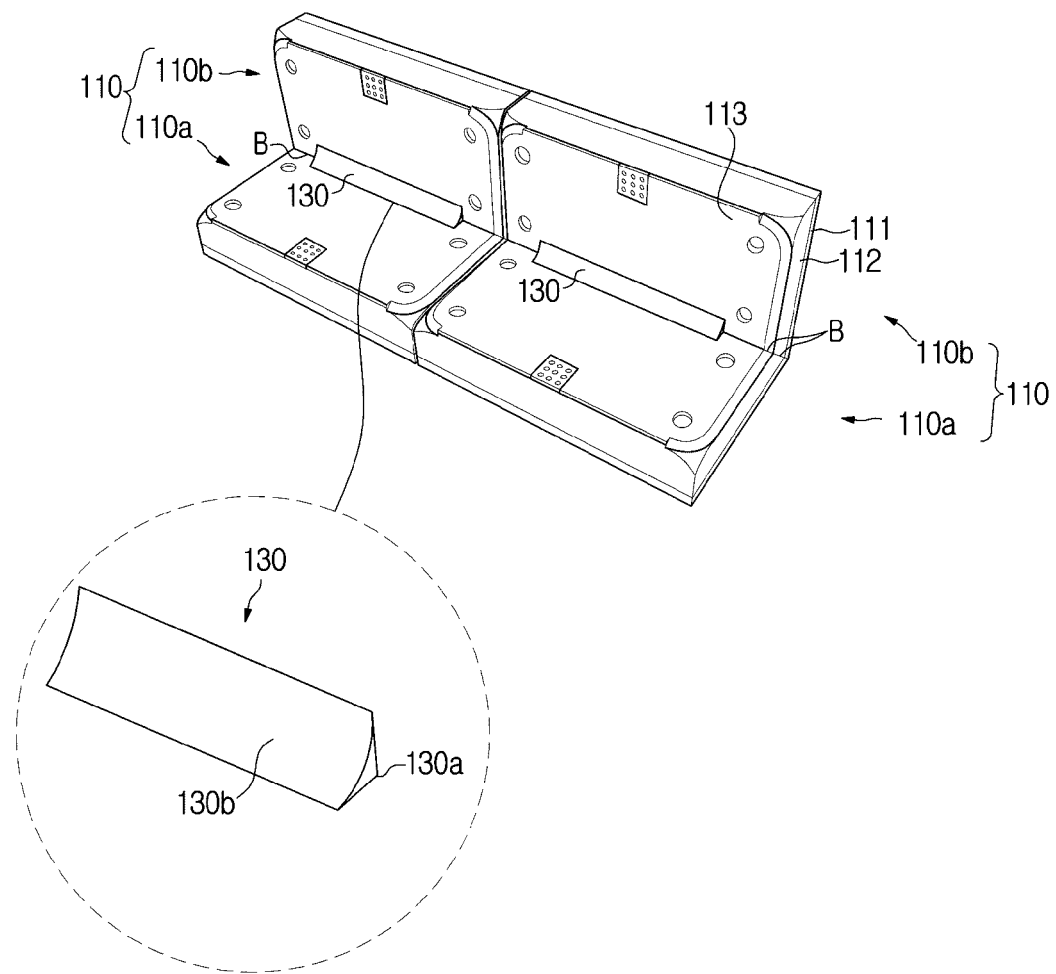
[Fig. 4]



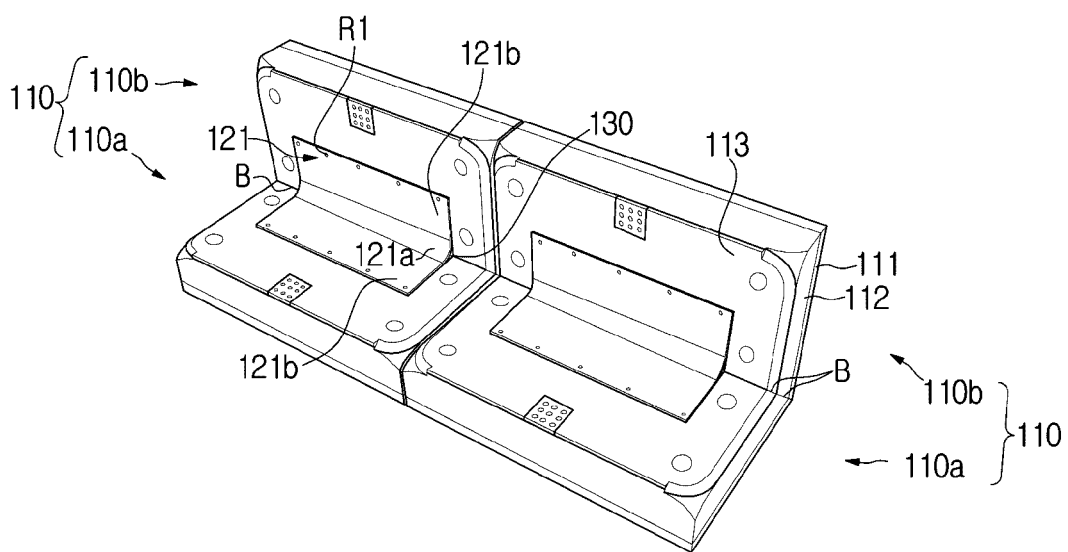
[Fig. 5]



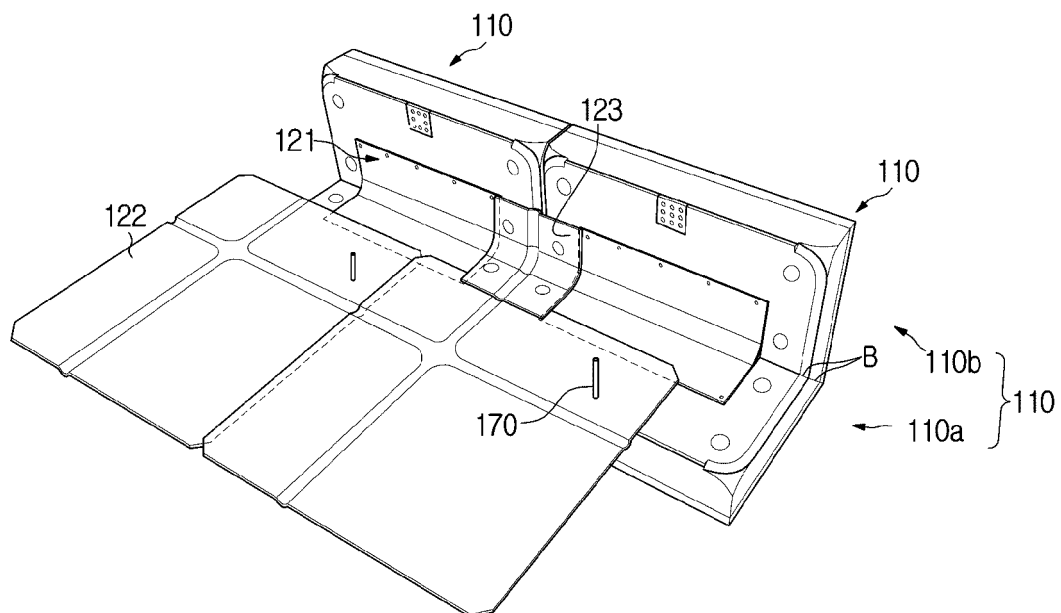
[Fig. 6]



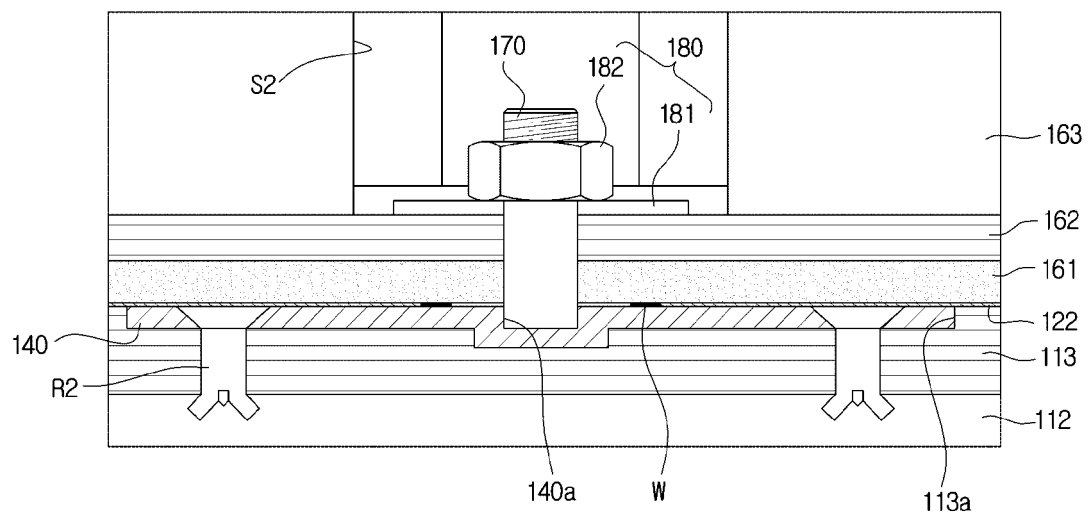
[Fig. 7]



[Fig. 8]



[Fig. 9]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2015/008595

A. CLASSIFICATION OF SUBJECT MATTER

B63B 25/16(2006.01)i, F17C 1/12(2006.01)i, B65D 90/06(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B63B 25/16; B63B 3/68; B63B 9/06; F17C 3/04; F17C 1/12; B65D 90/06

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

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

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

eKOMPASS (KIPO internal) & Keywords: barrier, separation, coupling, hinge, welding, corner part, insulation, board, cargo, protection plate, curved surface, coupling equipment, fluid and leak

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2012-0013258 A (SAMSUNG HEAVY IND. CO., LTD.) 14 February 2012 See paragraphs [0020]-[0029] and figures 1-3.	1-3,7
Y		4-6,8-11
Y	KR 10-1368763 B1 (SAMSUNG HEAVY IND. CO., LTD.) 03 March 2014 See paragraphs [0051]-[0128] and figures 2-19.	4-6,8-11
A	KR 10-2014-0014049 A (HYUNDAI HEAVY INDUSTRIES CO., LTD.) 05 February 2014 See paragraphs [0030]-[0089] and figures 3, 8-19.	1-11
A	KR 10-2012-0111335 A (SAMSUNG HEAVY IND. CO., LTD.) 10 October 2012 See paragraphs [0016]-[0051] and figures 1-4.	1-11
A	KR 10-2014-0021167 A (DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.) 20 February 2014 See paragraphs [0025]-[0048] and figures 1-6.	1-11

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

28 OCTOBER 2015 (28.10.2015)

Date of mailing of the international search report

04 NOVEMBER 2015 (04.11.2015)

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2015/008595

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-2012-0013258 A	14/02/2012	KR 10-2014-0019458 A	14/02/2014
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KR 10-2014-0014049 A	05/02/2014	KR 10-1432949 B1	21/08/2014
		KR 10-1432960 B1	21/08/2014
		KR 10-1487108 B1	27/01/2015
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		KR 10-2014-0010354 A	24/01/2014
		KR 10-2014-0010355 A	24/01/2014
		KR 10-2014-0014048 A	05/02/2014
		KR 10-2015-0039597 A	10/04/2015
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KR 10-2014-0021167 A	20/02/2014	KR 10-1383688 B1	09/04/2014

REFERENCES CITED IN THE DESCRIPTION

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