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(54) **WINDOW ASSEMBLY**

(57) The invention provides a window assembly which fulfil the requirements for windows for offshore constructions in respect or fire resistance and resistance to pressure due to wind and water impact. According to the invention a metallic strip which is normally welded to the window frame to encapsulate the window glass has been replaced with individual spacers welded to the window frame, leading to material and labor savings whereby manufacturing costs are reduced.

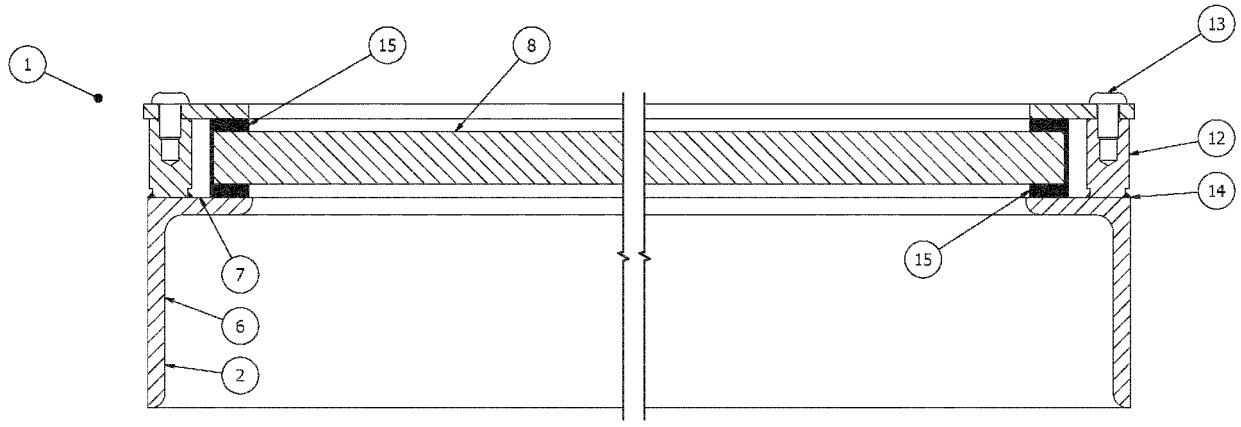

Fig. 3

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Description

Technical Field

[0001] The present invention relates to a window assembly for being mounted in an aperture/opening in an offshore construction and a method for manufacturing the window assembly.

Background

[0002] Window assemblies such as windows and portholes built into the structure of offshore constructions are commonly made up by a window frame and a window box, see e.g. document US2826282. The window frame accommodates the glass and gasket system and is mounted directly in pre-defined carvings/cut-outs, i.e. apertures/openings, in the outer hull structure during the early construction process. So far, within the technical field of window assemblies, the window box is the inner part that makes up the air-, gas- and sound-tight connection/membrane between the inner bulkhead liner, i.e. the inner part of the hull structure, and the window frame. The window frame may be made of aluminium or steel.

[0003] During the construction and building of large vessels, platforms and other offshore constructions, the window frames are typically installed at an early stage of the construction process. Only much later in the construction process, the inner (bulkhead) lining/panel, such as in accommodation and operation spaces, is established, so that the window box can be mounted.

[0004] Window assemblies are commonly manufactured in two different manners - from fibreglass or from a thin steel plate into a 3-dimensional pre-fabricated structure with a Width x Height x Depth (W x H x D) of up to 2000 x 3000 x 500 mm or even larger.

[0005] Window boxes made of fibreglass give a smooth surface which does not need any further surface treatment. These window boxes are easy to mount and facilitate an adaption/adjustment of the depth dimension of the window assembly. However, window boxes made of fibreglass have the disadvantage that each window box shape requires its own mould which cannot be prepared until final specification, such as the wall thickness etc., has been defined. Furthermore, if the specifications are altered, the mould must be modified or rebuild which requires resources.

[0006] Window boxes made of steel have the disadvantage of requiring special welding processes during manufacturing and mounting so as not to risk that the steel plates making up the window boxes wriggle. Furthermore, the finishing and surface treatment are comprehensive due to the welding processes.

[0007] Window boxes for offshore constructions are normally mounted in a mainframe in the window opening. Normally, the mainframe has a T-shaped cross section, where the part enclosing the window box may have varying dimensions corresponding to the thickness of the particular window. Thus, the mainframe is normally constructed as an L-shaped piece to which the metal-strip intended to enclose the window box is welded, thereby providing a substantial T-shaped cross section of the mainframe.

[0008] Consequently, using the known offshore window construction methods requires a large amount of welding operations

[0009] Within the present invention, the term offshore constructions is to be understood as seagoing vessels of all kinds (ships) and jackups, fixed, floating and semi-submerged oil rigs (oil platforms / offshore platforms) and other floating objects or installations fixed on the sea bed for oil and gas production and storage a well as accommodation installations, such as hotels or sleeping quarters.

Disclosure of the Invention

[0010] The aspect of the invention is to provide an improved attachment of windows in offshore constructions which is simpler and more cost-effective than in known offshore constructions.

[0011] The invention provides a solution which is labour and material saving and makes the mounting of windows in offshore constructions simpler, thereby reducing the required work.

[0012] In a first aspect, the present invention relates to a window assembly for being mounted in an aperture/opening in an offshore construction, the window assembly comprising

- a window frame having an outer portion and an inner portion, said outer portion being adapted to be attached to an outer part of said offshore construction, said inner portion being adapted for engagement with a shielding unit,
- a window glass having a first side and a second side and being adapted for closing said aperture/opening and having a first periphery along the first side being adapted for covering and contacting at least a part of said inner portion,
- a list being adapted for covering and contacting a second periphery along the second side of the window glass and pressing said first periphery of the window glass against said inner portion, said window glass and the list forming the shielding unit,

and wherein said list is connected to the inner portion by spacers individually attached to the inner portion and providing a distance between the inner portion and the list.

[0013] Normally, the window assembly is mounted in the aperture/opening of the offshore construction by means of welding, rivets, screws, nails or gluing. The connection between the aperture/opening and the window assembly should be watertight, and tightening means, such as e.g. gaskets or sealing fluids, may be applied.

[0014] In relation to the window frame, the distance provided by the spacers generally corresponds to the thickness of the window and optional gaskets. Thus, the window is attached to the window frame by means of the spacers and the list. Normally, the window frame will be have an L-shaped cross section, and the spacers will be attached to one side of the window frame, i.e. the inner portion, as illustrated in the figures.

[0015] Normally, the window assembly includes one or more gaskets serving to tighten the window opening and also reducing pressure directly on the window glass from the window frame and the list. Consequently, in an embodiment of the window assembly, the shielding unit further comprises a first gasket along the first periphery and/or a second gasket along the second periphery, preferably said first gasket being located between the first periphery and the inner portion, and preferably said second gasket being located between the second periphery and the list. In this manner, the forces acting between contact points of the window glass to the inner portion and to the list may be reduced, thereby sealing the opening and reducing the risk of harmful occurrences such as cracks in the window glass. Although the gaskets run along the periphery on both side of the window glass, the gaskets are not necessarily identical, but in some embodiments they are identical. The gaskets may e.g. be made from rubber such as silicone rubber.

[0016] The spacers, which serve to attach the list and thereby the window glass to the window frame, are substantially identical and having a length between a first and second end, said length being between 5 mm to 100 mm, preferably between 10 mm to 50 mm. Preferably, the spacers are made from a metallic alloy such as corrosion resistant alloys.

[0017] Although the spacers may have any desired shape, the spacers in an embodiment are substantially identical and having a cylindrical shape with a diameter from 8 mm to 40 mm, preferably from 10 mm to 30 mm. Spacers having such dimensions are very suitable for attaching the list to the window frame.

[0018] Moreover, the spacers are substantially identical and having a planar first end and a planar second end, preferably said first planar end is attached to the inner portion, and preferably said second planar end is attached to the list. This also facilitates the attachment of the list to the window frame.

[0019] Preferably, the spacers are attached to the inner portion of the window frame by welding, by gluing, by use or screws, or by use of rivets or nails.

[0020] Although the spacers may be attached to the list by the above-mentioned means, in an embodiment the spacers are attached to the list by weld bolts, screws, rivets or nails, and in particular weld bolts or screws. The use of such means facilitates the mounting of the list and the window glass to the window frame.

[0021] The spacers should ensure a proper attachment between the list and the window frame and in an embodiment of the window assembly, the spacers are attached to the inner portion and the list at intervals ranging from 20 mm to 150 mm, preferably ranging from 35 mm to 100 mm. The spacers are attached substantially in line following the shape of the list and the inner portion. By having the intervals between the individual spacers, a proper and durable attachment between the list and the window frame can be achieved.

[0022] In an embodiment of the window assembly, the window frame has an L-shaped cross section. The configuration with L-shaped cross section makes it possible in an uncomplicated manner to attach one section of the L-shape to the outer part of the offshore construction and having the other section attached to the list by means of the spacers.

[0023] In principle, the list may have any shape which follows the circumference of the window frame, and preferably in an embodiment of the window assembly the list is formed as a rim, preferably a square, rectangular or circular rim. Although the list may be made from plastic or synthetic materials, it is preferred that the list is made from steel such as stainless steel. The list and the window assembly may be provided with a coating, such as paint.

[0024] In an embodiment of the window assembly, the window assembly comprises a further window glass, preferably in the outer portion of the window frame. This may improve the functionality and strength of the window e.g. in respect of wind pressure or fire.

[0025] The window assembly according to the invention may be used for all off-shore constructions, such as off-shore constructions selected from a ship, a vessel, an oil and/or gas rig.

[0026] In an aspect, the invention relates to a method for manufacturing a window assembly for being mounted in an aperture/opening in an offshore construction, said method comprising

- providing a window frame having an outer portion and an inner portion, where said outer portion is adapted to be attached to an outer part of said offshore construction, said inner portion being adapted for engagement with a shielding unit,
- providing a window glass having a first side and a second side and being adapted for closing said aperture/opening and having a first periphery along the first side being adapted for covering and contacting at least a part of said inner portion,
- providing a list being adapted for covering and contacting a second periphery along the second side of the window glass and pressing said first periphery of the window glass against said inner portion, said window glass and the list forming the shielding unit,
- attaching spacers to the inner portion,
- placing the window glass between the inner portion and the list, and
- connecting said list to the inner portion by attaching the list to the spacers thereby providing a distance between the inner portion and the list, and thereby encapsulating the window glass between the inner

portion and the list.

[0027] The method may be applied to a window frame before it is mounted in an offshore construction e.g. in a workshop, or the method may be applied to the window frame after the frame has been mounted in an offshore construction. In this manner, the method provides great freedom for the mounting of windows in an offshore construction.

[0028] The method may also include the step of providing gaskets between the inner portion and the window and between the list and the window glass to seal the aperture/opening efficiently.

[0029] According to an embodiment of the method, the spacers are attached to the inner portion by means of welding. Attaching the individual spacers to the inner portion by welding is a relatively uncomplicated process which is easier to perform compared to welding a frame-like metal band to the inner portion.

[0030] The list may be attached to the spacers by means of e.g. rivets, nails, gluing or welding, but in an embodiment of the method, the list is attached to the spacers by means of weld bolts or screws, e.g. button heads according to DIN 7380.

[0031] The invention provides a window assembly which fulfils the requirements for windows for offshore constructions in respect or fire resistance and resistance to pressure due to wind and water impact. According to the invention, a metallic strip, which is normally welded to the window frame to encapsulate the window glass, has been replaced with individual spacers welded to the window frame, thus leading to material and labor savings whereby manufacturing costs are reduced.

[0032] Preferably, the window frame and spacer are made from metallic alloys such as corrosion-resistant alloys, and the window glass fulfils the requirements of ISO 614, and the list fulfils the requirements of AISI 304.

Brief Description of the Drawing(s)

[0033] The invention is explained in detail below with reference to the drawing(s), in which

Fig. 1 illustrates an embodiment of the prior art;
Fig. 2 illustrates a 3D view of the embodiment of Fig. 1;
Fig. 3 illustrates an embodiment according to the present invention;
Fig. 4 illustrates a 3D view of the embodiment of Fig. 3;
Fig. 5 illustrates an embodiment according to the present invention;
Fig. 6 illustrates a 3D view of the embodiment of Fig. 5.

[0034] The figures are only intended to show the principles of the invention, and details, which do not form part of the invention, may be omitted. The same reference numbers are used for the same parts.

Detailed description of the Invention

[0035] The invention provides window frames for offshore use which meet the requirements of fire resistance and pressure resistance in respect of offshore constructions which can be manufactured in a simpler and more cost-effective manner than the known types of window frames.

[0036] Figure 1 shows a cross section of a window assembly 1 of the known type. The assembly has a window frame 2 which has a substantially T-shaped cross section and having an outer portion 6 and an inner portion 7. The window frame includes a flange 3 and a flange 4. The flange 4 is connected with a list 11 by means of a weld bolt 13. During manufacturing, the inner portion 7 comprising the flange 4 is normally attached to the outer portion 6 at the position of the flange 3 by welding. The width of the window glass 8 and gaskets 15 determines the width of the inner portion 7, such that when a decision of window type and gasket has been made, the width and size of the inner portion can be determined, and the inner portion can be welded to the outer portion 6. However, the welding process is quite labour-intensive

[0037] The flange 4 and the list 11 together with the flange 3 encapsulate the window glass 8. Between the flange 3 and the window glass 8 and between the list 11 and the window glass 8 gaskets 15 are mounted.

[0038] Figure 2 shows the window assembly 1 of figure 1 in a 3D view with the window frame 2 having the list 11 attached by means of weld bolts 13 to enclose the window glass 8.

[0039] Figure 3 shows a window assembly 1 according to the invention. In this embodiment, the window assembly comprises a window frame 2 with a substantially L-shaped cross section. The window frame 2 comprises an outer portion 6 and an inner portion 7. The outer portion 6 can be attached to the edges of a window opening (not shown).

[0040] At the inner part of the window frame 2, spacers 12 are attached with one end to the inner portion 7 by welding 14. At the opposite end, the spacer 12 is connected with a list 11 by means of weld bolts 13.

[0041] The list 11 runs along the periphery of the window glass 8, but does not cover the window glass 8 (and gasket 15) entirely. A part of the list, an outer part, does not cover the window glass 8, but serves to connect the list 11 with the spacers 12.

[0042] The list 11 serves to encapsulate the window glass 8 via gasket 15 running along the periphery of the second side 10 of the window glass 8. Another gasket 15 is located between the first side 9 of the window glass 8 and the inner portion 7 of the window frame 2. The gaskets 15 on each side of the window glass 8 cooperate with the inner portion 7 and the list 11 to maintain the window glass 8 in position in the window frame 2 by means of pressure. The length of the spacers 12 also

serves to determine the pressure on the window glass 8 and gaskets 15. Thus, the length of the spacers 12 can be determined, when the width of the window glass 8 and the gaskets 15 are determined.

[0043] Figure 4 shows a 3D illustration of the window assembly 1 of figure 3. The window frame 2 is connected with the list 11 via the spacers 12 attached to the window frame 2 by welding 14 and to the list by weld bolts 13. Thereby, the window glass 8 is kept in place in the window assembly 1. It is clear that the use of spacers 12 requires much less welding than in the traditional window frame of figure 1 and 2, such that the manufacture of a window assembly according to the present invention is more efficient and cost-effective.

[0044] Figure 5 shows an alternative embodiment of the window assembly 1 according to the invention. Similar to the embodiment shown in figure 3, the window assembly comprises a window frame 2 which has a substantially L-shaped cross section. However, in comparison with the window frame in figure 3, the L-shaped cross section of the window frame 2 is turned 180 degrees. The window frame 2 also includes an outer portion 6 and an inner portion 7, and due the 180 degrees turning of the L-shape the inner portion 7 forms a projecting flange around the window assembly 2

[0045] For mounting the window, glass spacers 12 are attached with one end to the inner portion 7 by welding 14. At the opposite end, the spacers 12 are connected with a list 11 by means of a weld bolts 13 .

[0046] The list 11 serves to secure the window glass 8 in the window assembly by means of the gaskets 15. One of the gaskets 15 is running along the periphery of the second side 10 of the window glass 8, and the other gasket runs on the opposite side of the window glass 8 along the periphery of the first side 9 of the window glass 8 and facing the inner portion 7 of the window frame 2. This means that a gasket 15 is located between the first side 9 of the window glass 8 and the inner portion 7 of the window frame 2, and another gasket is located between the second side 10 of the window glass 8 and the list 11. Thus, the gaskets 15 on each side of the window glass 8 cooperate with the inner portion 7 and the list 11 to maintain the window glass 8 in the correct position in the window frame 2 by means of pressure.

[0047] Figure 6 shows a 3D illustration of the window assembly 1 of figure 5. The window frame 2 is connected with the list 11 via the spacers 12 attached to the window frame 2. The L-shape of the cross section of the window frame 2 connected with the list 11 forms a projecting flange around the window assembly, where the inner portion 7 of the window frame 2 and the list project. The spacers are attached to the inner portion by welding 14, and the list is connected with the spacers by weld bolts 13. Thereby, the window glass 1 is kept in place in the window assembly 1.

[0048] The embodiments presented above are manufactured for use in offshore constructions and are designed to withstand the conditions in an offshore environment, e.g. the corners are rounded like windows in aircrafts to avoid cracks due to fatigue. Measures are also taken in respect of fire and wind and water effects. Moreover, the materials used and the production methods should normally be in compliance with the relevant industrial standards (ISO, DIN, AISI).

[0049] The skilled person would also realise that the window assemblies according to the invention presented in figures 4-6 can be designed in different ways, e.g. with two or three window glasses forming two or three layered windows.

List of references:

[0050]

1	window assembly
2	window frame
3	flange
4	flange
6	outer portion
7	inner portion
8	window glass
9	first side
10	second side
11	list
12	spacer
13	weld bolt
14	welding
15	gasket

Claims

1. A window assembly for being mounted in an aperture/opening in an offshore construction, the window assembly comprising

   - a window frame having an outer portion and an inner portion, said outer portion being adapted to be attached to an outer part of said offshore construction, said inner portion being adapted for engagement with a shielding unit,
   - a window glass having a first side and a second side and adapted for closing said aperture/opening and having a first periphery along the first side being adapted for covering at least a part of said inner portion,
   - a list being adapted for covering a second periphery along the second side of the window glass and pressing said first periphery of the window glass against said inner portion, said window glass and the list forming the shielding unit,

   and wherein said list is connected to the inner portion by spacers individually attached to the inner portion and providing a distance between the inner portion and the list.

2. A window assembly according to claim 1, wherein the shielding unit further comprises a first gasket along the first periphery and/or a second gasket along the second periphery, preferably said first gasket being located between the first periphery and the inner portion, and preferably said second gasket being located between the second periphery and the list.

3. A window assembly according to claim 1 or 2, wherein the spacers are substantially identical and having a length between a first and second end, said length being between 5 mm to 100 mm, preferably between 10 mm to 50 mm.

4. A window assembly according to any one of the preceding claims, wherein the spacers are substantially identical and having a cylindrical shape with a diameter from 8 mm to 40 mm, preferably from 10 mm to 30 mm.

5. A window assembly according to any one of the preceding claims, wherein the spacers are substantially identical and having a planar first end and a planar second end, preferably said first planar end is attached to the inner portion, and preferably said second planar end is attached to the list.

6. A window assembly according to any one of the preceding claims, wherein the spacers are attached to the inner portion by welding, gluing, screws, or rivets.

7. A window assembly according to any one of the preceding claims, wherein the spacers are attached to the list by weld bolts, screws, or rivets.

8. A window assembly according to any one of the preceding claims, wherein the spacers are attached to the inner portion and the list at intervals ranging from 20 mm to 150 mm, preferably ranging from 35 mm to 100 mm.

9. A window assembly according to any one of the preceding claims, wherein the window frame has an L-shaped cross section.

10. A window assembly according to any one of the preceding claims, wherein the list is formed as a rim, preferably a square, rectangular or circular rim.

11. A window assembly according to any one of the preceding claims, wherein the window assembly comprises a further window glass, preferably in the outer portion of the window frame.

12. A window assembly according to any one of the preceding claims, wherein the offshore construction is selected from a ship, a vessel, an oil and/or gas rig.

13. A method for manufacturing a window assembly for being mounted in an aperture/opening in an offshore construction, said method comprising

- providing a window frame having an outer portion and an inner portion, where said outer portion is adapted to be attached to an outer part of said offshore construction, said inner portion being adapted for engagement with a shielding unit,
- providing a window glass having a first side and a second side and being adapted for closing said aperture/opening and having a first periphery along the first side being adapted for covering and contacting at least a part of said inner portion,
- providing a list being adapted for covering and contacting a second periphery along the second side of the window glass and pressing said first periphery of the window glass against said inner portion, said window glass and the list forming the shielding unit,
- attaching spacers to the inner portion,
- placing the window glass between the inner portion and the list, and
- connecting said list to the inner portion by attaching the list to the spacers thereby providing a distance between the inner portion and the list, and thereby encapsulating the window glass between the inner portion and the list.

14. A method according to claim 13, wherein the spacers are attached to the inner portion by means of welding.

15. A method according to claim 13 or 14, wherein the list is attached to the spacers by means of weld bolt or screws.

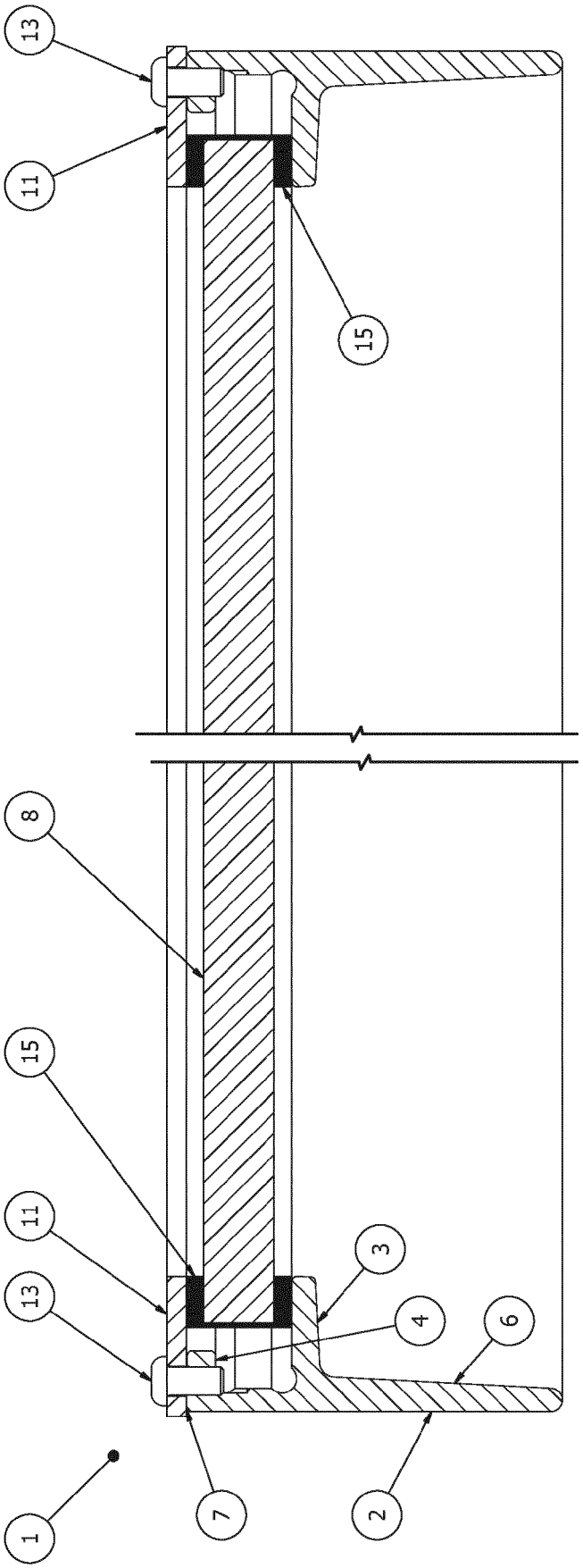
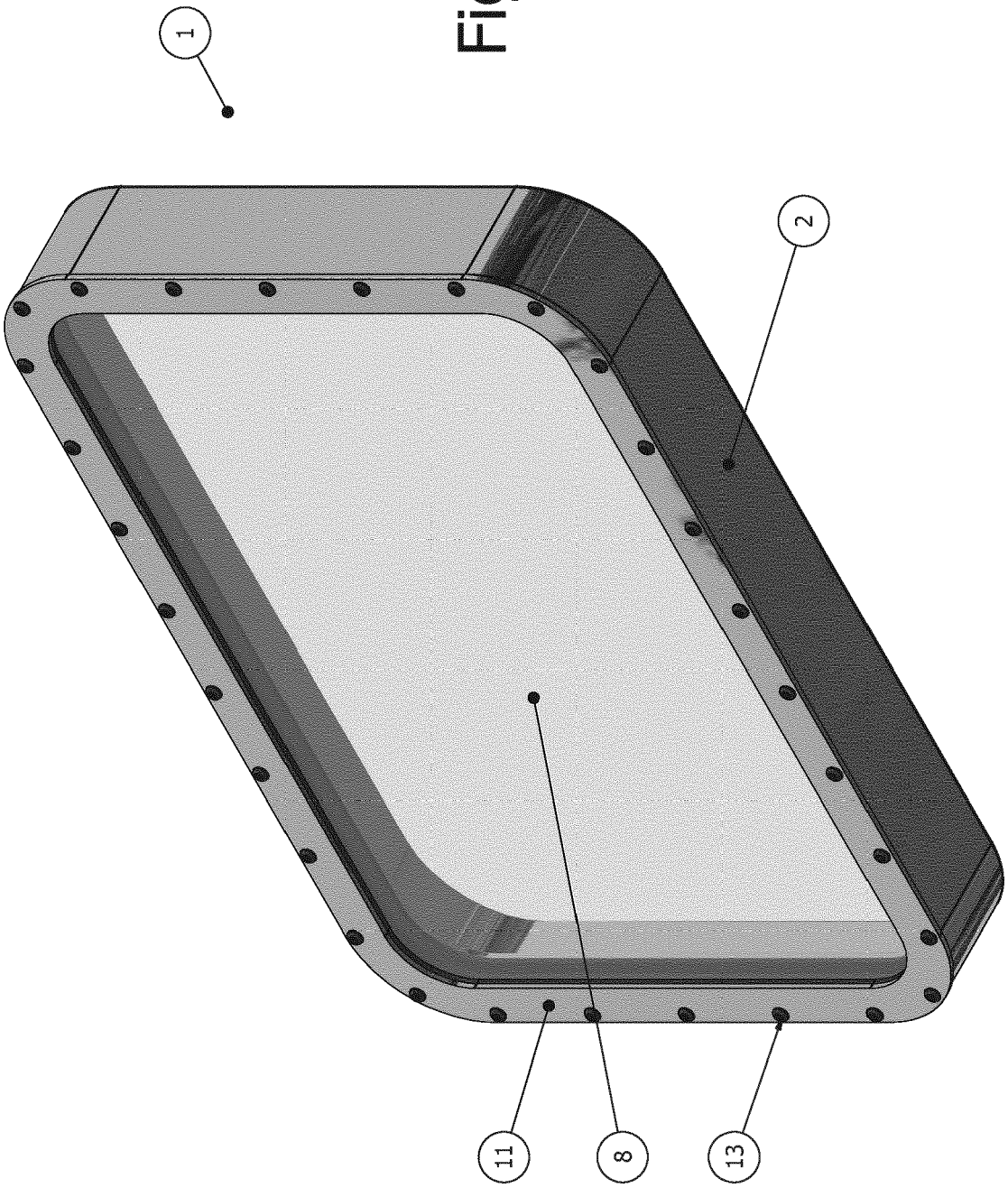


Fig. 1

Fig. 2



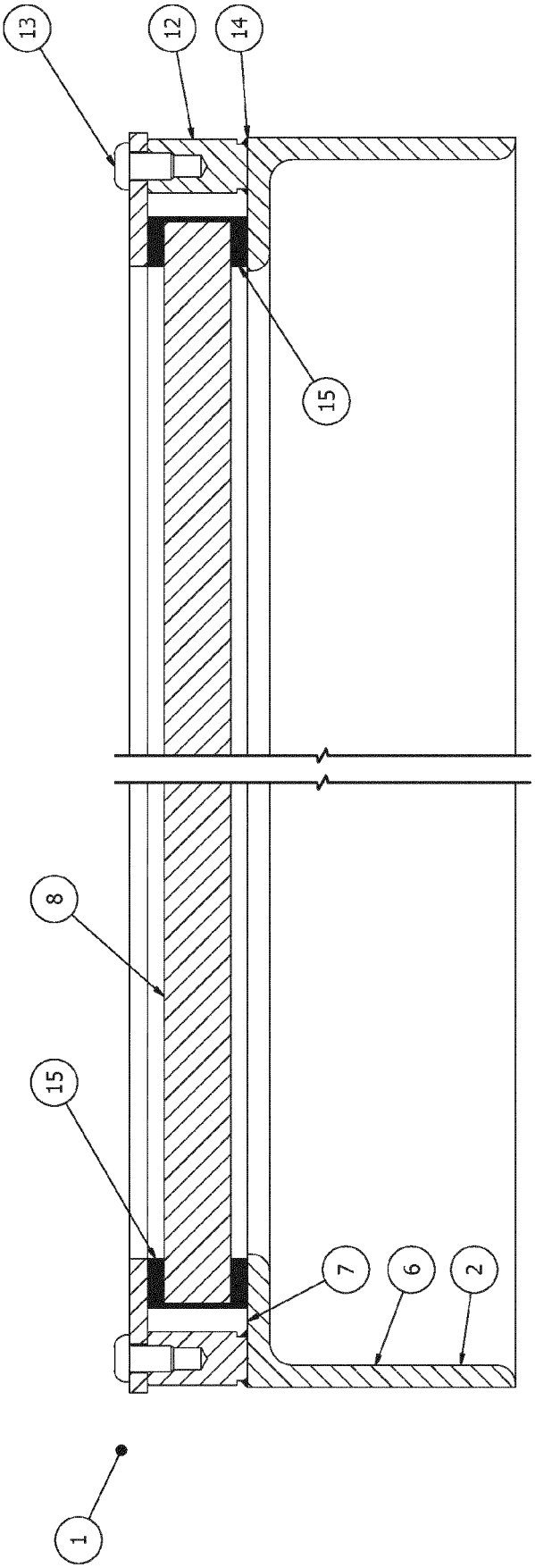
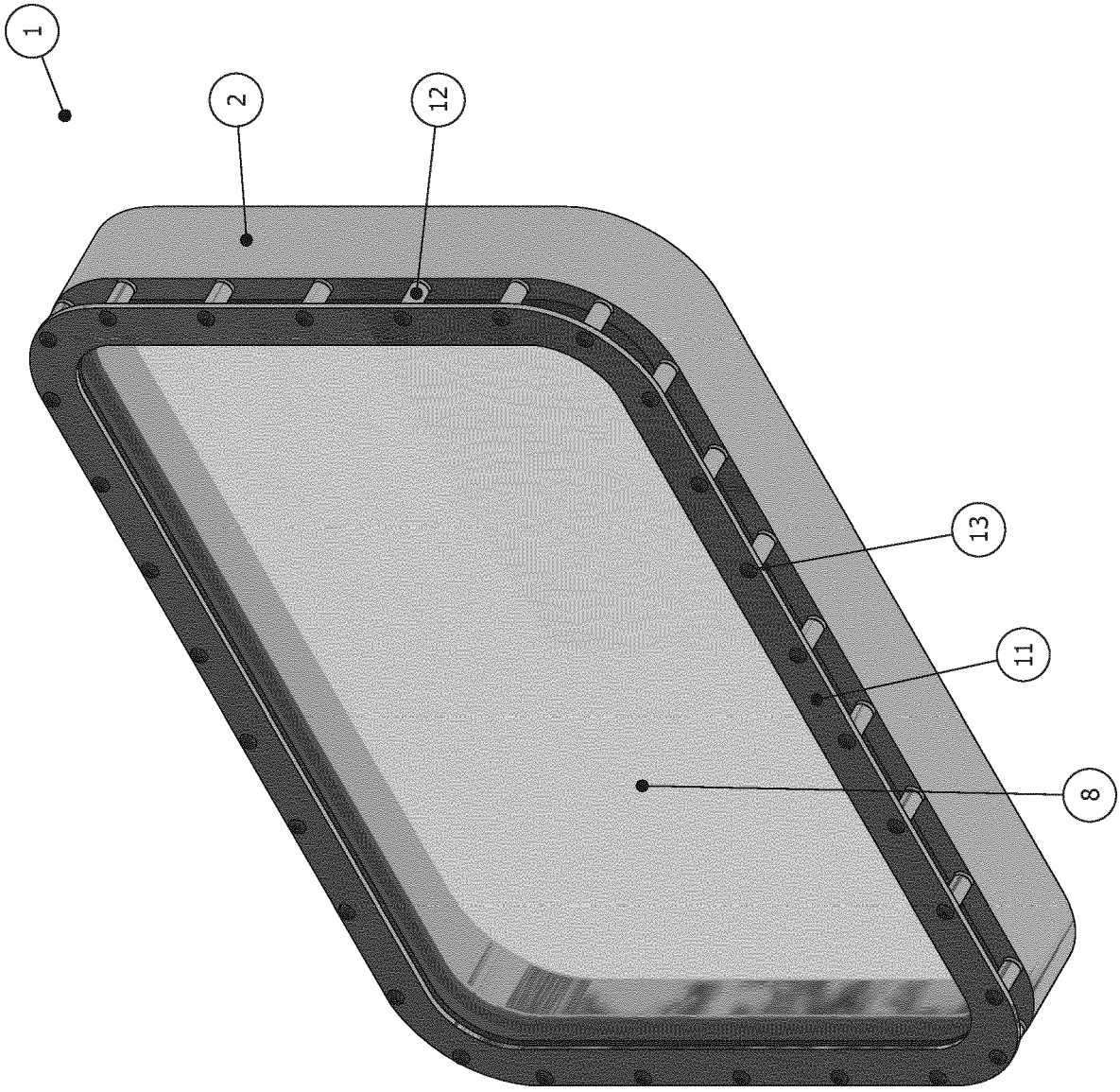


Fig. 3

Fig. 4



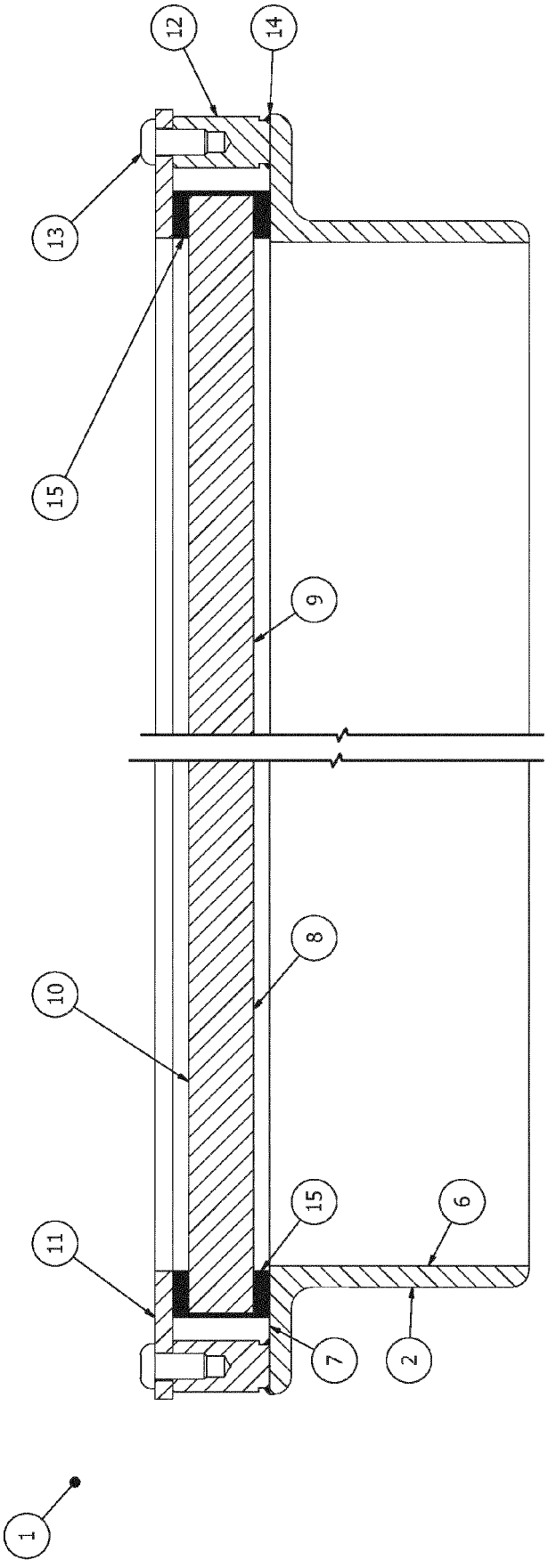
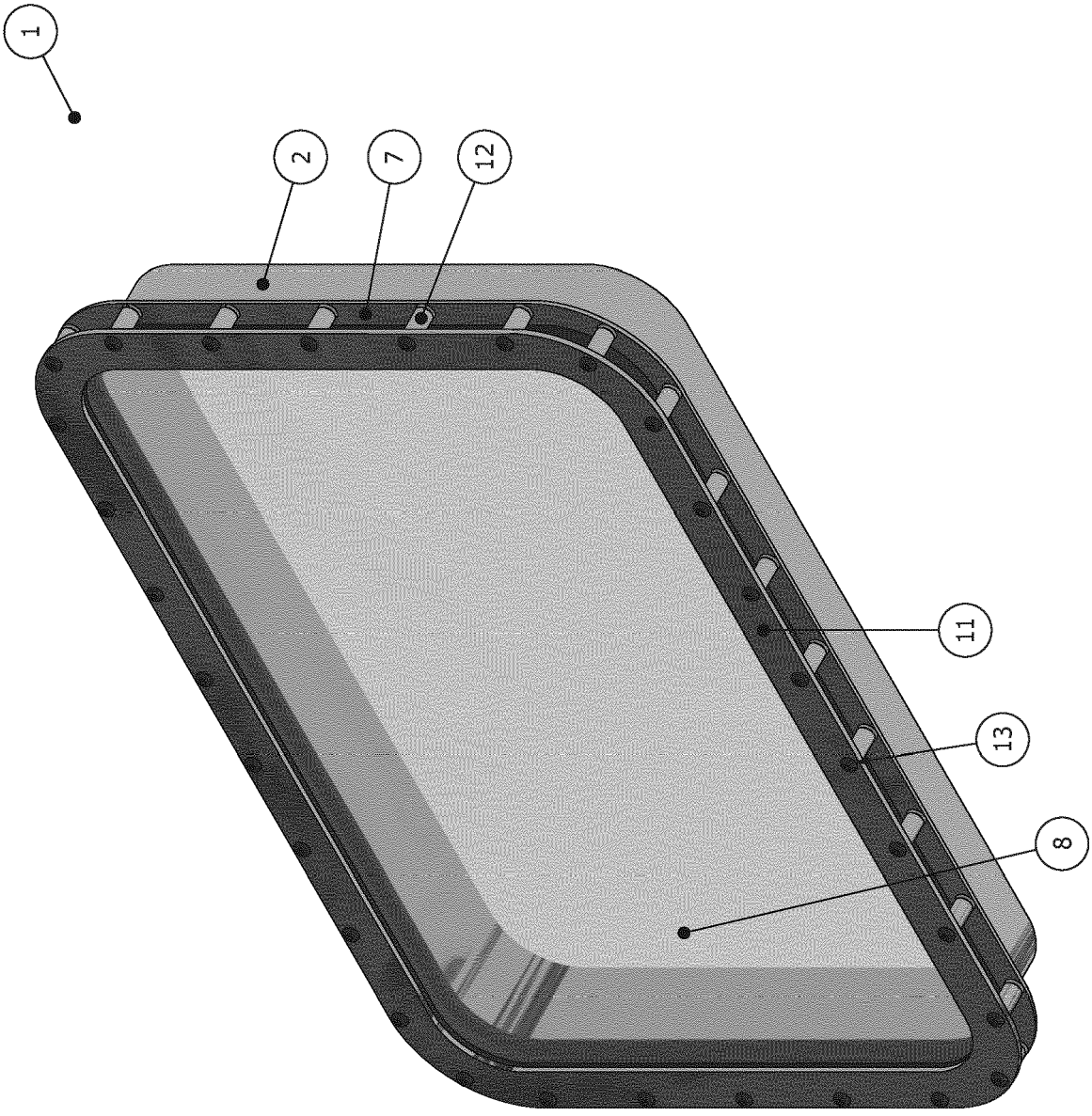


Fig. 5

Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 23 17 3935

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 115 092 322 A (COSCO SHIPPING HEAVY IND CO LTD) 23 September 2022 (2022-09-23) * figures 1-4 * -----	1-15	INV. B63B19/00

TECHNICAL FIELDS SEARCHED (IPC)

B63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 October 2023	Crespo Vallejo, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 115092322 A	23-09-2022	NONE	

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Patent documents cited in the description

- US 2826282 A **[0002]**