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(72) Inventeurs/Inventors:
TSUCHIYA, MASAHIKO, JP;
ABE, TOMOHISA, JP

(73) Propriétaire/Owner:
HONDA GIKEN KOGYO KABUSHIKI KAISHA, JP

(74) Agent: DENNISON ASSOCIATES

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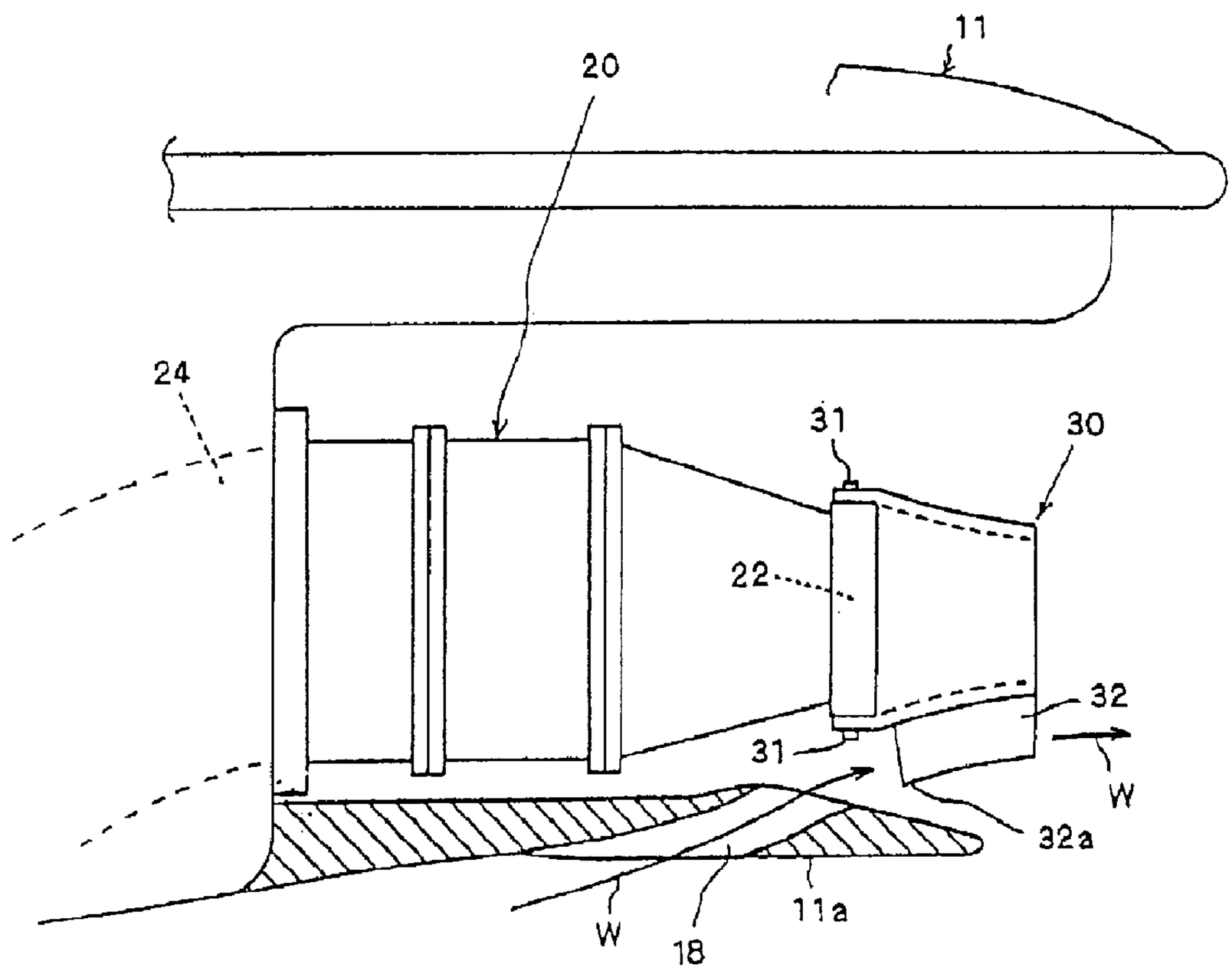
(54) Title: JET-PROPELLED BOAT



(57) Abrégé/Abstract:
To enable changing of course when a jet stream from a jet pump has stopped or is low. A nozzle 30 of a jet pump 20 is constructed so as to be rotatable, and a rudder 32 that does not project downwards further than a boat bottom 11a is provided at the nozzle 30. A rudder channel 18 for guiding water flow W to the rudder 32 is provided separately from a jet pump channel 24. It is preferable for the rudder 32 to be duct-shaped and it is preferable for the rudder channel 18 to be formed of a watercourse plate with an end at the front with respect to a direction of travel opening away from the boat body when driving of the jet pump 20 is halted or when the rotational speed of driving of the jet pump is a prescribed value or less.

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ABSTRACT OF THE DISCLOSURE

To enable changing of course when a jet stream from a jet pump has stopped or is low. A nozzle 30 of a jet pump 20 is constructed so as to be rotatable, and a rudder 32 that does not project downwards further than a boat bottom 11a is provided at the nozzle 30. A rudder channel 18 for guiding water flow W to the rudder 32 is provided separately from a jet pump channel 24. It is preferable for the rudder 32 to be duct-shaped and it is preferable for the rudder channel 18 to be formed of a watercourse plate with an end at the front with respect to a direction of travel opening away from the boat body when driving of the jet pump 20 is halted or when the rotational speed of driving of the jet pump is a prescribed value or less.

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TITLE: JET-PROPELLED BOAT

FIELD OF THE INVENTION

The present invention relates to a jet-propelled boat equipped with a jet pump with a rotatable nozzle as a means of propulsion. The present invention more specifically relates to a jet-propelled boat where it is possible for the boat to change course even when a boat is stopped or decelerating as a result of a jet stream from a jet pump being stopped or being weak.

BACKGROUND OF THE INVENTION

Related jet-propelled boats such as in Japanese Patent Laid-open Publication No. Hei. 5-162689 as shown in FIG. 5 are well known.

As shown in FIG. 5, a boat 1 is equipped with an engine 3 mounted within a boat body 2, and a jet pump 3a driven by this engine 3.

A nozzle 5 that can be rotated up and down via a pair of upper and lower pins 6 is provided at a jet opening 4 of the jet pump 3a, and a rudder 8 is provided at a shaft 9 at a rear part of the nozzle 5. The nozzle 5 is connected to handlebars 7 using a steering wire (not shown) and is rotated by operating the handlebars, so that the rudder 8 and the nozzle 5 rotate together.

According to this jet-propulsion boat, the course can be changed while the boat is being propelled by a jet stream from the jet pump 3a by rotating the nozzle 5 so as to change the direction of the jet stream. The course can then be further changed using the rudder 8 while the boat is advancing as a result of its own inertia when the jet stream of the jet pump is stopped or is weak when the boat is either stopped or decelerating. If the rudder 8 is not provided with this type of jet-propelled boat, the course cannot be changed when the boat is travelling under its own inertia when the jet stream caused by the jet pump is stopped or weak when the boat is stopped or decelerating. This situation is avoided by providing the rudder 8.

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With the aforementioned related jet-propelled boat (FIG. 5), the construction is such that the course can be changed by changing the direction of a water flow W moving along the boat bottom 2a using the rudder 8. It would therefore be difficult to anticipate there being a jet pump of this type where a lower end 8a of the rudder 8 does not project further downwards than the boat bottom 2a that could be used in shallow water. If a construction is adopted where the lower end 8a of the rudder 8 does not project further down than the boat bottom 2a, the boat can be used in shallow water but if this construction is adopted then the rudder 8 will cease to function as a rudder.

However, when the center of rudder force and the rudder shaft become separated, the steering force required for the rudder to be effective increases dramatically.

SUMMARY OF THE INVENTION

In order to resolve the aforementioned problems, it is the object of the present invention to provide a jet-propelled boat capable of changing course when the jet stream of the jet pump is halted or weak, and which benefits from not having any parts projecting from the bottom of the boat.

In order to achieve the aforementioned object, a jet-propelled boat with a propulsion means of a jet pump with a rotatable nozzle comprises a rudder projecting no further downwards than a boat bottom provided at the nozzle, and a rudder channel for guiding water flow to the rudder provided separately from a jet pump duct.

In an aspect of the invention, the rudder of the jet-propelled boat of claim 1 is duct-shaped.

In another aspect of the invention, the rudder of the jet-propelled boat is configured in such a manner that the rudder channel is formed of a watercourse plate with an end at the front with respect to a direction of travel opening away from a boat body when driving of the jet pump is

halted or when a rotational speed of driving of the jet pump is a prescribed value or less.

According to a preferred embodiment of the jet-propelled boat, the nozzle of the jet pump constituting the propulsion means is rotatable. The course can therefore be changed when the boat is being propelled by the jet pump by rotating the nozzle so as to change the direction of the jet stream.

Further, a rudder that does not project lower than the bottom of the boat is provided at the nozzle and a rudder channel for guiding the flow of water to the rudder is provided that is separate from the channel for the jet pump. It is therefore possible to change course by changing the direction of the direction of the water currents flowing at the rudder channel when the jet stream due to the jet pump is stopped or weak so that the boat is stopped, is decelerating, or is travelling as a result of its own inertia.

According to this jet-propelled boat, with this rudder, the flow of water is guided by a rudder channel that is separate from the jet pump channel, regardless of the rudder not projecting lower down than the bottom of the boat. It is therefore possible to change course when the boat is moving under its own inertia when the jet stream due to the jet pump is stopped or is weak so that the boat is stopped or is decelerating.

According to a preferred embodiment of the jet-propelled boat, the rudder is duct-shaped. The direction of the flow of water guided by the rudder channel can therefore be changed in a more effective manner and dramatically superior changing of course can be achieved.

According to a preferred embodiment of the jet-propelled boat, the rudder is configured in such a manner that the rudder channel is formed of a watercourse plate with an end at the front with respect to a direction of travel opening away from a boat body when driving of the jet pump is halted or when a rotational speed of driving of the jet pump is a prescribed value or less. This

watercourse plate therefore forms the rudder channel while simultaneously acting as a resistance plate while the boat is moving under its own inertia as a result of the jet stream of the jet pump being stopped or weak when the boat is stopped or decelerating.

In other words, the channel plate acts as a resistance plate when, for example, the boat stops rapidly or slows down rapidly. It is therefore possible to change course in a superior manner when the boat comes to a halt rapidly or reduces speed rapidly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially cut-away side view showing a first embodiment of a jet-propelled boat of the present invention.

FIG. 2 is a partially cut-away exploded view showing the essential parts of the first embodiment.

FIG. 3 (a) is a perspective view showing a nozzle 30 of the aforementioned first embodiment, and FIG. 3(b) is a perspective view showing a nozzle 30 of a second embodiment of a jet-propelled boat of the present invention.

FIG. 4 is a partially cut-away exploded view showing a third embodiment of a jet-propelled boat of the present invention.

FIG. 5(a) and FIG. 5(b) are views illustrating the related art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following is a description with reference to the drawings of the preferred embodiments of the present invention.

FIG. 1 is a partially cut-away side view showing a first embodiment of a jet-propelled boat of the present invention. FIG. 2 is a partially cut-away exploded view showing the essential parts of the first embodiment in FIG. 1.

As shown in FIG. 1, a jet-propelled boat 10 of the first embodiment is a saddle-ridden small boat where a

rider sits on a seat 12 on a boat body 11 and steers the jet-propelled boat 10 using a steering handlebar 13 with a throttle grip.

The boat body 11 is a floating structure where a space 16 is formed within a joined lower hull panel 14 and upper hull panel 15. An engine 17 is mounted on a lower panel 14 within the space 16 and a jet pump 20 constituting propulsion means driven by the engine 17 is provided at the rear part of the lower hull panel 14.

The jet pump 20 has a channel 24 extending from a water intake 21 opening at the bottom of the boat, passing through a jet opening 22 and reaching a nozzle 30, and an impeller 25 located within the channel 24. A shaft 26 of the impeller 25 is coupled with an output shaft 17a of the engine 17. When the impeller 25 is then driven by the engine 17, water taken in through the water intake 21 is spurted out from the jet opening 22 via the nozzle 30 and the boat body 11 is propelled. The driving speed of the engine 17, i.e. the force of propulsion due to the jet pump 20, is controlled by rotating the throttle grip of the steering handlebar 13.

As shown in FIG. 2, the nozzle 30 can be rotated using a pair of upper and lower pins 31, 31 provided at the jet opening 22 and a rudder 32 is formed integrally with the lower part of the nozzle 30. The rudder 32 of this embodiment is formed as a plate shape, as shown in FIG. 3(a), and a lower end 32a of the rudder 32 does not project further than a boat bottom 11a (refer to FIG. 1 and FIG. 2). As is clear from FIG. 2, a rudder channel 18 that is separate from the jet pump channel 24, for guiding the water flow W to the rudder 32 is provided at the boat bottom 11a. In FIG. 3(a), numeral 33 indicates an insertion hole for the pin 31.

The nozzle 30 is coupled to the steering handlebar 13 by a steering cable (not shown) so that the nozzle can be rotated by operating the steering handlebar 13, and the rudder 32 therefore also rotates together with the nozzle 30.

According to the above jet-propelled boat 10, the nozzle 30 of the jet pump 20 that is the means of propulsion can be rotated. The course can therefore be changed by changing the direction of the jet stream as a result of rotating the nozzle 30 when the jet-propelled boat 10 is being propelled by the jet pump 20.

The rudder 32 is provided at the nozzle 30 in such a manner as to not project further downwards than the boat bottom 11a and the rudder channel 18 is provided separately from the channel 24 of the jet pump 20 so as to guide a water flow W to the rudder 32. It is therefore possible to change course by changing the direction of the water flow W flowing through the rudder channel 18 using the rudder 32 while the boat body 11 is moving under its own momentum due to the jet stream of the jet pump 20 being stopped or weak while the boat is stopped or decelerating.

Namely, according to this jet-propelled boat , with this rudder, the flow of water is guided by a rudder channel that is separate from the jet pump channel, regardless of the rudder not projecting lower down than the bottom of the boat. It is therefore possible to change course when the boat body 11 is moving under its own momentum due to the jet stream of the jet pump being stopped or weak when the boat has stopped or is decelerating.

FIG. 3(b) is a perspective view showing a nozzle 30 of a second embodiment of a jet-propelled boat of the present invention, and portions in FIG. 3(b) corresponding to the same portions in the first embodiment are given the same numerals.

The point of distinction of the second embodiment with the first embodiment is that the rudder 32 provided integrally with the nozzle 30 is duct-shaped, but other aspects of the second embodiment are the same as for the first embodiment. With this configuration, water flow W (refer to FIG. 2) guided to the rudder 32 using the rudder channel 18 flows into the rudder 32 from inlets 32b, 32b, and flows out from the rudder 32 through outlets 32c, 32c.

The direction of the water flow W can also be changed as a result of the water flow W colliding with a side surface 32d of the rudder 32.

The same operating results as were obtained for the first embodiment can therefore also be obtained for the second embodiment.

Further, as the rudder is duct-shaped, the direction of the flow of water guided by the rudder channel can be changed in a more effective manner and dramatically superior changing of course can be achieved.

FIG. 4 is a partially cut-away exploded view showing the essential parts of a third embodiment of a jet-propelled boat of the present invention, and portions in FIG. 4 corresponding to the same portions in the first and second embodiments are given the same numerals.

The point of distinction of the third embodiment with respect to the first and second embodiments is that the rudder channel 18 is formed of a watercourse plate 40 with an end 40a at the front with respect to a direction of travel opening away from the boat body 11 when driving of the jet pump 20 is halted or when a rotational speed of driving of the jet pump 20 is a prescribed value or less, and other aspects are the same as the first and second embodiments.

The watercourse plate 40 has side plates 40b, 40b (only one shown in FIG. 4) on the left and right sides in the direction of travel of the jet-propelled boat 10. Rear ends 40c of the side plates 40b, 40b are located at the rear end 14a of the lower panel 14 using a shaft 41. Long holes 40d are provided at the rear part of the side plates 40b and ends of links 42, 42 (only one shown) are coupled to the long holes 40d in such a manner as to be able to move along the long holes 40d. The bases (other ends) of the links 42 are then located at the lower hull panel 14 using a shaft 44 in such a manner as to be rotatable.

The links 42 and the watercourse plate 40 are coupled to the throttle grip of the steering handlebar 13 using an appropriate coupling mechanism (for example, a steering

cable, etc.) (not shown). When the throttle grip is then returned completely, or when the angle of rotation is less than a prescribed angle (i.e. when the driving of the jet pump 20 is stopped or when the drive speed of the jet pump 20 is a prescribed value or less), the watercourse plate 40, the watercourse plate 40 is centered about the shaft 41 in the manner shown by the solid lines in FIG. 4 and the end 40a opens up in a direction away from the boat body 11. When the throttle grip is then rotated to a prescribed angle or greater (i.e. when the drive speed of the jet pump 20 is a prescribed value or greater), the watercourse plate 40 closes so as to make close contact with or be in close proximity to the boat bottom 11a, as shown by the imaginary lines in FIG. 4.

The same operating results as were obtained for the first and second embodiments can therefore also be obtained for the third embodiment.

According to the jet-propelled boat of this embodiment, the rudder channel 18 is formed of a watercourse plate 40 with an end 40a at the front with respect to a direction of travel opening away from a boat body 11 when driving of the jet pump 20 is halted or when a rotational speed of driving of the jet pump 20 is a prescribed value or less. This watercourse plate 40 therefore forms the rudder channel 18 while simultaneously acting as a resistance plate while the boat is moving under its own inertia (when the jet stream of the jet pump is stopped or weak) when the boat is stopped or decelerating.

The watercourse plate 40 therefore acts as a resistance plate when, for example, the boat 10 stops rapidly or slows down rapidly, and it is therefore possible to change course in a superior manner when the boat comes to a halt rapidly or decelerates rapidly.

A description is given in the above of preferred embodiments of the present invention but the present invention is by no means limited to the aforementioned embodiments, and suitable modifications are possible

without deviating from the spirit of the present invention as laid out in the patent claims.

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

1. A jet-propelled boat with a propulsion means of a jet pump with a rotatable nozzle, comprising:

a rudder projecting no further downwards than a boat bottom provided at the nozzle, and;

a rudder channel for guiding water flow to the rudder provided separately from a jet pump duct.

2. The jet-propelled boat of claim 1, wherein the rudder is duct-shaped.

3. The jet-propelled boat of claim 1 or 2, wherein the rudder channel is formed of a watercourse plate with an end at the front with respect to a direction of travel opening away from a boat body when driving of the jet pump is halted or when a rotational speed of driving of the jet pump is a prescribed value or less.

FIG. 1

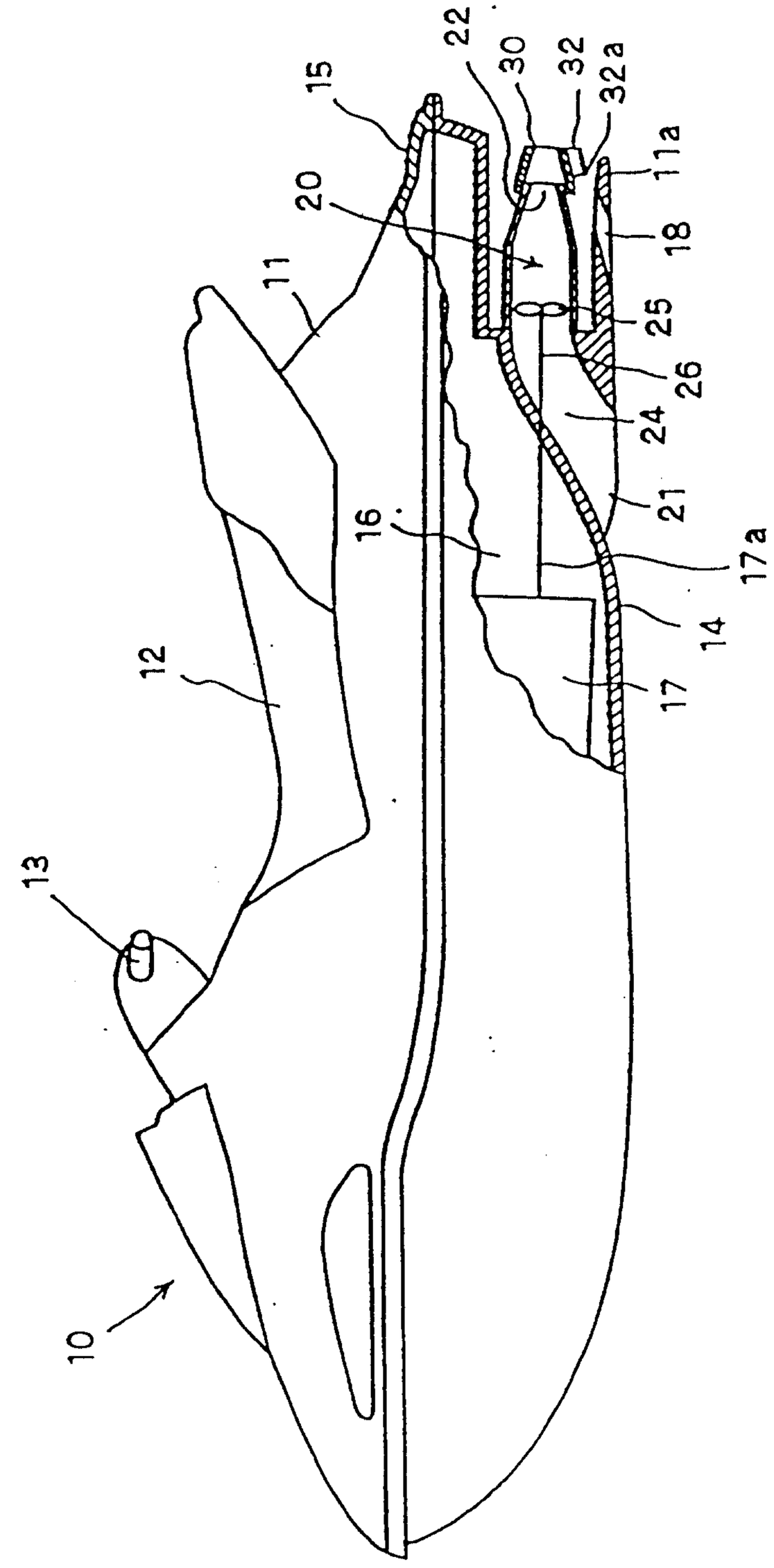


FIG. 2

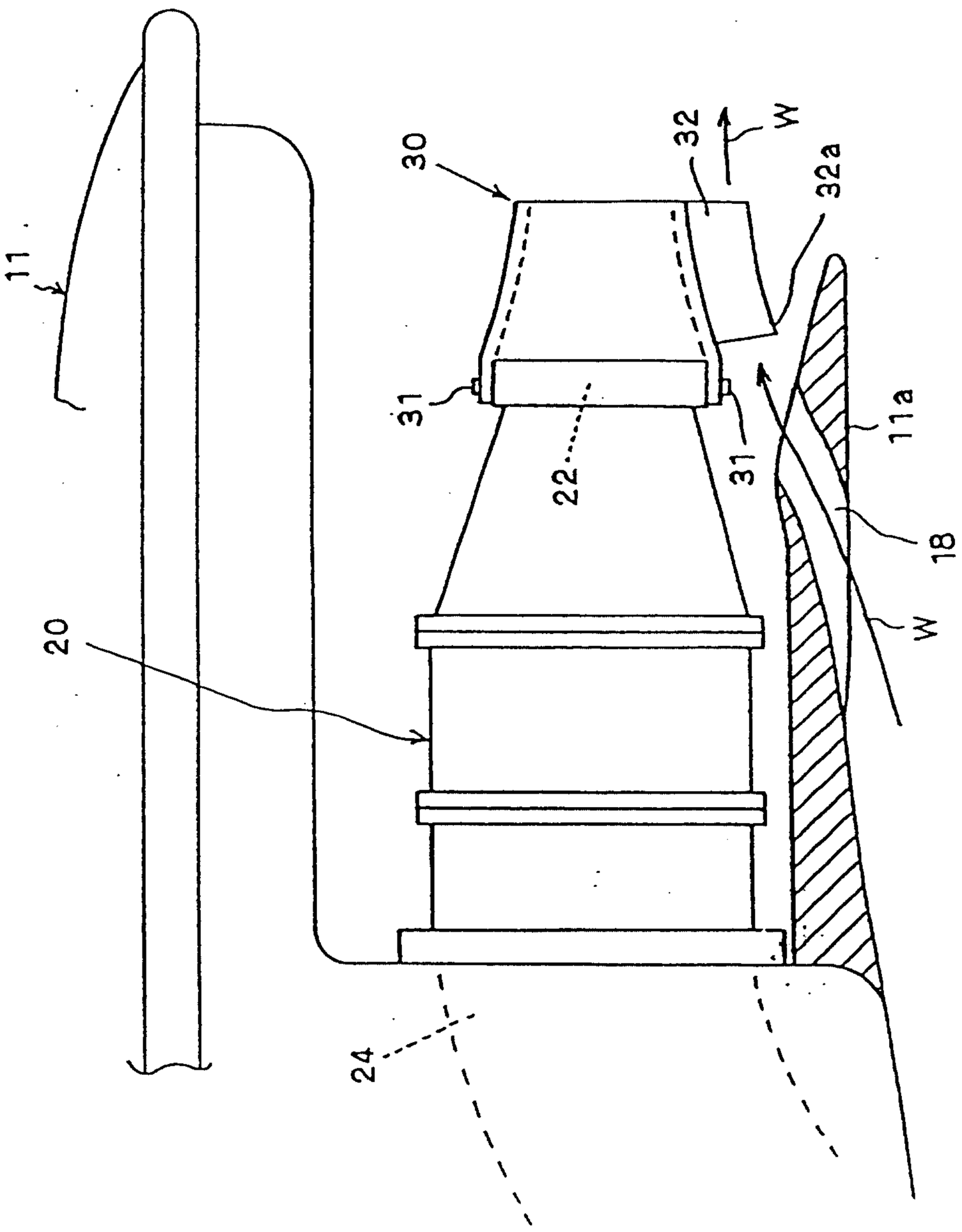
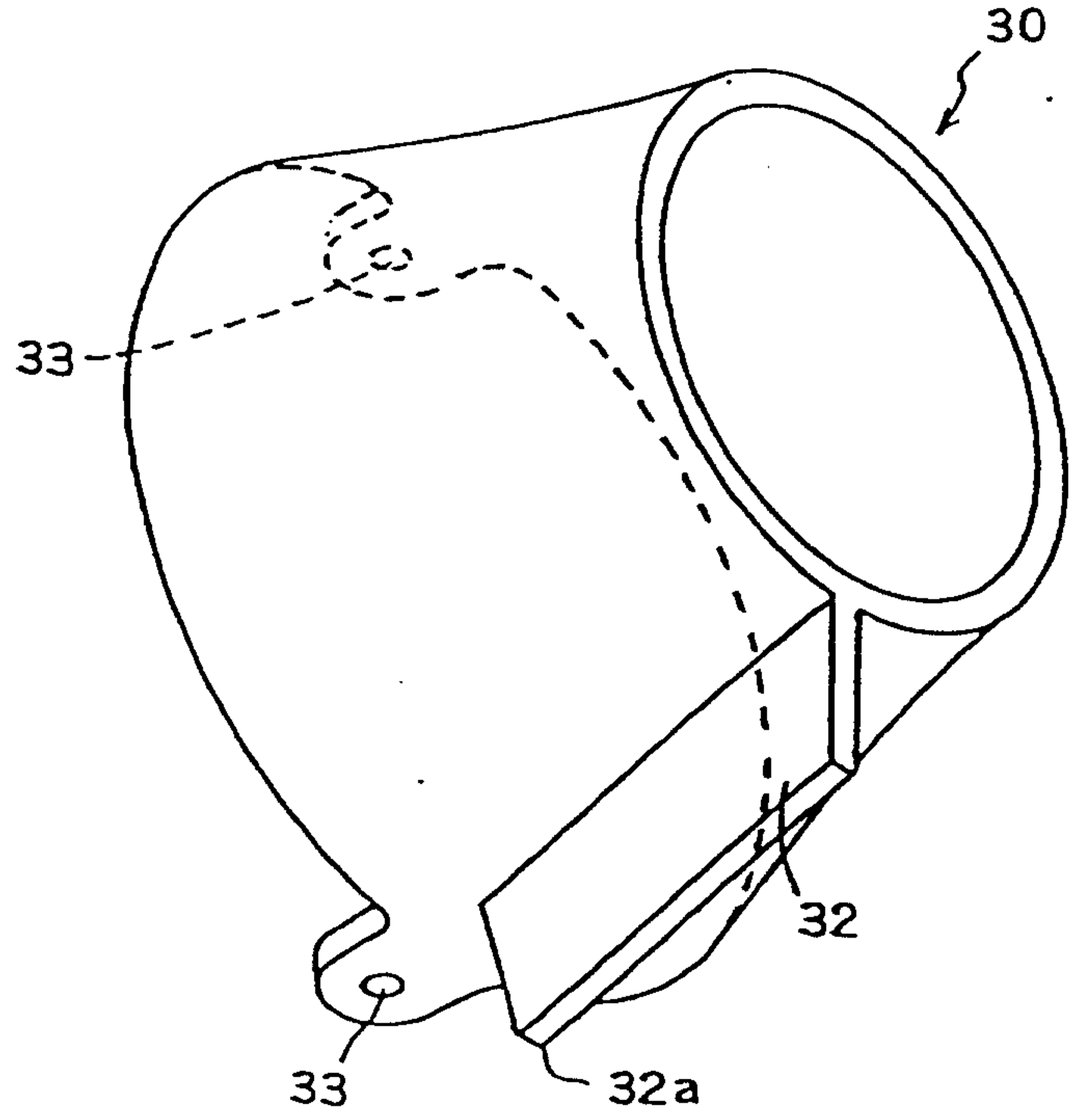


FIG. 3

(a)



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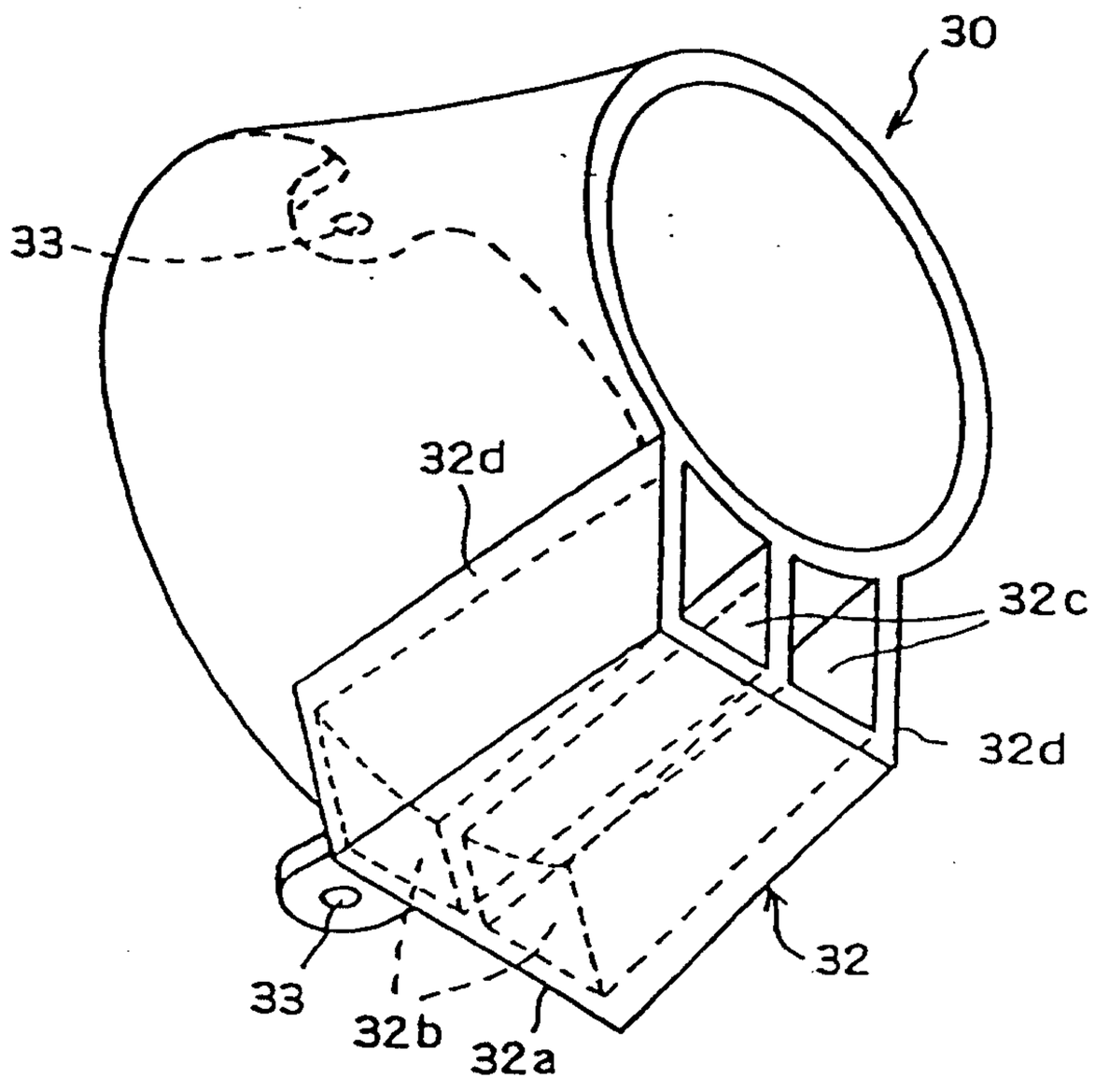


FIG. 4

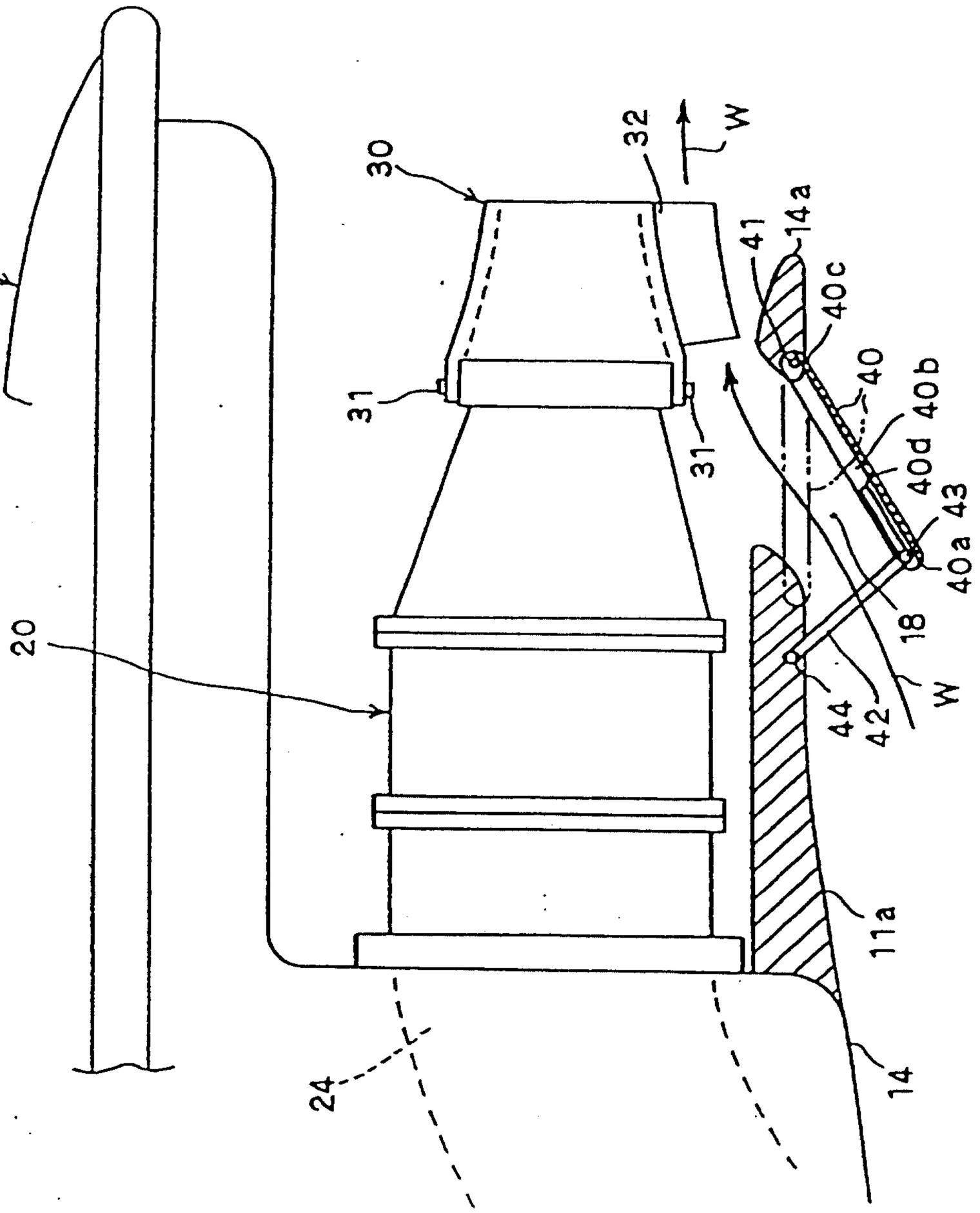
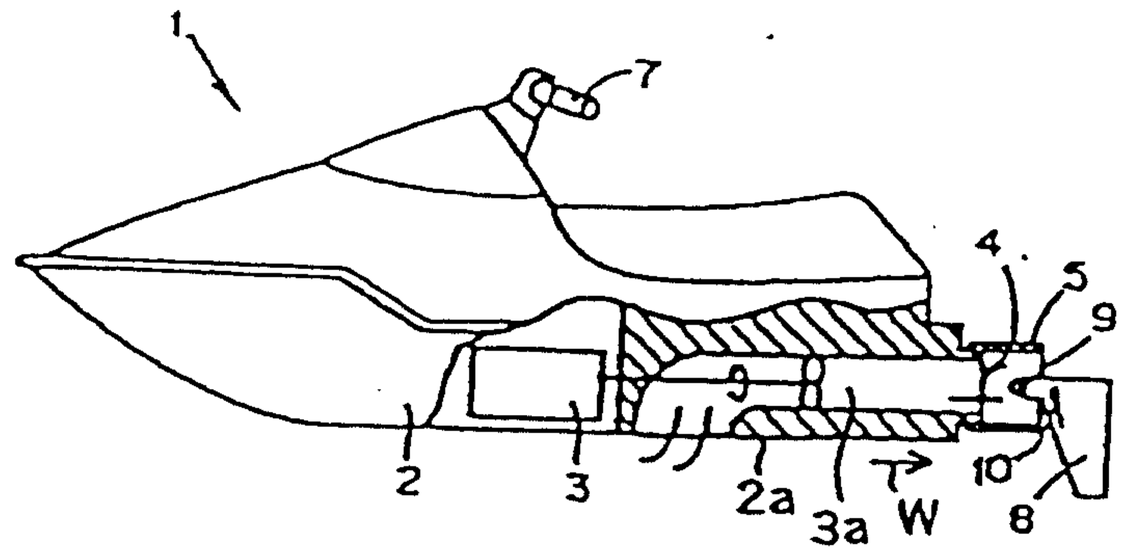


FIG. 5

(a)



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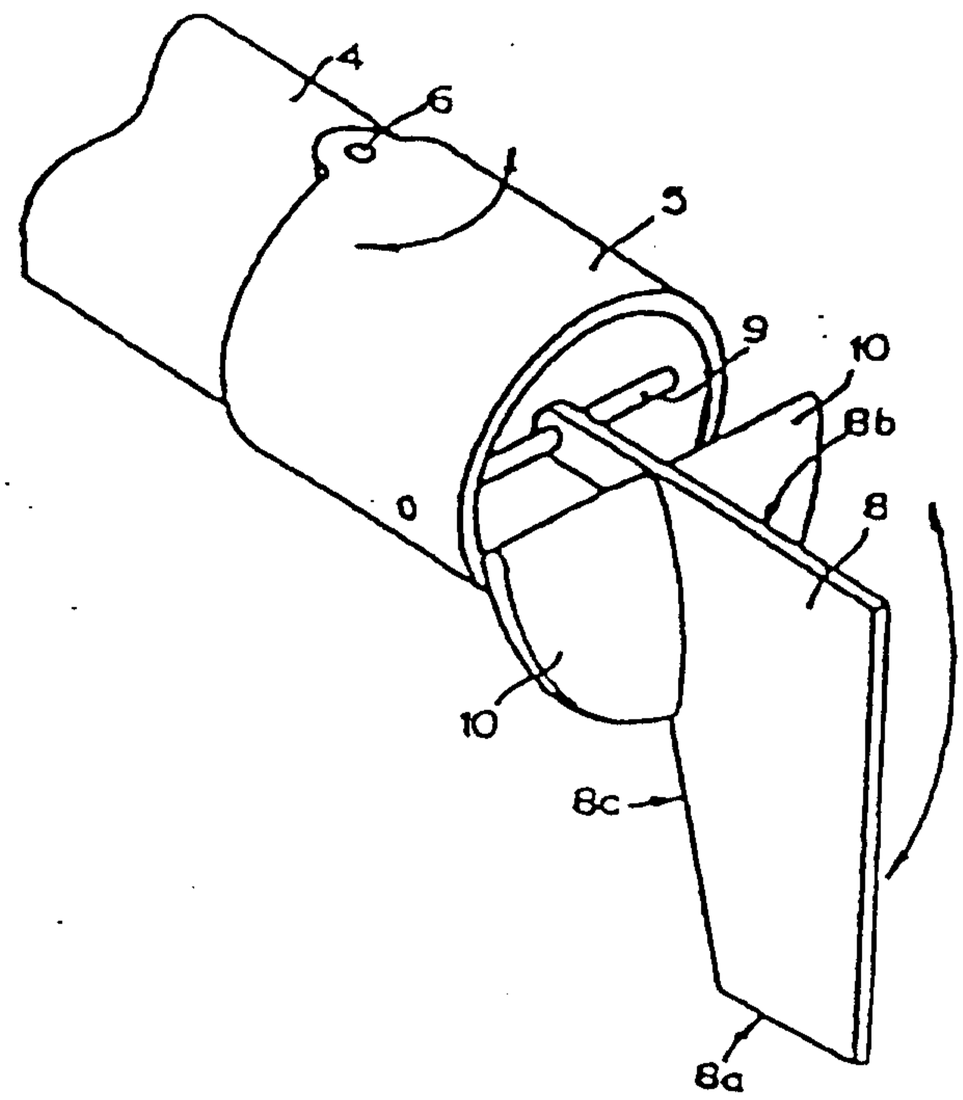

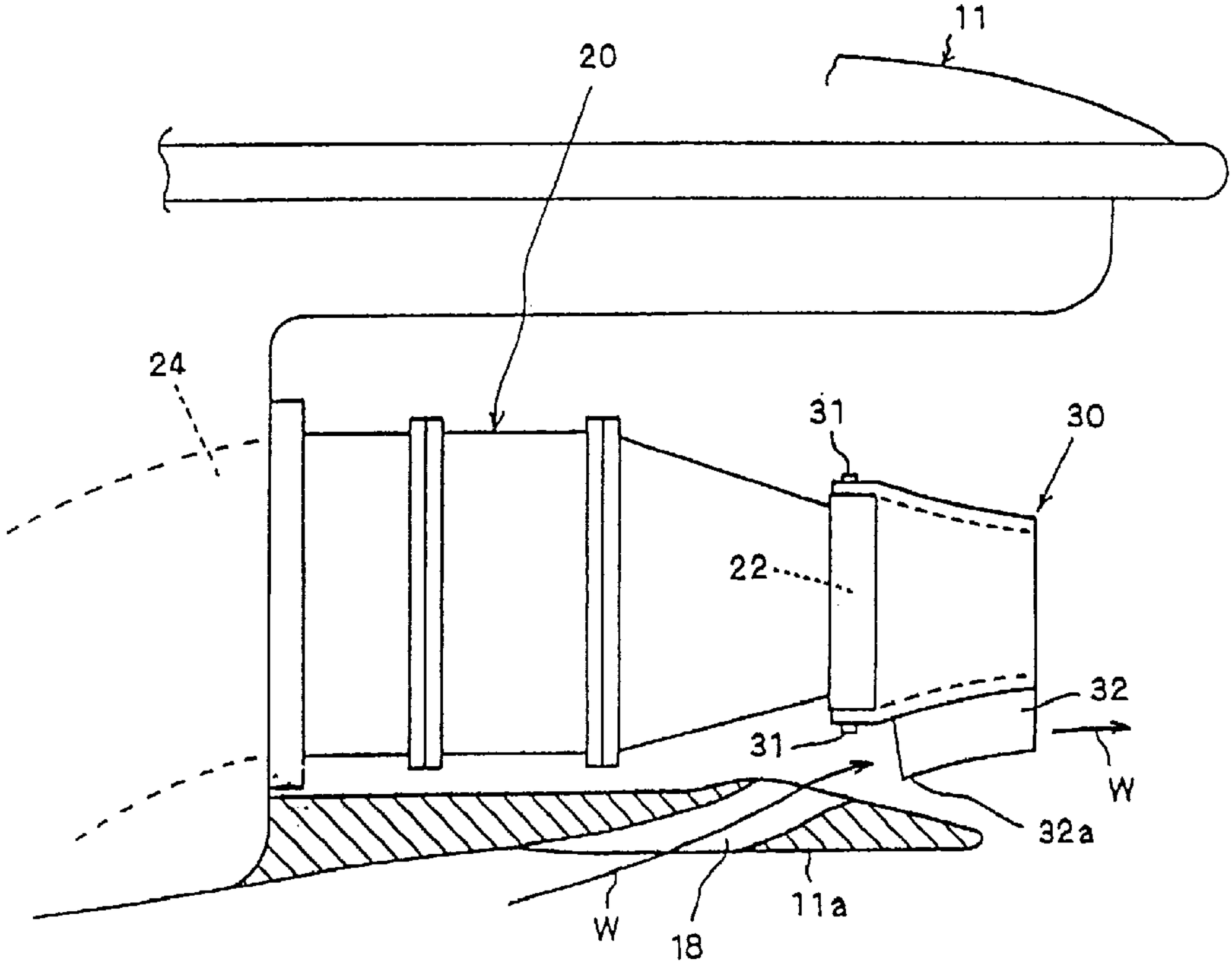
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32a
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11a