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(54) **BOAT HULL**

(57) A boat hull (1) comprises a longitudinal lower profile (10), in longitudinal section, comprising: a convex longitudinal front section (T1); a concave longitudinal back section (T3) and a longitudinal intermediate rectilinear section (T2) that is joined with the longitudinal front section (T1) by means of a first corner point (F1) and to the longitudinal back section (T3) by means of a second corner point (F2); in cross section, the hull comprises a convex transverse profile (P1) along the longitudinal front section (T1), a concave transverse profile (P3) along the longitudinal back section (T3) and a rectilinear transverse profile (P2) that extends along the longitudinal intermediate section (T2); said rectilinear transverse profile (P2) being joined with the convex transverse profile (P1) in the first corner point (F1) and with the concave transverse profile (P3) in the second corner point (F2).

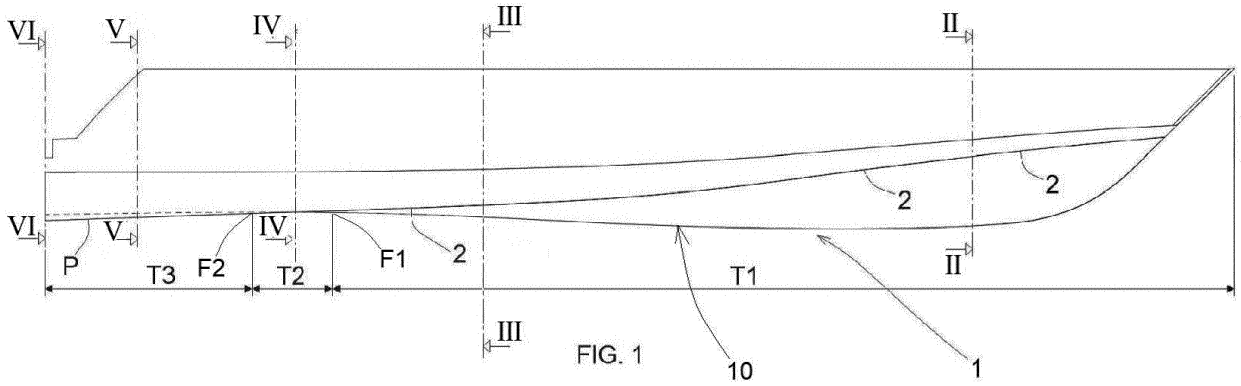

FIG. 1

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Description

[0001] The present patent application for industrial invention relates to a boat hull.

[0002] Boats, such as motor boats, are known, which comprise "V"-shaped hulls. Said "V"-shaped hulls have a lower profile in cross section with a V-shape in the bow that gradually tends to become less sharp towards the stern.

[0003] In order to plane and keep a suitable speed, the boats with such "V"-shaped hull need to be equipped with high-performance propulsion engines.

[0004] In fact, "V"-shaped hulls will plane only after lowering the stern considerably relative to the surface of the water, and after aligning the hull relative to the surface of the water, forcing the hull on the water and generating a vertical dynamic thrust of the hull. Therefore, said "V"-shaped hulls will return to a basically horizontal position only when the boat has reached a sufficiently high speed. So, a very powerful engine is needed to obtain such a plane effect, with very high fuel consumption because the planing of the boat is forced and abrupt, not soft and gradual. Evidently, this determines very high fuel consumption.

[0005] An additional drawback of "V"-shaped hulls is related to the fact that such hulls are generally not very stable and are subject to excessive rolling.

[0006] AT504311 discloses a boat hull provided with a lower profile, in cross section, with:

- a concave front section with "U" shape, which extends from the bow to over half of the total length of the hull; and
- a convex back section that is joined to the concave front section by means of a corner point.

[0007] Moreover, the hull of AT504311 has a lower profile in longitudinal section that gradually goes from a concave curvature to a convex curvature. However, when sliding on the water, such a type of longitudinal lower section of the bottom of the hull will generate waves that tend to increase the pitching and rolling of the hull.

[0008] US2006/124042 discloses a boat hull provided with a lower profile, in cross section, with:

- a "V-shaped front section;
- a planar intermediate section that is joined with the front section; and
- a back section that is joined with the intermediate section.

[0009] The hull of US2006/124042 has a discontinuous longitudinal lower profile because of the presence of a step. The provision of a discontinuous longitudinal lower profile increases the level of complexity when designing and producing the hull because of its irregular shapes.

[0010] The purpose of the present invention is to overcome the drawbacks of the prior art by providing a boat hull with a suitable shape in order to avoid the generation of waves that can cause pitching and rolling.

[0011] Another purpose is to devise a boat hull that is stable, simple to design and produce, inexpensive and easy to maintain.

[0012] These purposes are achieved according to the invention with the characteristics of the appended independent claim 1.

[0013] Advantageous embodiments will appear from the dependent claims. The boat hull of the invention is defined by claim 1.

[0014] The advantages of the boat hull according to the present invention are evident. Because of the provision of the intermediate section that is continuously joined by means of two corner points to the longitudinal front and back sections, the boat provided with the hull of the invention does not generate waves that may cause the undesired pitching and rolling of the boat. In fact, because of such a shape, the hull can slide on the water, also at high speed, without generating vortical motion or wave motion.

[0015] For the sake of clarity, the description of the boat hull according to the invention continues with reference to the appended drawings, which have a merely illustrative, not limiting value, wherein:

- Fig.1 is a side view of a right-hand side of a boat provided with the hull according to the invention;
- Figs. 2-6 are cross-sectional views of Fig.1, respectively taken along the section planes II-II, III-III, IV-IV, V-V and VI-VI.
- Fig. 7 is a front view of the boat of Fig.1.

[0016] With reference to Fig.1, the hull according to the invention is disclosed, which is generally indicated with numeral (1).

[0017] The hull (1) has a longitudinal lower profile (10), in longitudinal section, comprising:

- a longitudinal front section (T1);
- a longitudinal intermediate section (T2), and
- a longitudinal back section (T3);

[0018] The longitudinal front section (T1) is convex, with upward concavity, and extends from the front of the bow to over half of the total length of the hull (1).

[0019] The longitudinal back section (T3) is concave, with downward concavity, and has a lower length than the longitudinal front section (T1). The longitudinal back section (T3) is defined by a portion of circumference. The longitudinal back section (T3) extends from the back of the stern up to the longitudinal intermediate section (T2). The longitudinal back section (T3) has a length that is approximately ¼ of the length of the longitudinal front section (T1).

[0020] The longitudinal intermediate section (T2) is rectilinear. The longitudinal intermediate section (T2) has a lower length than the longitudinal front section (T1) and

the longitudinal back section (T3). The longitudinal intermediate section (T2) has a length that is approximately ⅓ of the length of the longitudinal back section (T3).

[0021] The longitudinal intermediate section (T2) is joined with the longitudinal front section (T1) by means of a first corner point (F1) with transition from curved to rectilinear and to the longitudinal back section (T3) by means of a second corner point (F2) with transition from rectilinear to curved.

[0022] The three longitudinal sections (T1, T2, T3) are joined without step discontinuity. In view of the above, the hull (1) has a continuous longitudinal lower profile, without any steps and discontinuities.

[0023] Because of the provision of the longitudinal intermediate section (T2) that is continuously joined by means of two corner points (F1, F2) to the longitudinal front and back sections (T1, T3), the boat provided with the hull (1) of the invention does not generate waves that may cause undesired pitching and rolling of the boat. In fact, such a shape permits the hull to slide on the water, including at high speed, without generating any vortical motion or wave motion. Moreover, by avoiding the formation of waves, the power of the engine is not dispersed.

[0024] Furthermore, because of the continuous longitudinal lower profile (10), the hull (1) is easy to produce.

[0025] With reference to Figs. 2 and 3, in cross section, the hull (1) has a convex transverse profile (P1) with upward concavity that extends along the longitudinal front section (T1).

[0026] With reference to Fig. 4, in cross section, the hull (1) has a rectilinear transverse profile (P2) that extends along the longitudinal intermediate section (T2).

[0027] With reference to Figs. 5 and 6, in cross section, the hull (1) has a concave transverse profile (P3) that extends along the longitudinal back section (T3).

[0028] With reference to Figs. 2 and 3, the convex transverse profile (P1) has a "V" shape in a front portion of the longitudinal front section (T1). Going towards the stern, the "V"-shape of the convex transverse profile (P1) (Fig. 2) is enlarged and flattened, being provided with a "U" shape (Fig.3) in a back portion of the longitudinal front section (T1). Going towards the stern, the "U" shape of the convex transverse profile (P1) is enlarged and flattened gradually towards the longitudinal intermediate section, being uninterruptedly joined with the rectilinear transverse profile (P2) (Fig. 4) of the longitudinal intermediate section, in the first corner point (F1).

[0029] Still going towards the stern, the rectilinear transverse profile (P2) of the longitudinal intermediate section is uninterruptedly joined with the concave transverse profile (P3) in the second corner point (F2).

[0030] With reference to Figs. 5 and 6, the concave transverse profile (P3) of the longitudinal back section is defined by portions of circumference with a decreasing radius of curvature going towards the stern. Otherwise said, the minimum radius of curvature of the concave transverse profile (P3) is in the stern.

[0031] The provision of a concave profile both in longitudinal section and in cross section, in the part of the hull that corresponds to the stern, avoids the generation of waves during the forward traveling of the hull (1) because the concavity does not let the water out laterally from the hull and forces the water out only in the stern of the hull. Consequently, the energy consumption of the hull is low.

[0032] With reference to Figs. 1 to 3 and to Fig. 7, the hull (1) comprises two lateral stabilization edges (2) in symmetrical position, which protrude outwards.

[0033] Such lateral edges (2) give stability to the hull (1), which does not need to be provided with flaps. The provision of said lateral edges, instead of flaps, reduces the manufacturing costs.

[0034] In longitudinal section, with reference to Fig. 1, the lateral edges (2) extend along the longitudinal front section (T1). In the bow, the lateral edges (2) are basically disposed at half height of the hull (1). Going towards the longitudinal intermediate section (T2), the lateral edges (2) descend towards the bottom of the hull (1) until they reach the bottom of the hull near the first corner point (F1).

[0035] With reference to Fig. 7, the lateral edges (2) have a width (b) in cross section.

[0036] The width (b) of the lateral edges (2) increases from the bow to half of the length of the longitudinal front section (T1) and decreases going from half of the length of the longitudinal front section (T1) towards the longitudinal intermediate section (T2).

[0037] The hull (1) receives a dynamic thrust from the water in the maximum concavity point, both in longitudinal section and in cross section, and in the bow. In view of the above, the boat provided with such a hull (1) has a high stability also when the lateral edges (2) extend only along the longitudinal front section (T1).

[0038] Moreover, such a shape of the hull (1) determines a linear plane, progressively rising from the surface of the water, avoiding any abrupt change and maintaining a constant longitudinal position. In such a way, the power needed to achieve a high speed is requested in a more gradual way than in the boats of the prior art, avoiding peaks of motive power absorption during acceleration. So, fuel consumption can be optimized in a speed range comprised between 26 and 37 km/h (between 14 and 20 knots). In such a speed range, the consumption of a boat provided with the hull (1) is reduced by approximately 30% with respect to a boat of the prior art.

[0039] The hull (1) can be made of any suitable material (fiberglass, steel, aluminum, etc.) and can have a parametric geometry, in such a way to be produced with lengths comprised between 9 and 46 meters (between 30 and 150 feet). Furthermore, the hull (1) can be used with any propulsion.

[0040] The shape of the hull (1) guarantees a reduced immersion of the hull. In view of the above, the boat with the hull (1) of the invention can move forward also in shallow water. Moreover, the shape of the hull (1) provides a large interior space in the stern area.

Claims

1. Boat hull (1) comprising a longitudinal lower profile (10), in longitudinal section, comprising:

   - a convex longitudinal front section (T1) with upward concavity;
   - a concave longitudinal back section (T3) with downward concavity, defined by a portion of circumference;

   said hull (1) comprising, in cross section:

   - a convex transverse profile (P1) with upward concavity that extends along the longitudinal front section (T1) of the longitudinal lower profile;
   - a concave transverse profile (P3) with downward concavity that extends along the longitudinal back section (T3) of the longitudinal lower profile;

   characterized in that
   said longitudinal lower profile (10) comprises a longitudinal intermediate rectilinear section (T2) that is joined with the longitudinal front section (T1) by means of a first corner point (F1) with transition from curved to rectilinear, and to the longitudinal back section (T3) by means of a second corner point (F2) with transition from rectilinear to curved;
   said hull being provided, in cross section, with a rectilinear transverse profile (P2) that extends along the longitudinal intermediate section (T2) of the longitudinal lower profile; said rectilinear transverse profile (P2) being joined with the convex transverse profile (P1) in the first corner point (F1) and with the concave transverse profile (P3) in the second corner point (F2).

2. The boat hull (1) of claim 1, wherein the longitudinal front section (T1) of the lower longitudinal profile extends from the bow to over half of the total length of the hull (1).

3. The boat hull (1) of claim 1 or 2, wherein the longitudinal back section (T3) of the longitudinal lower profile has a lower length than the longitudinal front section (T1).

4. The boat hull (1) of any one of the preceding claims, wherein the longitudinal intermediate section (T2) of the longitudinal lower profile has a lower length than the longitudinal front section (T1) and the longitudinal back section (T3).

5. The boat hull (1) of any one of the preceding claims, wherein the convex transverse profile (P1) has a "V"-shape in a front portion of the longitudinal front section (T1), and a "U"-shape in a back portion of the longitudinal front section (T1); going towards the stern, said "V"-shape of the convex transverse profile (P1) is enlarged and flattened, taking said "U"-shape; going towards the stern, said "U"-shape of the convex transverse profile (P1) is enlarged and flattened in such a way to be joined with the rectilinear transverse profile (P2) in the first corner point (F1).

6. The boat hull (1) of any one of the preceding claims, wherein the concave transverse profile (P3) is defined by portions of circumference with a decreasing radius of curvature towards the stern.

7. The boat hull (1) of any one of the preceding claims, comprising two lateral stabilization edges (2), said lateral edges (2) being symmetrical and protruding outwards.

8. The boat hull (1) of claim 7, wherein in longitudinal section, the lateral edges (2) extend along the longitudinal front section (T1); in the bow, said lateral edges (2) are disposed at half of the height of the hull (1); going towards the longitudinal intermediate section (T2), said lateral edges (2) descend towards the bottom of the hull (1) until they reach the bottom of the hull near the first corner point (F1).

9. The boat hull (1) of claim 7 or 8, wherein the lateral edges (2) have a width (b) in cross section; said width (b) of the lateral edges (2) increasing from the bow to half of the length of the longitudinal front section (T1) and decreasing from half of the length of the longitudinal front section (T1) towards the longitudinal intermediate section (T2).

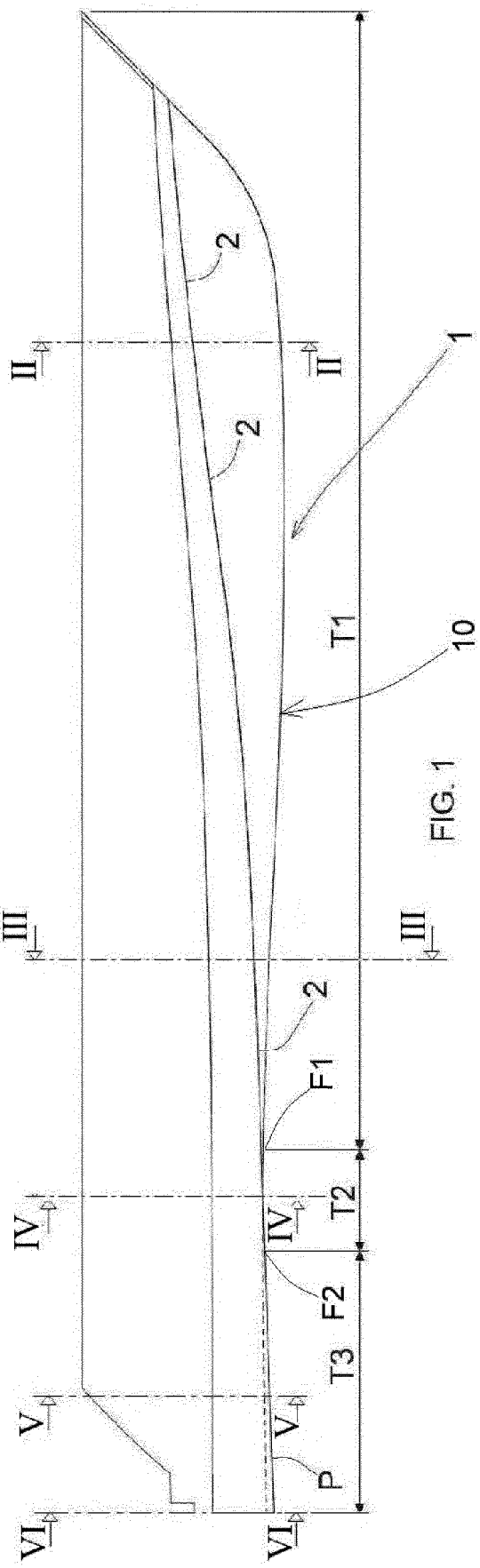

FIG. 1

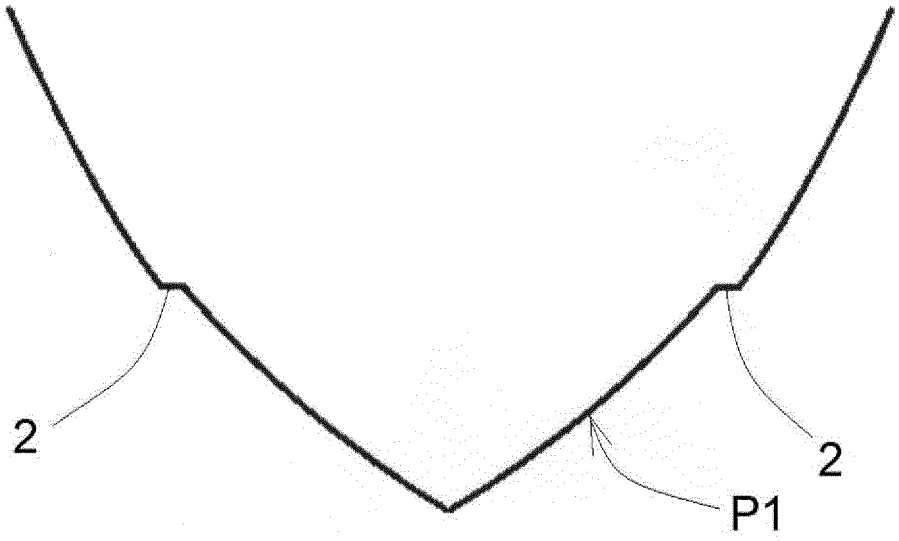

FIG. 2

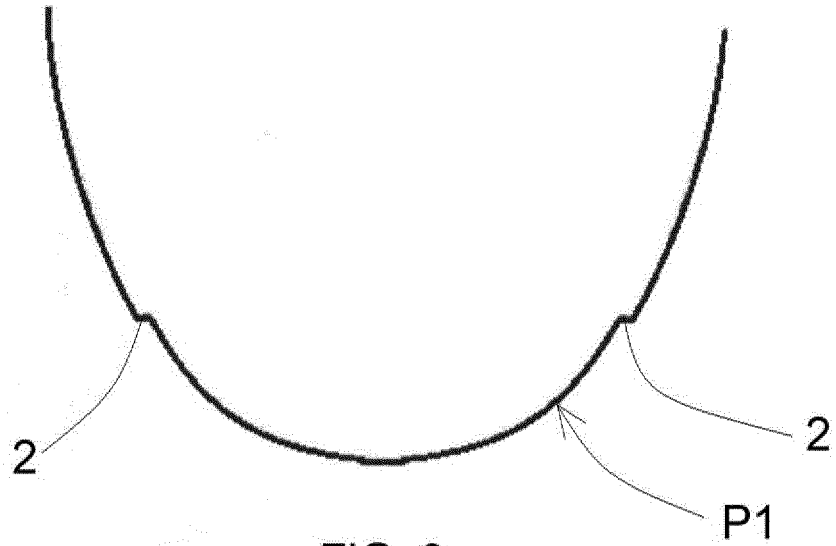

FIG. 3

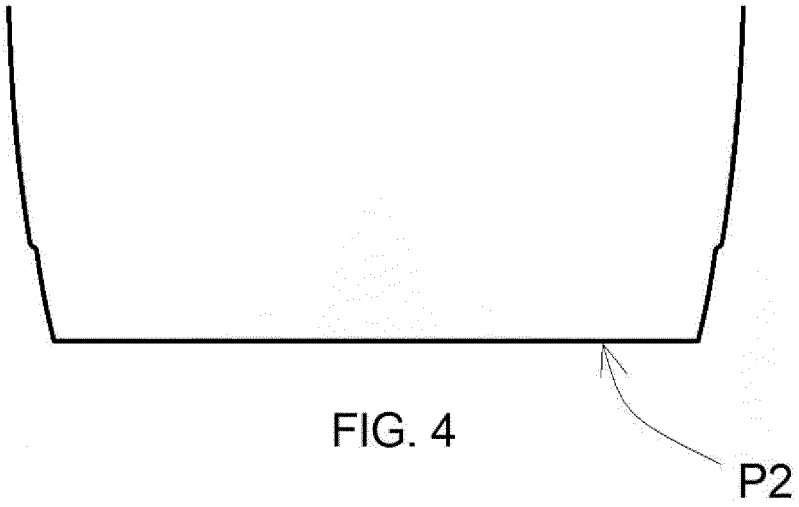

FIG. 4

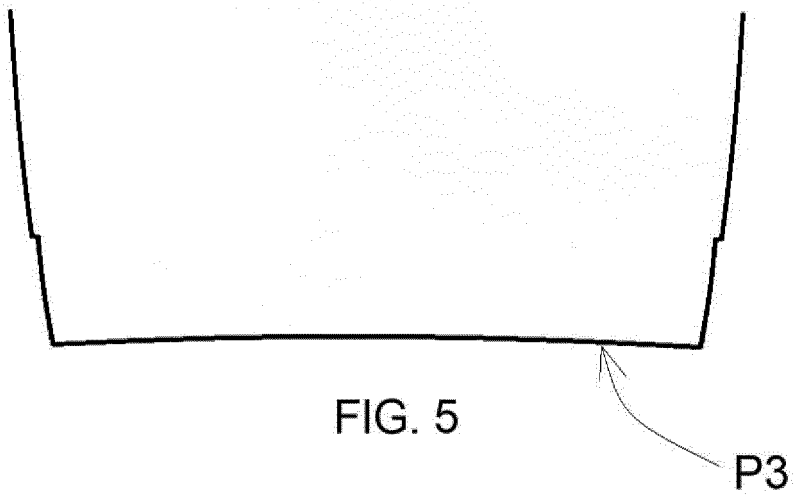

FIG. 5

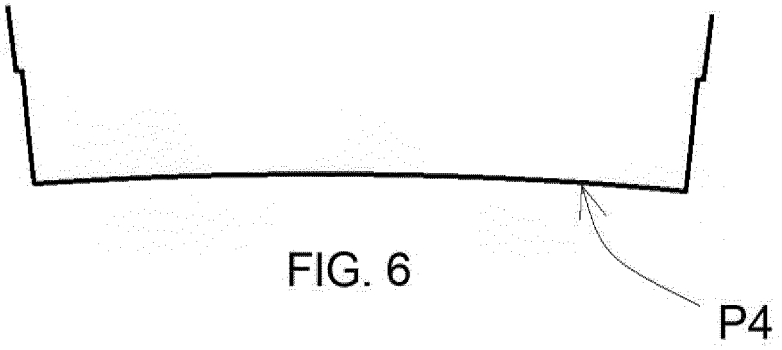

FIG. 6

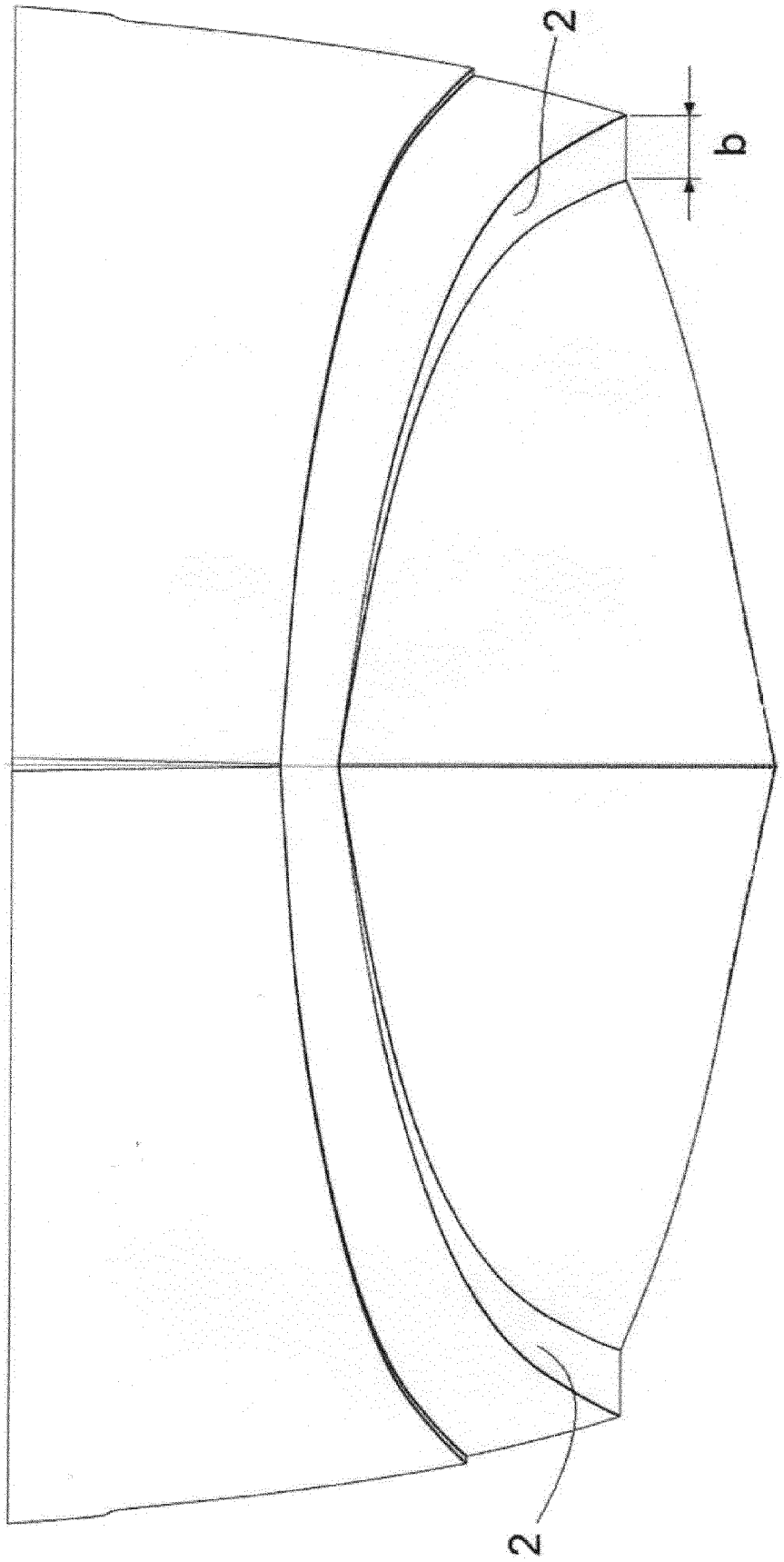

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 19 9142

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	AT 504 311 A1 (RAUHOFER UND SCHUSTER GMBH [AT]) 15 April 2008 (2008-04-15) * figure 2.4 * * claim 1 * * page 2, line 12 - page 2, line 16 * * page 4, line 1 - page 4, line 2 *	1-9	INV. B63B1/18 B63B1/08
X,D	US 2006/124042 A1 (SCHULZ WALTER A [US]) 15 June 2006 (2006-06-15) * figures 7-10A *	1-9	

TECHNICAL FIELDS SEARCHED (IPC)

B63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 February 2019	Freire Gomez, Jon

CATEGORY OF CITED DOCUMENTS

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13-02-2019

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- US 2006124042 A **[0008] [0009]**