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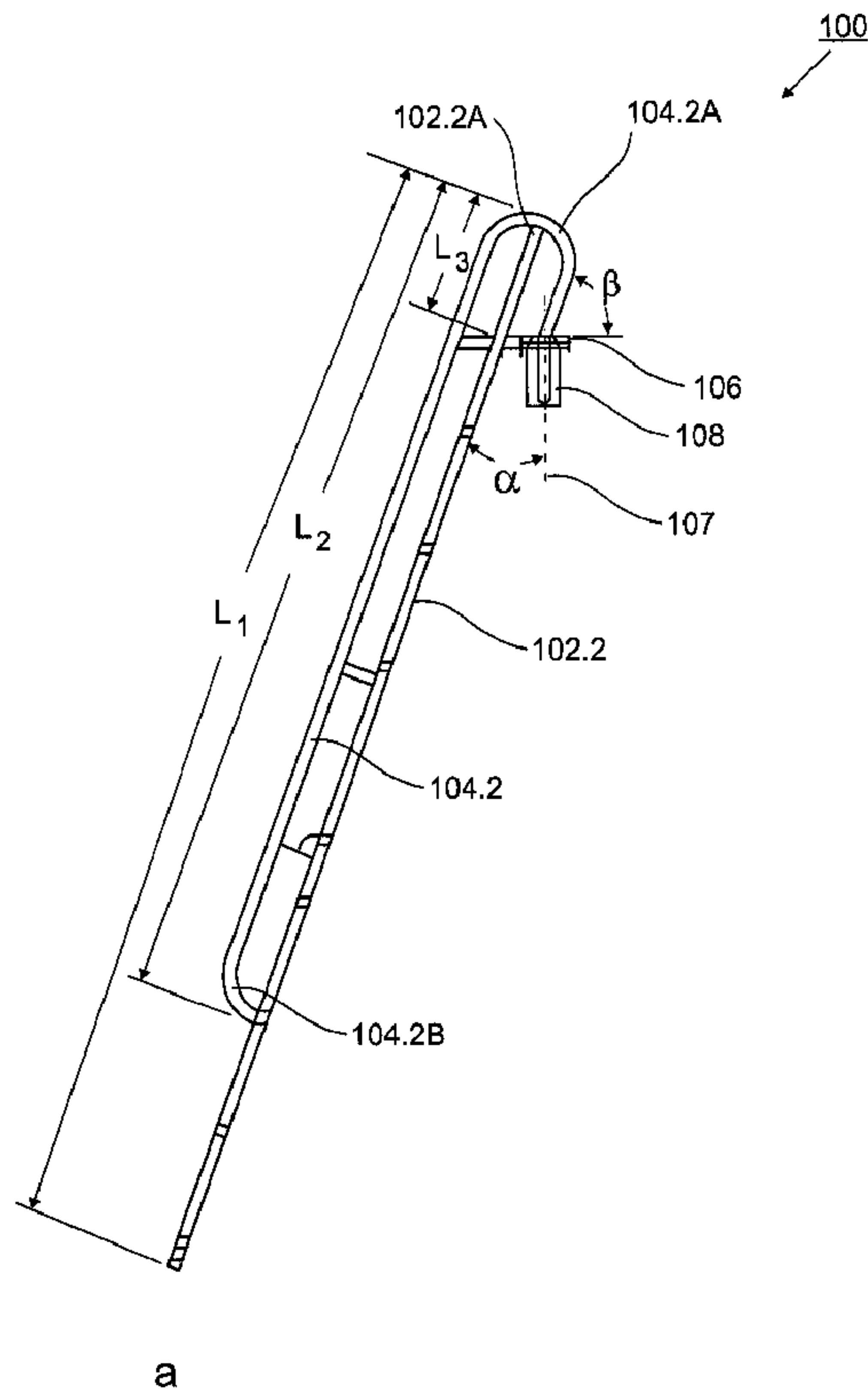
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(54) Titre : SYSTEME D'ECHELLE DE SECURITE DESTINE AUX BATEAUX  
(54) Title: SAFETY LADDER SYSTEM FOR WATER-BORNE VESSELS



(57) **Abrégé/Abstract:**

A safety ladder for a water-borne vessel is provided. The safety ladder comprises a first siderail and a second siderail with the second siderail being placed at a predetermined distance to the first siderail and oriented substantially parallel thereto. A plurality of

(57) **Abrégé(suite)/Abstract(continued):**

rungs is placed between the first siderail and the second siderail and oriented substantially perpendicular thereto. A ladder connecting element is mounted to a top portion of the safety ladder. The ladder connecting element is adapted for being mated with a respective support connecting element disposed in proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder to the hull. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

## ABSTRACT

A a safety ladder for a water-borne vessel is provided. The safety ladder comprises a first siderail and a second siderail with the second siderail being placed at a predetermined distance to the first siderail and oriented substantially parallel thereto. A plurality of rungs is placed between the first siderail and the second siderail and oriented substantially perpendicular thereto. A ladder connecting element is mounted to a top portion of the safety ladder. The ladder connecting element is adapted for being mated with a respective support connecting element disposed in proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder to the hull. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

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# SAFETY LADDER SYSTEM FOR WATER-BORNE VESSELS

## FIELD OF THE INVENTION

5 The present invention relates to safety ladders, and more particularly to a safety ladder system for water-borne vessels.

## BACKGROUND OF THE INVENTION

10 Falling overboard is one of the most dangerous and life-threatening events that can happen at sea. Particularly in rough seas situations occur where seamen or fishermen while working on deck of a ship or fishing boat loose hold and fall or are washed overboard. In such Man OverBoard (MOB) situations it is essential to enable the person washed overboard getting back on board as quick and safe as possible in order to prevent the person from drowning and/or suffering from  
15 hypothermia in cold waters.

Equipment presently used for MOB situations are, for example, rope ladders or straight ladders with hook type top for hanging over the washboard of a boat. Unfortunately, these ladder systems are hard to install and, in particular in rough seas, difficult and dangerous to climb since these  
20 ladders typically swing sideways as well as towards or away from the hull of the boat, resulting in dangerous rescue situations where the person cannot get hold of the ladder, falls off the ladder, or gets smashed against the hull.

It is desirable to provide a safety ladder system for water-borne vessels where the ladder when  
25 mounted extends downwardly along an outside of the hull in a substantially fixed manner.

It is also desirable to provide a safety ladder system for water-borne vessels where the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

30 It is also desirable to provide a safety ladder system for water-borne vessels where the ladder is

easy and quick to install/uninstall.

## SUMMARY OF THE INVENTION

5 Accordingly, one object of the present invention is to provide a safety ladder system for water-borne vessels where the ladder when mounted extends downwardly along an outside of the hull in a substantially fixed manner.

10 Another object of the present invention is to provide a safety ladder system for water-borne vessels where the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

15 Another object of the present invention is to provide a safety ladder system for water-borne vessels where the ladder is easy and quick to install/uninstall.

20 According to one aspect of the present invention, there is provided a safety ladder for a water-borne vessel. The safety ladder comprises a first siderail and a second siderail with the second siderail being placed at a predetermined distance to the first siderail and oriented substantially parallel thereto. A plurality of rungs is placed between the first siderail and the second siderail and oriented substantially perpendicular thereto. A ladder connecting element is mounted to a top portion of the safety ladder. The ladder connecting element is adapted for being mated with a respective support connecting element disposed in proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder to the hull. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

30 According to the aspect of the present invention, there is provided a safety ladder for a water-borne vessel. The safety ladder comprises a first siderail and a second siderail with the second siderail being placed at a predetermined distance to the first siderail and oriented substantially parallel thereto. A plurality of rungs is placed between the first siderail and the second siderail and oriented substantially perpendicular thereto. A ladder connecting element is mounted to a top

portion of the safety ladder. The ladder connecting element is adapted for being mated with a respective support connecting element disposed in proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder to the hull. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner. A platform is mounted to a top portion of each of the siderails, the platform forming a top step of the safety ladder having the ladder connecting element extending downwardly therefrom with the connecting element comprising an elongated body. The ladder connecting element is oriented at an angle between 15° and 25° to the siderails.

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According to the aspect of the present invention, there is provided a safety ladder system for a water-borne vessel. The safety ladder system comprises a safety ladder support structure adapted for being mounted to a top portion of a hull of the water-borne vessel. The safety ladder support structure has a support connecting element. A safety ladder has a ladder connecting element mounted to a top portion thereof. The ladder connecting element is adapted for being mated with the support connecting element. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

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According to the aspect of the present invention, there is provided a safety ladder system for a water-borne vessel. The safety ladder system comprises a safety ladder support structure adapted for being mounted to a top portion of a hull of the water-borne vessel. The safety ladder support structure has a support connecting element. A safety ladder has a ladder connecting element mounted to a top portion thereof. The ladder connecting element is adapted for being mated with the support connecting element. The ladder connecting element is mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner. The safety ladder support structure comprises a substantially flat support plate adapted for being mounted to the top portion of the hull. The support connecting element comprises an elongated body extending upwardly therefrom and is oriented substantially perpendicular to the flat support plate. The ladder connecting element comprises an elongated body extending downwardly from the top portion of the safety ladder at a predetermined angle

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thereto with the angle being between 15° and 25°.

The advantage of the present invention is that it provides a safety ladder system for water-borne vessels where the ladder when mounted extends downwardly along an outside of the hull in a substantially fixed manner.

A further advantage of the present invention is that it provides a safety ladder system for water-borne vessels where the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

A further advantage of the present invention is to provide a safety ladder system for water-borne vessels where the ladder is easy and quick to install/uninstall.

#### BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention is described below with reference to the accompanying drawings, in which:

Figures 1a to 1d are simplified block diagrams illustrating in a side view, a front view, a perspective front view, and a perspective top view, respectively, a safety ladder according to a preferred embodiment of the invention;

Figures 2a and 2b are simplified block diagrams illustrating in a side view and a top view, respectively, a support structure of the safety ladder according to a preferred embodiment of the invention;

Figure 2c is a simplified block diagram illustrating in a cross-sectional view a securing mechanism of the safety ladder according to a preferred embodiment of the invention;

Figure 2d is a simplified block diagrams illustrating in a top view another support structure of the safety ladder according to a preferred embodiment of the invention; and,

Figures 3a and 3b are simplified flow diagrams illustrating in side views the safety ladder according to a preferred embodiment of the invention when installed to a vessel.

5 DESCRIPTION OF THE PREFERRED EMBODIMENT

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention belongs.

10 Although any methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, the preferred methods and materials are now described.

15 While the description of the preferred embodiments hereinbelow is with reference to a safety ladder system for being mounted to a washboard of a fishing vessel, it will become evident to those skilled in the art that the embodiments of the invention are not limited thereto, but are also adaptable for being mounted to an upper portion of a vessel's hull where a washboard is not available such as, for example, a deck of a pleasure watercraft. Furthermore, the embodiments of the invention are adaptable in length for different sized vessels as long as the safety ladder can be manually installed.

20 Referring to Figures 1a to 1d a safety ladder for a water-borne vessel 100 according to a preferred embodiment of the invention is provided. The safety ladder 100 comprises a first siderail 102.1 and a second siderail 102.2 placed a predetermined distance apart – width W – and oriented substantially parallel to each other. A plurality of rungs 110 are placed between the first siderail 102.1 and the second siderail 102.2 and are oriented substantially perpendicular thereto. The number of rungs 110 is determined in dependence upon a desired length of the safety ladder 100 and a desired distance between successive rungs 110 of the safety ladder 100. Ladder connecting element 108 is mounted to a top portion of the safety ladder 100. The ladder connecting element 108 is adapted for being mated with a respective support connecting element disposed in  
30 proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder 100 to the hull, as will be described hereinbelow. The ladder connecting element 108 is mounted such

that the safety ladder 100 when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

5 Preferably, platform 106 is mounted to a top portion of each of the siderails 102.1, 102.2. The platform 107 forms a top step of the safety ladder 100 and has the ladder connecting element 108 in the form of an elongated body such as, for example, a hollow cylinder, oriented substantially perpendicular thereto – axis 107 – and extending downwardly therefrom. Further preferably, the platform 106 is oriented at an angle  $\beta$  – preferably, between  $65^\circ$  and  $75^\circ$  - to the siderails 102.1, 102.2, resulting in the ladder connecting element 108 extending downwardly at a predetermined  
10 angle  $\alpha$  to the siderails 102.1, 102.2 with the angle  $\alpha$  preferably being between  $15^\circ$  and  $25^\circ$ .

Further preferably, the safety ladder 100 comprises a first handrail 104.1 and a second handrail 104.2 mounted to the first siderail 102.1 and the second siderail 102.2, respectively, and oriented substantially parallel thereto. To re-enforce the upper portion of the safety ladder 100, the first  
15 handrail 104.1 and the second handrail 104.2 each comprise a U-shaped top portion 104.1A, 104.2A, respectively, surrounding a top end 102.1A, 102.2A of the respective siderail 102.1, 102.2 and mounted thereto. The end of the U-shaped top portion 104.1A, 104.2A of each of the hand rails 104.1, 104.2 is mounted to the platform 106. To facilitate entering/exiting the safety ladder 100, the platform 106 is mounted a predetermined distance  $L_3$  downward from the top end  
20 102.1A, 102.2A of the siderails 102.1, 102.2 with the distance  $L_3$  preferably being between 10'' and 20''.

Further preferably, the safety ladder 100 comprises a rounded bottom section 102B, for example, by manufacturing the siderails 102.1, 102.2 from a single piece of aluminum tubing which is bent  
25 into U-shape, as well as rounded bottom sections 104.1B, 104.2B of the handrails 104.1, 104.2, respectively, to prevent pinching and/or snagging.

The safety ladder 100 is made of a light weight yet strong material such as, for example, commercially available aluminum tubing having a square, rectangular, or round cross section -  
30 for the siderails 102.1, 102.2, the handrails 104.1, 104.2, the rungs 110, and the ladder connecting element 108 - and aluminum sheet material for the platform 106, using conventional

manufacturing technologies such as cutting, bending and welding. In an example implementation for use with the washboard to a fishing vessel the safety ladder was made of aluminum tubing having a square cross section with the safety ladder having: overall length  $L_1$  of approximately 116''; handrail length  $L_2$  of approximately 88''; length  $L_3$  of the platform 106 from the top of approximately 15''; distance  $D_R$  between successive rungs 110 of approximately 12''; width  $W$  of approximately 20''; length  $L_{CE}$  of the ladder connecting element 108 of approximately 6''; and, outside diameter of the ladder connecting element 108 of approximately 3''.

Further preferably, markers 112 for indicating the location of each of the rungs 110 are disposed on the siderails 102.1, 102.2, for example, by brightly coloring sections of the siderails 102.1, 102.2 located just above of each of the rungs 110, as illustrated in Figure 1c.

Further preferably, an anti-slip material is disposed onto predetermined sections of the rungs 110, the platform 106, and the handrails 104.1, 104.2 where desirable to improve gripping. For example, commercially available anti-slip strips are bonded to the predetermined sections, as illustrated in Figure 1d.

Figures 2a to 2d illustrate a safety ladder support structure 120 according to the invention for mounting the safety ladder 100 to a top portion of a hull of the water-borne vessel. Preferably, the safety ladder support structure 120 comprises a substantially flat support plate 120A - adapted for being mounted to the top portion of the hull such as the top of washboard 10 using, for example, conventional screw fasteners 122 - having support connecting element 120B in the form of a hollow cylinder oriented substantially perpendicular thereto and extending upwardly therefrom. The support connecting element 120B is adapted for being mated with the ladder connecting element 108 such that the ladder connecting element 108 is easily inserted and removed while also ensuring that the ladder connecting element 108 is substantially fixedly held when accommodated therein. For example, the support connecting element 120B and the ladder connecting element 108 are provided as hollow cylinders having a round cross section with the outside diameter of the ladder connecting element 108 being determined to fit the inside diameter of the support connecting element 120B and vice versa when mated along axis 107, as indicated by the block arrow in Figure 2a. The safety ladder support structure 120 is made of, for example,

commercially available aluminum tubing and aluminum sheet material using conventional manufacturing technologies such as cutting and welding. Alternatively, connecting elements having different cross sections such as, for example, square or rectangular cross sections are employed.

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Employment of the upwardly oriented support connecting element 120B and the respective downwardly oriented ladder connecting element 108 enables easy installation of the safety ladder 100 by: lifting the safety ladder 100 from a storage location inside (I) the vessel over the washboard 10 outside (II) the vessel; placing the safety ladder 100 into cutout 12A in railing 12; using the ends 12B of the railing 12 as guides gliding the safety ladder 100 downwardly with the siderails 102.1, 201.2 in contact with edge 10A of the washboard 10 until the ladder connecting element 108 is just above the support connecting element 120B; and, lowering the safety ladder 100 further such that the ladder connecting element 108 is inserted into the support connecting element 120B until the two connecting elements are mated. Preferably, the support plate 120A is placed such that the siderails 102.1, 102.2 are in contact with the edge 10A of the washboard 10 when the two connecting elements are mated.

Optionally, the support plate 120A comprises one or two guiding elements 134 for guiding movement of the safety ladder during installation in case the support structure has to be installed in a location without a railing 12. The guiding elements 134 comprise, for example, flat plates extending upwardly from the support plate 120A and oriented substantially perpendicular thereto.

Further optionally, the safety ladder 100 is tethered 130 to the safety ladder support structure 120 using, for example, a rope or chain link 130 connected to the safety ladder 100 and connecting loop 132 mounted to the support plate 120A. The tether 130 secures the safety ladder 100 to the safety ladder support structure 120 in case grip is lost during handling of the safety ladder 100 outside (II) the vessel and enables retrieving of the same by pulling the tether 130.

Optionally, the ladder connecting element 108 is pivotally movable mounted to the siderails 102.1, 102.2, enabling pivoting of the ladder connecting element 108 about an axis parallel to the rungs 110. The pivotally movable ladder connecting element 108 allows mating of the same with

the support connecting element 120B while the safety ladder is still onboard. The mated safety ladder 100 is then rotated about the axis 107 over the washboard 10 and lowered when outside the vessel.

5 Preferably, a securing mechanism is provided for securing the ladder connecting element 108 to the support connecting element 120B when mated therewith. The securing mechanism comprises, for example, bores 109 and 124 disposed in the ladder connecting element 108 and the support connecting element 120B, respectively. When the ladder connecting element 108 and the support connecting element 120B are mated, securing bolt 126 is inserted through the aligned  
10 bores 109 and 124 and secured via securing clip 128, thus preventing upward movement of the ladder connecting element 108 and possible disengagement of the same from the support connecting element 120B, as illustrated in Figure 2d.

Figure 3a and 3b illustrate the safety ladder 100 mounted to the safety ladder support structure  
15 120 with the two connecting elements 108 and 120B properly mated and secured, resulting in the safety ladder 100 being fixedly placed with respect to the washboard 10 and the hull 14 of the vessel at a predetermined angle  $\alpha$  thereto, i.e. the safety ladder 100 is substantially prevented from swinging in any direction with respect to the vessel. Preferably, the length of the safety ladder 100 is determined such that the bottom of the safety ladder 100 reaches below the water  
20 level 16 to facilitate stepping onto the same when floating/swimming on the water. Furthermore, the angle  $\alpha$  being between  $15^\circ$  and  $25^\circ$  is determined to enable safely climbing up the safety ladder 100 without assistance as well as to enable sliding of a man basket thereon.

Further uses of the safety ladder 110 are: for enabling divers to climb aboard the vessel after a  
25 dive; as a dry dock ladder; and for enabling wheelhouse roof access, for example, to a life boat, when not used for enabling climbing aboard the vessel.

The present invention has been described herein with regard to preferred embodiments. However, it will be obvious to persons skilled in the art that a number of variations and modifications can  
30 be made without departing from the scope of the invention as described herein.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A safety ladder for a water-borne vessel comprising:  
5 a first siderail and a second siderail, the second siderail placed at a predetermined distance to the first siderail and oriented substantially parallel thereto;  
a plurality of rungs placed between the first siderail and the second siderail and oriented substantially perpendicular thereto; and,  
a ladder connecting element mounted to a top portion of the safety ladder, the ladder connecting  
10 element being adapted for being mated with a respective support connecting element disposed in proximity to a top portion of a hull of the water-borne vessel for mounting the safety ladder to the hull, the ladder connecting element being mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.
- 15
2. The safety ladder according to claim 1 wherein the ladder connecting element comprises an elongated body extending downwardly from the top portion of the safety ladder at a predetermined angle to the siderails.
- 20
3. The safety ladder according to claim 2 wherein the ladder connecting element is oriented at an angle between 15° and 25° to the siderails.
4. The safety ladder according to claim 2 wherein the ladder connecting element comprises a single cylinder placed at a center between the siderails.
- 25
5. The safety ladder according to claim 2 comprising a platform mounted to a top portion of each of the siderails, the platform forming a top step of the safety ladder having the elongated body extending downwardly therefrom.
- 30
6. The safety ladder according to claim 5 wherein the platform is oriented at an angle between 65° and 75° to the siderails.

7. The safety ladder according to claim 5 comprising a first handrail and a second handrail mounted to the first siderail and the second siderail, respectively, wherein the first handrail and the second handrail each have a U-shaped top portion surrounding a top end of the respective siderail and mounted thereto and wherein an end of the U-shaped top portion of each of the handrails is mounted to the platform.

8. The safety ladder according to claim 7 wherein the platform is mounted between 10'' and 20'' downward from the top end of the siderails.

9. The safety ladder according to claim 1 wherein the first siderail and the second siderail are connected forming a curved bottom section of the safety ladder.

10. The safety ladder according to claim 1 comprising markers disposed on the siderails, the markers placed for indicating the location of each of the rungs.

11. The safety ladder according to claim 1 comprising an anti-slip material disposed onto the rungs.

12. A safety ladder system for a water-borne vessel comprising:  
a safety ladder support structure adapted for being mounted to a top portion of a hull of the water-borne vessel, the safety ladder support structure having a support connecting element; and,  
a safety ladder having a ladder connecting element mounted to a top portion thereof, the ladder connecting element being adapted for being mated with the support connecting element, the ladder connecting element being mounted such that the ladder when mounted extends downwardly along an outside of the hull at a predetermined angle thereto in a substantially fixed manner.

13. The safety ladder system according the claim 12 wherein the safety ladder support structure comprises a substantially flat support plate adapted for being mounted to the top portion of the hull and wherein the support connecting element comprises an elongated body extending

upwardly therefrom.

14. The safety ladder system according the claim 13 wherein the elongated body is oriented substantially perpendicular to the flat support plate.

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15. The safety ladder according to claim 13 wherein the ladder connecting element comprises an elongated body extending downwardly from the top portion of the safety ladder at a predetermined angle thereto.

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16. The safety ladder according to claim 15 wherein the ladder connecting element is oriented at an angle between 15° and 25°.

17. The safety ladder system according the claim 12 comprising a tether connected to the safety ladder and to the safety ladder support structure for securing the safety ladder thereto.

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18. The safety ladder system according the claim 12 comprising a securing mechanism for securing the ladder connecting element to the support connecting element when mated therewith.

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19. The safety ladder system according the claim 18 wherein one of the ladder connecting element and the support connecting element comprises a hollow cylinder adapted for accommodating a respective cylinder therein and wherein the securing mechanism comprises a securing bolt adapted for being accommodated in respective bores disposed in the ladder connecting element and the support connecting element.

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20. The safety ladder system according the claim 12 wherein the safety ladder support structure comprises at least a guiding element for guiding movement of the safety ladder during installation.

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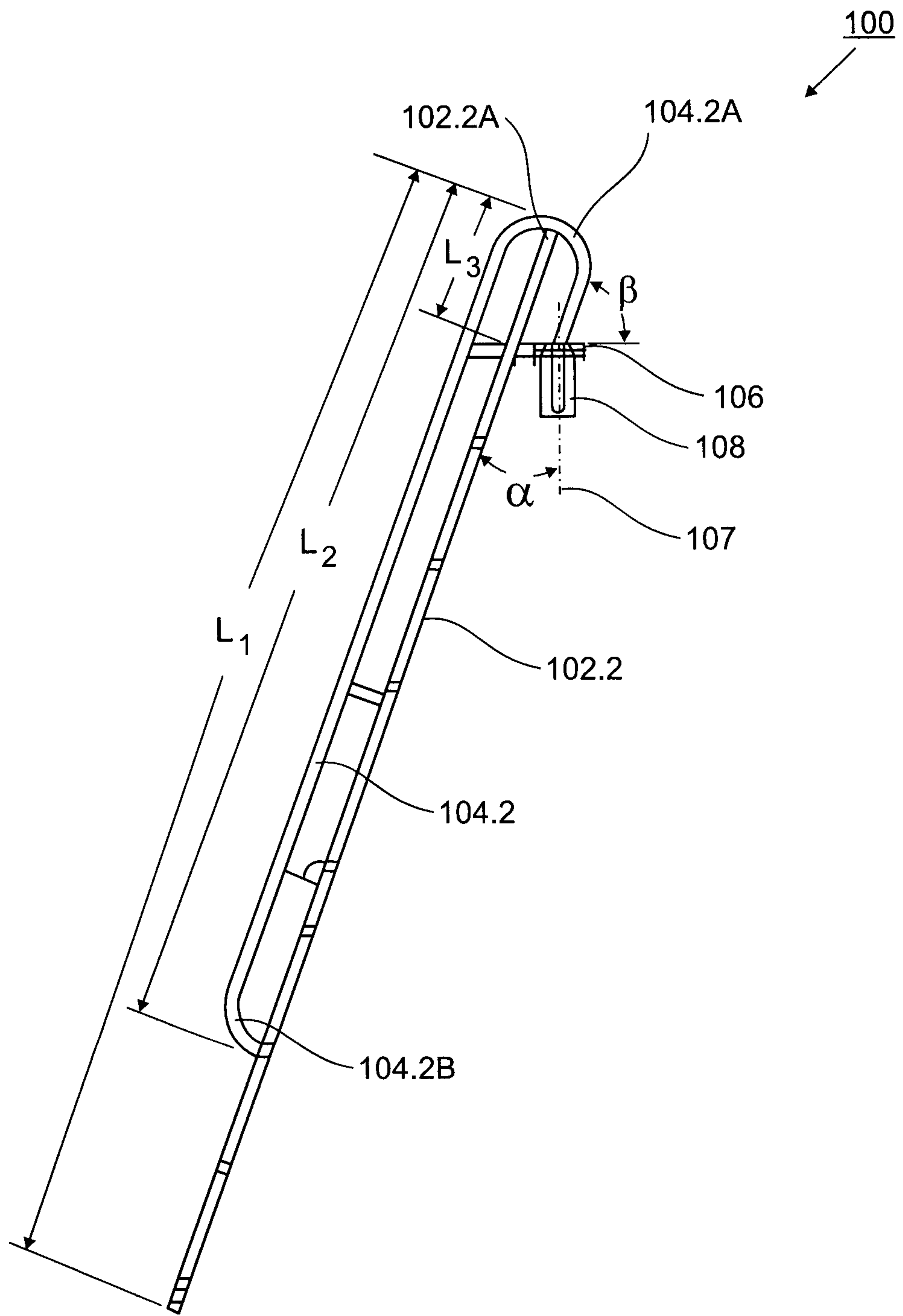


Figure 1a

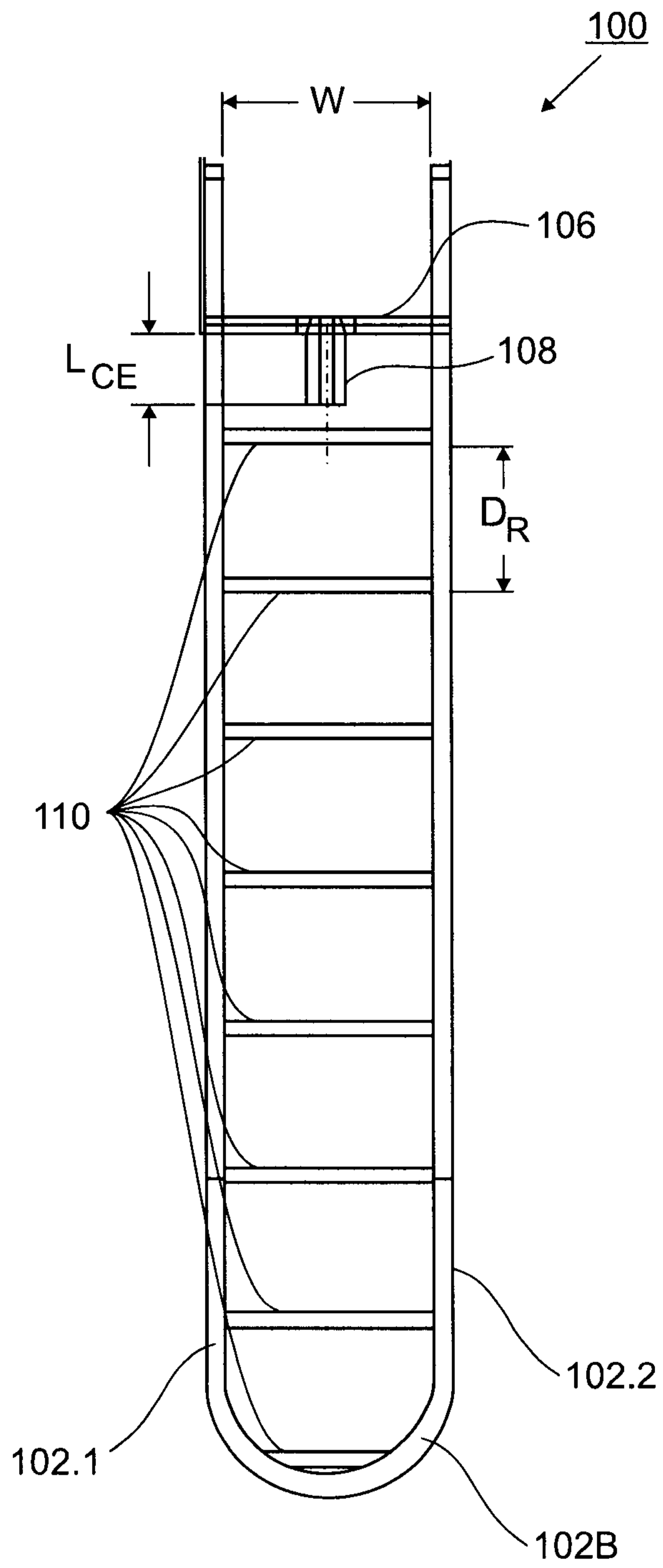


Figure 1b

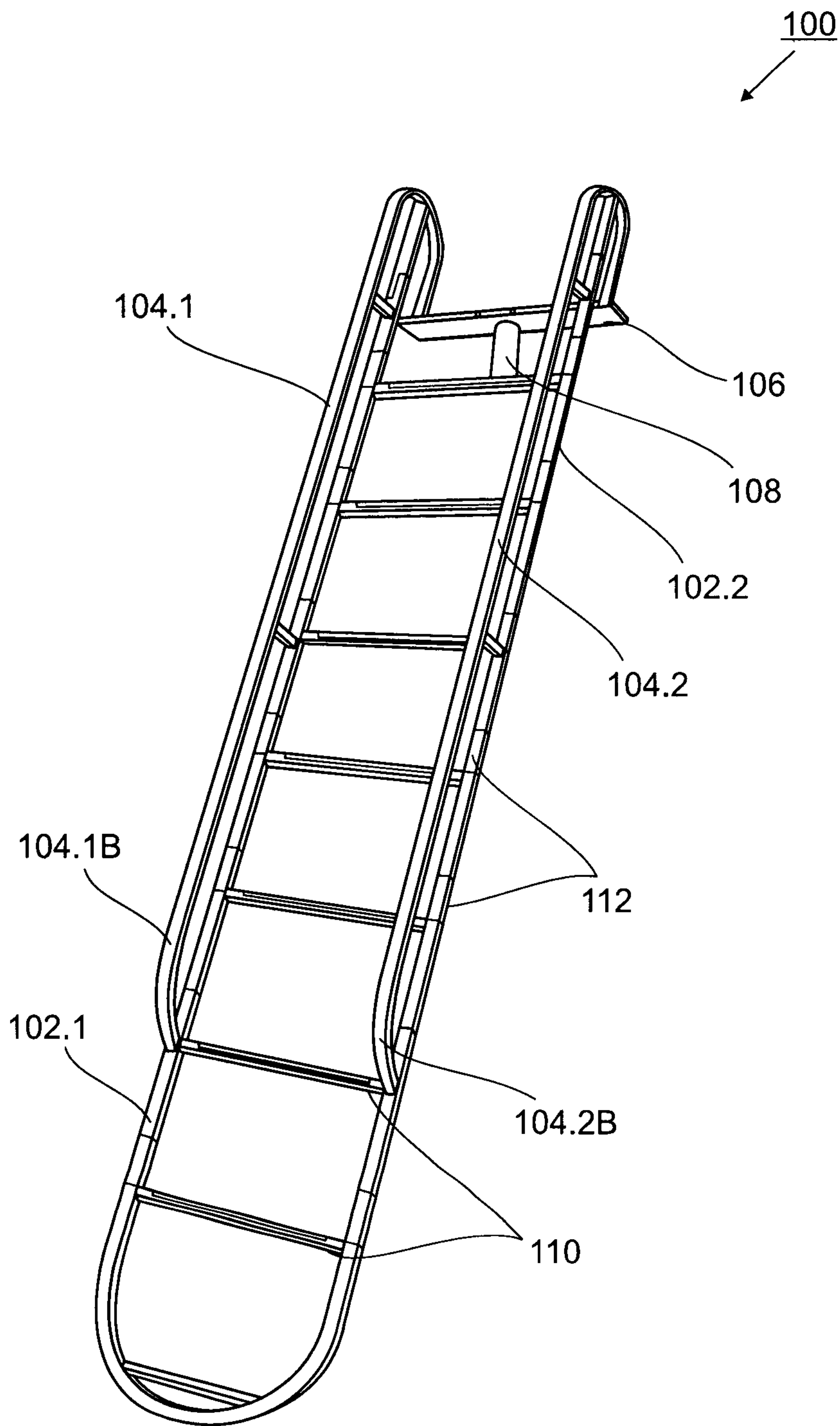


Figure 1c

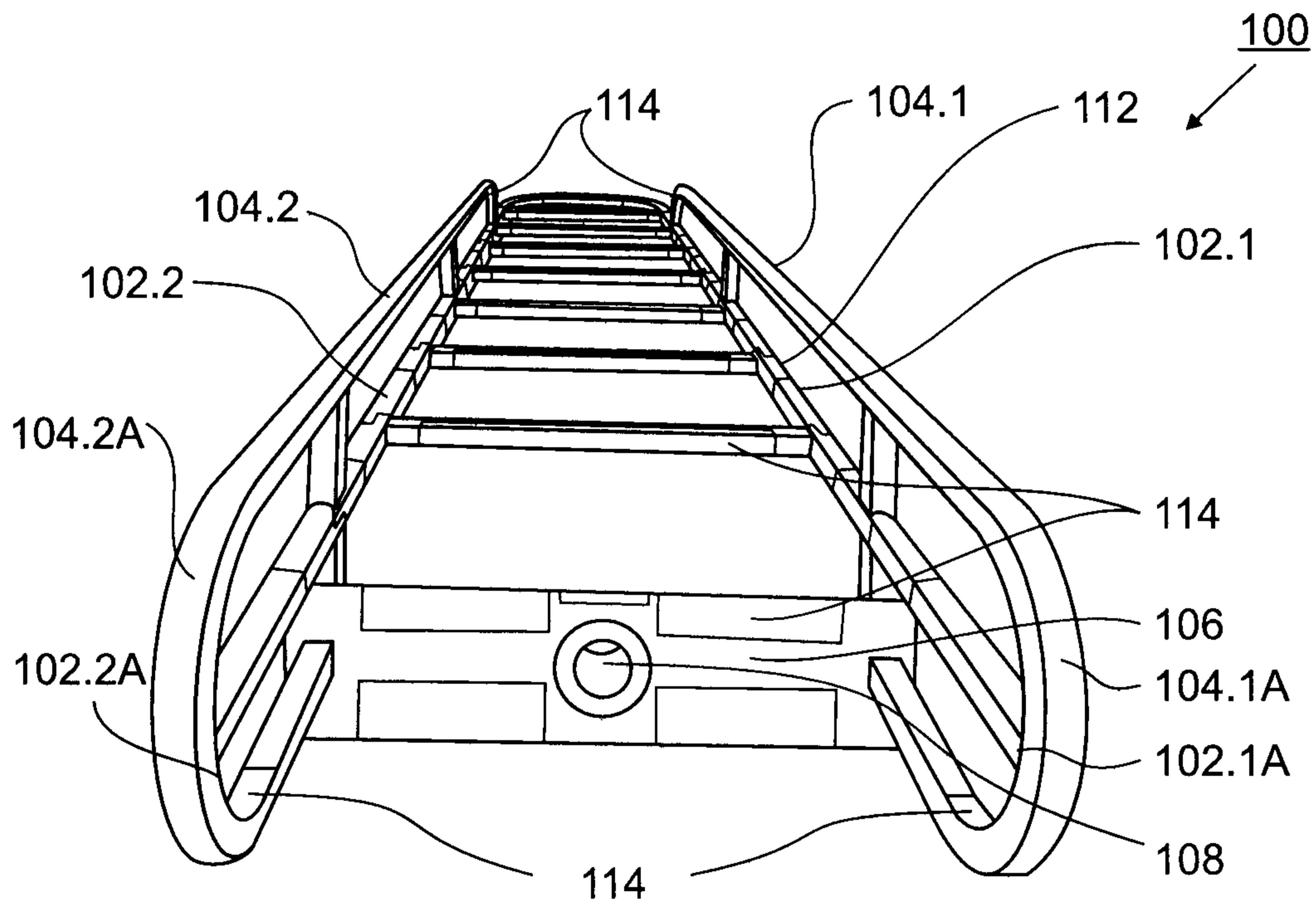


Figure 1d

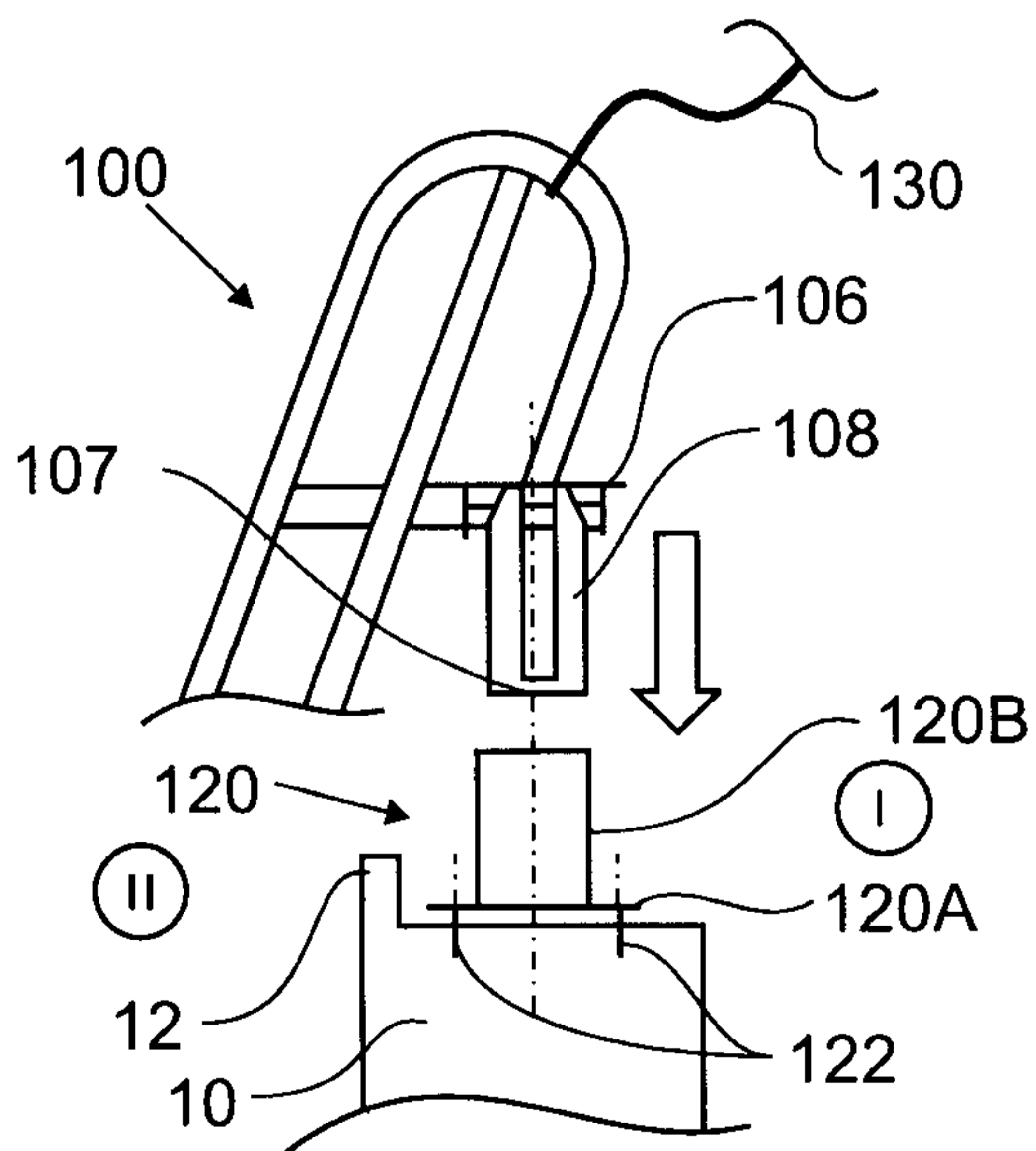


Figure 2a

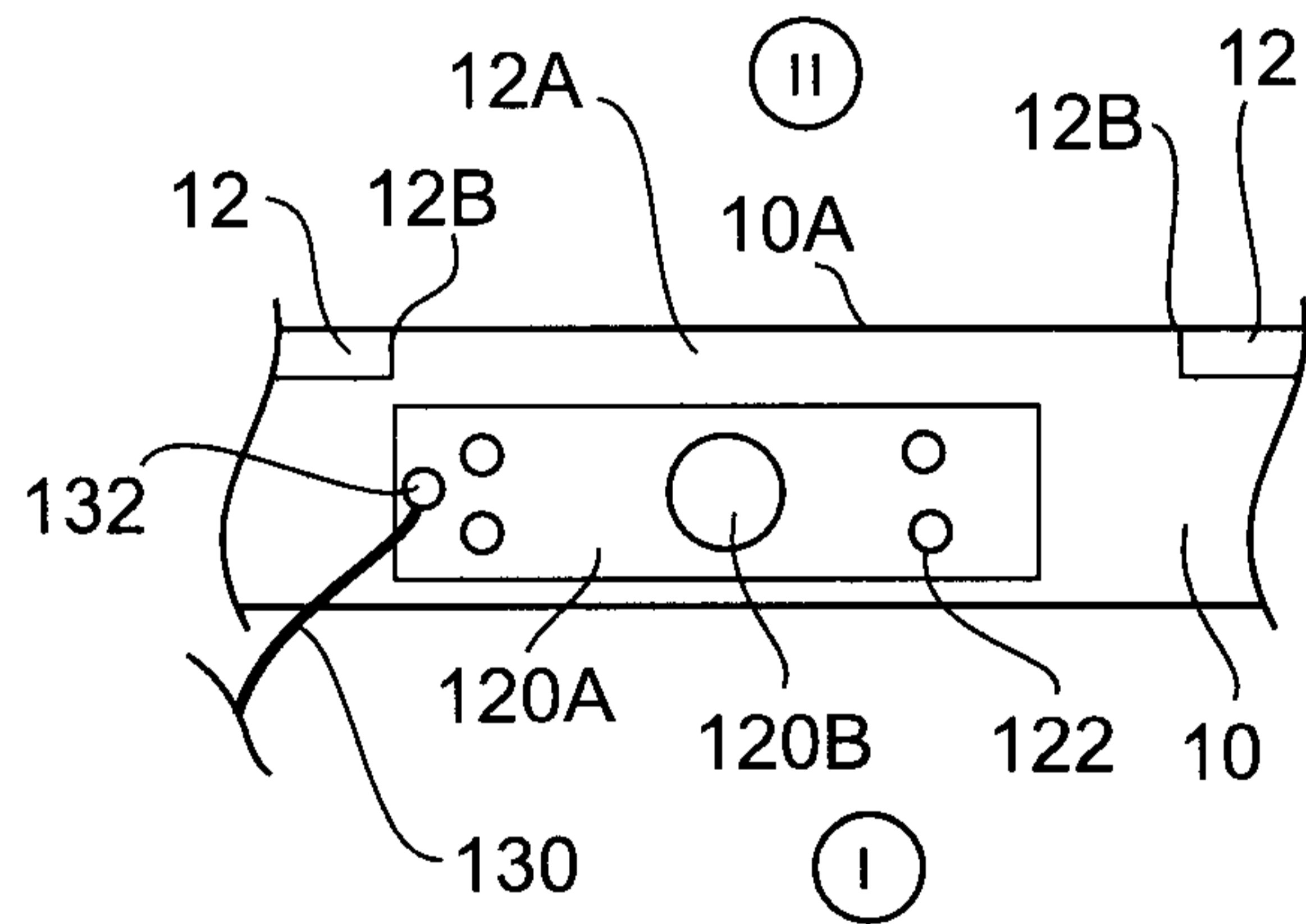


Figure 2b

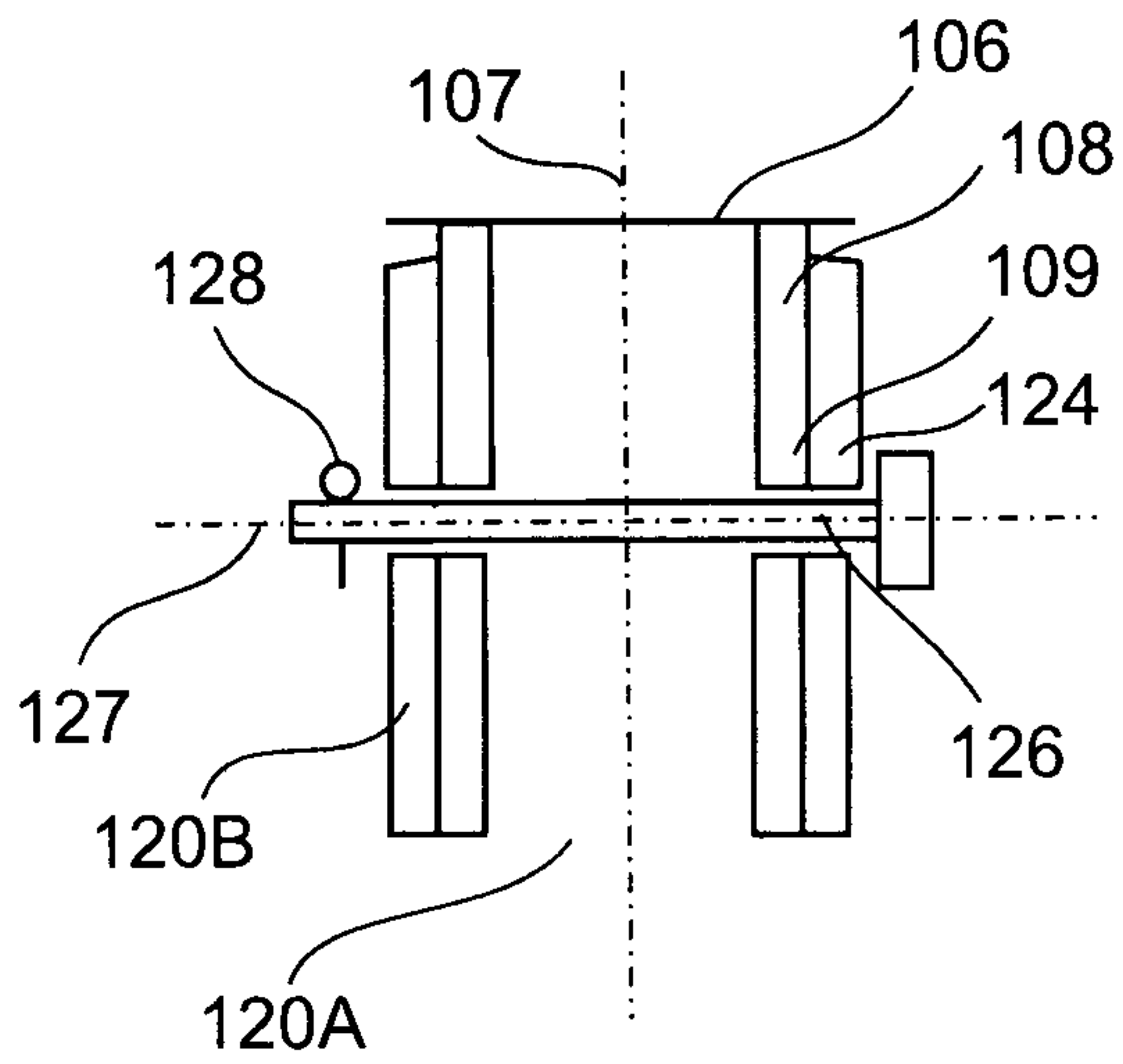


Figure 2d

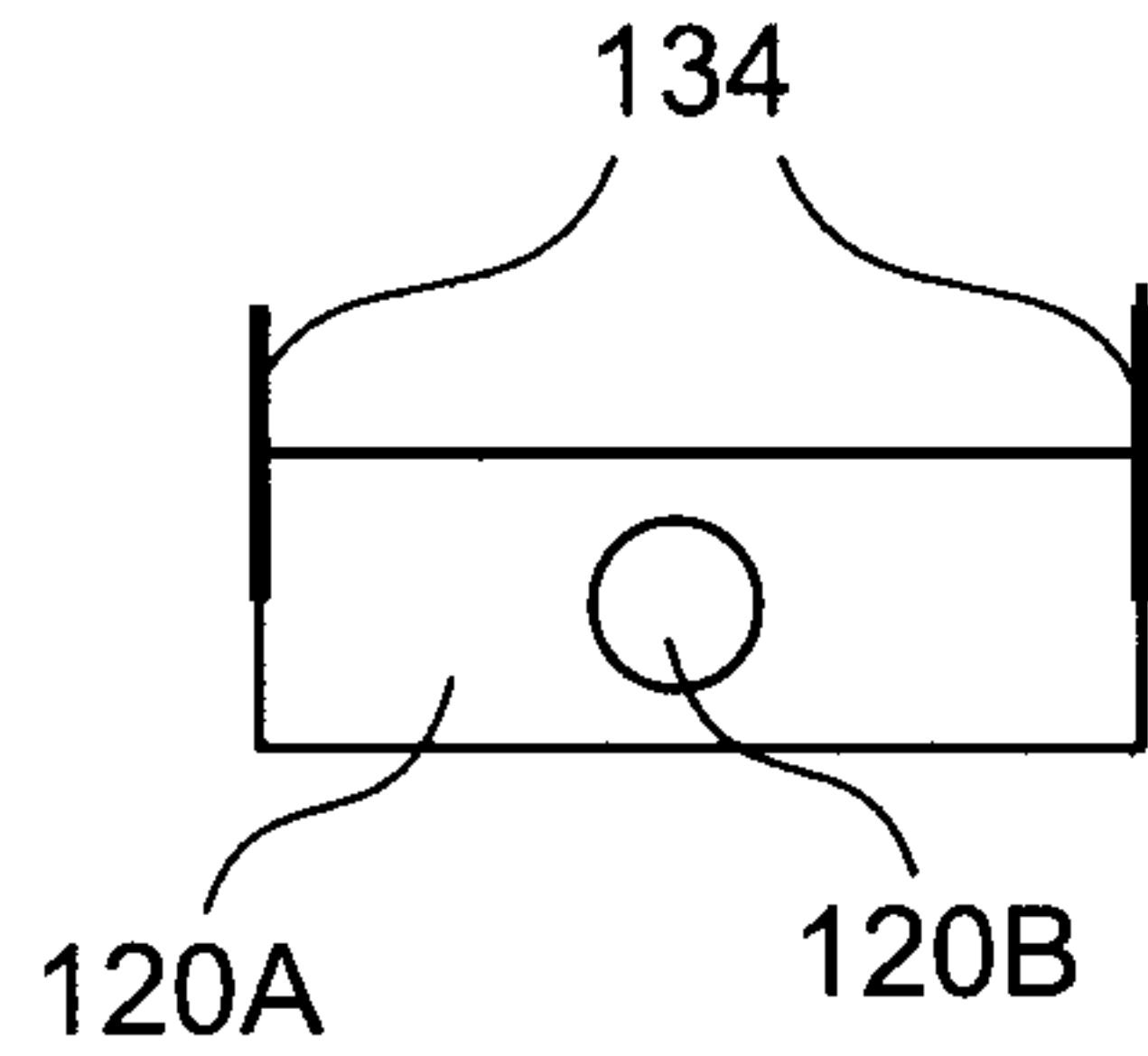


Figure 2c

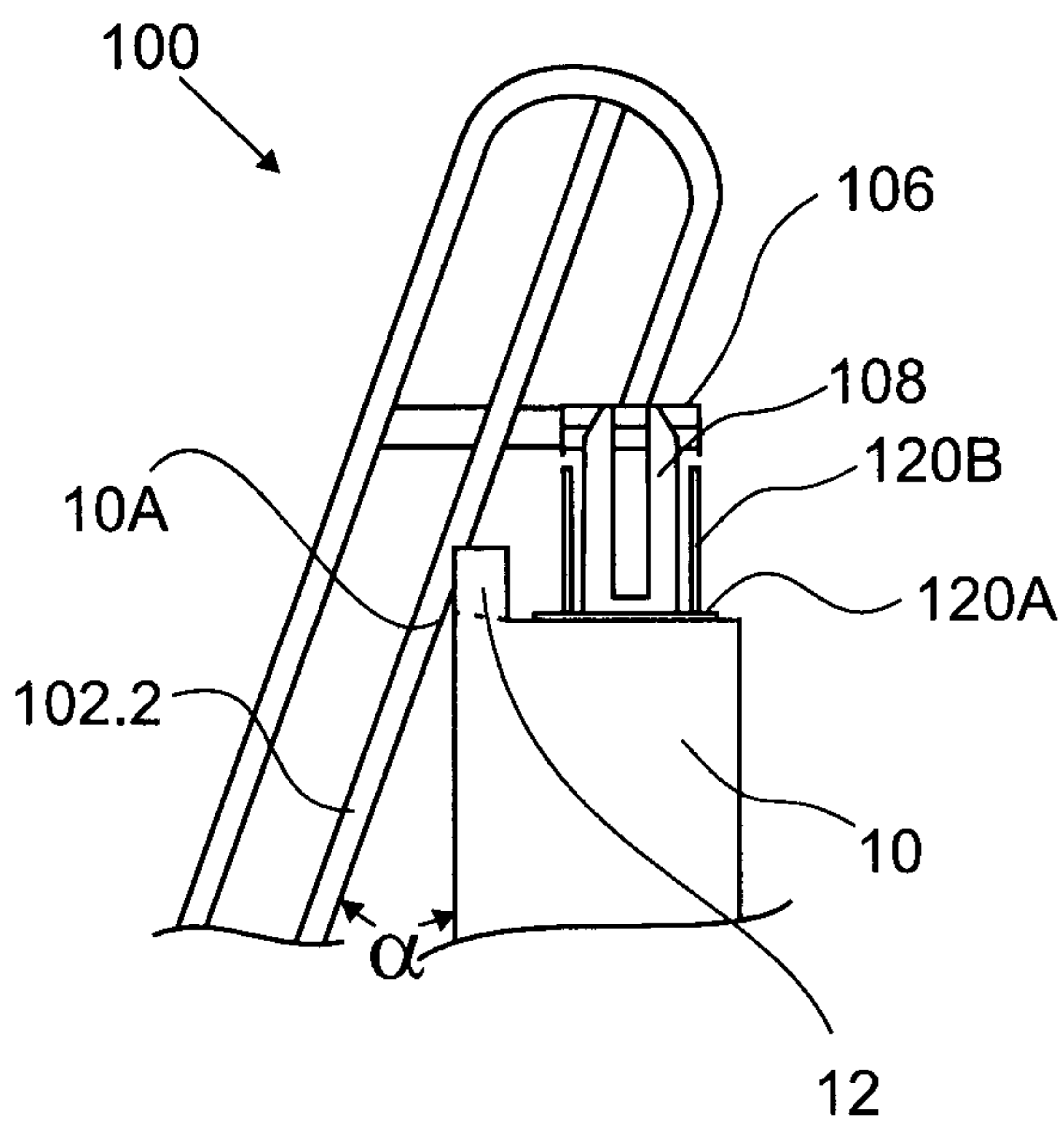


Figure 3a

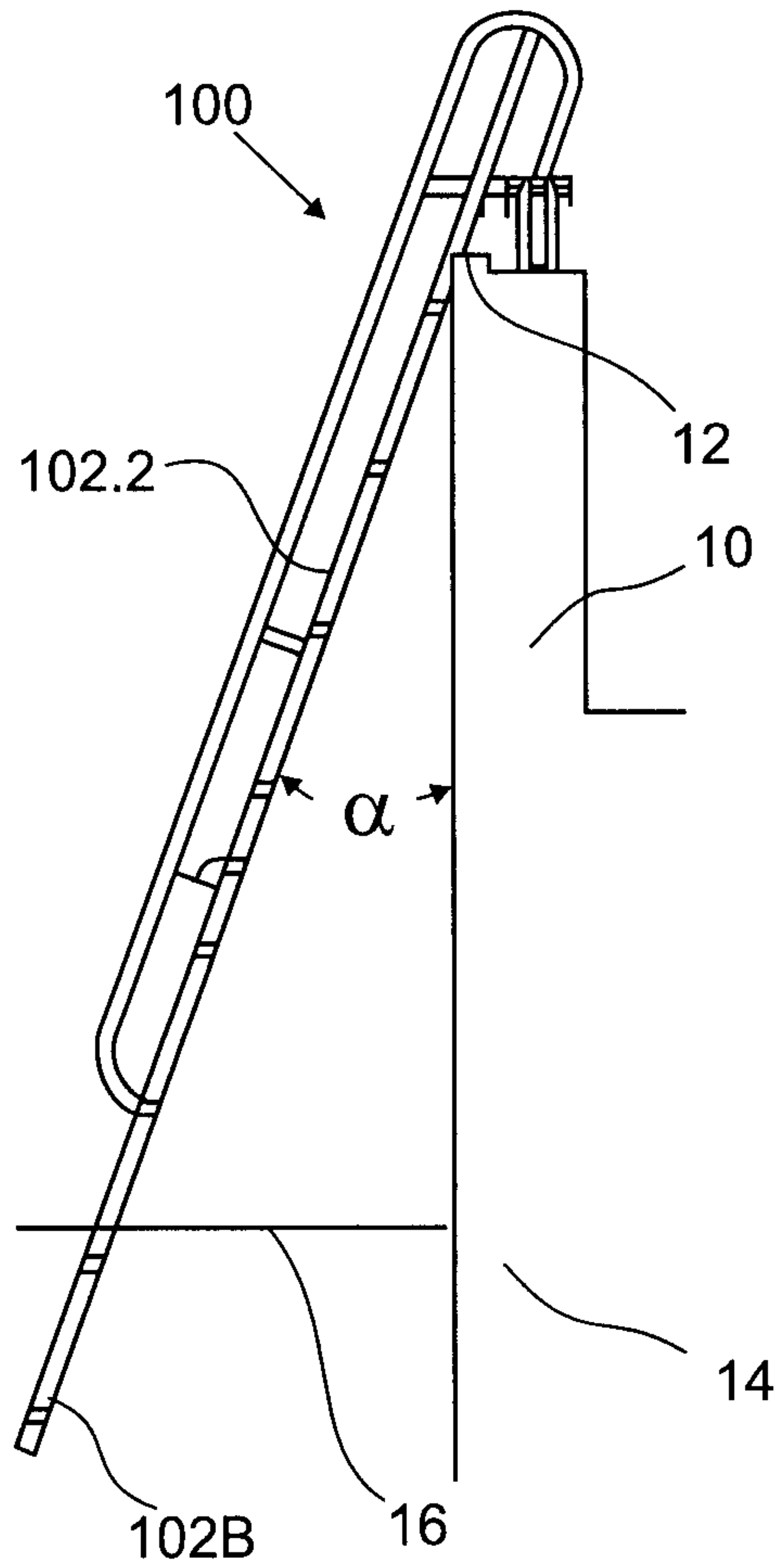


Figure 3b

