(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 445 188 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.08.2004 Bulletin 2004/33

(51) Int Cl.[7]: **B63B 1/16**, B63B 1/18

(21) Application number: **03447023.7**

(22) Date of filing: **10.02.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(71) Applicant: **Lattanzio, Eugenio**
Berchem, Antwerp 2600 (BE)

(72) Inventor: **Lattanzio, Eugenio**
Berchem, Antwerp 2600 (BE)

Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Boat hull

(57) A boat hull for planing and high speed planing operation, including a transom stern (12), freeboard side portions (14) extending forwardly from the transom and terminating in a v bow (16). Comprising: A bottom surface that is composed by a deep V bottom (35) that is interrupted in the lower part by a surface (24), this one generates in transverse cross sections a flat bottom and extends forwardly from the transom decreasing very gradually the height and width up to disappear in a point. From said point to the bow continues the V bottom and from approximately to this point start the keel (25) that extend to a region near the tunnels end

Rails (30) and chines (18) with a respective rail (20) that extend from bow to transom and are parallel to the centreline from 50% of waterline length to the transom except the inner border of the chine and tunnels (22) (if the boat has tunnels).

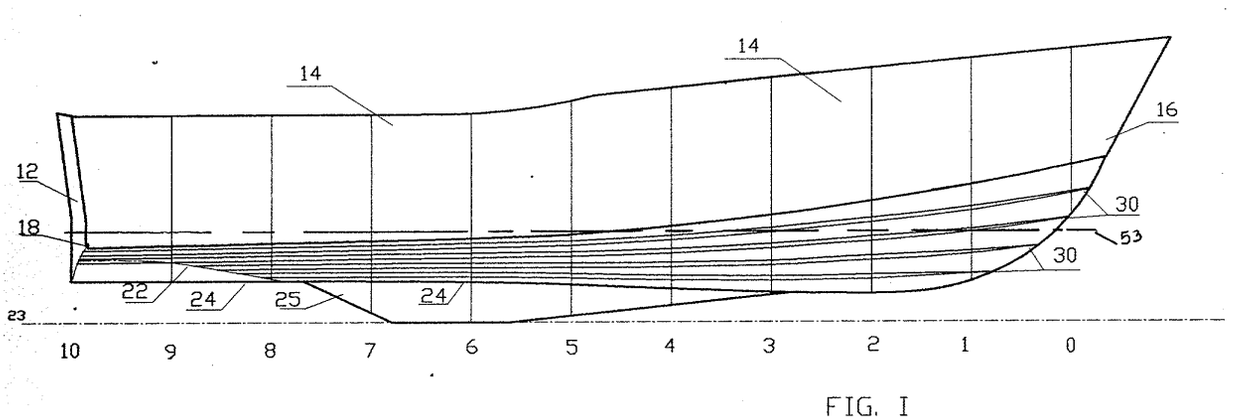

FIG. I

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Description

[0001] I Eugenio Lattanzio a citizen of Italy with residence in Floraliënlaan 310 Berchem Antwerp in Belgium, do hereby declare this invention, for which I pray be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

[0002] This invention relates in general to a boat hull, particularly a boat hull for planing operation also for high speed planing operation mode

[0003] Prior art hulls for use in planing operation and high speed planing operation and motor powered operation generally have been in two classes

[0004] The original flat bottoms boat hulls, they have an easy and more efficient planing operation especially in calm waters

[0005] Nevertheless in rough waters, there are several disadvantages, they are unstable when turning (even in calm waters at high speed) and there are also some problems in directional stability and a side slipping that are manifested in this condition (calm waters) in high speed

[0006] Another different type of bottom hull is the deep v bottom hull, having an angle of dead-rise of over 20 degrees at the transom (dead-rise is the angle which the bottom surfaces make with the horizontal). With or without constant sections but with longitudinal rails (spray strakes) and chines that also contribute to the stiffening of the bottom hull

[0007] In this kind of bottom (deep V) most of the problems of the associated with flat bottom are eliminated, the biggest criticism is than the powerful engines are necessary to bring the hull a given speed

[0008] And in the motor powered boats in the early stage of planing the effective lifting area of the flatter planning surface (in flat bottom hulls) permits to plane more rapidly than a deep V

[0009] This stage is achieved more easily and therefore with less expenditure of power. At higher speed this incidence and advantages are decreasing in flat bottoms and become unstable specially when turning and there is also a tendency to side slipping and decrease also the directionally stability specially in rough waters

[0010] Also in a typical planing hull generates a great amount of waves and spray around and behind it at speed. This generation of waves, is represent by a deflection of a certain mass of water, requires and absorbs a percentage of energy provided by the propulsive device utilizing a stored fuel.

[0011] The energy spent on generating waves is wasted, and also is creating disturbance for other boat operators and also causing shore erosion. The fuel consumption is incremented because of this generation of waves with of course a higher operative cost of the craft and also is reduced the potential speed. In many areas the speed limits are restricted to avoid disturbances generated by the formation of waves

[0012] Accordingly, it is the general purpose of the present invention to provide a boat hull for planing operation and especially for high-speed planing operation, which combine high performance and seaworthiness, adequate directional stability and handling characteristics especially when turning in rough waters. This high performance boat hull has the advantage to achieve a fast and easy stage of planing with less expenditure of power and fuel and also with low formation of waves in the whole range of speeds from zero to maximum

[0013] To this end, the present invention consist in a planing operation and high speed planing operation boat hull, including a transom stern, freeboard side portions extending forwardly from the transom and terminating in a v bow Comprising: A bottom surface that is composed by a deep V bottom with chines and rails (spray stakes) with angle of dead-rise between 20 and 26 degrees at the transom

[0014] This deep V bottom is intersected by a surface that generates in the whole (surface) extension a flat bottom in transverse cross sections. Said surface that extends forwardly from the transom up to disappear in a point in about 67-70 % approximately of the length waterline. From that point to the bow continues a V bottom and from that point approximately start the keel that extend up to region where the tunnels are finishing (approximately),

[0015] Said surface has a width in the transom in the order of 6-12 % of the hull beam, At the same time from the transom said surface is decreasing very gradually and smoothly its height (perpendicular distance from the base plane) and the width up to its end, from the 50 % of the length of said surface up to its end (surface) this reduction of width and height is increased

[0016] Chines that are flat in transverse cross sections and extend from the transom forwardly to the bow increasing progressively their height from base plane up to merge both chines in a point above waterline The outer border of each chine has a rail in the whole extension, the inner border of the chine from about 50 % of the length waterline to the transom is approaching progressively to centre line generating a chine width in the transom about 12-16 % of the beam waterline (each one) The rails (there are 2 to 4 per side) extend from transom to the bow. The rails together with the outer border of each chine (rail included) extend parallel to the centreline from the 50 % of the length waterline to the transom

Tunnels (only in cases that are required) Start in the transom and extend up to 18-25 per cent of the length waterline. They are composed of two parts the upper and lateral .The upper is flat in transverse cross sections. From the transom the first 25% of the tunnel length is flat and from this point is decreasing the gradually the height (tunnel) up to disappear. The dimension of the tunnels in the transom depends of the propeller diameter and shaft angle.. The rails are interrupted in the tunnels

[0017] In order that this invention may be more readily understood reference will be now made to the accompanying drawings in which:

Figure I is a side elevation view of a boat hull constructed in accordance with the invention

Figure II is an inverse plan view showing the boat hull of fig. I

Figure 3 Is showing some of the transverse cross sections along the length of a boat constructed in accordance with this invention

Figure 4 is a transverse cross section of the boat hull of Fig I and II constructed in accordance with the invention in the section 6

Figure 5 is a view of the boat hull of Fig I and II constructed in accordance with the invention from the rear (left of Figure I, where is possible to appreciate the tunnels, keel is not showed)

Figure 6 is a view of the boat hull of Fig I and II constructed in accordance with the invention from the rear (left of Figure I, in the option without the tunnels, keel is not showed)

Figure 7 is a transverse cross section of the boat hull of Fig I, II constructed in accordance with the invention in the section 2

Figure 8 is a perspective view of a boat hull of Fig I and II constructed in accordance with the invention where is possible to see the bottom (deep v and surface that intersect this one), chines and tunnels but keel and rails are not showed with the only objective to permit show the other items more clearly
All the drawings are reproduction of the original in a reduced scale

[0018] Referring to the drawings, there is shown a boat hull of a pleasure craft, commercial or patrol type providing motor powered

[0019] The boat hull is suited for use with inboard engines (two are recommended) .In cases of use of Inboard - outboard engines, water jets or a transmission with surface propeller installed in the transom the tunnels are not recommended. Also is possible to use outboard engines in smaller boats also in this case tunnels are not recommended. And also the tunnels are not recommended if there is installed only one engine

[0020] In same cases according design characteristics and shaft angles, tunnels may be eliminated even with two inboard engines but this is not recommended

[0021] To this end, the present invention consists in a boat hull for planing operation and also for high speed planing operation, including a transom stern (12), freeboard side portions (14) extending forwardly from the transom (12) and terminating in a V bow (16). Figure I and II.

[0022] And a length and beam waterline described by the waterline (53).

[0023] A bottom surface that is composed by a deep V bottom (35) with chines (18) and rails (spray stakes) (30)

[0024] With angle of dead-rise between 20 and 26 degrees at the transom but are recommended angles of 23 to 25 for highest performance. Figures 3,5, 6 and 8

[0025] The deep V bottom (35) is intersected by a surface (24) that extends forwardly from the transom in about 67-70 % of the length waterline up to disappear in a point. And said surface generates a flat lower bottom in transverse cross sections; interrupting the deep V bottom (35).

[0026] Said surface start in the transom (12) with a width in the order of 6-12 % of the hull beam, and extends forwardly in about 67-70 % approximately of the length waterline (length waterline considered when the boat is simply floating without motion, like for example a length waterline generated by the waterline 53), said surface (24) generates a lower bottom that is always flat (in transverse cross sections) interrupting the deep V bottom (35).

[0027] At the same time from the transom (12) this surface is decreasing very gradually and smoothly its height (distance from the base plane (23)) and width; from the 50 % of the surface's length approximately to the point where said surface (24) disappear this reduction of width and height is increased. And from said point the deep V bottom continues forwardly to the bow FIG 7

[0028] The keel (25) start approximately in the point where the surface (24) that intersect the deep V (35) merge in a point with this deep V and extend from that point up to the region where approximately the tunnels (22) are finishing. Figure I to II and 8

[0029] The keel (25) in the lowest part can to be also flat. This is recommended but not always necessary. Figure 4

[0030] The rails (30) extend from transom to the bow in both sides of bottom in a number from two to four per side and from a proximally 50 per cent of the length waterline to the transom are parallel to the centreline (40). Fig II

[0031] The chines (18) are flat in transverse cross sections starting in the transom (12) (where are always below waterline (53)) and extend forwardly from the transom towards the bow (16) increasing progressively their height distance from base plane (23) up to merge both chines in a point above waterline (53) in the bow region (16).

[0032] The outer border of each chine has a rail (20) in the whole extension, (considering like the outer border of the chine the one that result of the intersection

between chine (18) and side (14),

[0033] The inner border of the chine (nearest to centreline (40) from about 50 per cent of the length waterline to the transom is approaching progressively to centre line generating a chine width in the transom in the order of 12-16 per cent of the beam waterline (each one)

[0034] The rails (30) together with the outer border of each chine (rail included) extend parallel to the centreline (40) from about 50 per cent of the length waterline to the transom (12)

[0035] The surface (24) that interrupt the deep V remains always flat in transverse cross sections describing the shape of a certain kind of triangle in plan view

[0036] The tunnels (22) (only in cases that are required) start in the transom (12) and extend forwardly up to 18-25 per cent of the length waterline

[0037] They are composed of two parts the upper and lateral. The upper is also flat in transverse cross sections in its whole extension .The width and the height from base plane (23) of the tunnels in the transom depends of the propeller diameter and shaft angle. From the transom (12) in the first 25 % of the tunnel length the upper part of the tunnel is flat Fig I and 8

[0038] And from this point each tunnel is decreasing the height(distance from base plane 23) up to disappear

[0039] The rails (30) are interrupted in the tunnels Fig II

[0040] The other part of the tunnels it means the side of each one start in the point where the deep V bottom (35) is intersected by the surface (24) and vertically extends up to the upper part of the tunnel with angle (respect to the vertical that can to be variable depending for example of the propeller diameter)

[0041] The vertical height of keel (25) (distance from base plane (23) up to surface (24) and the proportions of tunnels (22) can change depending in every case for example of the type of engine or propeller diameter

[0042] The operation of the boat hull is as follows

[0043] The boat can achieve an earlier and easier stage of planing, lesser planing angle and lower formation of waves than in the prior hulls. In transverse cross sections the chines, the bottom end (generated by the surface that intersect the deep V) and the upper part of the tunnels (if the boat has tunnels) are flat is clear to see in fig 3 and 5 and without tunnels in Fig 6,

[0044] This invention permits to achieve an earlier stage of planing with less expenditure of power and saving fuel consumption than in the prior hulls, the energy or power that is wasted in the formation of waves in the prior hulls is reduced and eliminated in a big percentage (in the whole range of speeds) using this power to increment the speed of the boat.

[0045] The surface that intersects the deep V bottom has the main influence to achieve an earlier stage of planing. When the boat is operating from low speed the water is going straight to the transom due the effect of the rails, chines and keel acting together this effect is incremented with the increment of the speed that permit to have a low formation of waves and very good directional stability especially in rough waters.

[0046] In cases of boats with tunnels (if are required) their adequate shape (fig I to 3; 5 and 8) also has influence to avoid cavitation in the propeller

[0047] When the boat is operating at high speed planing mode or simply planing mode, the keel remains always in the water also the rear portions of the bottom and this effect particularly increment the directional stability that is especially noted when the boat is turning. The good handling characteristics are especially noted when the boat is also turning and especially in rough waters. The keel has a big importance in the directional stability and its height (from base plane can to be variable depending for example of the propeller diameter or operation area, because in same cases depending of the engine and propeller diameter contribute also to protect the propellers in case to touch the ground, touching first the keel and not the propellers

[0048] The rails (spray strakes) contribute to the directionally stability and to keep in some measure the deck " dry" (together with chines in bow region) and also in the stiffening of the bottom

[0049] The description of the boat hull that was made with reference to the drawings can achieve the stage of planing easier and earlier than the prior hulls, with lower formation of waves in the whole range of speeds than the prior hulls saving fuel consumption; provide good handling characteristics preventing the side slipping and with good directional stability especially in rough waters. These particulars are especially manifested when turning in rough waters

Claims

1. a boat hull for planing operation and high speed planing operation, including a transom stern, freeboard side portions extending forwardly from the transom and terminating in a v bow comprising: A bottom surface that is composed by a deep V bottom with a dead-rise angle between 20 and 26 degrees at the transom. This deep V bottom is intersected by a surface that generates in the whole (surface) extension a flat bottom in transverse cross sections. Said surface that extends forwardly from the transom up to disappear in a point in about 67-70 % approximately of the length waterline of the hull, from said point to the bow continues the deep V bottom and from said point approximately start the keel that extends up to region where the tunnels are ending (approximately), Said surface has a width in the transom in the order of 6-12 % of the hull beam, At the same time from the transom said surface is decreasing very gradually and smoothly its height (distance from the base plane) and also the width up to its end ,from approximately the 50 % of the length of said surface up to the point where

said surface disappear this reduction of width and height is increased

b) Chines that are flat in transverse cross sections and extend from the transom forwardly to the bow increasing progressively their height from base plane up to merge both chines in a point above waterline The outer border of each chine has a rail in the whole extension, the inner border of each chine from about 50 % of the length waterline is approaching progressively to centre line generating a chine width in the transom about 12-16 % of the beam waterline (each one) The rails (there are 2 to 4 per side) extend from transom to the bow. The rails together with the outer border of each chine (rail included) extend parallel to the centreline from about the 50 % of the length waterline to the transom

c) Tunnels (only in cases that are required) extend from the transom up to the 18-25% of the length waterline. They are composed of two parts the upper and lateral. The upper is flat in transverse cross sections. From the transom in the first 25 % of tunnel length the upper part is flat and from this point tunnel is decreasing its height up to disappear. The dimension of the tunnels in the transom depends of the propeller diameter and shaft angle. The rails are interrupted in the tunnels

2. A -planing hull as claimed in claim 1 in cases that the swimming platform is incorporated to hull in the transom (like in typical cases of GRP construction) and the transom itself is below this one

3. A planing boat hull as claimed in claims 1 or 2 in cases that tunnels are not required

4. A high speed planing boat hull constructed and arranged substantially as herein fore described with reference to the FIG I, Fig II And Fig 3 to 8 of the accompanying drawings

Amended claims in accordance with Rule 86(2) EPC.

1. A boat hull for planing operation and high speed planing operation comprising:

A transom stem (12), freeboard side portions (14) extending forwardly from the transom (12) and terminating in a V bow (16);
a bottom surface that is composed by a deep V bottom (35) with a dead rise angle between 20 and 26 degrees at the transom, said deep V bottom is intersected by a surface (24) that generates in its whole extension a flat bottom in transverse cross section and said surface extends forwardly from the transom up to disappear in a point about approximately 67-70 % of the length waterline of the hull, from said point to the bow continues the deep V bottom and from said point approximately starts the keel (25) that extends to the transom, ending at a distance generally between 18-25 % of the hull length waterline before reach the transom; said surface (24) has a width at the transom of approximately in the order 6-12 % of the hull beam, at the same time from the transom (12) forwardly up to its end the surface (24) is decreasing very gradually and smoothly its width and also its height from the base plane (23), from approximately the 50 % of the length of the surface (24) up to the point where said surface disappear the reduction of height and width is increased; and
the chines (18) that are flat in transverse cross sections and extends from the transom forwards to the bow increasing progressively their height from base plane (23) up to merge both chines in a point above waterline, the outer border of each chine has a rail in its whole extension, the inner border of each chine, from approximately 50 % of the length waterline to the transom is approaching progressively to the centre line (40) generating a chine width at the transom generally in the order of 12-16 % of the hull beam waterline at the transom, each one;
the rails (30) are in the amount of 2 to 4 per side and they extend from the bow generally to the transom, and together with the outer border of each chine and their rails (20) extend generally parallel to the centre line (40) from about 50 % of the length waterline of the hull to the transom

2. A boat hull as claimed in claim 1 when is necessary the utilization of tunnels (22) generally they extend from the transom (12) forwards generally 18-25 % of the hull length waterline; they are composed by two parts the upper and the lateral, the upper is flat in transverse cross sections, the upper part of each tunnel (22) from the transom is also flat in the first 25 % of its length and from this region extend forwards decreasing progressively the height from base plane (23) up to disappear, the dimension of the tunnels (22) depends mainly of the propeller diameter and shaft angle; the rails (30) are interrupted in the tunnels (22)

3. A boat hull as claimed in claim 1 and 2 where the vertical height of the keel (25) distance from the surface (24) to the base plane (23) depending of some considerations as the propeller diameter or propulsive device, is adopted according these ones.

4. A boat hull claimed in claims 1 to 3 in cases where the swimming platform is constructively integrated to the hull in the transom, and the transom itself is below this one

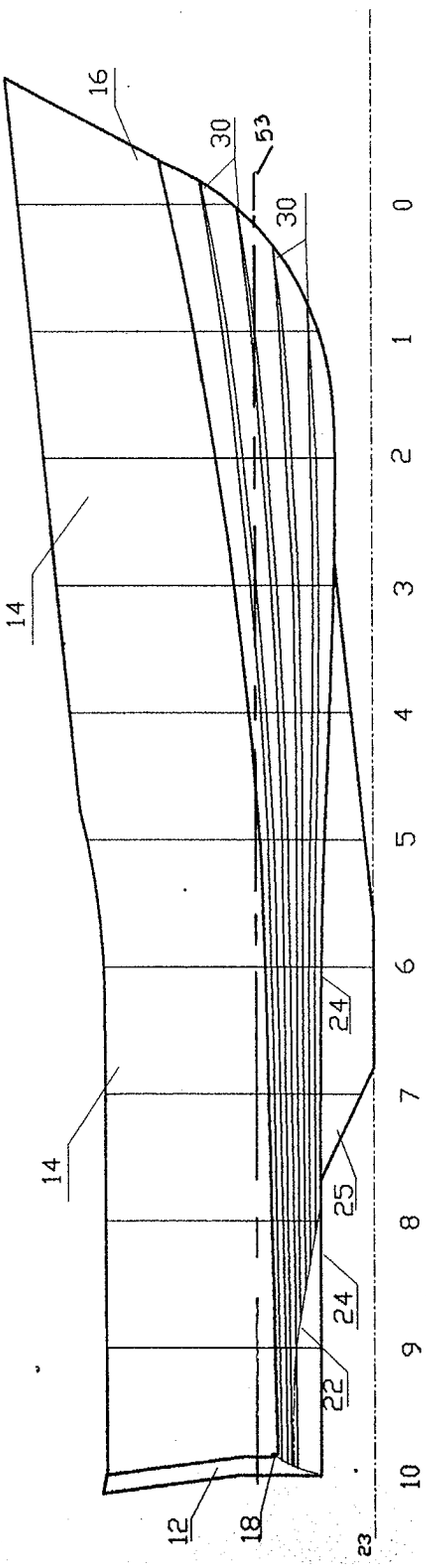

FIG. I

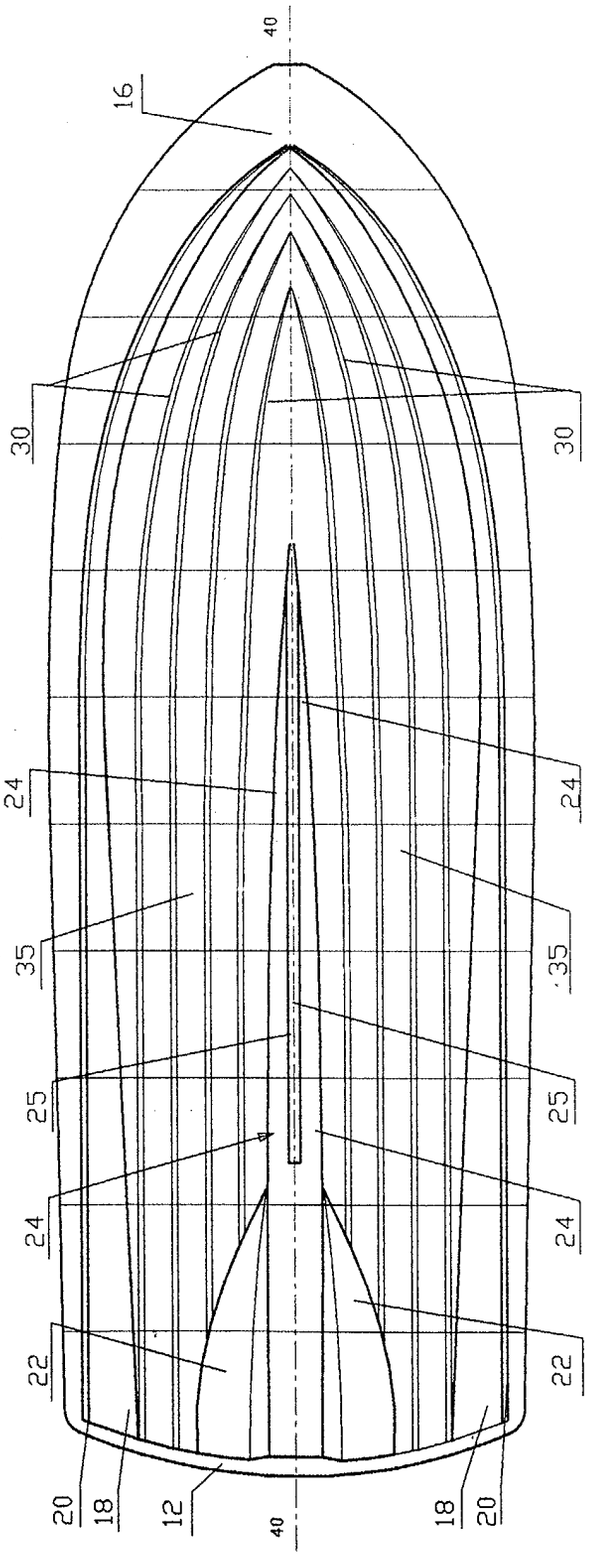

FIG. II

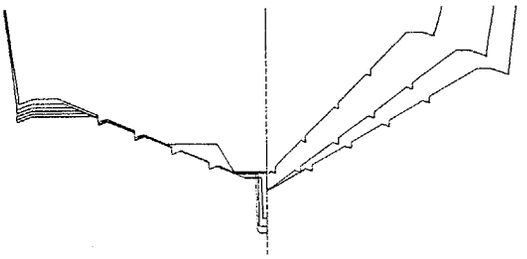

FIG 3

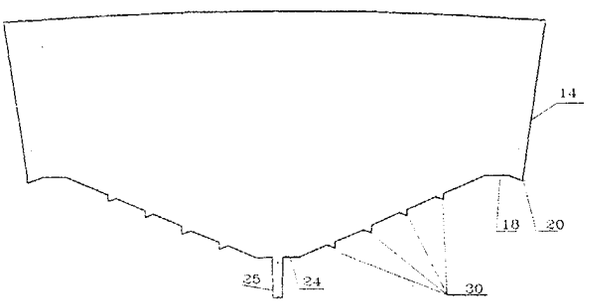

FIG 4

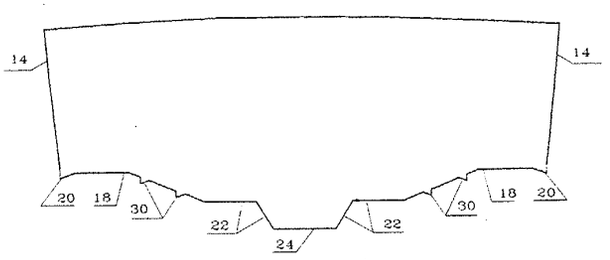

FIG 5

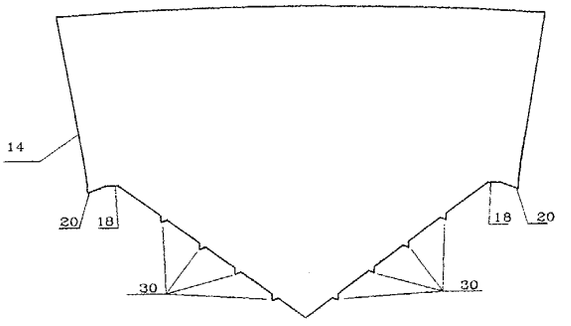

FIG 7

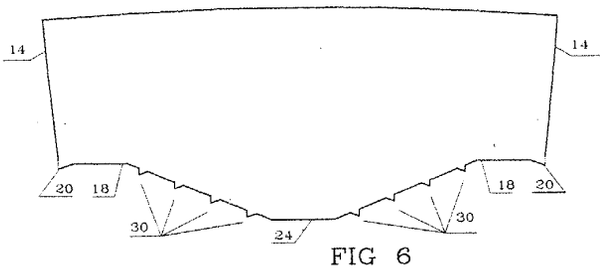

FIG 6

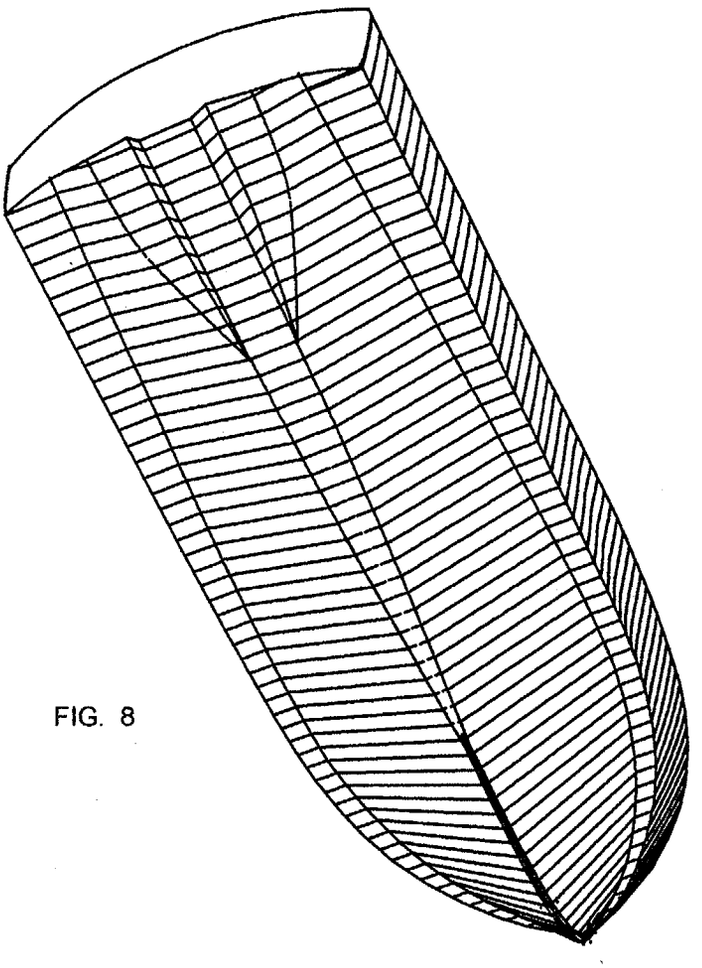

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 44 7023

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.7)
A	US 5 456 202 A (SCHOELL HARRY L) 10 October 1995 (1995-10-10) * column 3, line 9 - column 4, line 65; figures *	1-4	B63B1/16 B63B1/18
A	US 4 233 920 A (JENSEN DALE H ET AL) 18 November 1980 (1980-11-18) * column 3, line 26 - column 4, line 32; figures *	1-4	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7) B63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	8 July 2003	Moya, E

CATEGORY OF CITED DOCUMENTS

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08-07-2003

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