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Applicant: **Yamaha Motor Co., Ltd.**
2500 Shingai
Iwata-shi Shizuoka-ken(JP)

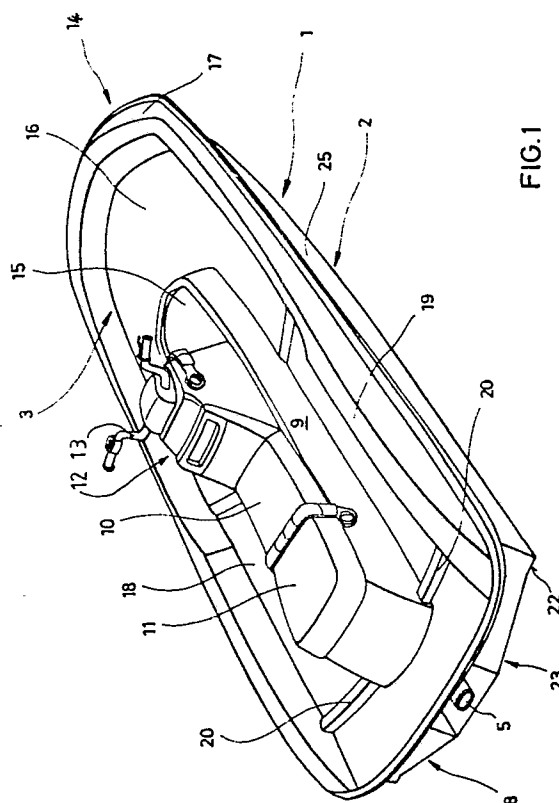
Inventor: **Kobayashi, Noboru**
c/o 2500 Shingai
Iwata-shi Shizuoka-ken(JP)

Representative: **Patentanwälte Grünecker,**
Kinkeldey, Stockmair & Partner
Maximilianstrasse 58
D-8000 München 22(DE)

Jet boat.

The jet boat according to the invention has a combined box-shaped and triangular hull (2), the bottom side (21) of the substantially rectangular hull bottom (22) being provided with a substantially triangular raised portion (23) extending towards the stern. In the weighted state of the bows the waterline circumscribes a rectangle, while the waterline circumscribes a triangle when the boat is under way.

The jet boat is suitable for use as an aquatic sports implement, for instance as a platform for line fishing



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Jet Boat

The present invention relates to a jet boat having a hull, a sternwards facing jet propulsion system, a seat bench extending for'ard from the stern in the longitudinal direction of the hull with a rider's seat, and a control cockpit disposed for'ard of said seat bench adjacent the longitudinal center of the hull, the engine of said jet propulsion system being located substantially below the cockpit.

So-called "jetbikes" or "wetbikes" are already known from practical use. These jetbikes or wetbikes are aquatic sports craft having a motorcycle-type control cockpit with handlebars, and a seat bench. The rider sits astride the longitudinally extending seat bench as in the case of a motorcycle. Certain models of such jet boats are equipped with seat benches having a pillion seat abaft the rider's seat. The hulls of known jet boats are formed as triangular hulls, as a result of which the boats have highly responsive steering characteristics and excellent manoeuvrability. The general advantage of such jet boats resides in the fact that they enable the rider to move relatively fast from one location to another, and that their handling is extremely simple. These advantages are accompanied by the disadvantage, however, that such jet boats are highly unstable when not under way, i. e. when drifting. The rider has to remain on the rider's seat if he wants to prevent the boat from capsizing or himself from falling into the water. This results in an undesirable handicap in use of the known jet boats. They are essentially suited for use only as pleasure or sports craft for people who do not mind getting wet on frequent occasions as in the case of windsurfing or surfboard-riding.

Also known on the other hand are motorboats of larger size which are less manoeuvrable for this very reason.

It is therefore an object of the present invention to broaden the scope of usefulness of jet boats of the type defined in the introduction, so that the drifting boat can also be used as a platform for recreational activities such as line-fishing.

According to the invention this object is attained by the provision that the seat bench extends for'ards beyond the control cockpit to form at least one front seat, and that the hull is of a substantially box-shaped construction, the bottom surface of the substantially rectangular hull bottom being provided with a triangular elevation extending towards the stern, so that the waterline of the hull substantially circumscribes a rectangle when the boat is drifting and the front seat is occupied, while substantially circumscribing a triangle when the boat is under way with the front seat unoccupied and the rider's seat occupied.

This construction permits the field of employ of the jet boat to be considerably broadened without substantially impairing the manoeuvrability and favourable handling properties of the boat. The arrangement of the front seat for'ard of the control cockpit provides the possibility of access to the bows when the boat is drifting, without being hampered by the control cockpit. This permits the jet boat to be also used for other recreational activities such as line fishing. When the boat is under way, the rider and his passenger occupy the seat bench extending aft from the control cockpit. The thus established weight distribution automatically results in the waterline circumscribing a triangle, because only the triangular portion of the combination hull lies on the water to thereby ensure the good manoeuvrability of the jet boat. When arriving at the desired location for line-fishing, the passenger moves for'ard to occupy the front seat for'ards of the cockpit. At this time the hull of the jet boat lies already relatively flat on the water, so that its waterline substantially circumscribes a rectangle. When the passenger is then seated on the front seat, the box-shape of the hull comes into full effect, resulting in a remarkably good stability of the jet boat. It is thus possible to leave the seats and to move about on the boat without the immediate danger of falling off due to excessive list of the boat, or of the boat capsizing. The particular advantage of the solution according to the invention resides in the fact that in situations which might be conducive to the boat capsizing, i.e. when the center of gravity of the boat is shifted towards the bows, the boat assumes an attitude in which the waterline adjacent the bows circumscribes the front section of a rectangle due to the box-shaped bows portion of the boat lying on the water. This has the effect of automatically improving the lateral stability of the boat.

It has been found that the apparently conflicting aims of achieving improved lateral stability of the boat when drifting and the retention of optimum manoeuvrability and handling properties when under way can be attained in a particularly effective manner when the center of gravity of the boat is located substantially below the cockpit at about 40 to 45% of the hull's length from the stern, and when the front seat is located substantially at the same distance from the center of gravity as the rider's seat.

The combined box-shaped and triangular hull configuration may be readily obtained when the for'ard portion of the hull's bottom is contoured in such a manner that the enclosed angle of the waterline at the bows is greater in the upper portion

of the hull, i.e. when the bows are weighted, than in the lower portion of the hull, i.e. when the bows are relieved. This implies that the bows section of the hull is of box-shaped configuration at the higher level, whereas the aft portion of the bows section lying deeper in the water is already of a slightly triangular configuration. The box shape of the hull thus comes progressively into effect to improve the stability of the boat as the weight acting on the bows is increased.

Without substantially affecting the manoeuvrability of the jet boat, the lateral stability of the boat in the drifting state is still further improved when the hull is designed in such a manner that its opposite sides laterally connected to the hull's bottom are substantially parallel to one another and extend perpendicular to the hull's bottom, so that the lateral sides of the hull are immersed in the water when the boat is drifting. When the boat is under way, the lateral sides of the hull are lifted clear of the water at least at the bows section, so that they do not affect the manoeuvrability of the boat.

An embodiment of a jet boat according to the invention shall now be described by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a perspective view from above of a jet boat according to the invention,

fig. 2 shows a top plan view of the jet boat shown in fig. 1,

fig. 3 shows a sectional view taken along the line III-III in fig. 2,

fig. 4 shows a front end view of the hull of the jet boat of fig. 1,

fig. 5 shows a partially sectioned sideview of the jet boat of fig. 1,

fig. 6 shows a partially sectioned sideview of another embodiment of a jet boat and depicting different waterlines corresponding to respective operating conditions and load distributions,

fig. 7 shows a bottom plan view of the hull of the jet boat of fig. 6 and depicting the different waterlines corresponding to respective operating conditions and load distributions,

fig. 8 shows a sideview of still another embodiment of a jet boat, and

fig. 9 shows the jet boat of fig. 8 illustrating a different operating condition or load distribution.

Shown in the drawings are several embodiments of jet boats 1. The characteristics common to all of these embodiments shall at first be described before discussing the particulars of the individual embodiments. Each jet boat 1 has a substantially flat hull 2 carrying a likewise substantially flat deck 3. Provided abaft is a jet propulsion system 4 with a jet nozzle 5 opening at the lower stern. Jet propulsion system 4 is powered by an

engine 6 disposed adjacent the longitudinal center of hull 2, or more accurately, at the center of gravity CG. Disposed forward of engine 6 is a tank 7 for the fuel supply of engine 6.

Deck 3 carries a raised seat bench 9 extending forward from stern 8. Seat bench 9 comprises a driver's seat 10 and a pillion seat 11. Forward of seat bench 9 there is a control cockpit 12 comprising motorcycle-type handlebars 13 connected in a per se known and therefore not detailedly shown manner to jet propulsion system 4. Control cockpit 12 is located above center of gravity CG, and thus above engine 6. Seat bench 12 extends beyond control cockpit 12 towards the bows 14 so as to form a front seat 15 forward of control cockpit 12. Formed in deck 3 about seat bench 9 is a gutter 16 defined by coamings 17. At both sides of seat bench 9 gutter 16 merges with two foot troughs 18, 19 opening towards stern 8. The aft ends of foot troughs 18, 19 are each obturated by a respective transverse body 20 spaced from stern 8 for preventing the inflow of water from the stern.

As shown particularly distinctly in figs. 3, 4, 6 and 7, hull 2 of jet boats 1 is of a combined box-shaped and triangular construction, the bottom side 21 of the substantially rectangular hull bottom 22 being formed with a substantially triangular raised portion 23 extending towards the stern. The forward portion of hull bottom 22 is substantially box-shaped and relatively flat, whereas the aft portion of hull bottom 22 is of a more or less triangular cross-sectional shape extending to a greater depth. The two lateral sides 24 and 25 of hull 2 extend substantially parallel to one another and perpendicular to the lateral edges of bottom 22. In the stopped condition, i.e. with the jet boat 1 adrift, the major part of hull sides 24 and 25 is immersed in the water.

The shape of hull 2 may be even more clearly described with reference to the different waterlines (a) to (e) corresponding to various load and operating conditions. These waterlines are depicted in figs. 6 and 7.

The waterline (a) applies when driver's seat 10 and pillion seat 11 of seat bench 9 are occupied by two persons and jet boat 1 is under way. In this case the water line substantially circumscribes a triangle as clearly shown in fig. 7.

A course alteration causes hull 2 to heel, resulting in a corresponding displacement of the waterline. This state is depicted in fig. 7 by waterline (b) corresponding to a course alteration to port. It is to be noted that under these conditions the box-shaped bow section of hull 2 remains clear of the water, the waterline (b) being still of a substantially triangular configuration.

Waterline (c) corresponds to the state in which the two seats 10 and 11 of seat bench 9 are

occupied by two persons while jet boat 1 is not under way, i.e. adrift. In this state both sides 24, 25 of hull 2 are immersed to a major part. With the exception of its for'ard portion, waterline (c) circumscribes a substantially rectangular shape in this state. The for'ard portion of waterline (c) encloses an angle α with its apex centered on the longitudinal centerline CL of jet boat 1.

Waterline (d) corresponds to the state in which jet boat 1 is adrift and driver's seat 10 and front seat 15 are each occupied by a passenger. It is readily noted that the for'ard portion of waterline (d) has been displaced farther for'ard, resulting in a spreading of the enclosed angle α' . The configuration of the waterline thus approaches that of a rectangle still further.

The waterline designated (e) in fig. 6 corresponds to the state that the boat is adrift while only front seat 15 is occupied by a passenger. This state is also depicted in fig. 7, clearly showing that waterline (e) approaches the rectangular shape still further, although bows 14 is immersed somewhat deeper than stern 8. The for'ard portion of waterline (e) now encloses the maximum angle α'' . Also under these conditions, the major part of the hull's sides 24 and 25 remains immersed.

In order to obtain the described configurations of the water line under the respective load and operating conditions, it is important, apart from the configuration of the hull's bottom, that the center of gravity CG be located substantially below cockpit 12 at about 40 to 45% of the hull's length from stern 8. Front seat 15 is located substantially at the same distance from center of gravity CG as driver's seat 10. As a result, jet boat 1 is in a balanced state when drifting with front seat 15 and driver's seat 10 occupied. This state is shown in fig. 5.

The particulars of the various embodiments shall now be described in detail. These particulars mainly concern the construction of the transverse bodies 20 closing the aft ends of foot troughs 18 and 19.

In the embodiment shown in figs. 1 and 2, the transverse body is formed as a baffle 20 extending transversely of the longitudinal direction of the troughs somewhat for'ard of stern 8. Baffle 20 obturates the aft end of the respective foot trough 18, 19 to prevent the inflow of water thereinto from the stern when the latter is deep in the water. On the other hand, baffle 20 is located far enough for'ard of stern 8 for not hampering boarding of the boat from the water. Baffle 20 may even be used as a grip ledge to facilitate boarding from the stern.

In the embodiment shown in fig. 5, the transverse body comprises a resiliently compressible tubular bellows 26 extending transversely of foot troughs 18, 19. The non-deformed or relaxed state of bellows 26 is depicted in solid lines. The exer-

tion of pressure from above, for instance by pushing downwards with a foot, causes bellows 26 to assume the shape indicated by dotted lines. The thus designed transverse body may thus be of a greater height than a rigid body without thereby preventing water that has entered foot troughs 18, 19 from flowing off towards the stern. The exertion of sufficient pressure on bellows 26 permits any water to be drained from the foot troughs while the jet boat is under way. To accomplish this effect the driver or pillion-rider may for instance stand on bellows 26 while the boat is under way.

In another embodiment shown in fig. 6, the transverse body is formed as a flap mounted for pivoting about a horizontal pivot axis extending transversely of foot troughs 18, 19. Flap 28 is biased by a spring element 29 towards the obturating position shown in fig. 6, in which flap 28 prevents the water inflow from the stern into foot troughs 18, 19. Spring element 29 may be compressed by stepping onto flap 28 for permitting water already present in foot troughs 18, 19 to flow off towards the stern.

Shown finally in figs. 8 and 9 is an embodiment comprising a transverse body in the form of a buoyant flap 28. The aft end portion of each foot trough 18, 19 is provided with a recess 30 of triangular cross-sectional shape extending transversely of deck 3. The lowermost portion of recess 30 is provided with a drain opening communicating with a drain pipe 31 extending to the bottom side 21 of the hull's bottom 22 with its mouth opening towards stern 8. The for'ard portion of flap 28 is pivotally mounted about a horizontal pivot axis 27 extending transversely of foot troughs 18, 19. The two dash-dotted lines (f) and (g) in figs. 8 and 9 illustrate the respective waterline.

The waterline (f) in fig. 8 corresponds to the normal operating condition, with jet boat 1 under way and driver's seat 10 and pillion seat 11 occupied by two passengers. In contrast thereto, the waterline (g) in fig. 9 corresponds to the state in which jet boat 1 is drifting with stern 8 under excessive load as by a single person aboard occupying pillion seat 11. In this state water flows into recess 30 both from the stern and through drain pipe 31, causing flap 28 to float up. As a result, flap 28 obturates the aft portions of foot troughs 18, 19 to thereby prevent the inflow of water. Under normal load of the boat, the waterline extends below the lowermost portion of recess 30, and flap 28 is completely received within recess 30. Flap 28 will obviously be caused to float up already as soon as water enters recess 30, i.e. before stern 8 is immersed.

When the jet boat is under way, flap 28 is also lowered into recess 30 even when the waterline (f) is not below the lowermost portion of recess 30.

This is because when jet boat 1 is under way, an injector pump effect is created at the mouth of drain pipe 31, causing water contained in recess 30 to be drained therefrom, so that flap 28 cannot float up. As soon as the speed of the boat is reduced, the static pressure adjacent the mouth of drain pipe 31 at the bottom side 21 of the hull will rise, as a result of which flap 28 is permitted to float up to thereby obturate the aft end portion of foot troughs 18, 19.

All of the described embodiments of the transverse body 20 have in common that the flow-off of water already present in foot troughs 18, 19 is scarcely hampered, while the inflow of water from the stern is substantially prevented. Boarding of jet boat 1 from the water over the stern is not hampered by any of the transverse bodies 20.

Claims

1. A jet boat (1) having a hull (2), a sternside jet propulsion system (4), a seat bench (9) extending for'ards from the stern (8) in the longitudinal direction of the hull and comprising at least a rider's seat (10), and a control cockpit (12) located for'ards of said seat bench adjacent the longitudinal center of said hull (2), the engine (6) of said jet propulsion system (4) being positioned substantially below said control cockpit (12), characterized in that

said seat bench (9) extends for'ards beyond said cockpit (12) to form at least one front seat (15), and that said hull (2) is of a substantially box-shaped configuration, the bottom side (21) of the substantially rectangular hull bottom (22) being provided with a substantially triangular raised portion (23) extending towards the stern, so that the waterline (e) of said hull (2) substantially circumscribes a rectangle when the boat is drifting and said front seat (15) is occupied, while the waterline (a) substantially circumscribes a triangle when the boat is under way with said front seat (15) unoccupied and said rider's seat (10) occupied.

2. A jet boat according to claim 1, characterized in that the center of gravity (CG) of said boat (1) is located substantially below said cockpit (12) at about 40 to 45% of the hull's length from the stern (8), said front seat (15) being spaced from said center of gravity (CG) by substantially the same distance as said rider's seat (10).

3. A jet boat according to claim 1 or 2, characterized in that the bows section of said hull bottom (22) is contoured in such a manner that the angle (α , α' , α'') enclosed by the waterline at the bows is greater at a higher level of said hull (2),

corresponding to the weighted state of the bows (14), than at a lower level of said hull (2) corresponding to the relieved state of the bows (14).

4. A jet boat according to any of claims 1 to 3, characterized in that said hull (2) is designed in such a manner that the opposite hull sides (24, 25) laterally connected to the hull's bottom (22) are substantially parallel to one another and extend perpendicular to the hull's bottom (22), said lateral hull sides (24, 25) being immersed in the water when said boat (1) is adrift.

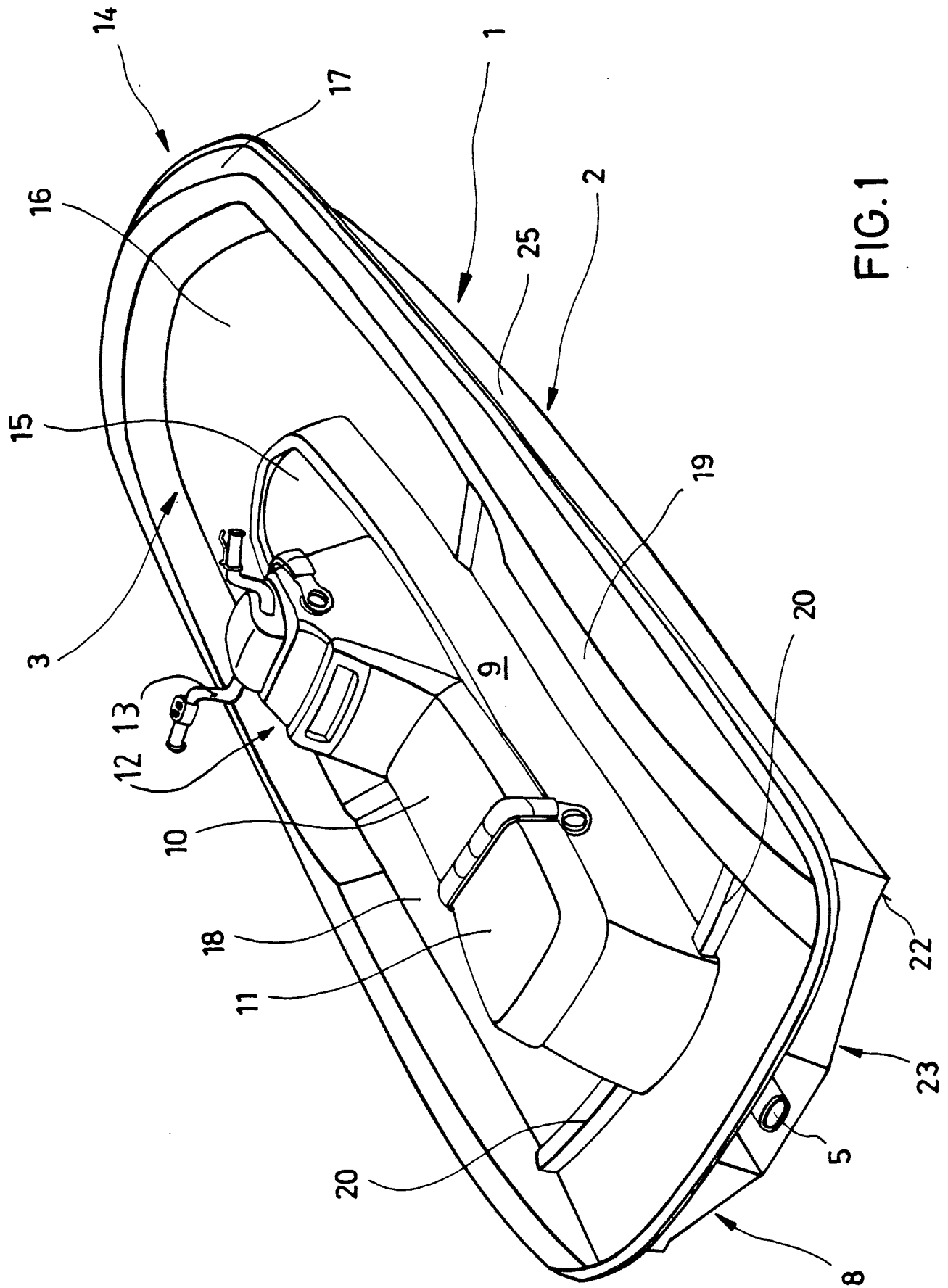


FIG. 1

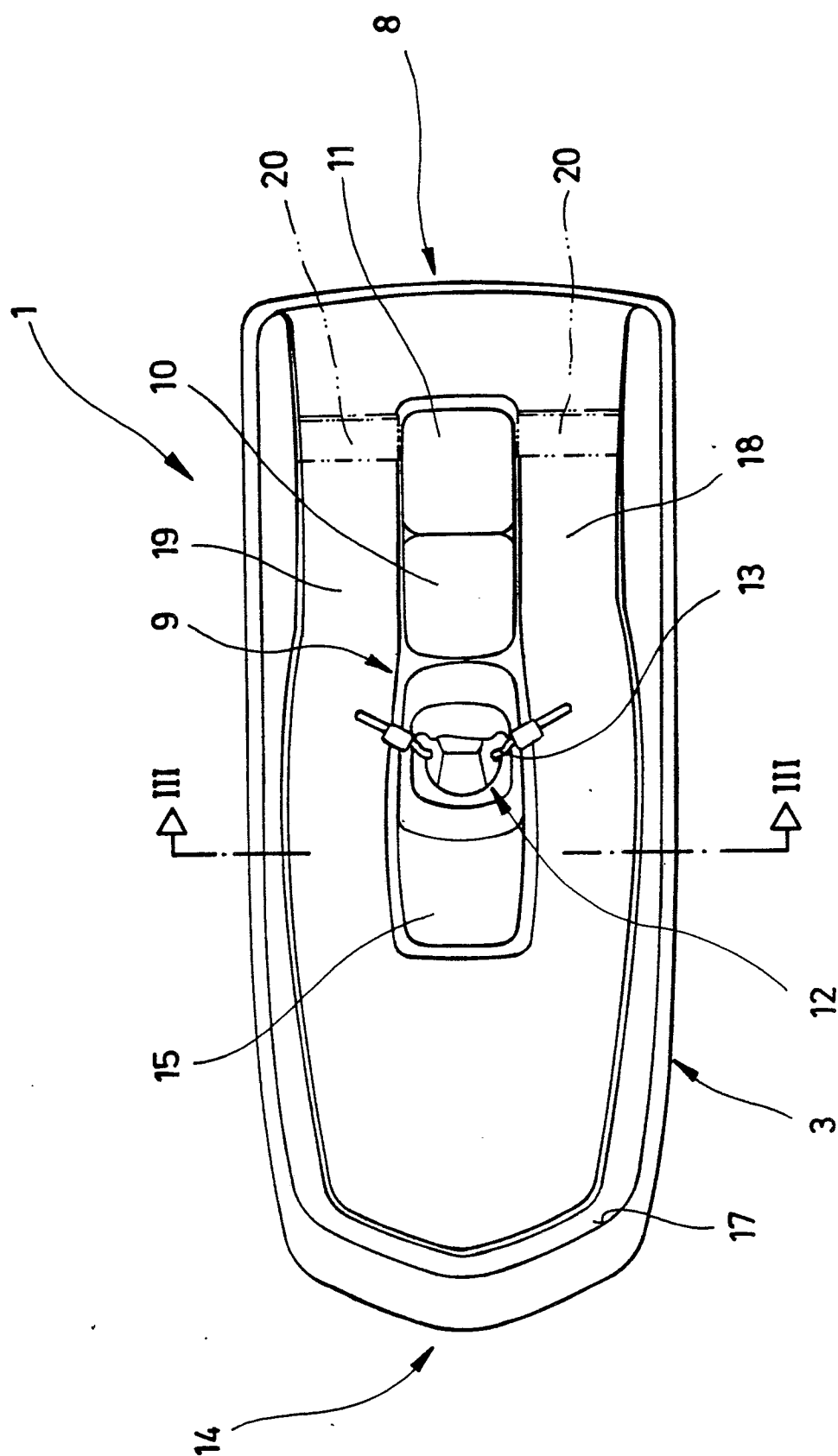


FIG. 2

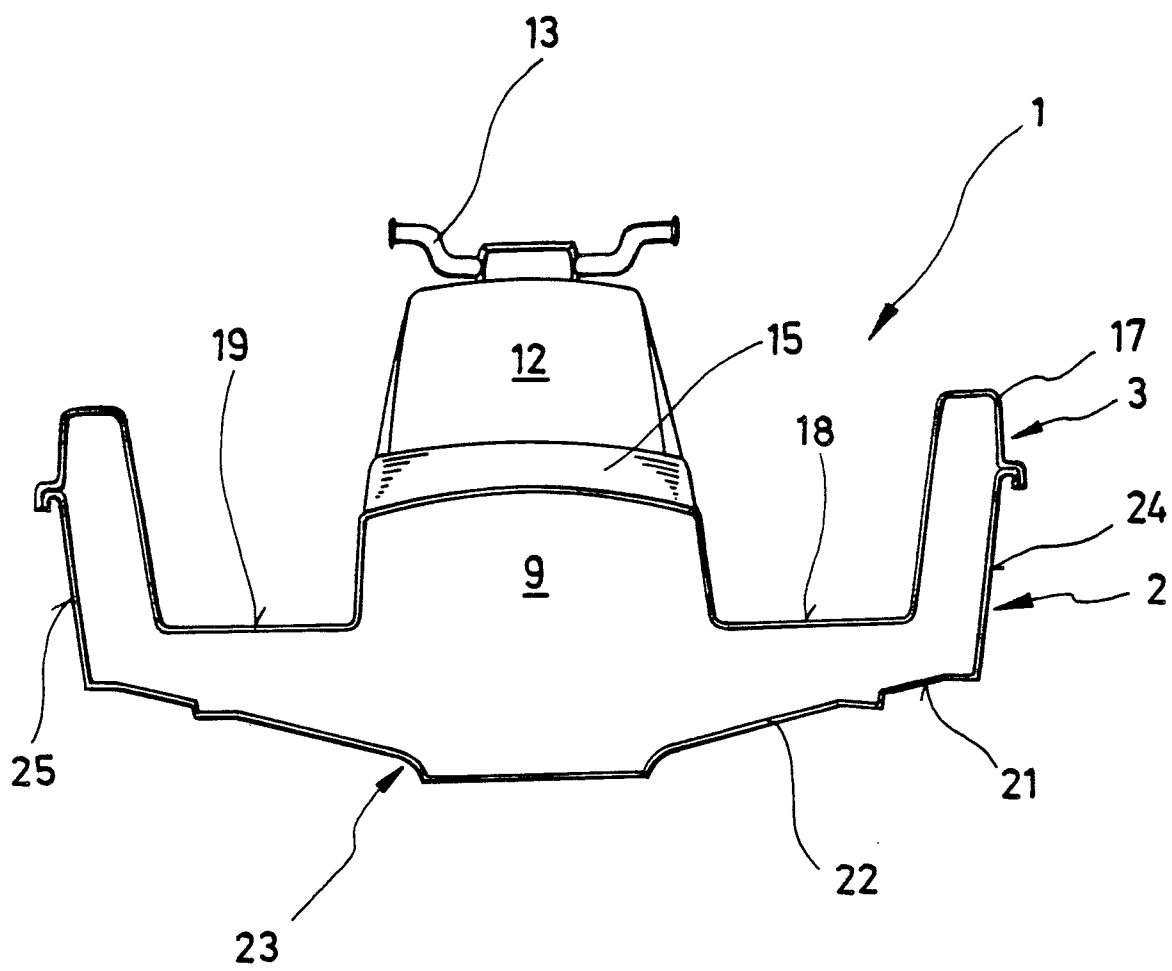


FIG.3

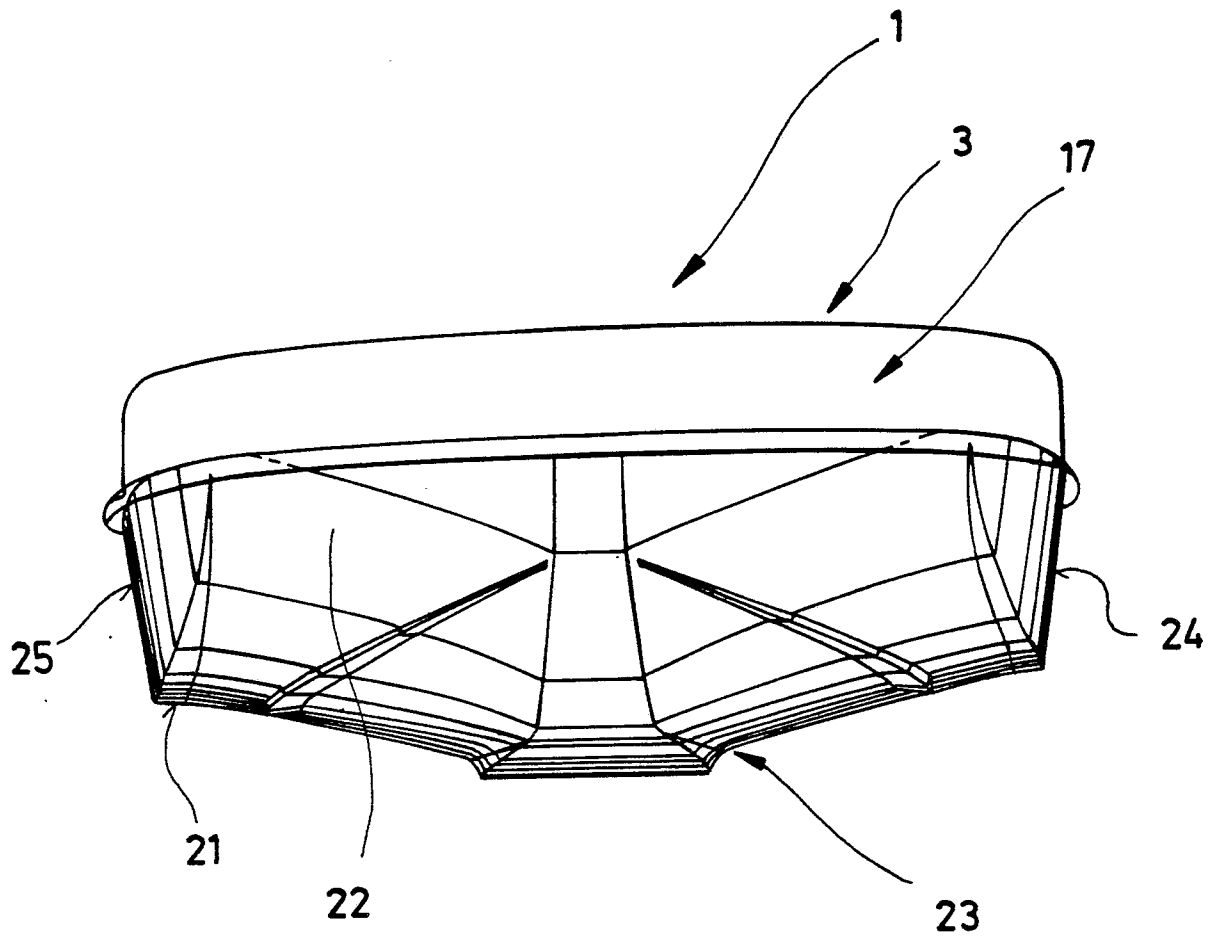


FIG. 4

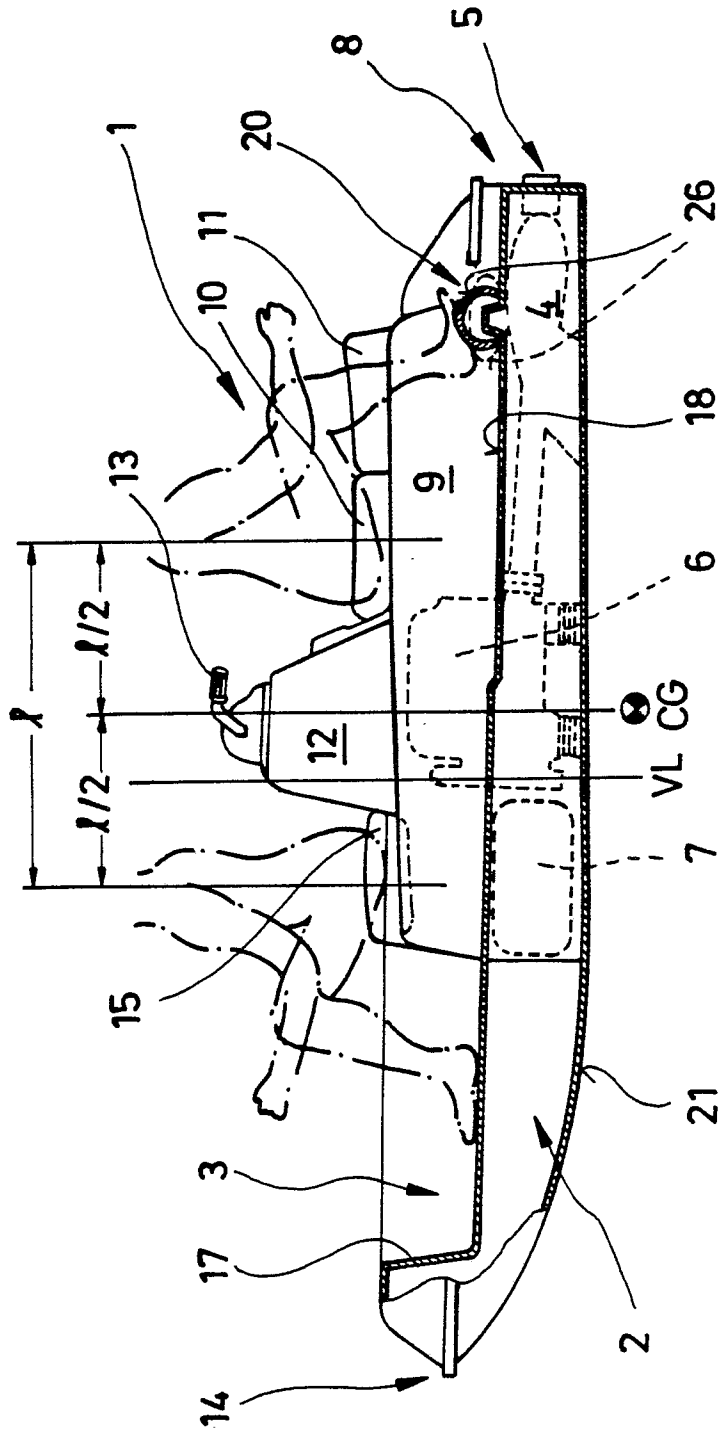


FIG.5

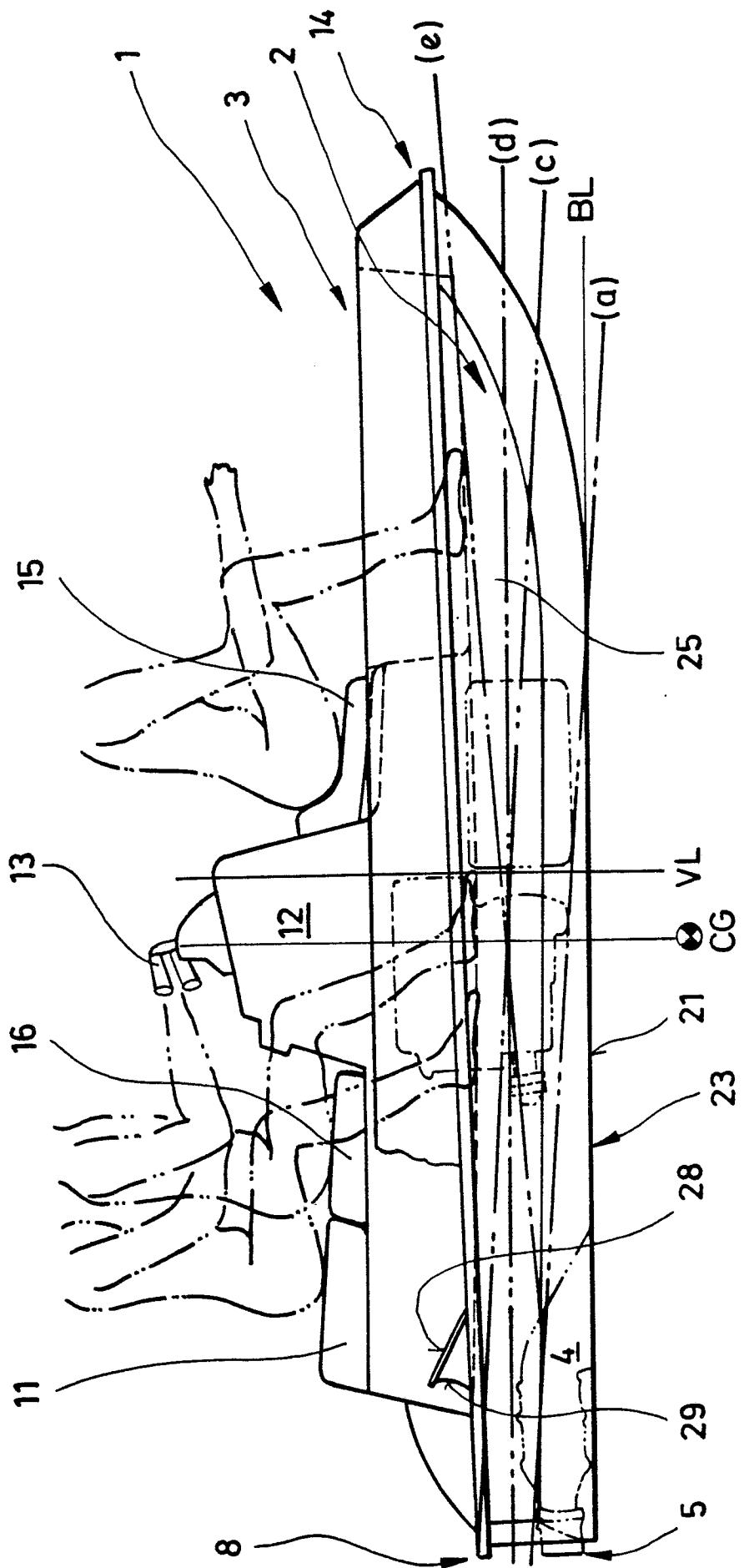


FIG. 6

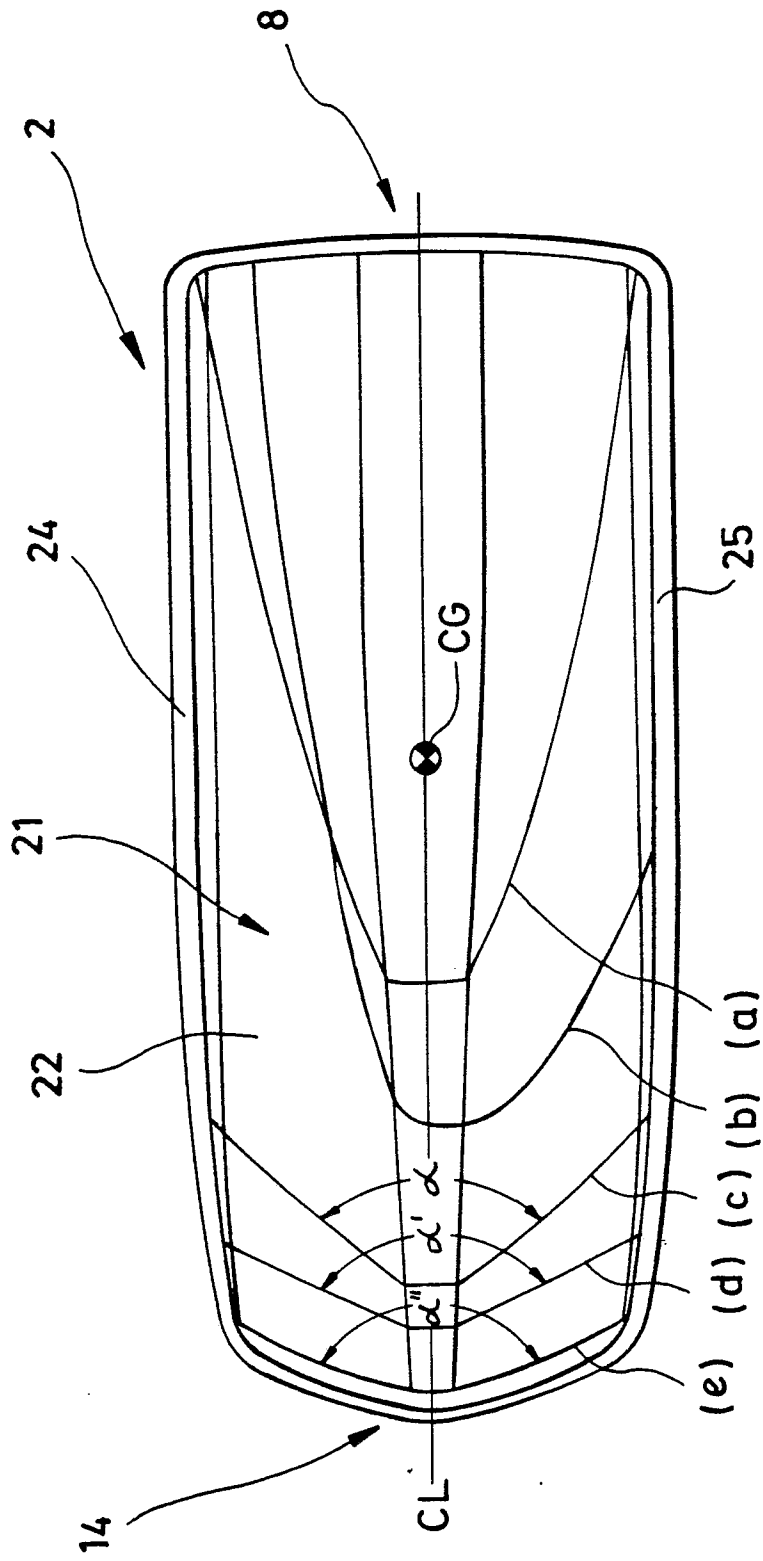


FIG. 7

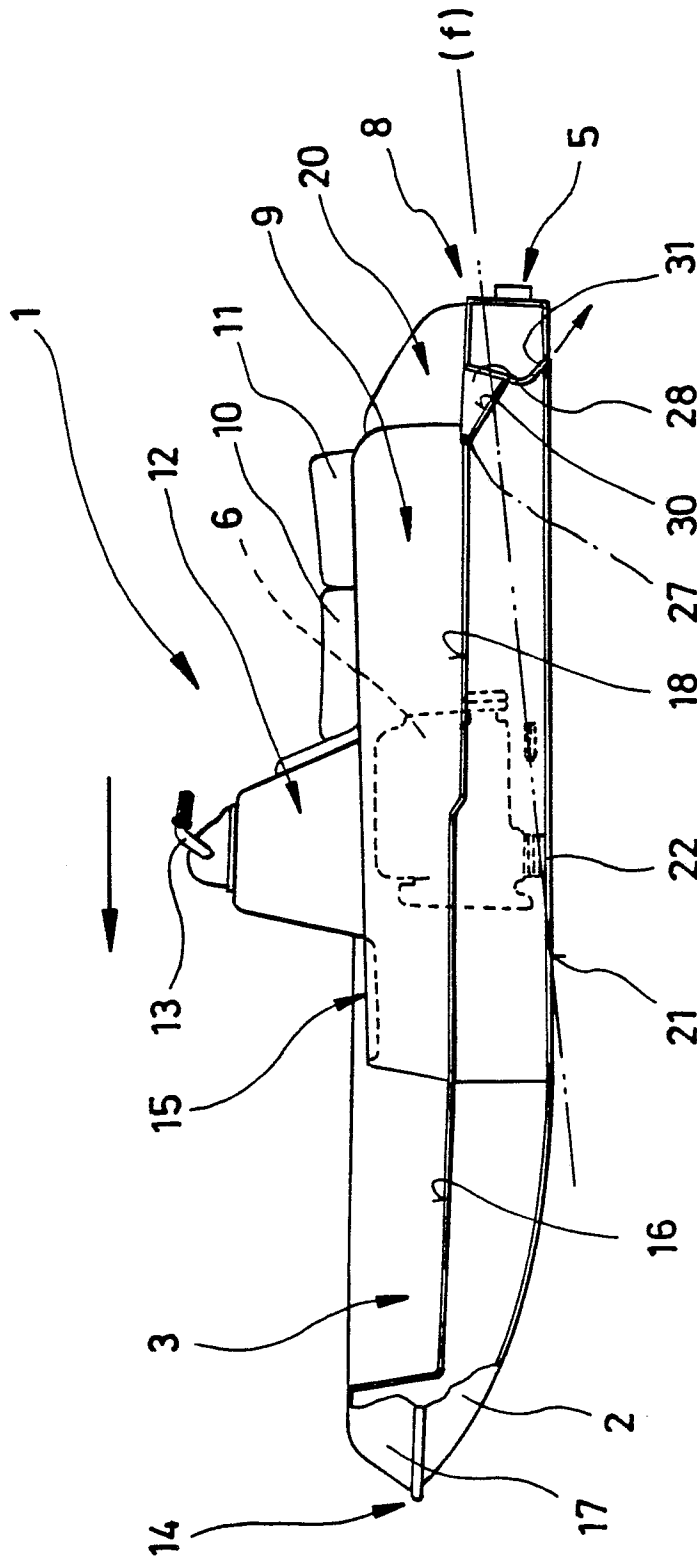


FIG. 8

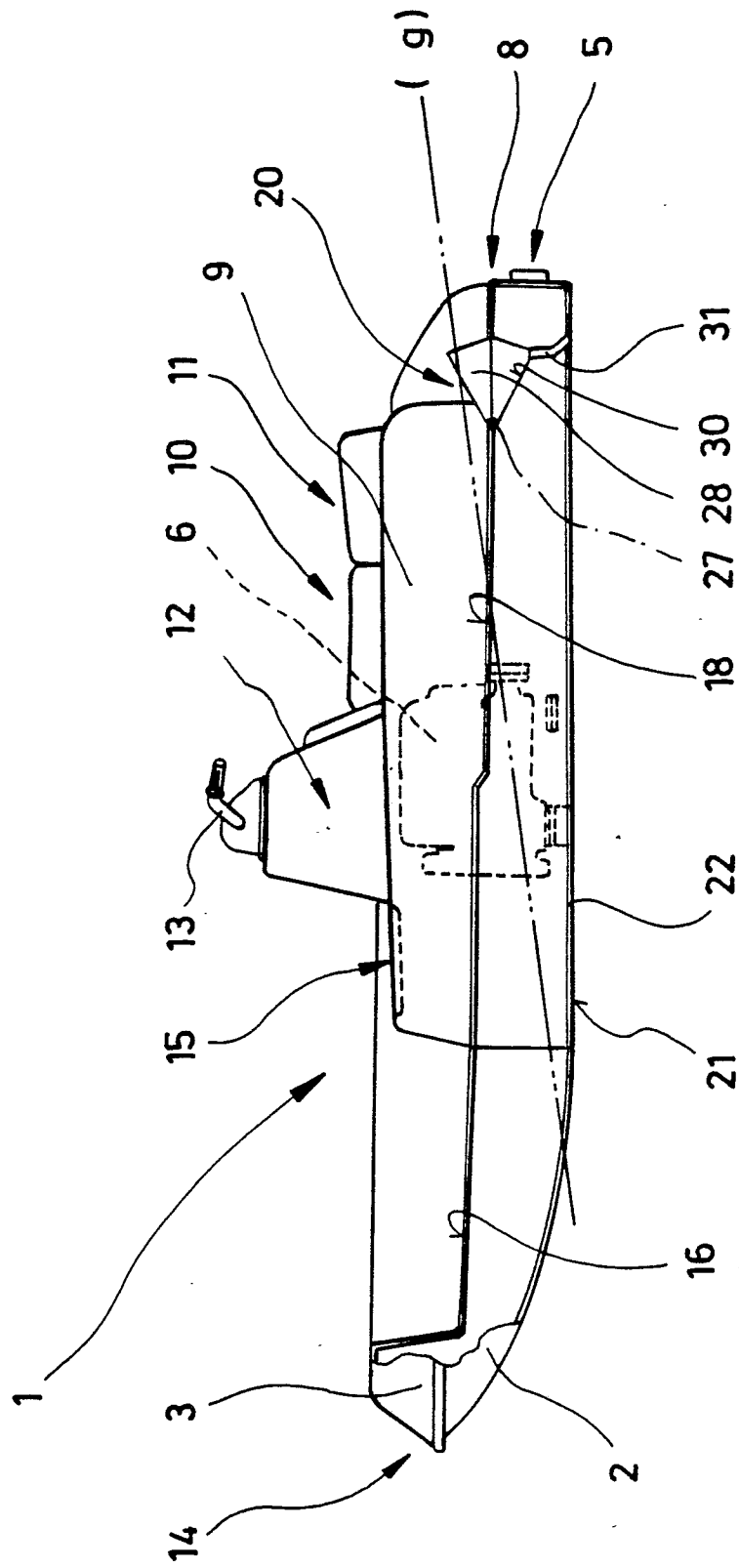


FIG. 9



DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)		
A	EP-A-0 201 326 (KAWASAKI JUKOGYO K.K.) * Page 1, line 1 - page 2, line 22; page 3, line 23 - page 4, line 15; figures 1-3 * ---	1-4	B 63 B 1/04 B 63 B 1/18 B 63 B 35/80		
A	US-A-4 128 072 (WOOD) * Column 2, line 50 - column 3, line 6; figures 1-7 * ---	1-4			
A	L. LORD: "Naval architecture of planing hulls", pages 100-102, 1946, Cornell Maritime Press, New York, US * Page 102, figure 46 * ---	1-4			
A	R. MUNRO-SMITH: "Notes and examples in naval architecture", pages 94-95, 1965, Edward Arnold (Publishers) Ltd, London, GB ---	1-4			
A	J.P. COMSTOCK: "Principles of naval architecture", third reprinting, August 1974, pages 99-101, The Society of Naval Architects and Marine Engineers, New York, US ---	1-4	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 63 B		
A	US-A-4 341 177 (TAKESHI MIYAZAKI) -----				
The present search report has been drawn up for all claims					
Place of search THE HAGUE		Date of completion of the search 30-11-1988	Examiner DE SENA Y HERNANDORENA A		
<table><tr><td>CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</td><td>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document
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