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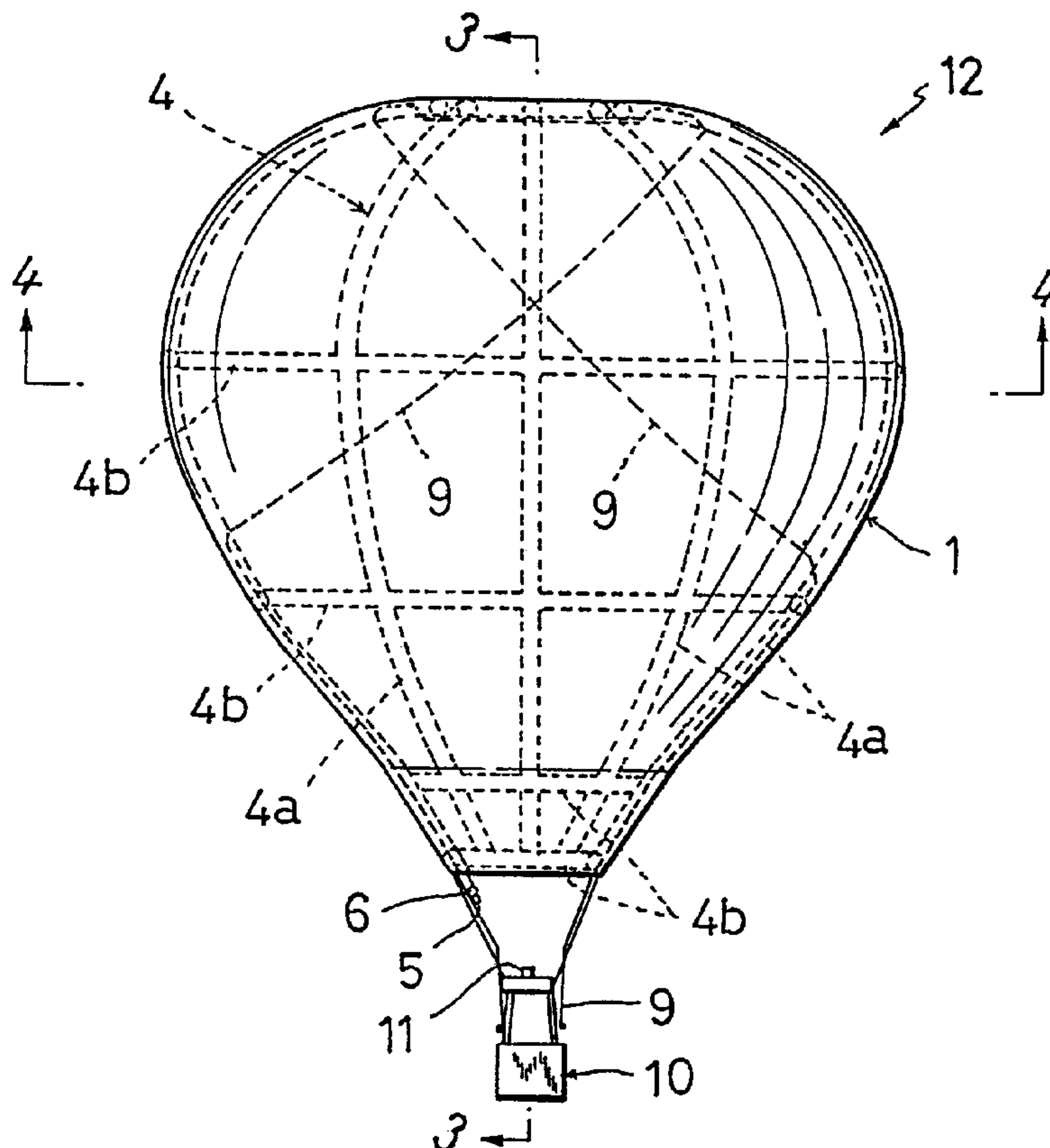
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(54) Title: AIRCRAFT



(57) Abrégé/Abstract:

According to the present invention, only by a flexible gas storage tube which becomes the frame that maintains the inflated condition of an envelope is established on the envelope which is folded at the time of nonuse an air balloon and an airship and can be put away, and suppling gas like air, helium, and hydrogen to the gas storage tube, this invention is possible to keep the condition which could be inflated in a short time simply in the envelope.



ABSTRACT OF THE DISCLOSURE

According to the present invention, only by a flexible gas storage tube which becomes the frame that maintains the inflated condition of an envelope is established on the envelope which is folded at the time of nonuse an air balloon and an airship and can be put away, and suppling gas like air, helium, and hydrogen to the gas storage tube, this invention is possible to keep the condition which could be inflated in a short time simply in the envelope.

AIRCRAFT

BACKGROUND OF THE INVENTION

5 The present invention, relating to air-
craft, provides an envelope which is folded at
the time of nonuse for an air balloon, para
glider, and hang glider and can be put away.

 Formerly, the envelope could be folded at
10 the time of nonuse for an air balloon and an
airship and could be put away and was combined
with a durability outer surface and high air-
tightness or heatproof inner skin.

 The former envelope required a lot of
15 trouble and time to inflate and expand to the
envelope of the former air balloon or an
airship, moreover, hardness was low, and it was
difficult to improve resistance against wind
and flight performance because of flexible
20 quality.

SUMMARY OF THE INVENTION

25 It is an object of the present invention
to able to be folded and put away at the time
of nonuse as before.

It is another object to the present invention to provide air craft with more rigidity and more easily supplying the flexible gas storage tube which becomes the frame that maintains the inflated condition of an envelope with gas.

The present invention provides an airship comprising an envelope for containing hot air for providing buoyancy during use of the airship, the envelope having a charging opening, at a bottom portion thereof, for receiving the hot air and the envelope being foldable for storage during a time of nonuse of the airship, the envelope having an inflatable robe structure which is inflatable to maintain the envelope in at least a partially inflated posture and to support the charging opening in an open condition for receiving the hot air during inflation of the envelope with the hot air from a collapsed, non-inflated condition, and means for supplying a gas to the inflatable robe structure to maintain the inflatable tube structure in an inflated condition.

The present invention also provides an airship comprising an envelope for containing hot air for providing buoyancy during use of the airship, the envelope having a charging opening, at a bottom portion thereof, for receiving the hot air and the envelope being foldable for storage during a time of nonuse of the airship, the envelope having a first inflatable tube structure for maintaining the envelope in at least a partially inflated posture of the envelope, the envelope having a second inflatable tube structure

interconnected with the first inflatable tube structure and encompassing the charging opening, the second inflatable tube structure maintaining the charging opening in an open condition for receiving the hot air to fill the envelope when the second inflatable tube structure is inflated, and means for supplying gas to the second inflatable tube structure to maintain an inflated condition thereof, the means for supplying gas including an air pump.

The prescribed and other objects and features of the present invention will be understood by reading carefully the following description in conjunction with the accompanying drawings.

The drawings are illustrative and are not to be limitative of the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view showing the first embodiment of the present invention;

Fig. 2 is a side view showing the first embodiment of the present invention;

Fig. 3 is an expanded sectional view taken on line 3-3 of Fig. 1;

Fig. 4 is an expanded sectional view taken on line 4-4 of Fig. 1;

Fig. 5 is a diagram showing the condition

to supply the air of the first embodiment of the present invention;

Fig. 6 is a front view showing the second embodiment of the present invention;

5 Fig. 7 is a top view showing the second embodiment of the present invention;

Fig. 8 is a front view showing the third embodiment of the present invention;

10 Fig. 9 is a top view showing the third embodiment of the present invention;

Fig. 10 is a front view showing the fourth embodiment of the present invention;

Fig. 11 is a top view showing the fourth embodiment of the present invention;

15 Fig. 12 illustrates the front view and partly in section showing the fifth embodiment of the present invention;

Fig. 13 is a top view showing the fifth embodiment of the present invention;

20 Fig. 14 is a front view showing the sixth embodiment of the present invention;

Fig. 15 is a top view showing the sixth embodiment of the present invention;

25 Fig. 16 is a front view showing the seventh embodiment of the present invention;

Fig. 17 is a top view showing the seventh embodiment of the present invention;

Fig. 18 is a perspective view showing the eighth embodiment of the present invention;

Fig. 19 is a front view showing the eighth embodiment of the present invention;

5 Fig. 20 is a perspective view showing the ninth embodiment of the present invention;

Fig. 21 is a front view showing the ninth embodiment of the present invention;

10 Fig. 22 is a perspective view showing the tenth embodiment of the present invention;

Fig. 23 is a longitudinal sectional view showing the tenth embodiment of the present invention;

15 Fig. 24 is a perspective view showing the eleventh embodiment of the present invention;

Fig. 25 is a front view showing the eleventh embodiment of the present invention;

Fig. 26 is a perspective view showing the twelfth embodiment of the present invention;

20 Fig. 27 is a typical sectional view showing of the twelfth embodiment of the present invention.

25 DESCRIPTION OF THE PREFERRED EMBODIMENT

Preferred embodiments of the present

invention will be described in more detail referring to the accompanying drawings.

Figs. 1 to 5 illustrate the first embodiment of the present invention, an envelope 1 is formed on the same shape of the envelope of the hot air balloon. A release valve 2 for heat release is formed in the upper part of the envelope 1, and a mouth 3 introducing heat is formed at the lower part of the envelope 1.

Therefore, envelope 1 is used as the material of the envelope like nylon and tetoron clothes with resinous coating by reason of the improving of airtightness and the protection of debasement.

A flexible gas storage tube 4 formed with the envelope 1 is a frame that maintains the inflated condition of the envelope 1 and comprises several vertical gas storage tubes 4a arranged equally in a vertical manner in all around the envelope 1, several horizontal gas storage tubes 4b formed at fixed space with the shape of the ring in a horizontal way around the envelope 1 and is connected with the vertical gas storage tubes 4a, and an opening and shutting valve 6 provided with a gas injection hold 5 formed into the lowest part of the horizontal gas storage tube 4b as the apparatus to

support and supply the vertical and horizontal
gas storage tubes 4a and 4b into gas like air,
helium, and hydrogen. In addition, the horizon-
tal gas storage tubes 4b are arranged at slight
5 measuring intervals in the part of the mouth 3
so as to be able to maintain an opening mouth 3.

A parachute vent 7 is provided with a face
fastener 8 which covers a release valve 2 with
the envelope 1 that is possible to open and
10 shut. Also a valve line 9 for the operation
which projects from the mouth 3 of the envelope
1 is provided in the parachute vent 7.

A gondola 10 is provided under the
envelope 1 by suspension system. And a burner
15 11 to send heat within the envelope 1 is
provided within the gondola 10.

When an aircraft 12 of above-mentioned
composition becomes in a condition in which the
envelope 1 has swelled by the envelope is
20 expanded and gas is supplied within the hori-
zontal gas storage tube 4b and vertical gas
storage tube 4a using air pump 13 from gas
injection hold 5, and these gas storage tubes
4 inflate, then the gas injection hold 5 is
25 closed by opening and shutting valve 6.

Secondly, the envelope 1 is made to rise
with the same operation as before, and it is

able to fly.

At the time of nonuse, envelope 1 folds as before and can be put away.

5

DIFFERENT PREFERRED

EMBODIMENTS OF THE INVENTION

10 Other embodiments of the present invention will now be described referring to Figs. 6 to 27. Through the drawings of the embodiments, like components are denoted by like numerals as of the first embodiment and will be explained in no more details.

15 Figs. 6 to 7 show the second embodiment of the present invention which is distinguished from the first embodiment by the fact that a skirt part 14 arranged as gas storage tubes like the flat tubes 4A formed of the part of
20 the mouth 3 of the envelope 1. An aircraft 12A with the skirt part 14 according to the second embodiment will provide the same effects as of the first embodiment.

25 Figs. 8 to 9 show the third embodiment of the present invention which is distinguished from the first embodiment by the fact that an aircraft 12B producing the envelop 1 and the

gas sotrage tube 4 is replaced with the enve-
lope 1A and gas storage tubes 4B.

The aircraft 12B comprises an envelope
1A enabling to keep the airship shape by a
5 flexible gas storage tube 4B enabling the shape
to be maintained as wing 15, horizontal fin 16,
vertical fin 17, and rudder 18 owing to the
supply of gas.

In the action of the aircraft 12B with
10 the envelope 1A and gas storage tube 4B, the
envelope 1A bulges the airship's shape owing to
the gas storage tube 4a, 4b, also the wing 15,
horizontal fin 16, vertical fin 17 and rudder
18 may become more rigid.

15 In addition, each of the gas storage tubes
4a, 4b, and 4B may be folded and put away when
gas is released from each tube.

Figs. 10 to 11 show the fourth embodiment
of the present invention which is distinguished
20 from the third embodiment by the fact that a
wing 19 with flap 27 which provides a triangle
of the flexible gas storage tubes 4B at the
envelope 1A of the airship's shape. An aircraft
12C with the wing 19 according to the fourth
25 embodiment will provide the same effects as of
the first embodiment.

Figs. 12 to 13 show the fifth embodiment of

the present invention which is distinguished from the fourth embodiment by the fact that a vertical gas storage tube 4a and a horizontal gas storage tube 4b are provided an envelope 20 to form the shape of the para glider's wing to be able to keep the shape of para glider expanded. An aircraft 12D with the shape of para glider's wing may certainly be maintain the expanded condition in order to inflate and supply gas into the vertical gas storage tubes and the horizontal gas storage tubes.

Figs. 14 to 15 show the sixth embodiment of the present invention which is distinguished from the fourth embodiment by the fact that an air storage tube 4B is able to maintain the condition in which an envelope 21 shaped wing of hang glider which is expanded to provide an envelope 21 shaped the wing of the hang glider. An aircraft 12E with the air storage tube 4B according to the sixth embodiment will provide the same effects as of the fourth embodiment.

Figs. 16 to 17 show the seventh embodiment of the present invention which is distinguished from the first embodiment by the fact that fluttering wings 24, 24 are enable to flutter with a holding rope 22 and a pulling rope 23 and main-

tains the condition that the air storage tube
4B is expanding is provided to the envelope 1A.
An aircraft 12F with the fluttering wing 24
arranged to the envelope 1A according to
5 seventh embodiment will provide the same
effects as of the first embodiment.

Figs. 18 to 19 show the eighth embodiment
of the present invention which is distinguished
from the third embodiment by the fact that
10 fluttering wings 24, 24 are composed of a sprigy
frame provided a gondola 26 is installed near
the central part under the envelope 1A. An air-
craft 12G with the fluttering wings 24, 24
composed by sprigy framework according to the
15 eighth embodiment will provide the same effects
as of the third embodiment.

Figs. 20 to 21 show the ninth embodiment of
the present invention which is distinguished
from the third embodiment by the fact that
20 wings 28, 28 similar to the para glider are
installed on both sides of the envelope 1A. An
aircraft 12H with the wings 28, 28 like para
glider according to the ninth embodiment will
provide the same effects as of the third em-
25 bodiment.

Figs. 22 to 23 show the tenth embodiment of
the present invention which is distinguished

from the ninth embodiment by the fact that an envelope 1B provides the shape of a bird. An aircraft 12I with the envelope 1B according to the tenth embodiment will provide the same effects as of the ninth embodiment.

Figs. 24 to 25 show the eleventh embodiment of the present invention which is distinguished from the ninth embodiment by the fact that an envelope 29, 29 which is formed in the shape of a glider is installed in the upper part of the gondola 26 and which is possible to set up and remove. An aircraft 12J according to the eleventh embodiment will provide the same effects as of the ninth embodiment.

Figs. 26 to 27 show the twelfth embodiment of the present invention which is distinguished of the first embodiment by the fact that an air pump 13 is connected with the lowest part of the horizontal gas storage tube 4b as the equipment to maintain and supply gas including air. An aircraft 12K with the air pump 13 according to the twelfth embodiment will provide the same effects as of the first embodiment.

ADVANTAGES OF THE INVENTION

As set forth above, the advantages of the present invention are as follows:

(1) Since an aircraft comprises an envelope which may be folded and stored away
5 at the time of nonuse for an air balloon and air ship, a flexible gas storage tube which is formed of the envelope and which may be maintain the condition that the envelope is inflated, and an equipment which maintains and
10 supplies gas like air, helium, and hydrogen into the flexible gas storage tube, may keep the inflated condition in order to inflate and supply gas into the flexible gas storage tube.

Therefore, inflating the envelope can be
15 performed comfortably and easily.

(2) As depicted in the above paragraph (1), it can be put away as before and is put away in a compact and can be kept by pulling out gas within the gas storage tube.

20 (3) As depicted in the above paragraph (1), though the structure is light by simplicity, the rigidity which is important in an air balloon and an airship can be given, and a resistance against wind and flight performance
25 is improved greatly.

(4) As depicted in the above paragraph (1), since the structure is simple, it is possible

to manufacture it easily. Also a mouth part is opened by a gas storage tube certainly, and it can be used safely as for the things which uses a burner for hot air balloon.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An airship comprising:

an envelope for containing hot air for providing buoyancy during use of said airship, said envelope having a charging opening, at a bottom portion thereof, for receiving said hot air and said envelope being foldable for storage during a time of nonuse of said airship;

said envelope having an inflatable tube structure which is inflatable to maintain said envelope in at least a partially inflated posture and to support said charging opening in an open condition for receiving said hot air during inflation of said envelope with said hot air from a collapsed, non-inflated condition; and

means for supplying a gas to said inflatable tube structure to maintain said inflatable tube structure in an inflated condition.

2. An airship according to claim 1, wherein the means for supplying a gas includes a gas injection port on said inflatable tube structure and a valve communicating said gas injection port with said inflatable tube structure.

3. An aircraft according to claim 1, wherein said means for supplying a gas includes an air pump connected to said inflatable tube structure.

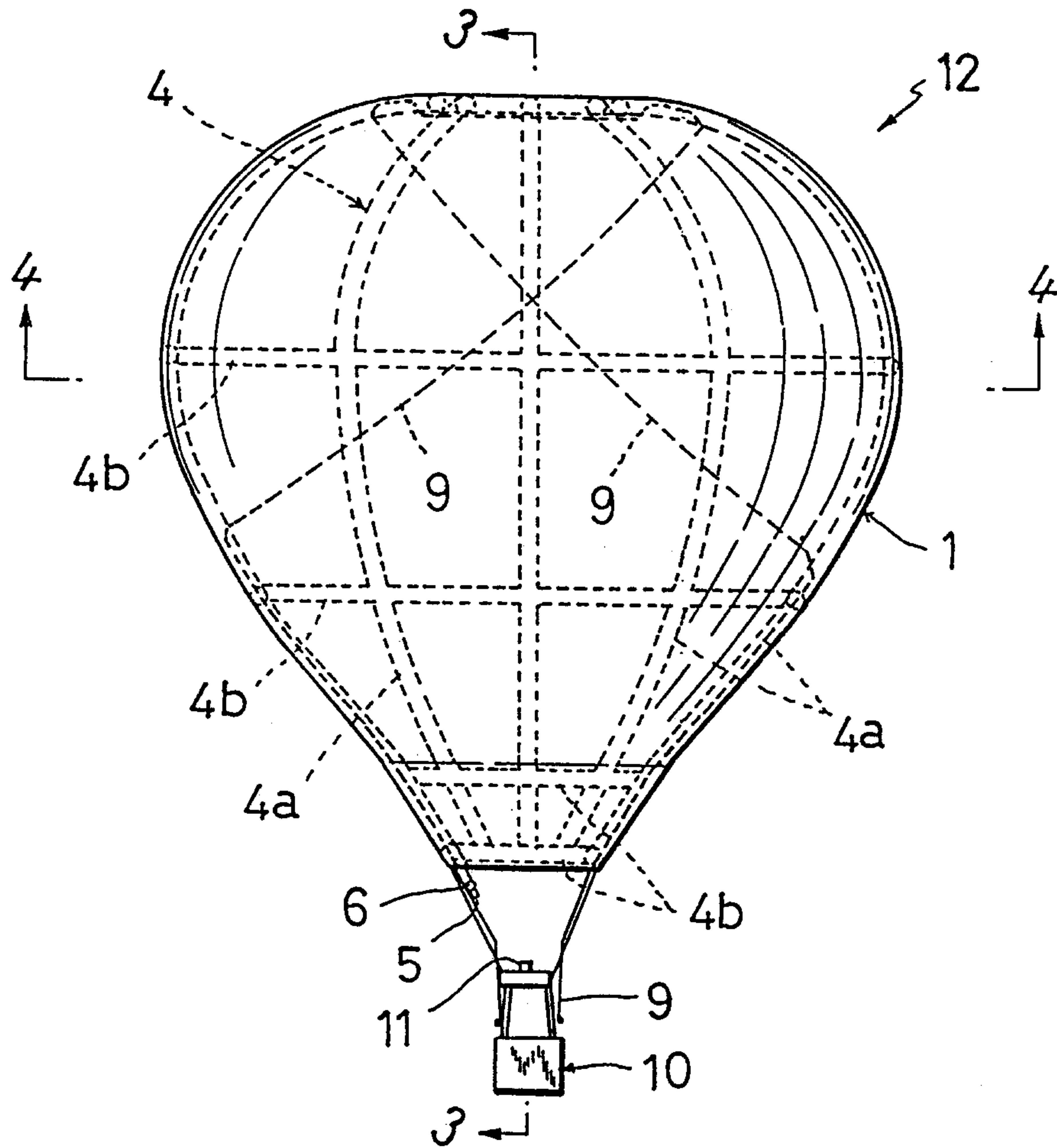
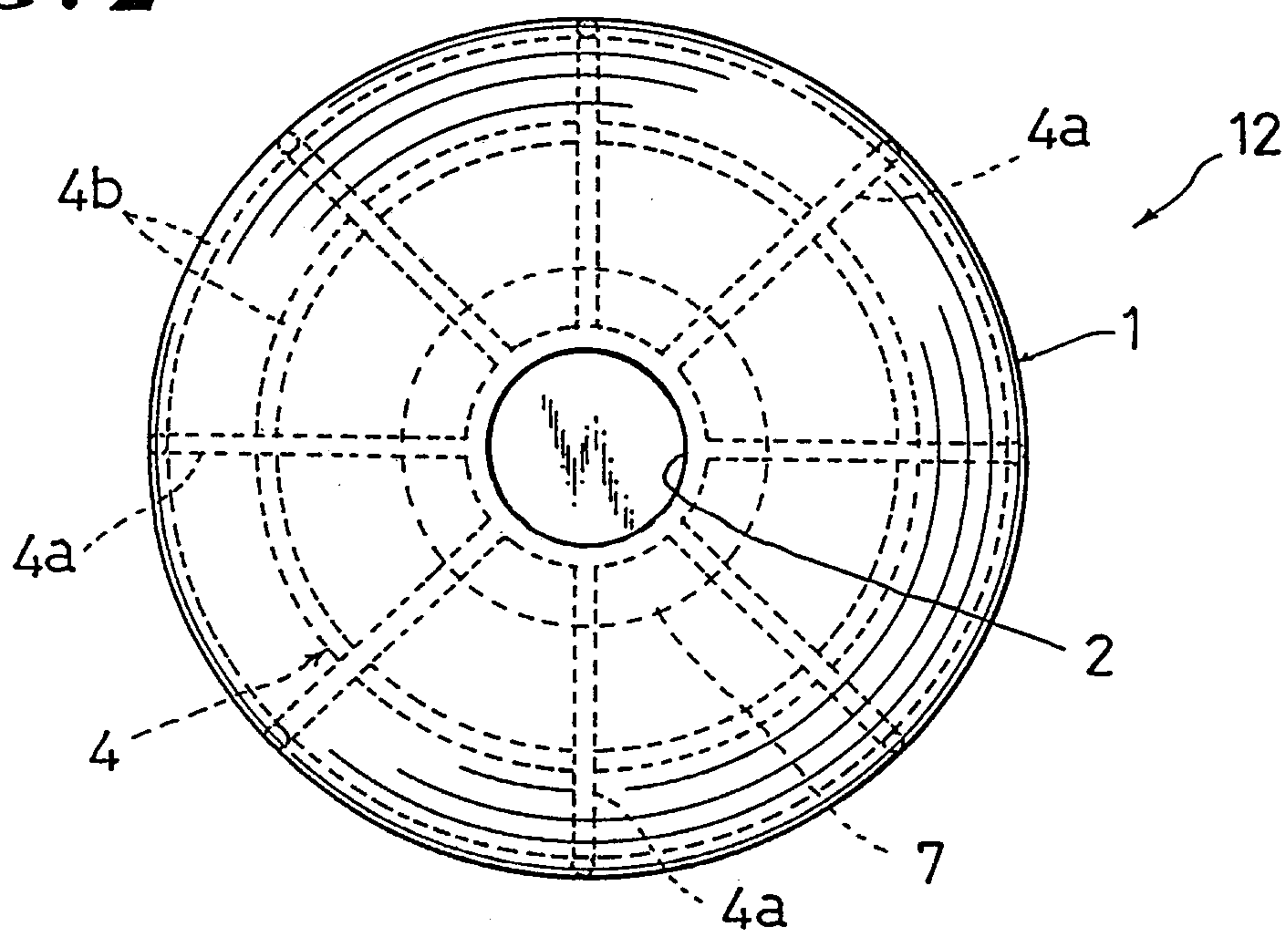
4. An airship comprising:

an envelope for containing hot air for providing buoyancy during use of said airship, said envelope having a charging opening, at a bottom portion thereof, for receiving said hot air and said envelope being foldable for storage during a time of nonuse of said airship;

said envelope having a first inflatable tube structure for maintaining said envelope in at least a partially inflated posture of said envelope;

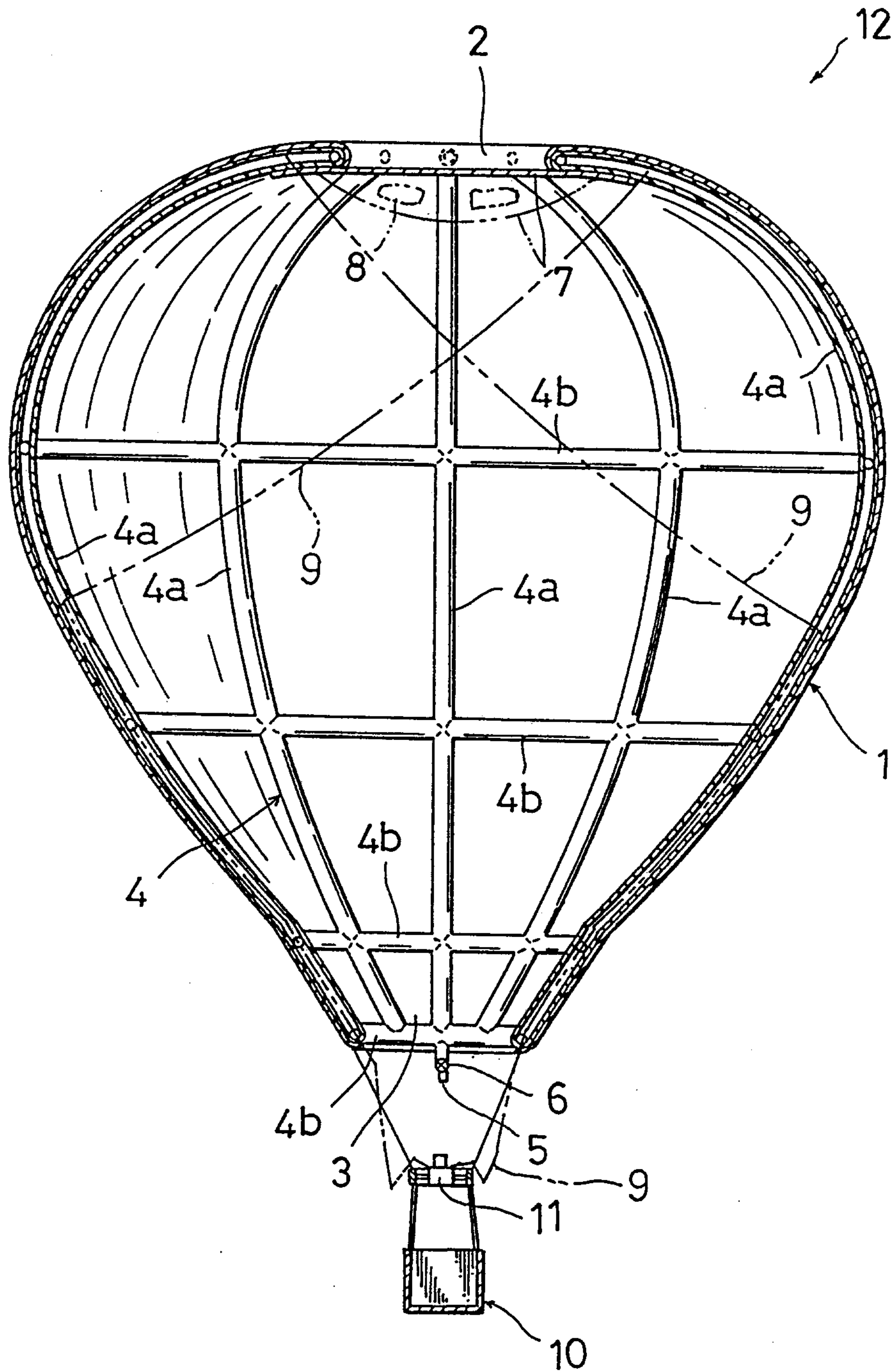
said envelope having a second inflatable tube structure interconnected with said first inflatable tube structure and encompassing said charging opening, said second inflatable tube structure maintaining said charging opening in an open condition for receiving said hot air to fill the envelope when said second inflatable tube structure is inflated; and

means for supplying gas to said second inflatable tube structure to maintain an inflated condition thereof, said means for supplying gas including an air pump.

FIG. 1**FIG. 2**

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FIG. 3



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FIG. 4

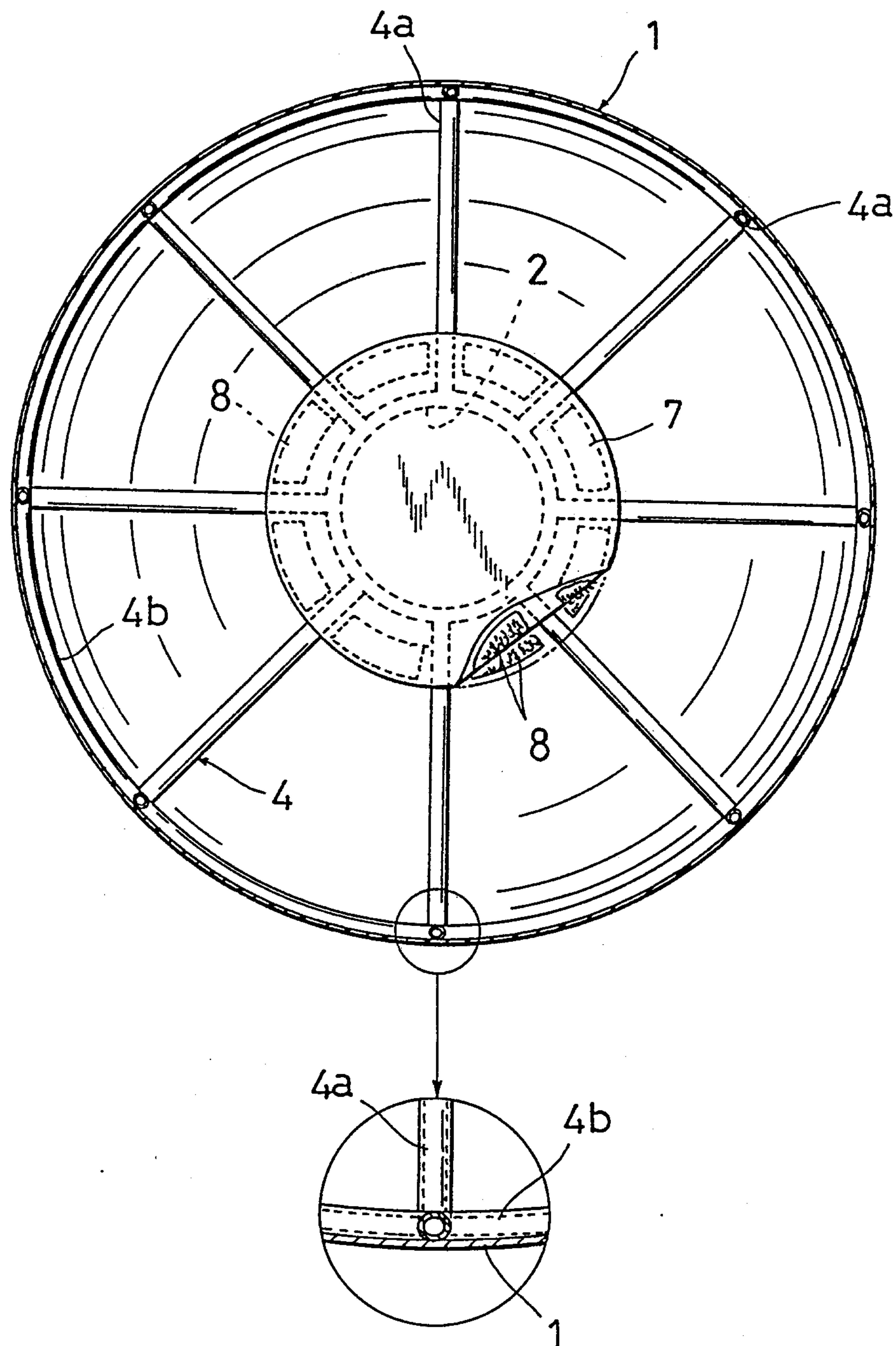
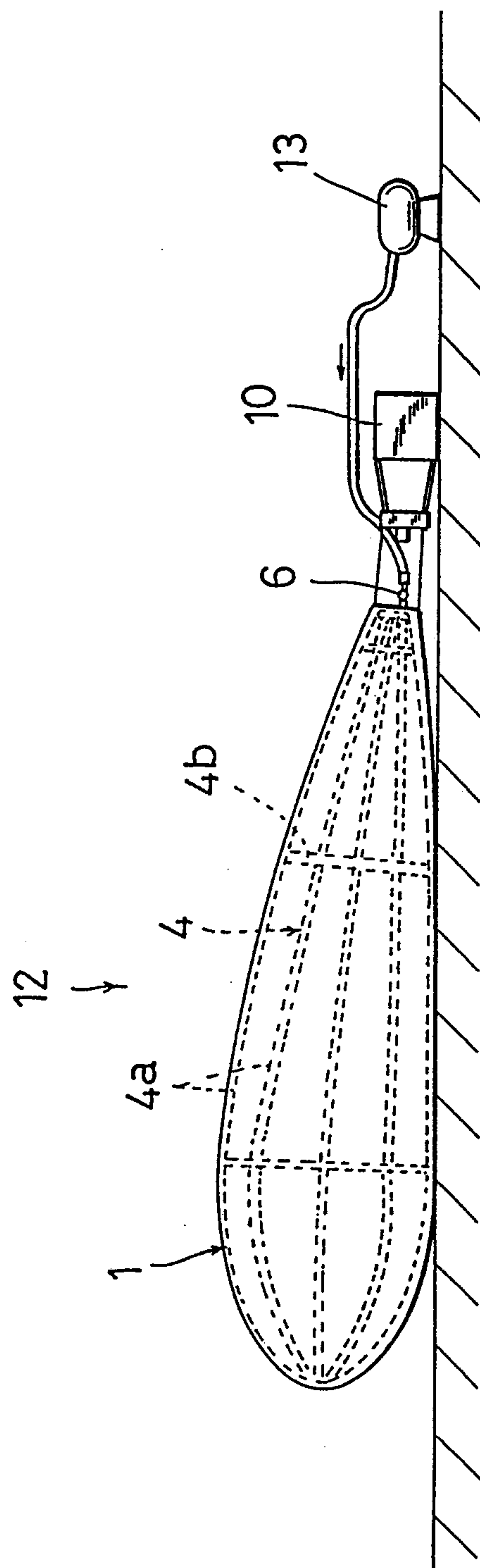


FIG. 5



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FIG. 6

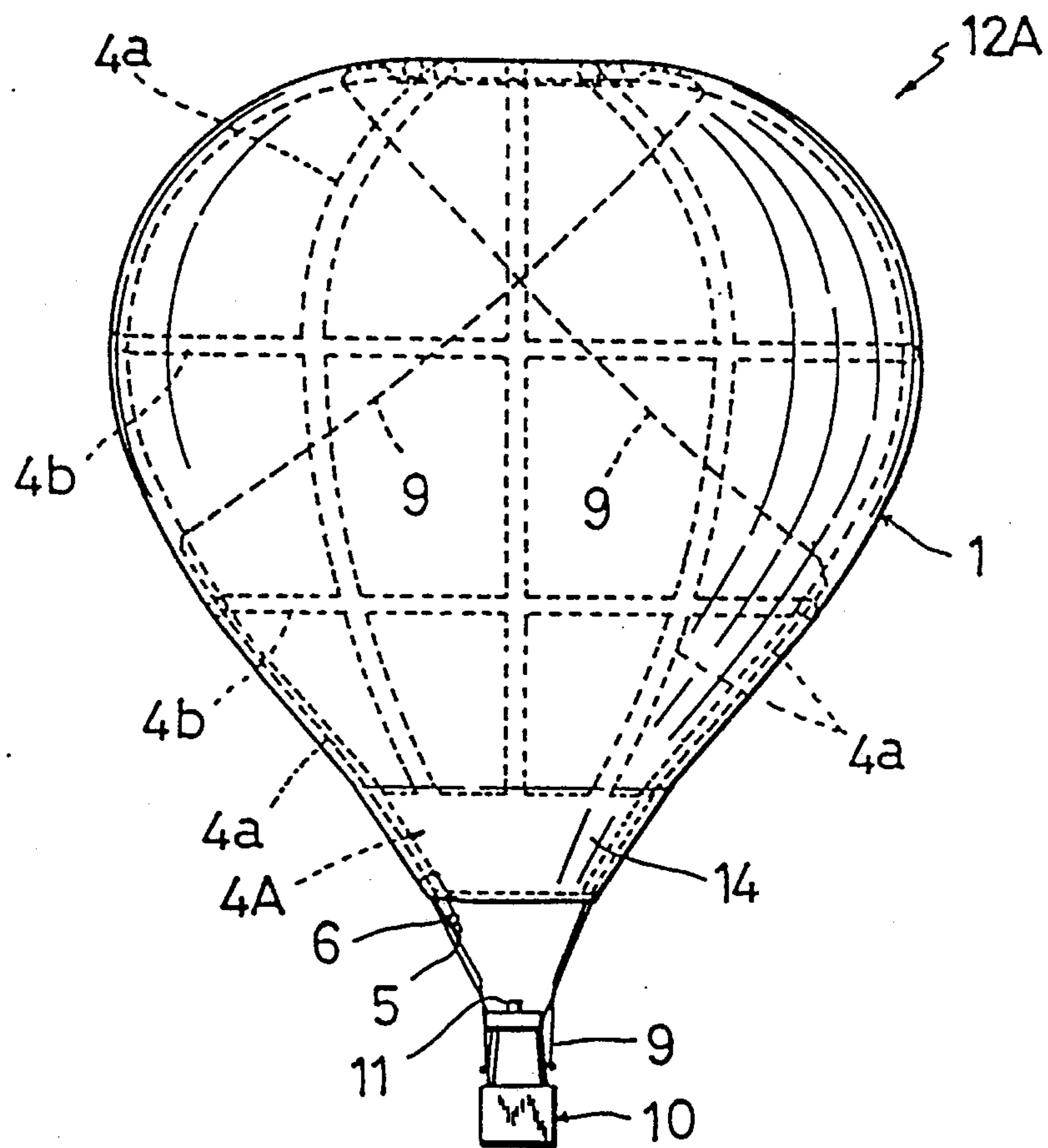
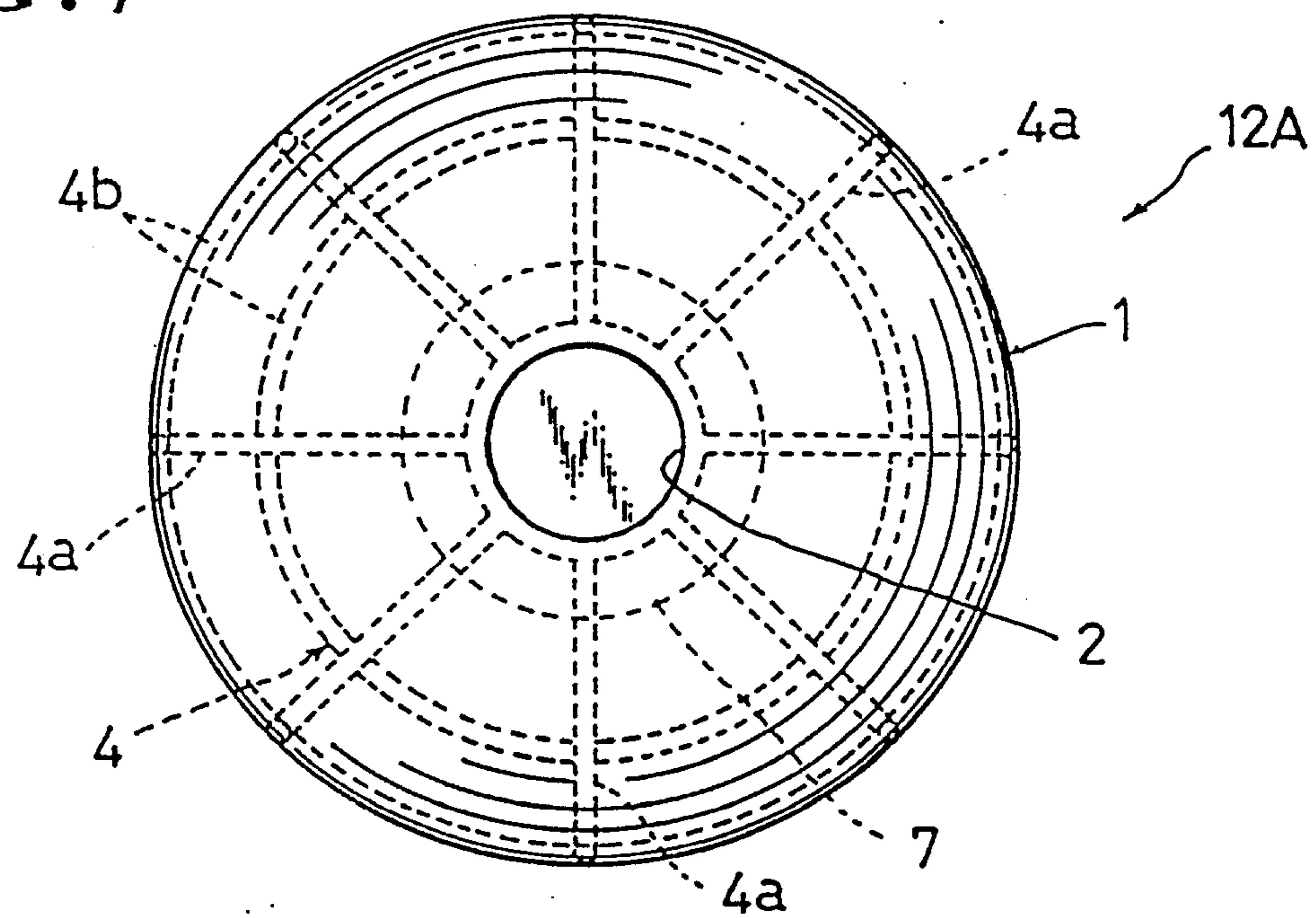


FIG. 7



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FIG. 8

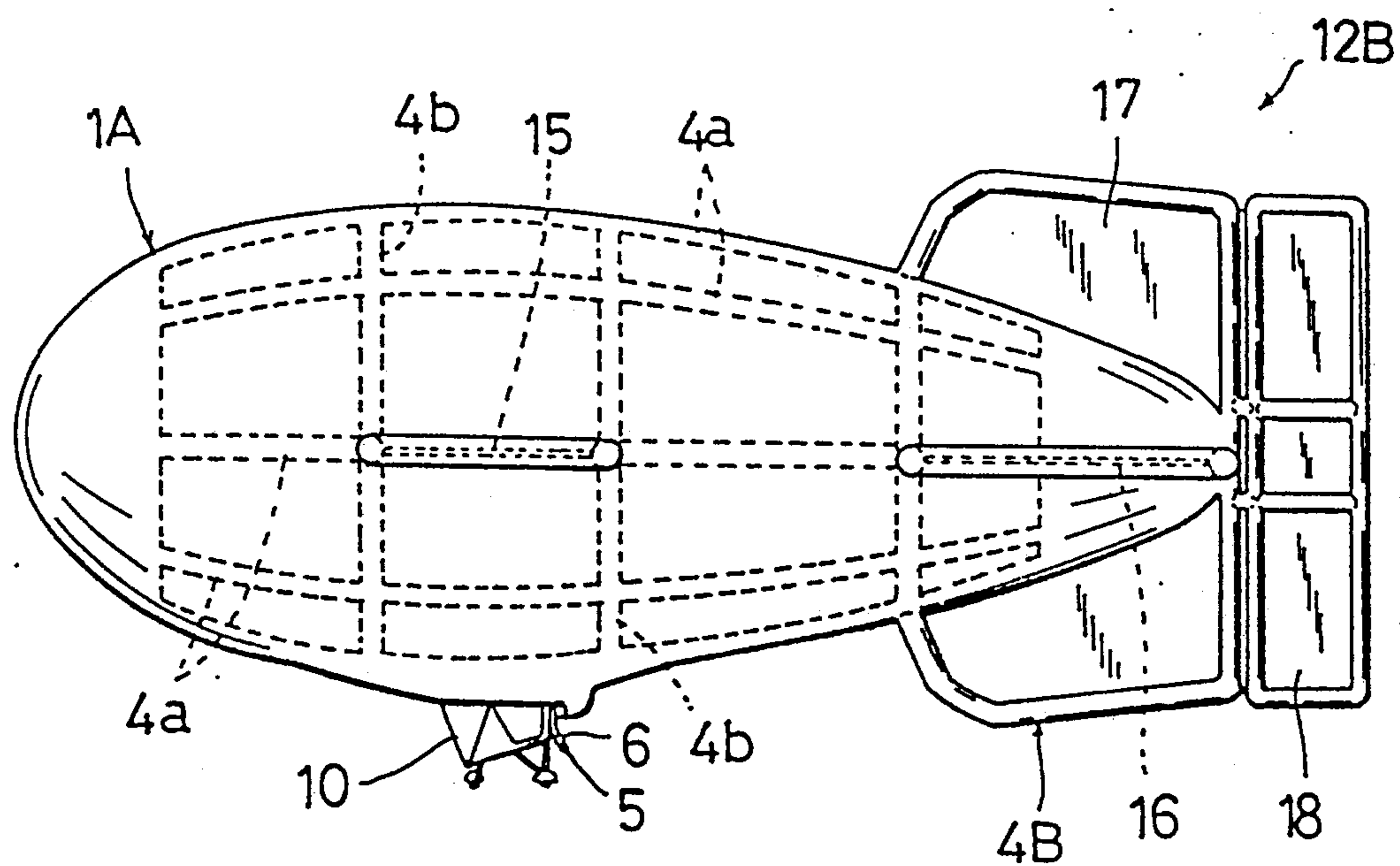


FIG. 9

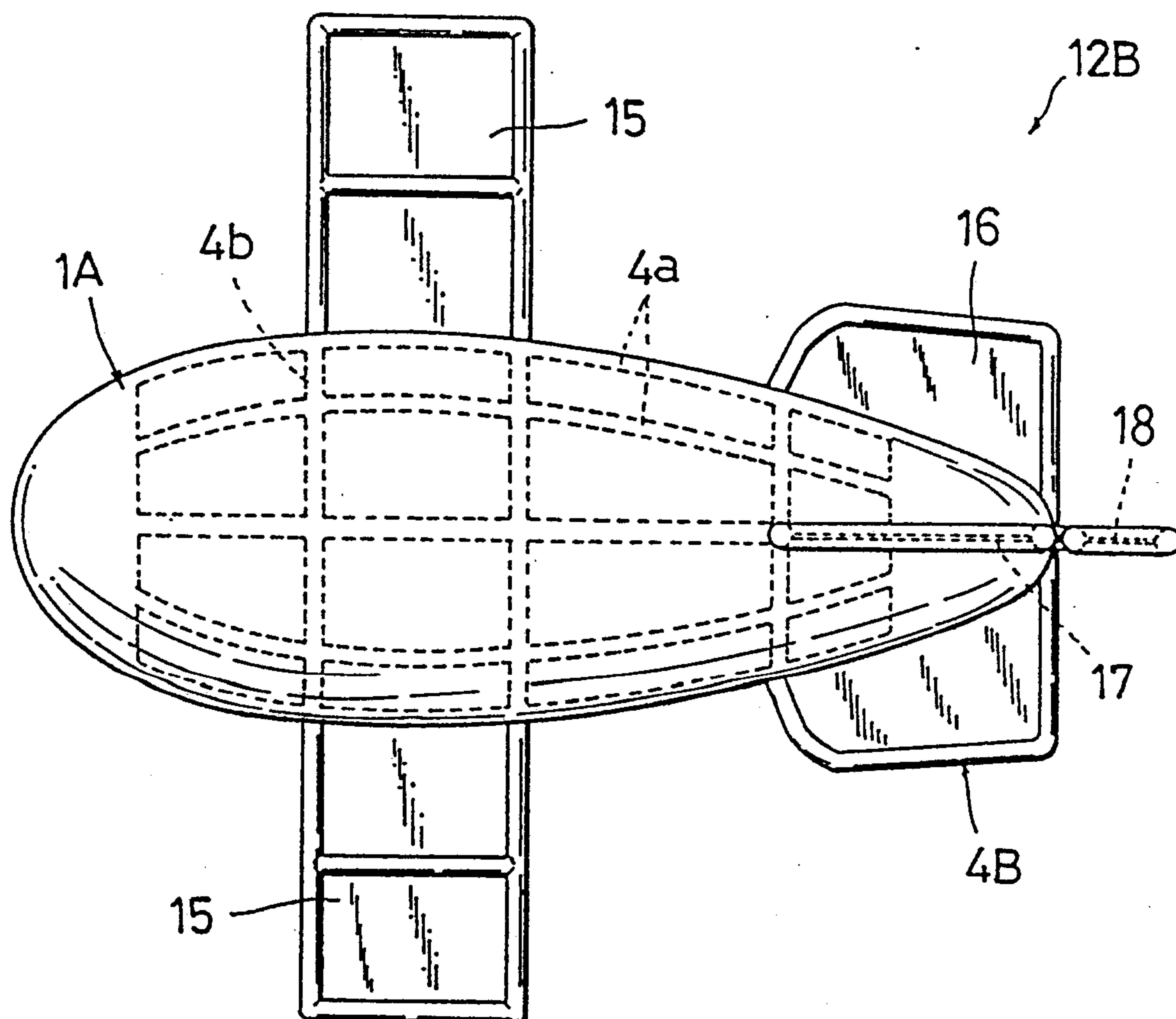
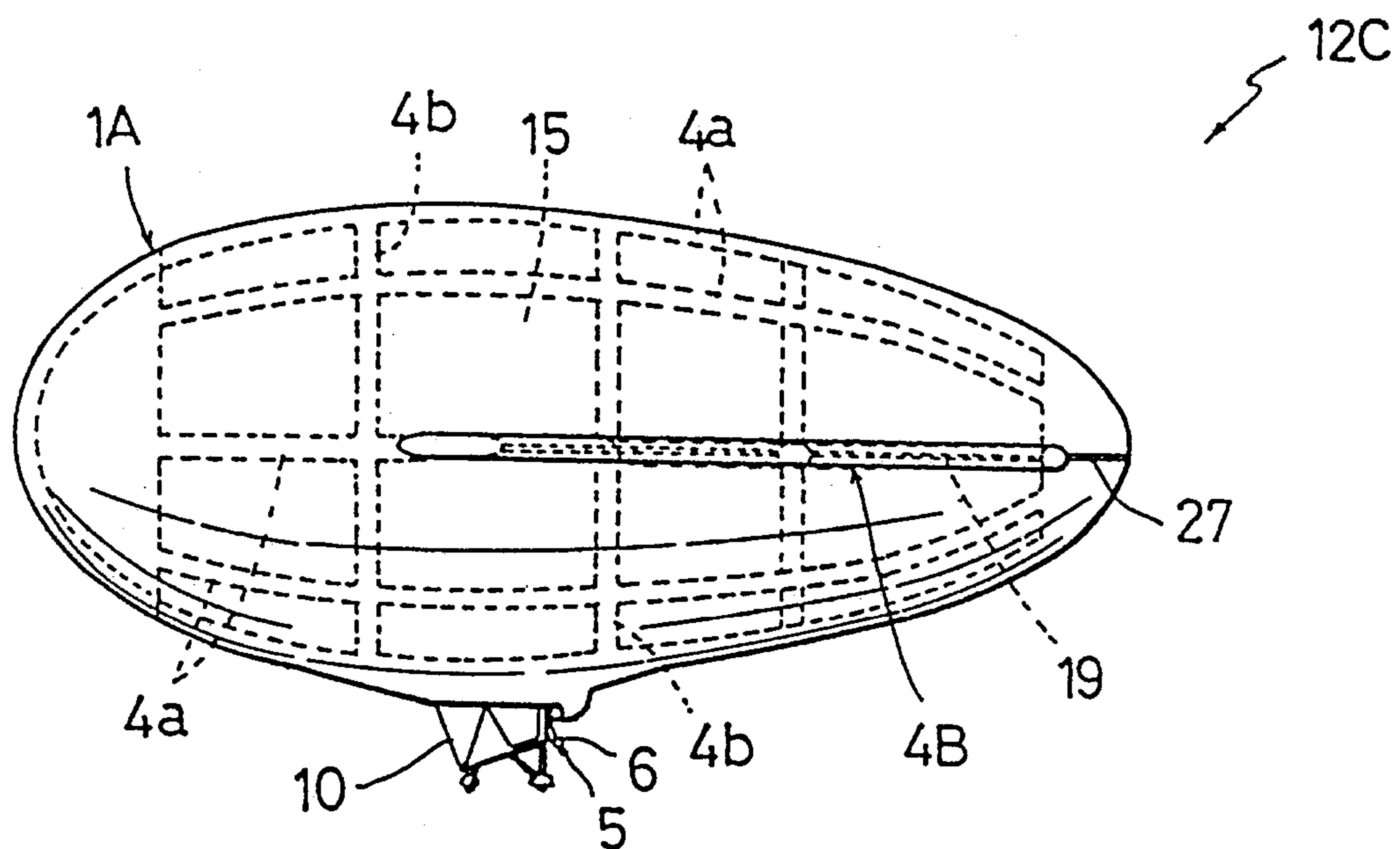
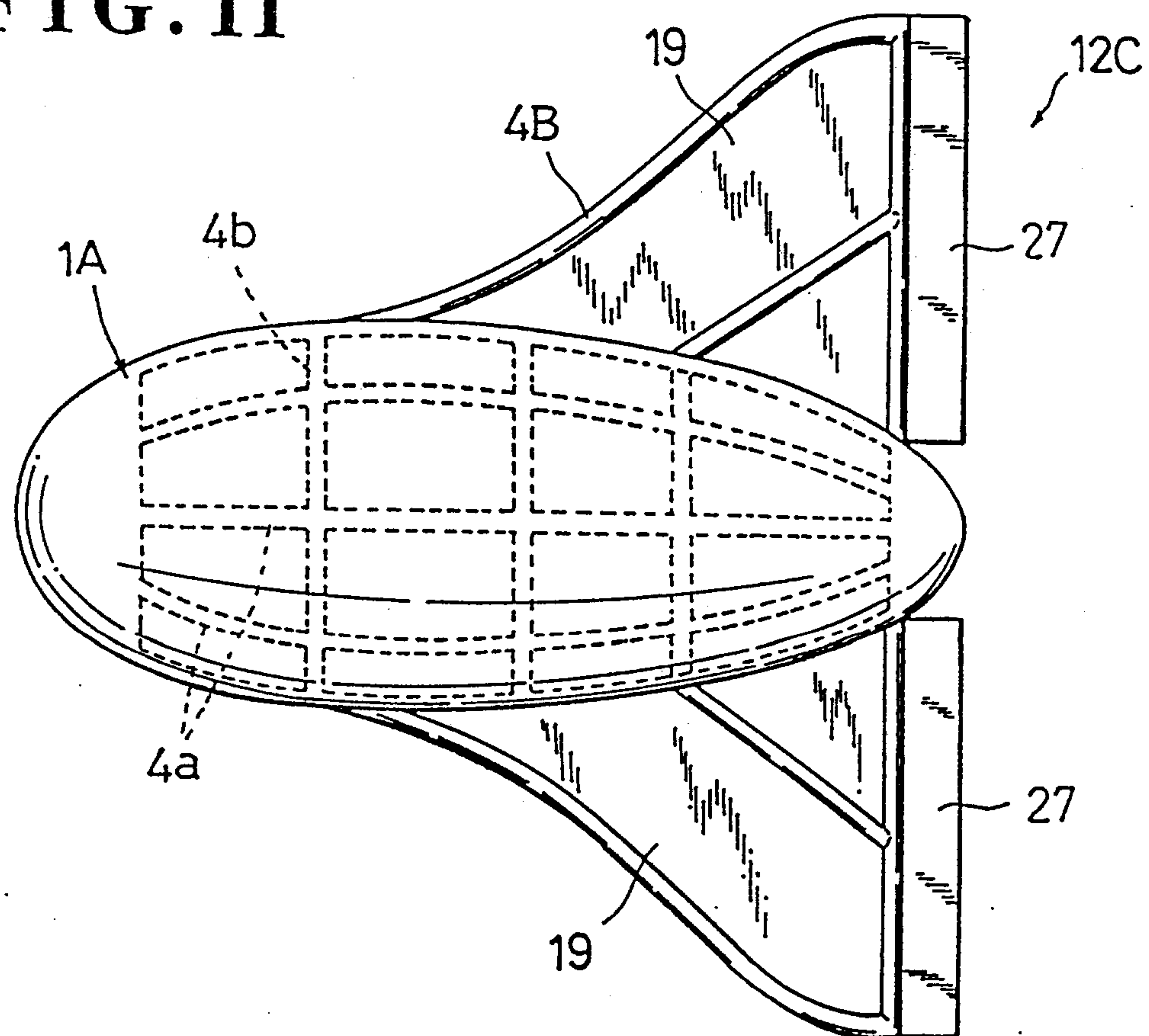
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FIG. 10**FIG. 11**

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FIG. 12

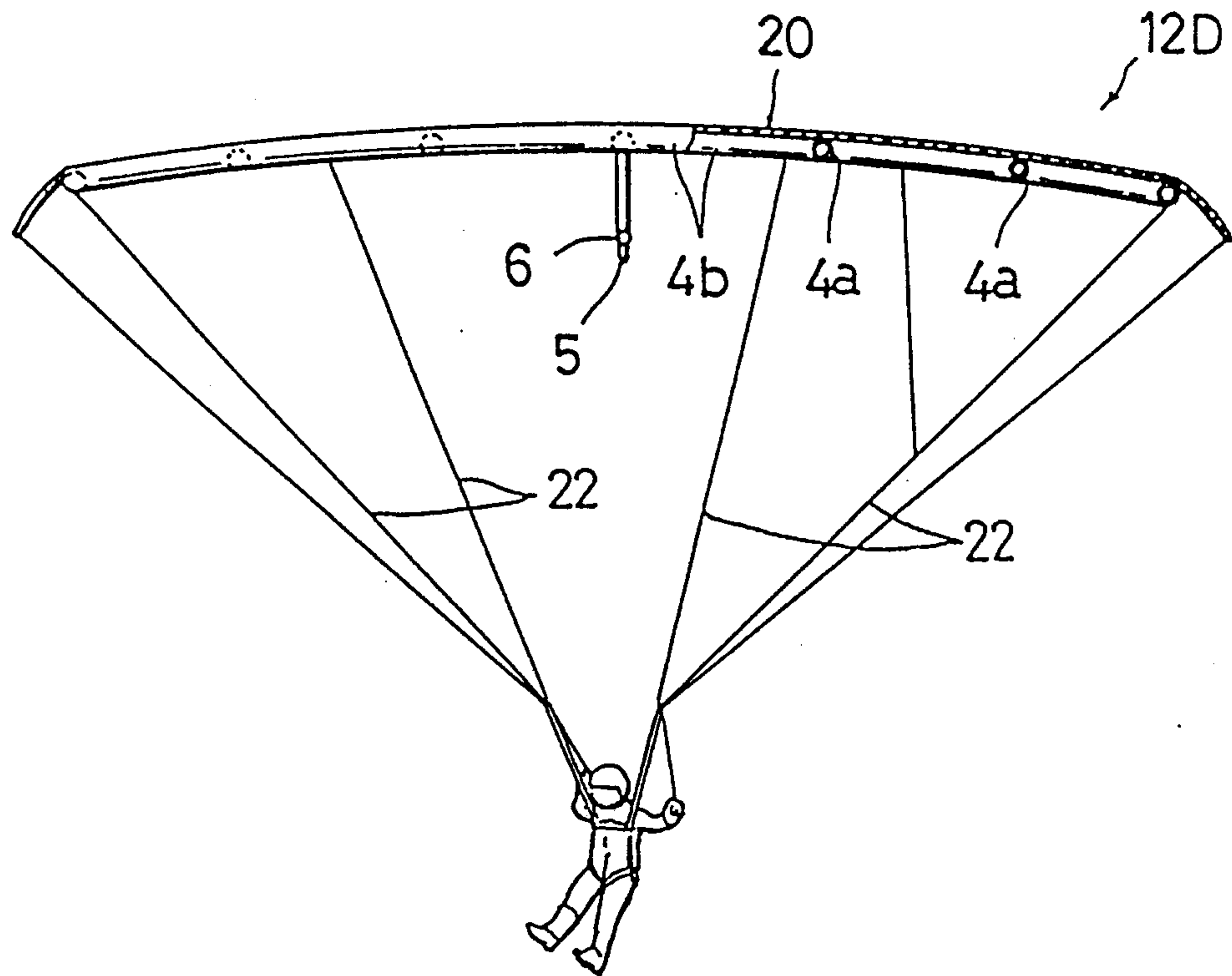


FIG. 13

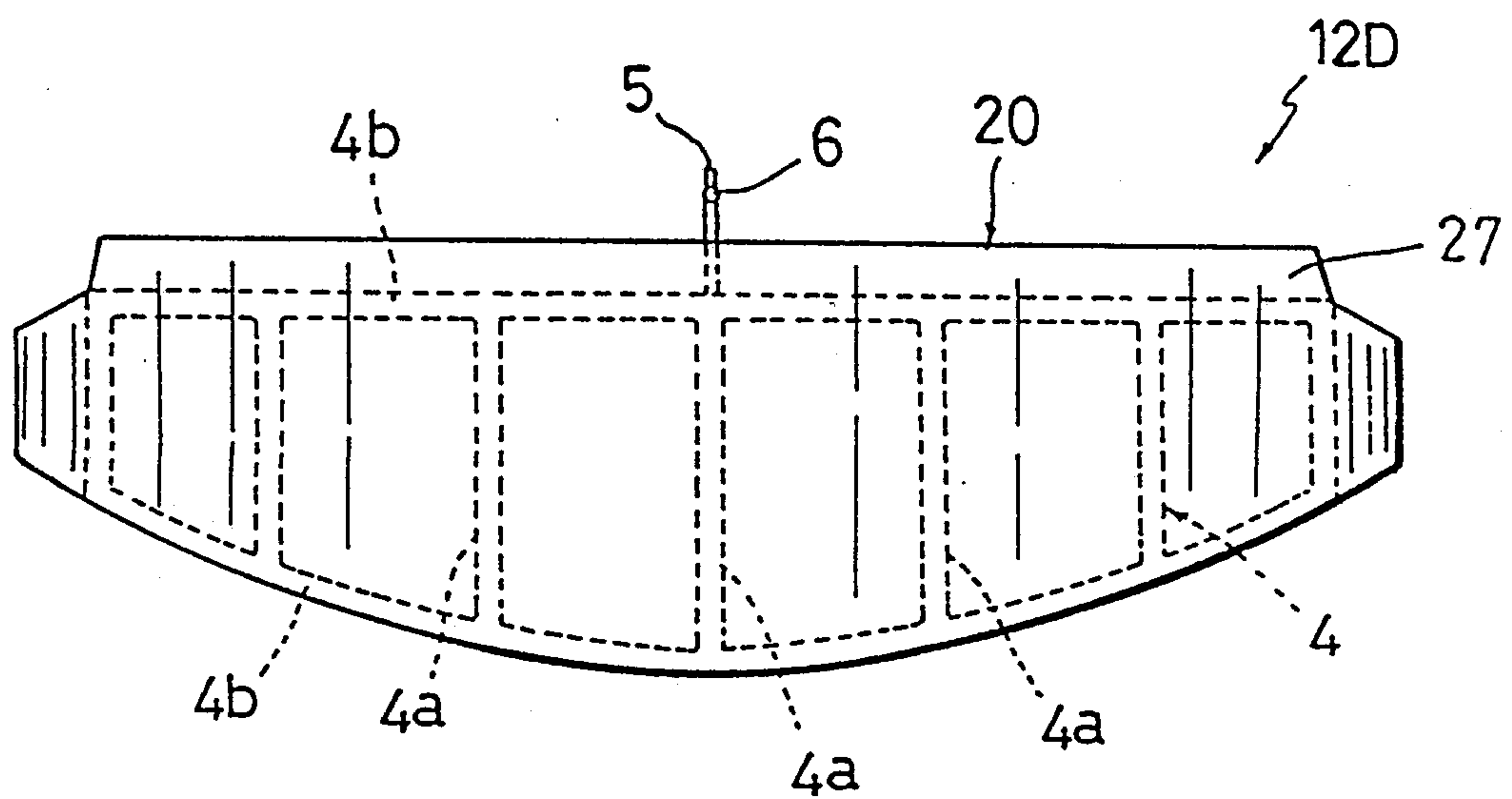


FIG. 14

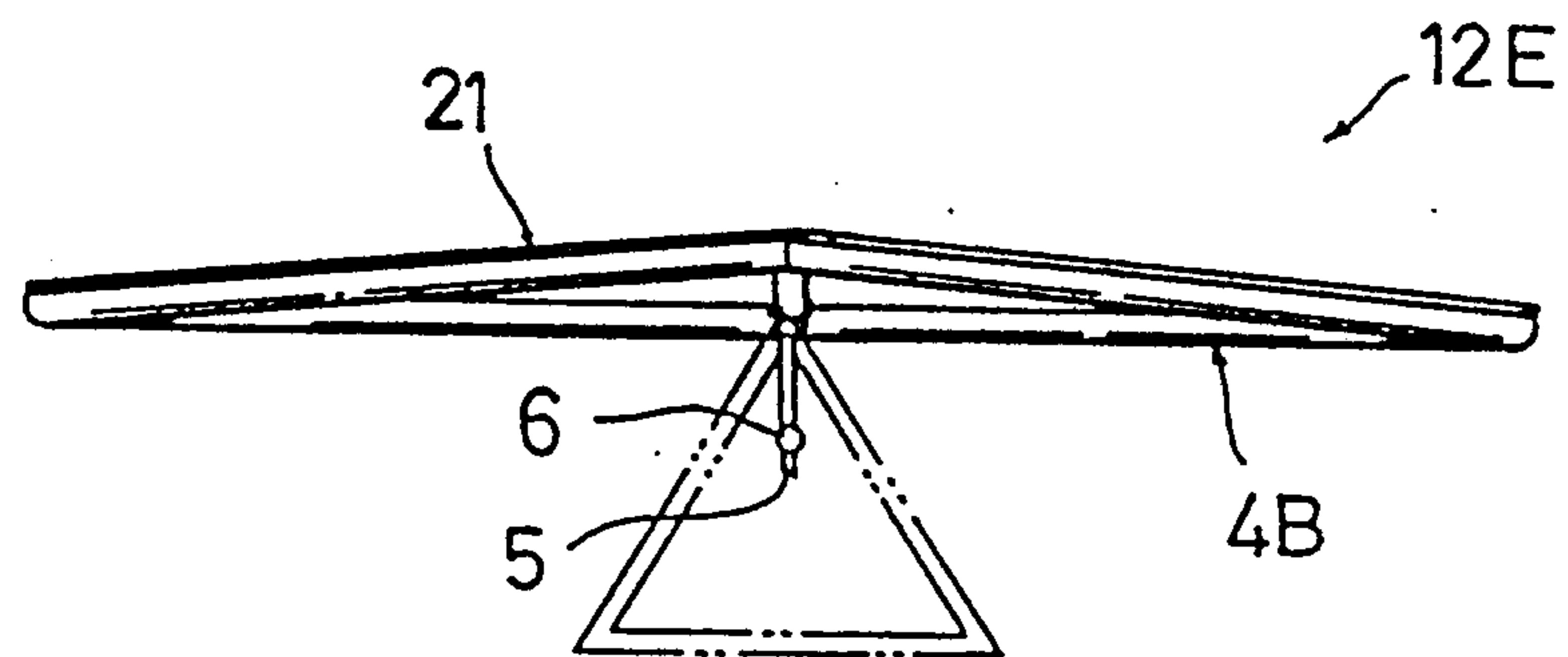
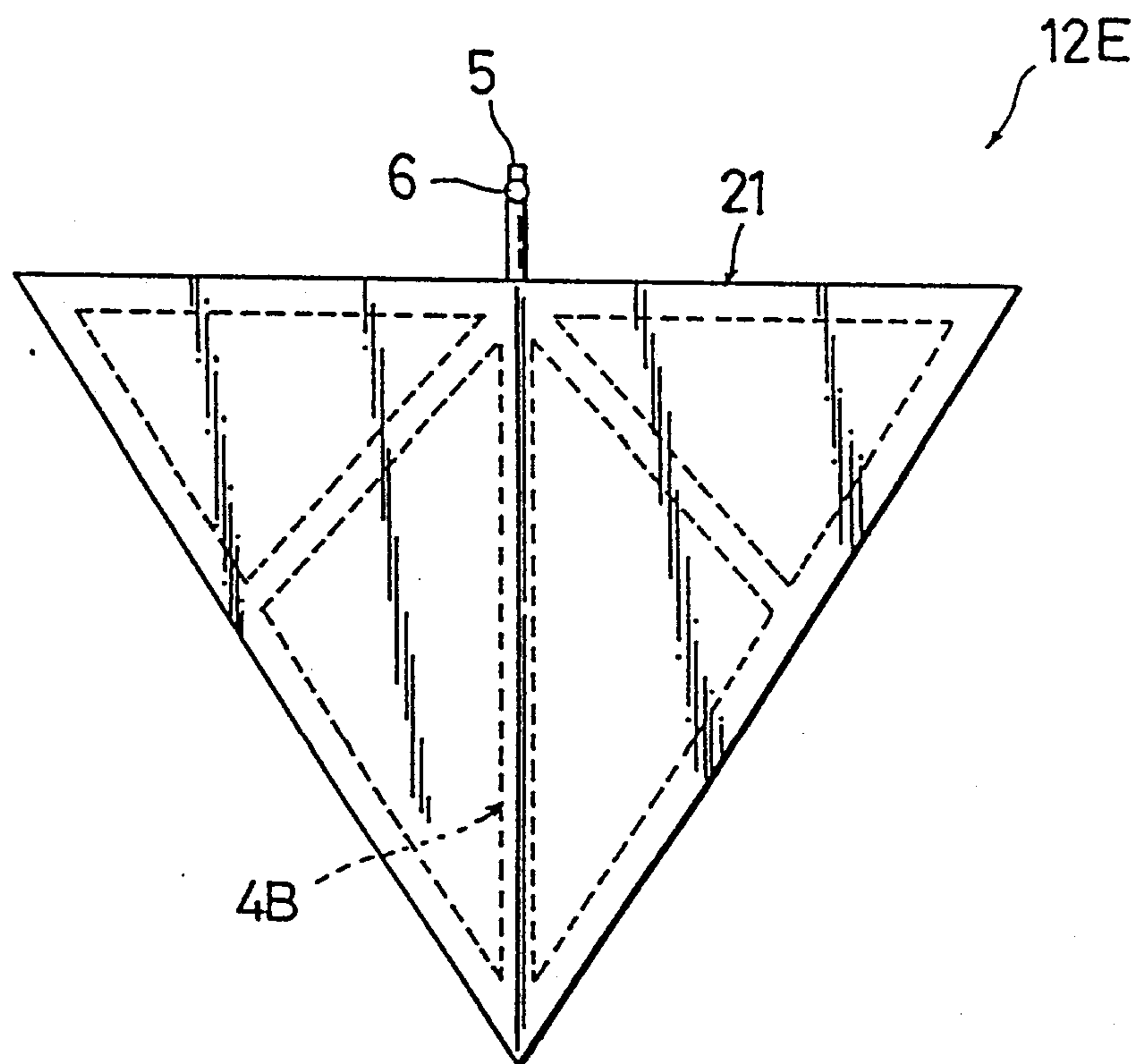
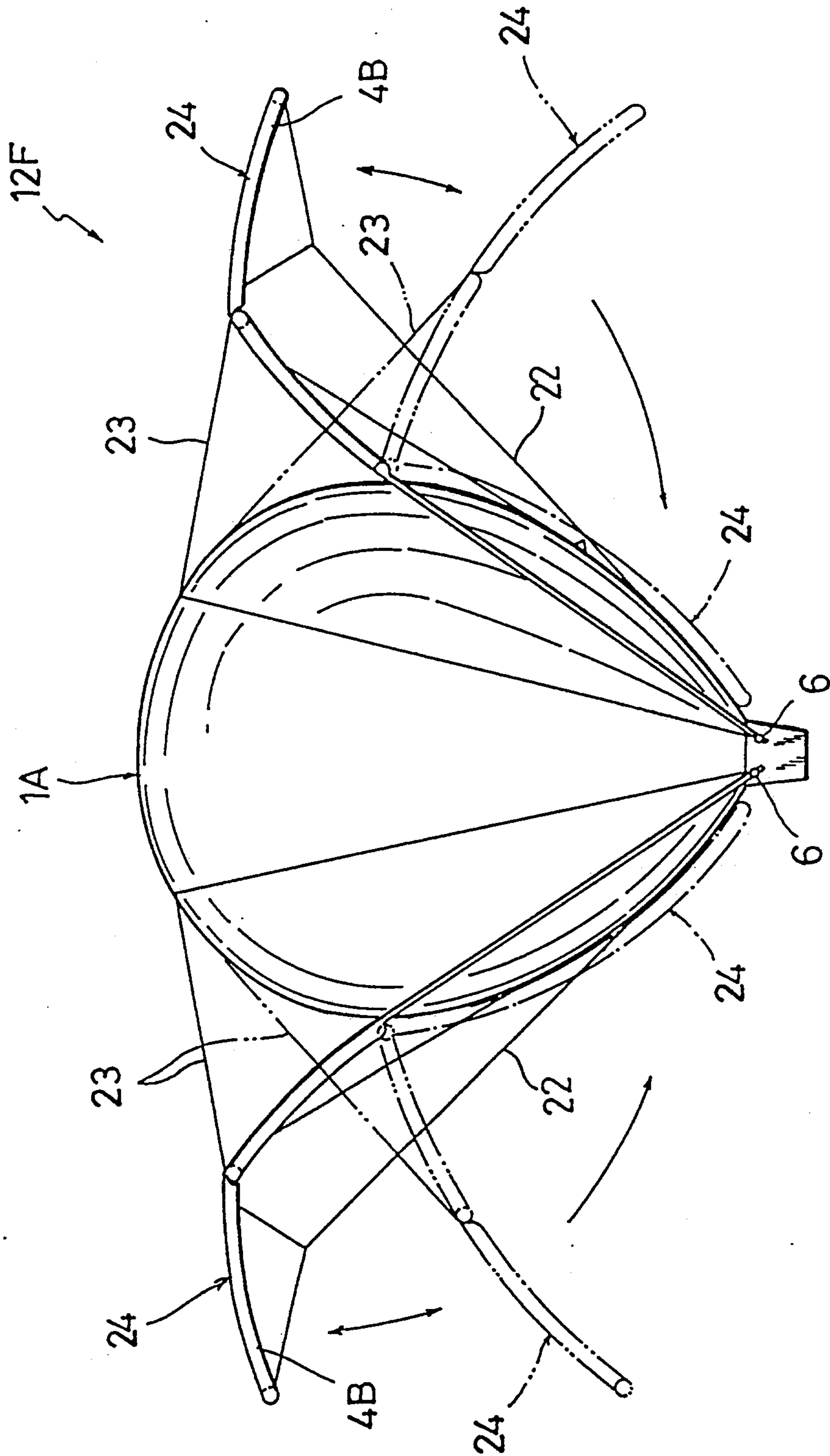


FIG. 15



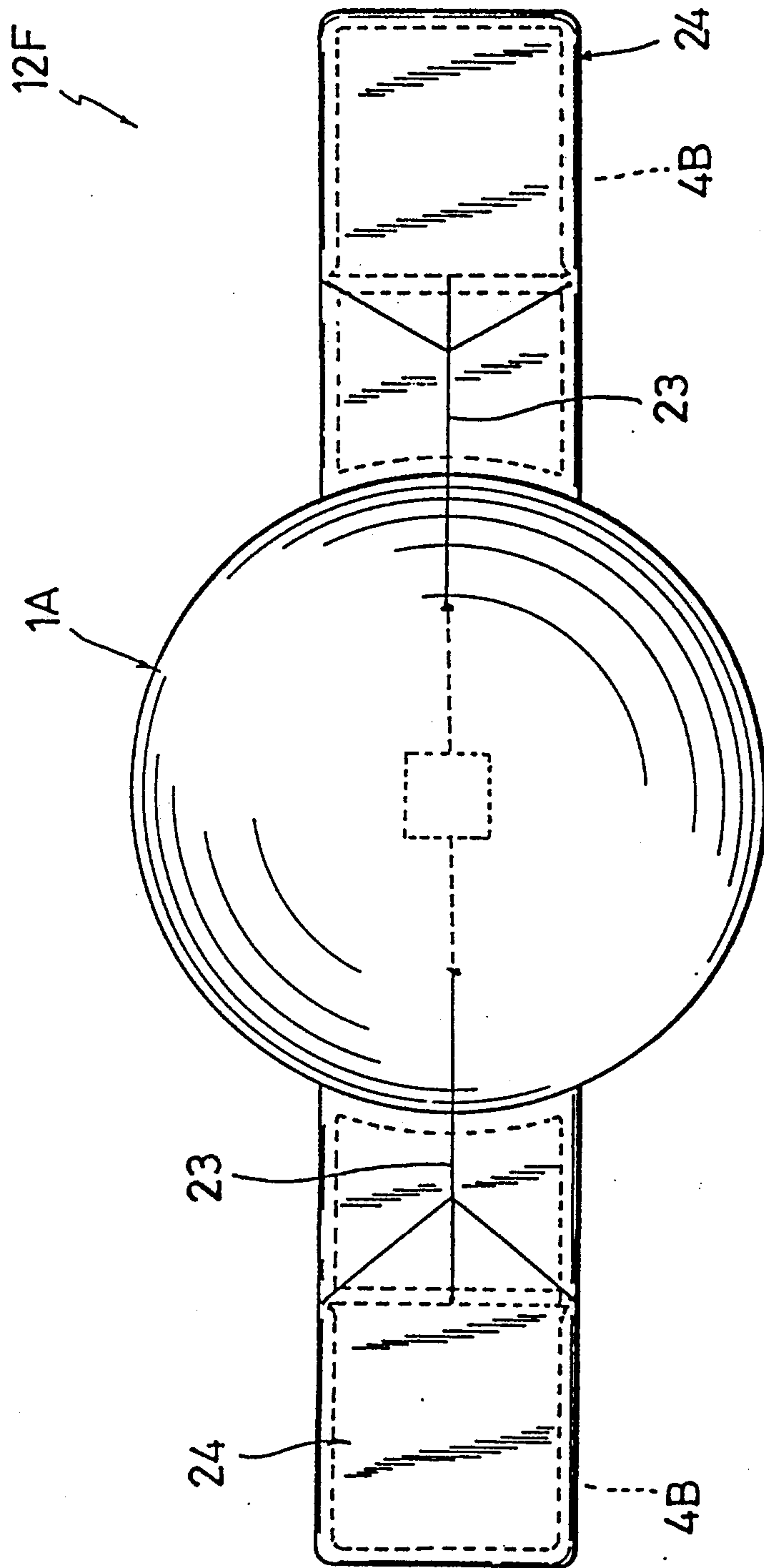
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FIG. 16



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FIG. 17



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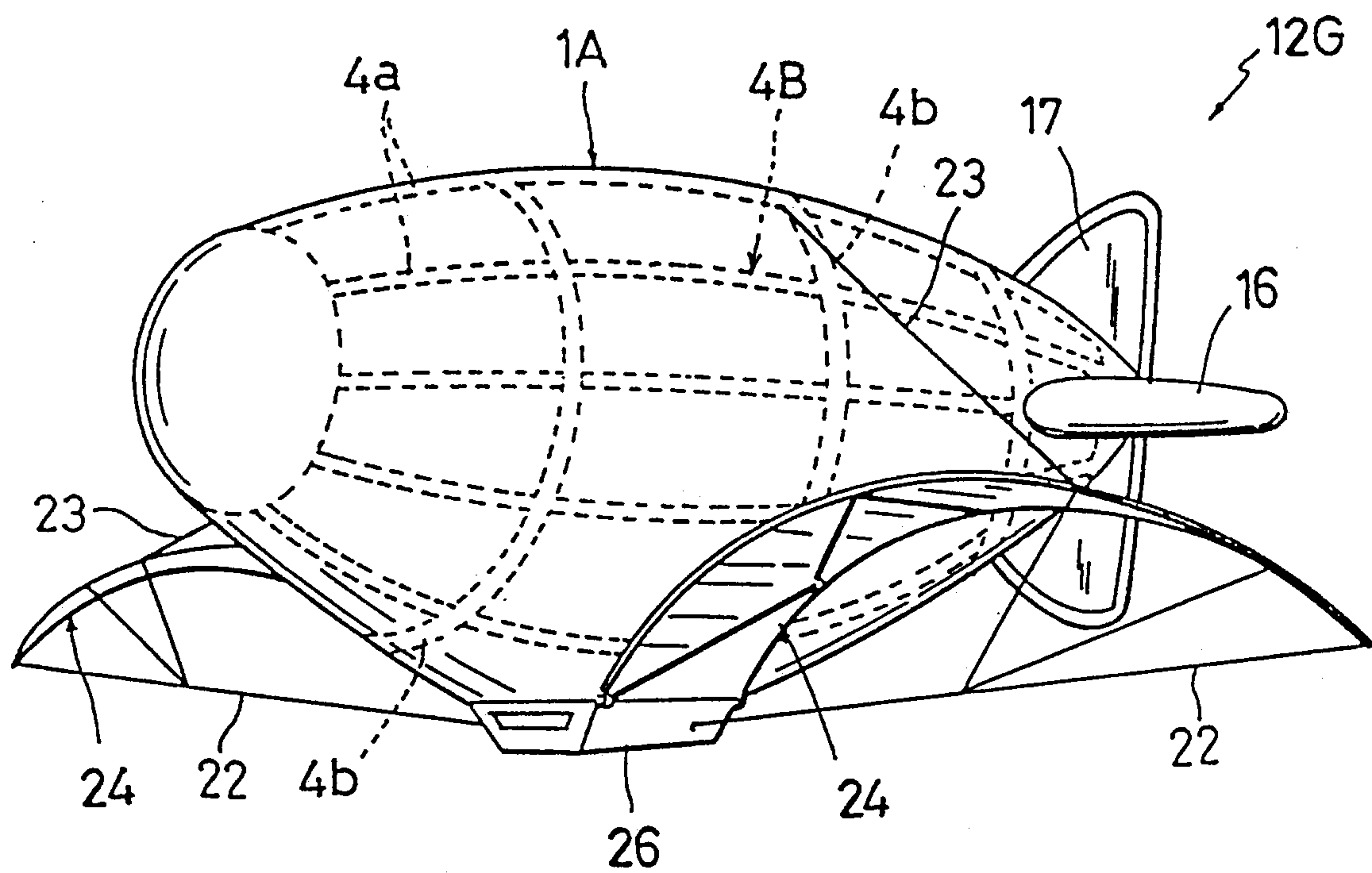
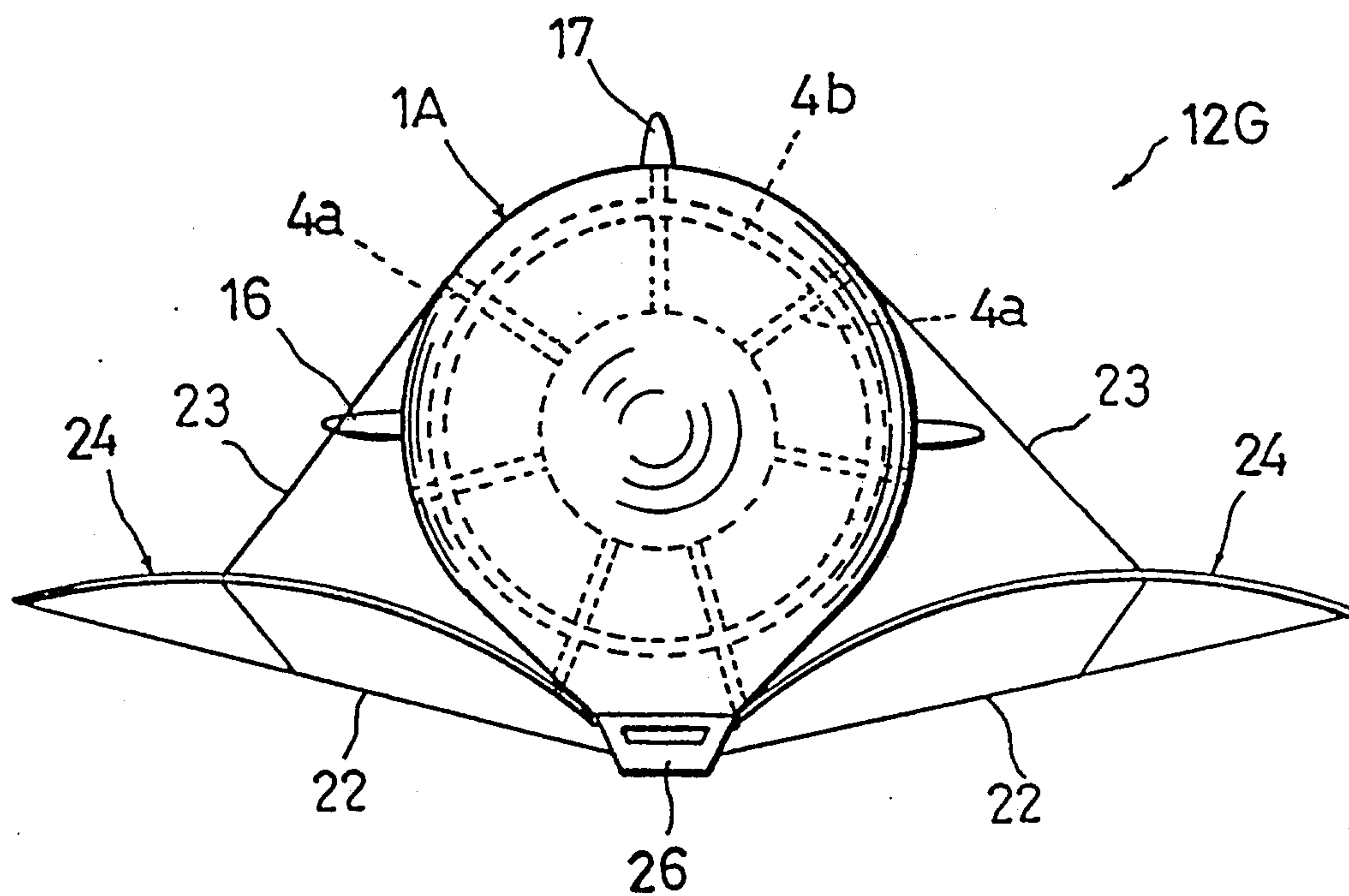
FIG. 18**FIG. 19***Hearts & Disk*

FIG. 20

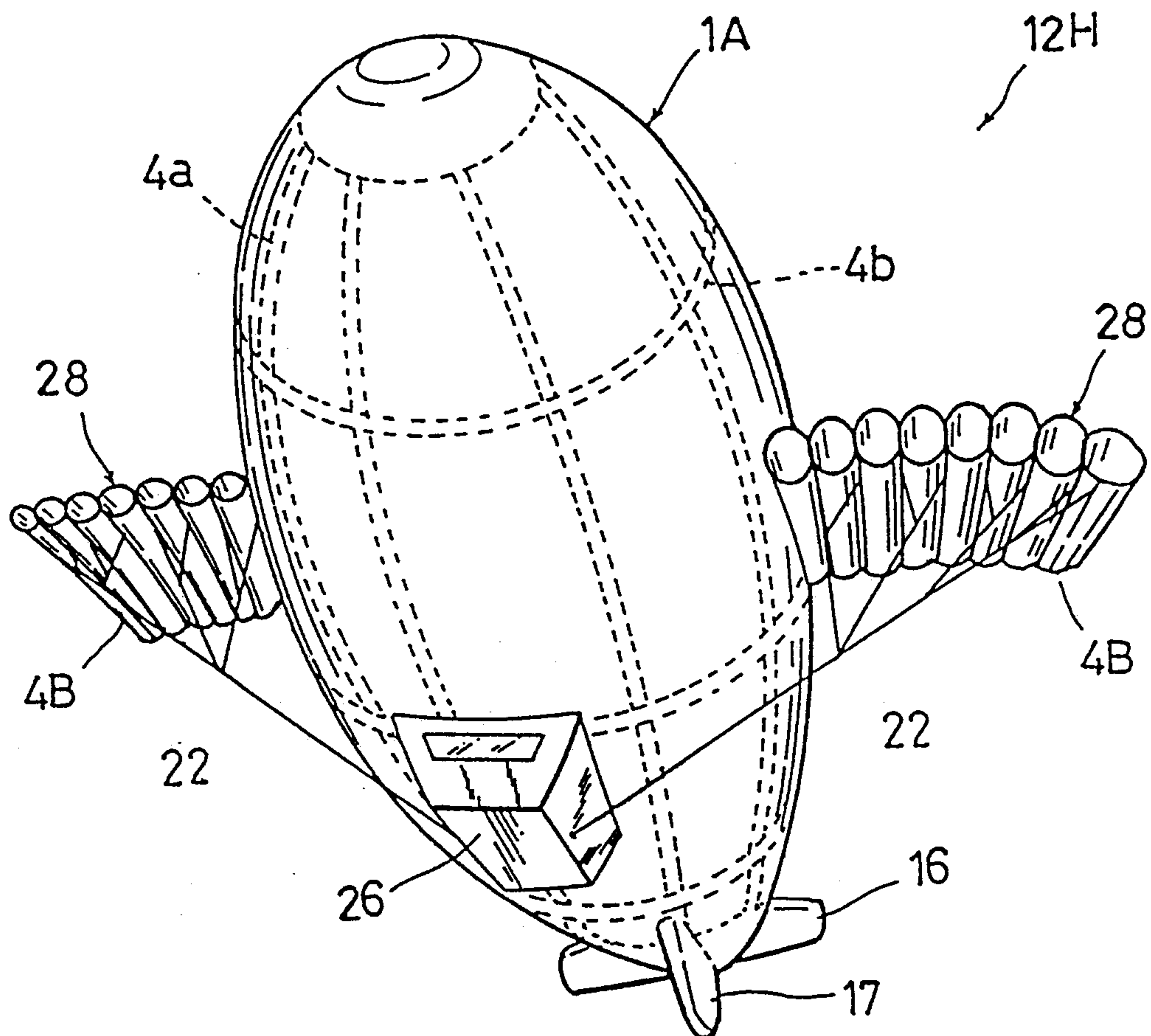


FIG. 21

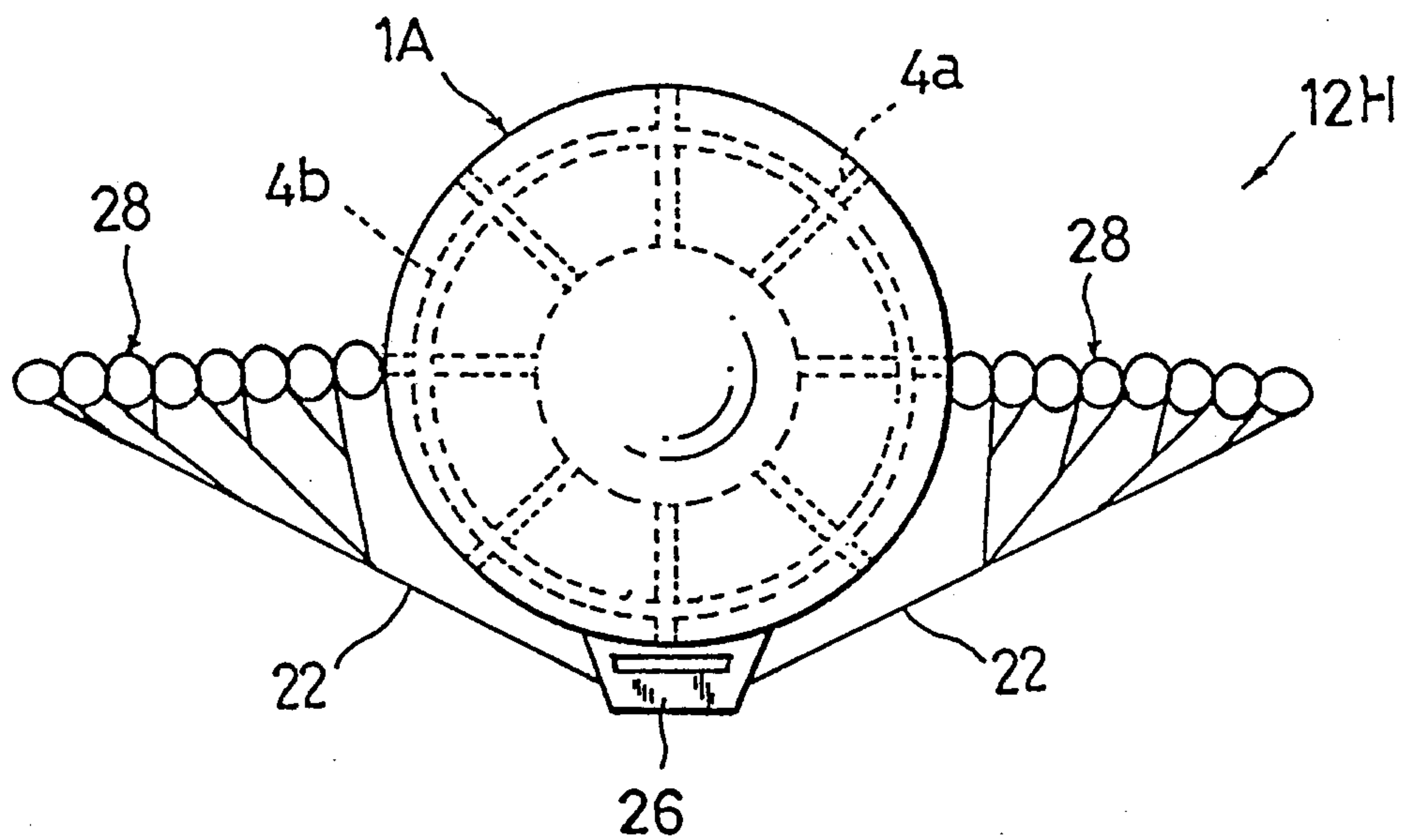


FIG. 22

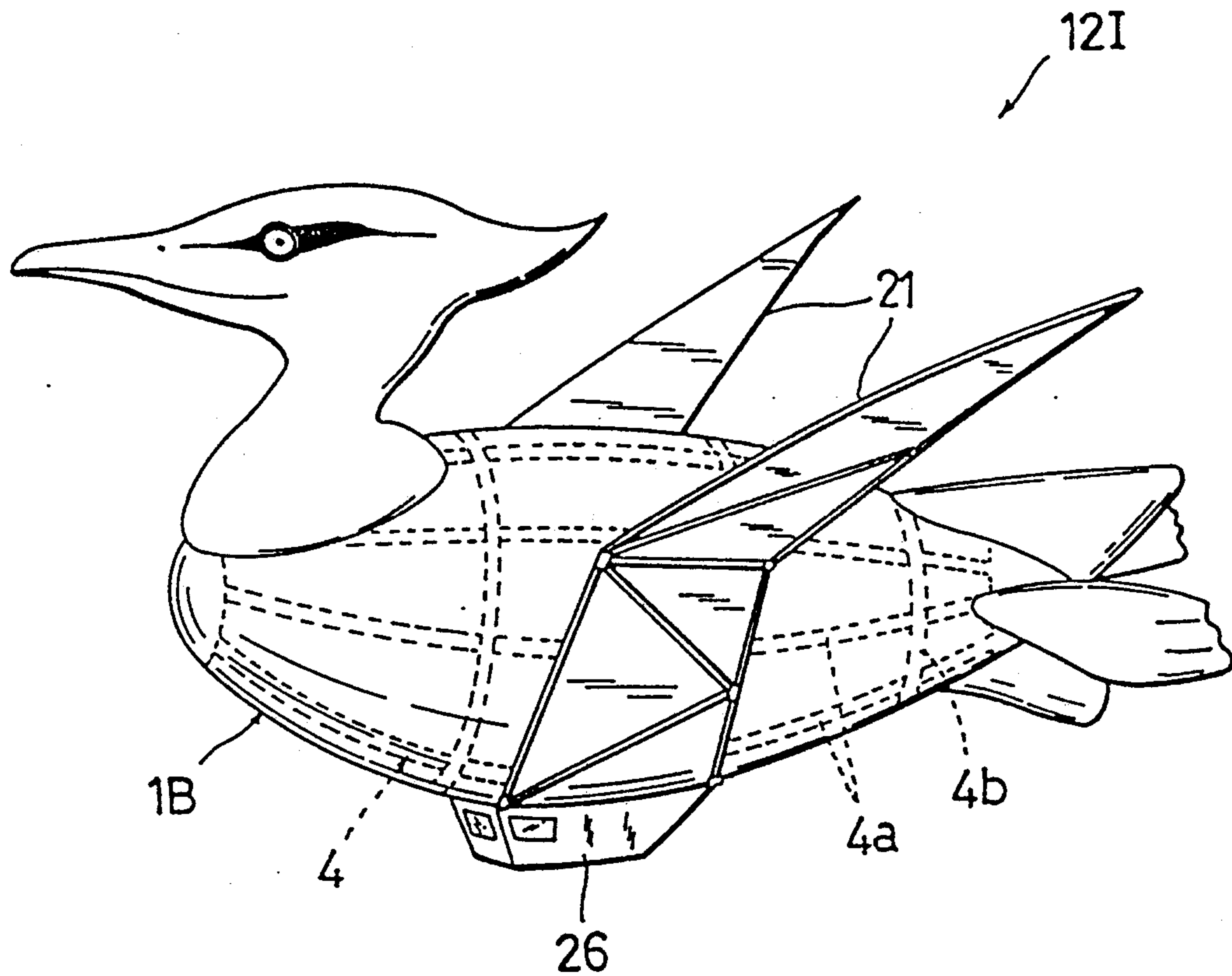
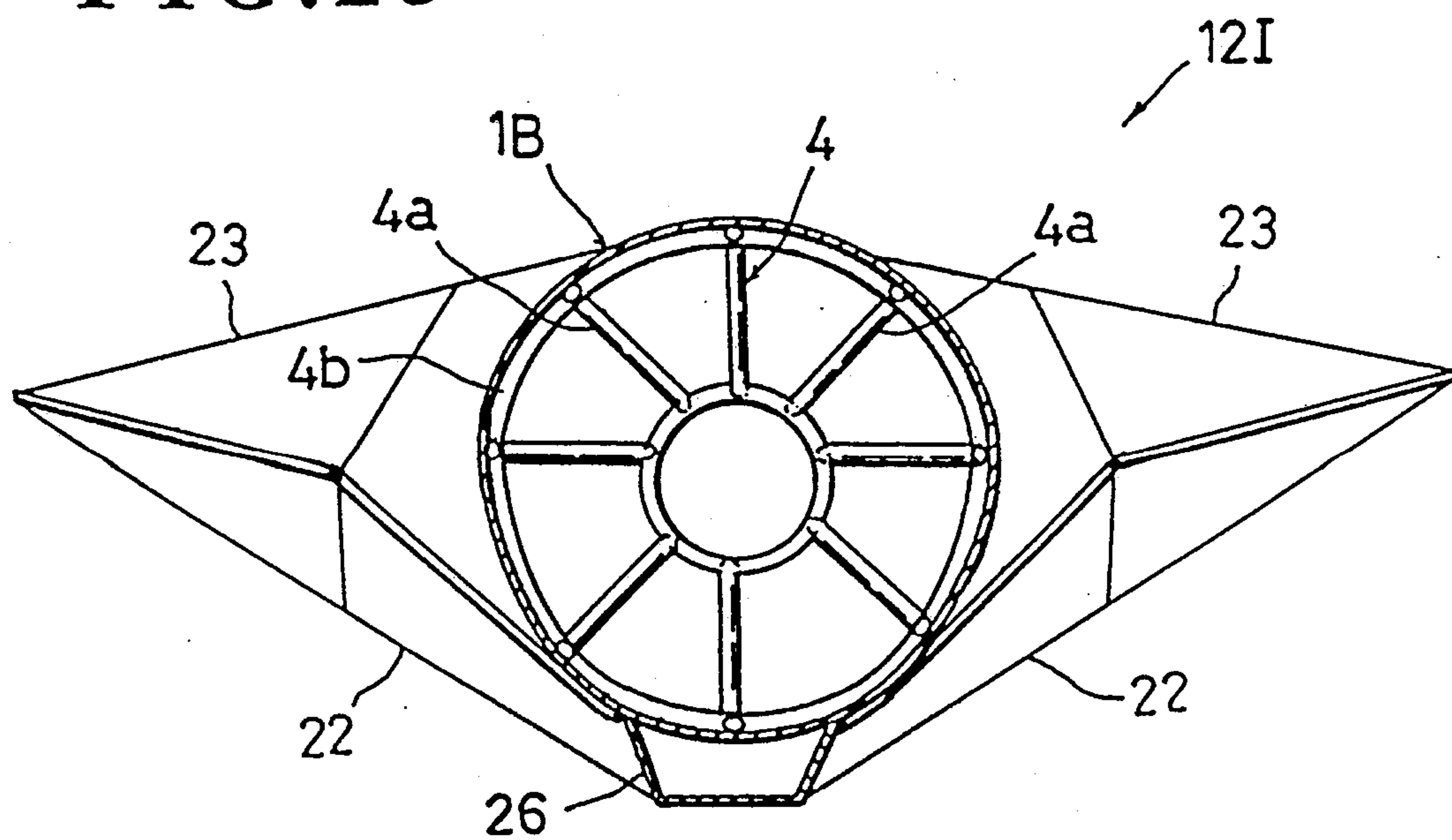


FIG. 23



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FIG. 24

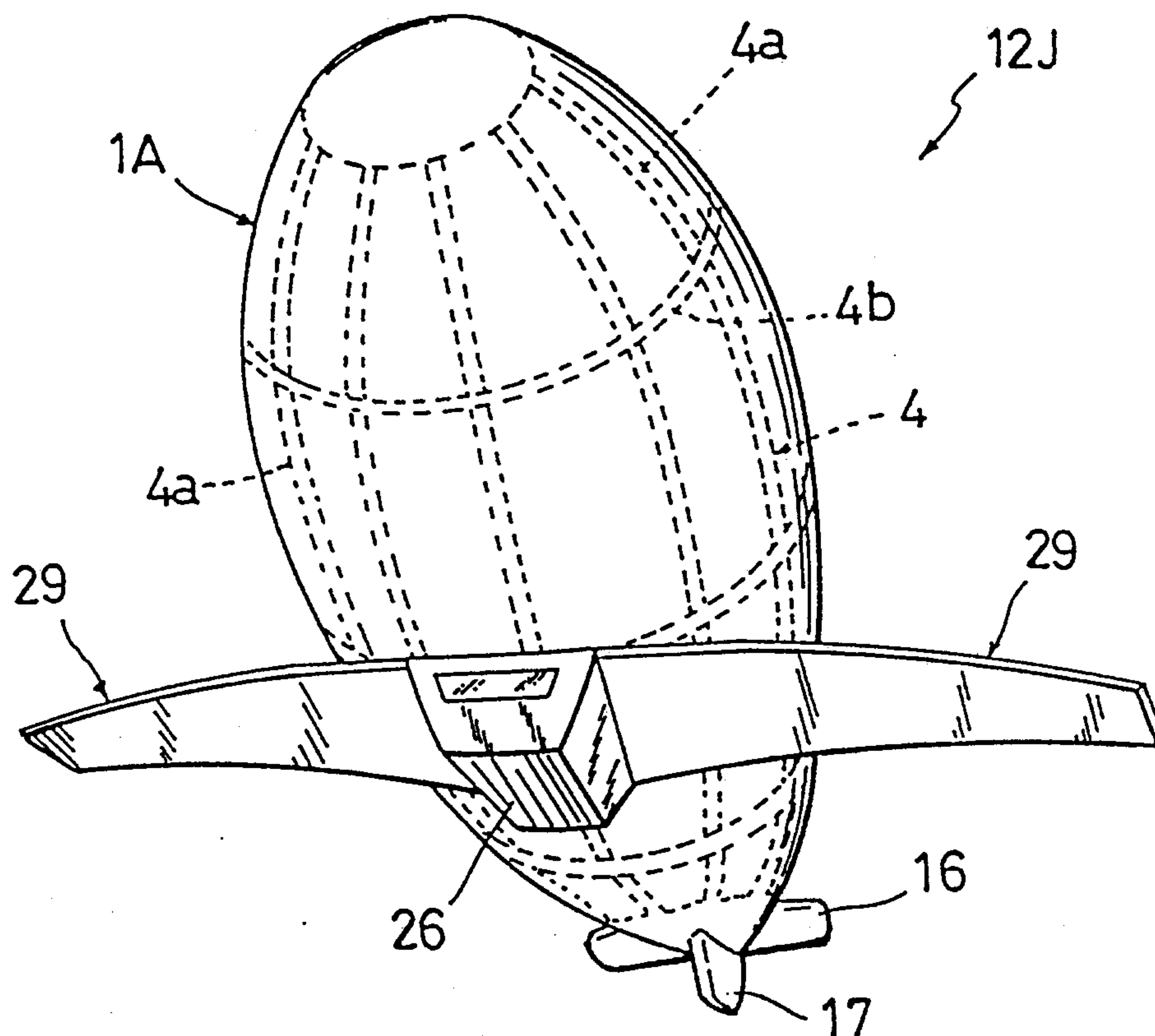


FIG. 25

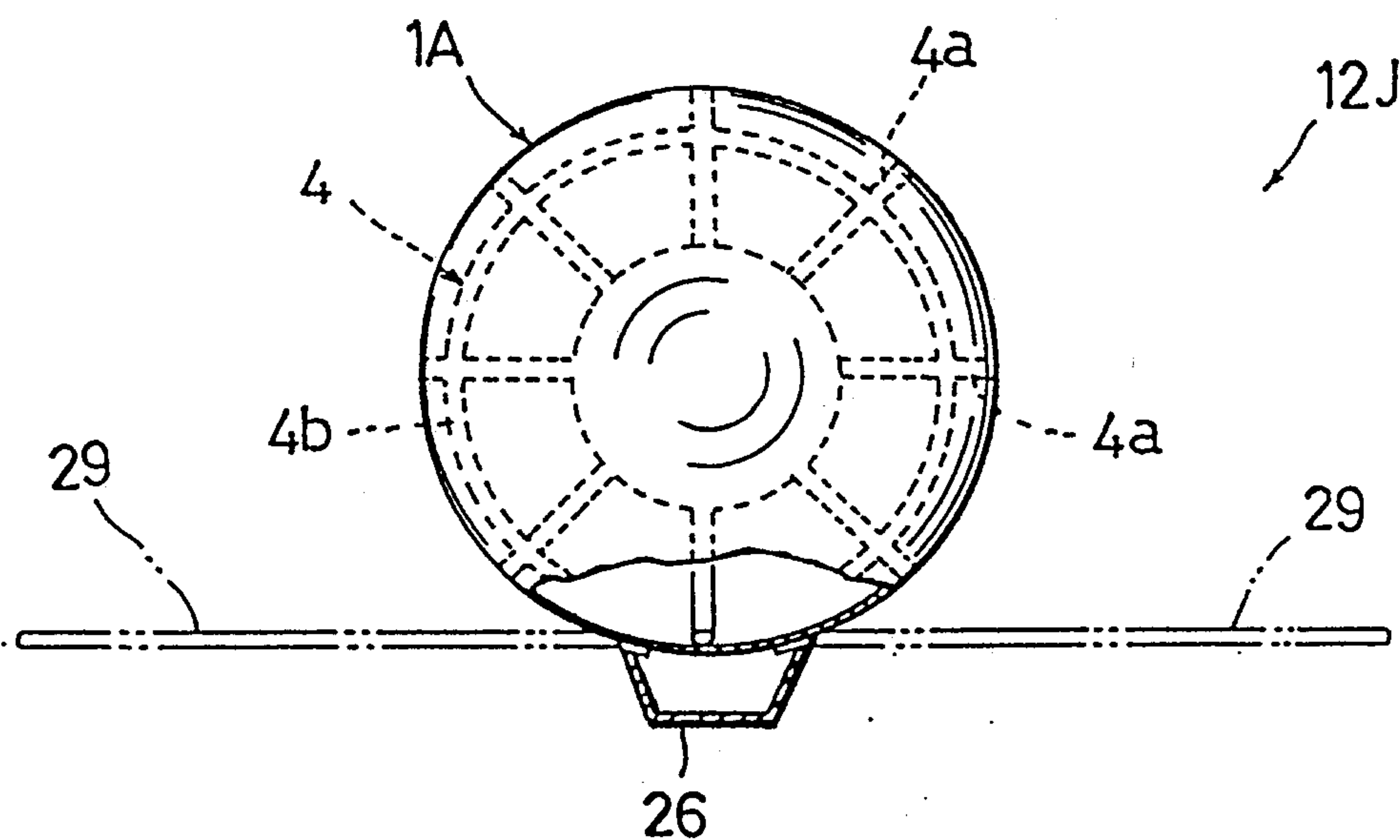


FIG. 26

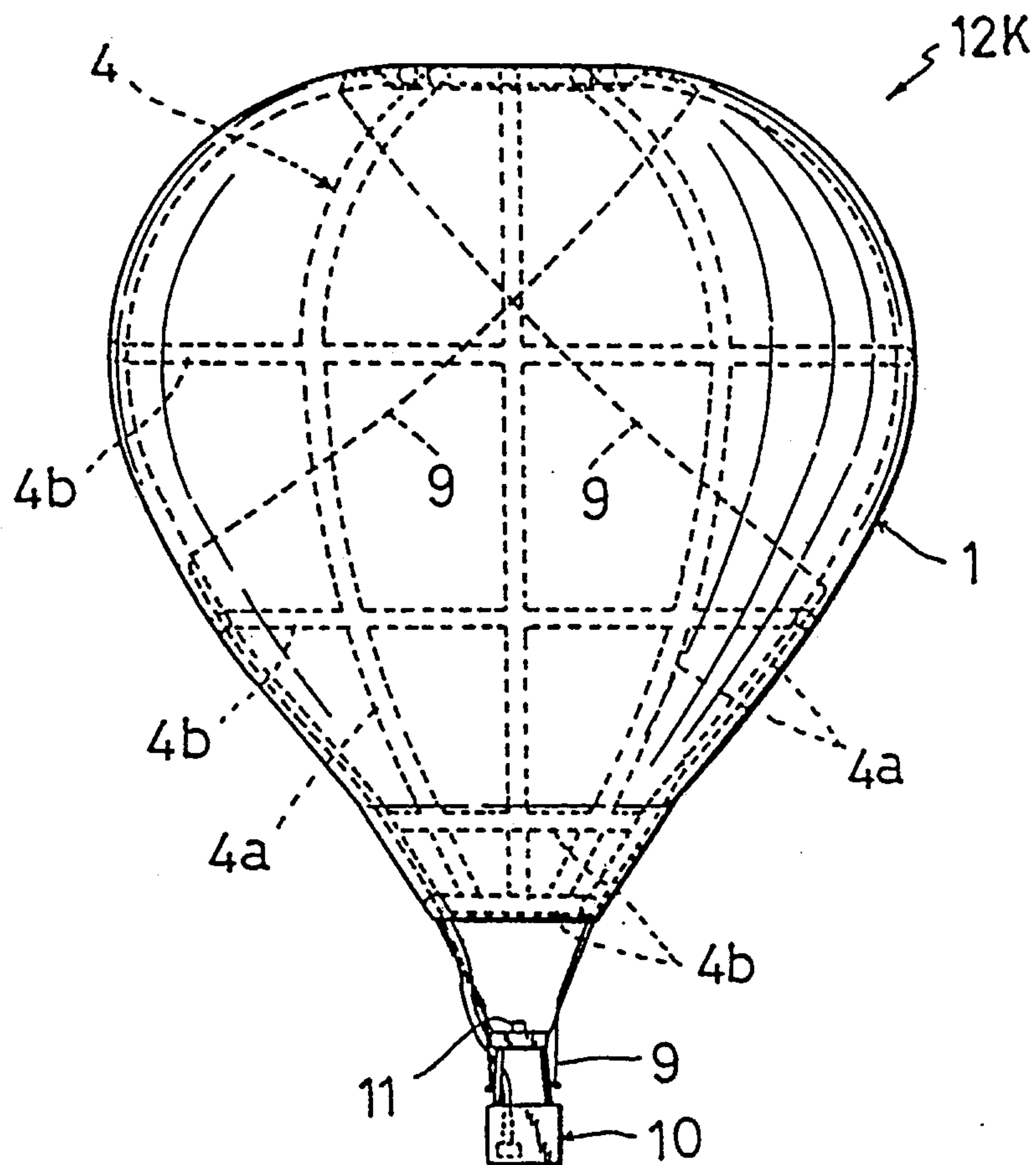


FIG. 27

