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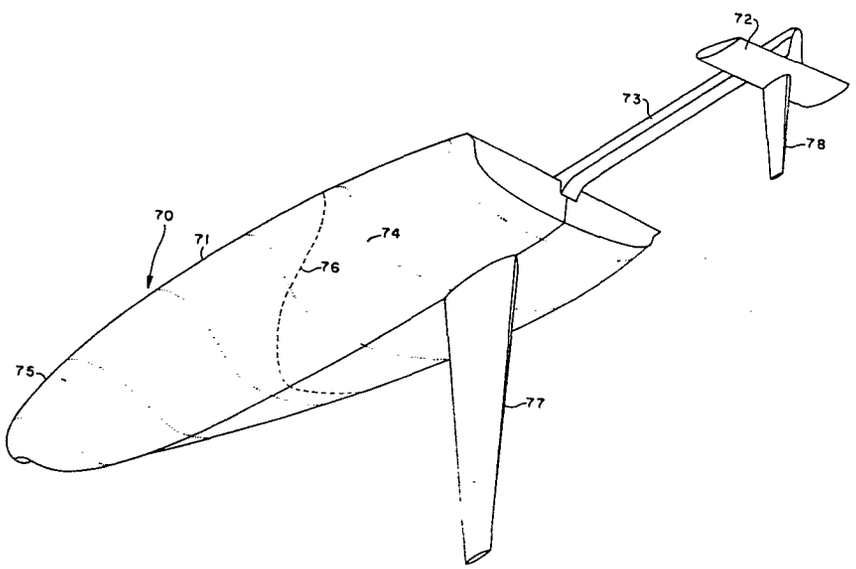
(54) Hull for small-size marine craft having reduced drag.

(57) A hull for a small-size marine craft comprising a main portion (71) with tail surface and a stabilizing stern portion (72) rigidly connected to the main portion by a reduced-drag tail portion (73).



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Hull for small-size marine craft having reduced drag

The present invention concerns hulls for small-size marine crafts, such as sailing boats, runabouts, wind surfers, surboards and the like and it has for its object to provide hulls of this kind having an improved performance characterized by reduced drag and an improved lift: drag ratio in calm and rough water.

With marine craft of this kind the lift and drag relevant to the performance are those at a range of cruising speeds referred to as the planning range. Within this range the drag increases only slightly with the speed, and consequently only a little additional power is required to increase the cruising speed. Against this, at low and high speeds outside the planning range increase of drag with an increase of speed is substantial and consequently also the additional power required for increasing the cruising speeds.

In a marine craft of the kind specified only a relatively small, essentially central zone of the hull, to be referred to hereinafter as "planning area", provides the preponderant portion of the lift during planning. The planning area is located in the maximum beam area, i.e. the boradest area and across it there extends the frontal stagnation line, i.e. the line along which the water flow relative to the craft reverses from counter-current to

co-current. The bow in many cases projects during planning out of the water and does thus not affect the lift and drag. The aft or stern, on the other hand, is as a rule fully or nearly fully wetted and in consequence, while contributing only marginally to the lift, contributes substantially to the drag of the craft.

Based on these observations, the invention provides a hull for a small-size marine craft comprising a main portion with planning surface and a stabilizing stern portion rigidly connected to the main portion by a reduced-drag tail portion.

The term "reduced-drag tail portion" means that the geometry of the tail is such that its drag is reduced as compared to a conventional hull of otherwise similar dimensions and shape.

In accordance with one embodiment of the invention said tail portion is in form of at least one bar.

In accordance with another embodiment of the invention said tail portion is in the form of a constricted hull portion extending between the main hull portion and the stabilizing stern portion. If desired, in such an embodiment the tail portion may be of reduced depth and the transition between it and the main hull portion thus may be in the form of a step formed at the bottom of the hull between them. In this way the drag of the tail portion is reduced both due to the constriction and due to the reduction of the depth thereof. Also due to the step between the tail and main portions and additional rear stagnation line is formed and in consequence in addition to having reduced drag the tail portion also improves the lift.

For strictly calm water usage the bow affects neither the lift nor the drag during planning. Consequently for such usages the size of the bow in a hull according to the invention is not governed by consideration of performance and, if desired, may be small and with a flattened

stern. Furthermore, for such usages the bow may be flat-bottomed.

Where, however, the hull according to the invention is designed for rough water usage a fine bow shape is developed which merges smoothly into the planning area. If desired, the bow portion may also be flared towards the sheer.

Also if desired, a hull according to the invention may comprise longitudinal strakes in the planning area, the bow area or both. Strakes in the planning area in conjunction with the dead rise improve the lift and transversal stability of the craft. Strakes in the bow area serve as deflectors in that they detach and throw sideways sheets of water while ploughing through waves. In this way the wetted surface and drag of the hull are decreased. The strakes in the bow area also ensure that the spray is oriented sideways and does not reverberate into the craft.

The uppermost strakes may also serve as hard chines for flat-surface construction.

The invention further concerns a marine craft comprising a hull as specified.

The invention is illustrated, by way of example only, in the accompanying drawings in which:

Fig. 1 is a bottom view of a flat-bottomed conventional surfboard;

Fig. 2 is an elevation of the board according to Fig. 1 in the course of cruising with a lift force distribution diagram;

Fig. 3 is a bottom view of one embodiment of a hull according to the invention;

Fig. 4 is a bottom view of another embodiment of a hull according to the invention;

Fig. 5 is a bottom view of yet another embodiment of a hull according to the invention;

Fig. 6 is an elevation of the hull according to Fig. 5 with a lift force distribution diagram;

Fig. 7 is a perspective view from below of an embodiment of a hull according to the invention; and

Fig. 8 is a perspective view from below of another embodiment of a hull according to the invention.

The surfboard 10 shown in Figs. 1 and 2 is flat-bottomed and has a fully flat planning area 11 across which there extends the frontal stagnation line 12.

In Fig. 2 the surfboard is shown diagrammatically during planning and it is assumed to cruise from left to right. From the lift force diagram it is seen that the preponderant portion of the lift force is concentrated in the planning area 11 while the contribution to the lift of the aft portion 13 is only marginal. The bow portion 14 projects out of the water and does thus not affect the lift. As can further be seen the flow of water relative to the cruising surfboard 10 reverses as the stagnation line 12.

The hull 30 according to the invention shown in Fig. 3 is designed for calm water. It comprises a main portion 31, a stabilizing stern portion 32 and a tail portion in form of a bar 33 connecting the stern portion 32 to the main portion 31. The bar 33 is designed not to be wetted or to be wetted only slightly so that only the stabilizing stern portion 32 is drag producing. As can be seen the main portion 31 of this embodiment is so dimensioned that it nearly coincides with the planning area 34 and it comprises only a small, flattened bow 35 and a small aft portion 36 to which the tail portion 33 is connected. The stagnation line is indicated at 37 and it is V-shaped due to the geometry of the hull.

The hull 40 according to the invention illustrated in Fig. 4 is designed for rough water usage. It differs from that of Fig. 3 by the size of the bow. As seen this

hull comprises a main portion 41, a stabilizing stern portion 42 connected to the main portion by a tail portion in form of a bar 43 projecting from the aft 46 of the main portion 41. The planning area 44 in this embodiment occupies only a section of the main portion 41 and in front thereof there extends fine-shaped bow 45.

As in the embodiment of Fig. 3, the drag of the tail portion is minimized and it is wholly or mainly produced by the stabilizing stern portion 42 while bar 43 is not or almost not wetted.

The stagnation line 47 is again V-shaped.

The embodiment of the invention shown in Figs. 5 and 6 is in principle similar to that of Fig. 4. As shown the hull 50 comprises a main portion 51, a stabilizing stern portion 52 and a constricted tail portion 53 merging into the main portion 51 with the formation of a step 54 so that the tail portion 53 is of reduced depth. Due to the constriction and the reduced depth of the tail portion 53 the drag thereof is reduced.

Similar as in Fig. 4 the planning area 55 occupies only a fraction of the main portion 51 and in front thereof the hull comprises a fine-shaped bow 56. The frontal stagnation line 57 is again V-shaped due to the geometry of the hull bottom and extends across the planning area 55. Due to the step 54 in this embodiment there is formed a second, rear stagnation line 58.

As can be seen from Fig. 6 in this embodiment the hull is slightly arched longitudinally into a banana-like shape.

Fig. 7 shows in perspective from below an embodiment of the invention similar to that of Fig. 4. As shown the hull 70 comprises a main portion 71 and a stabilizing stern portion 72 connected thereto by means of a tail portion in form of a bar 73. The lines drawn across the bottom of the main portion 71, one of which is indicated

at 74, intend to show the fine-shape of the main portion and its bow 75 the (imaginary) stagnation line is indicated at 76.

The hull further comprises a main leeboard 77 and an aft leeboard 78.

Fig. 8 shows in perspective from below another embodiment of the invention, similar to that of Figs. 5 and 6. As shown the hull 80 comprises a main portion 81, a stabilizing stern portion 82 and a constricted, connecting tail portion 83. Here again the lines drawn across the bottom, only one of which is indicated at 84, intend to show the fine shape of the main portion 81, the bow 85 and the tail portion 83. The (imaginary) stagnation line is indicated at 86. This embodiment as well comprises main and aft leeboards 87 and 88.

The main portion further comprises a number of continuous strakes 89 which serve for the purpose of lateral stabilization and water deflection as explained hereinbefore.

The tail portion 83 is of lesser depth than the main portion 81, a step 810 being formed between them. Consequently the reduced drag of the tail portion is due both to its constriction and to its reduced depth.

CLAIMS

1. A hull for a small-size marine craft comprising a main portion with tail surface and a stabilizing stern portion rigidly connected to the main portion by a reduced-drag tail portion.

2. A hull according to Claim 1 wherein said tail portion is in the shape of at least one longitudinal bar.

3. A hull according to Claim 1 wherein said tail portion is a constricted body portion.

4. A hull according to Claim 3 wherein the tail portion is of reduced depth.

5. A hull according to Claim 4 comprising a step between the main and tail portions.

6. A hull according to any one of the preceding claims wherein the main body portion comprises strakes.

7. A hull according to Claim 6 wherein the strakes extend along the planning area.

8. A hull according to Claim 6 wherein the strakes extend along the bow.

9. A hull according to Claim 6 wherein the strakes extend along the entire main body portion.

10. A small-sized marine craft comprising a hull according to any one of Claims 1 to 9.

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Fig.1

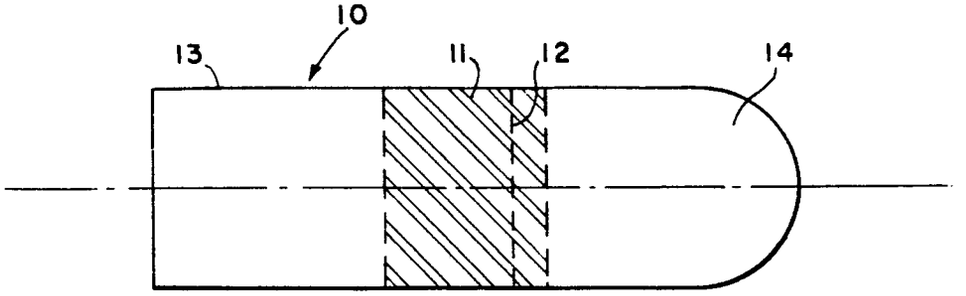


Fig.2

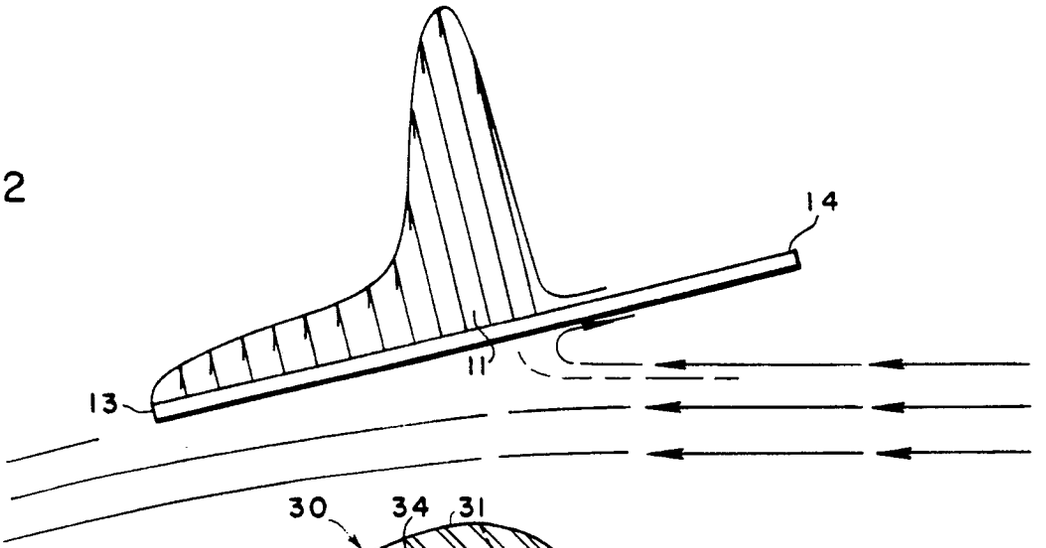


Fig.3

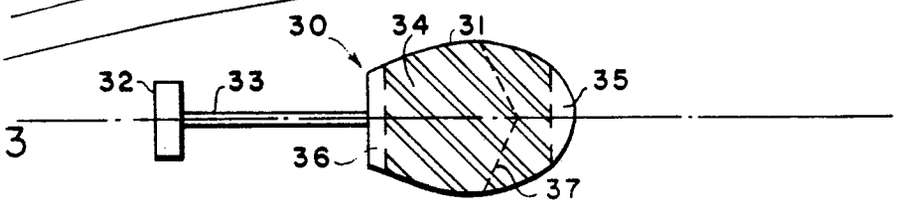


Fig.4

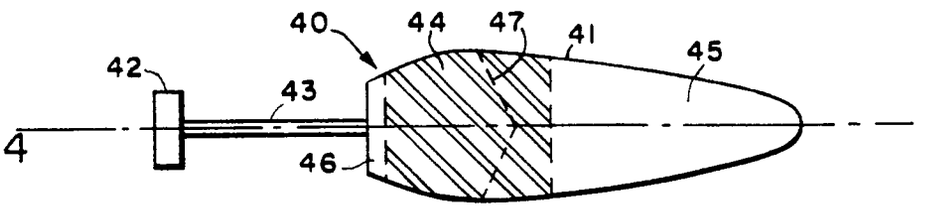


Fig.5

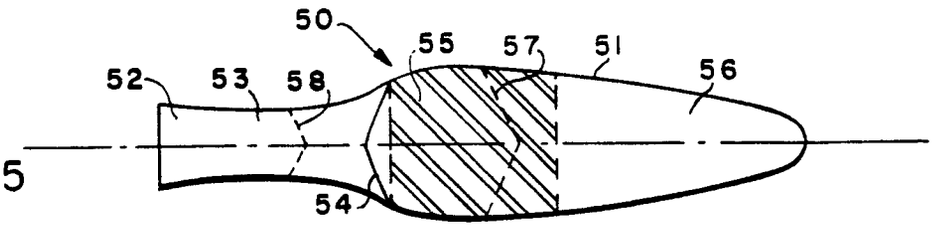
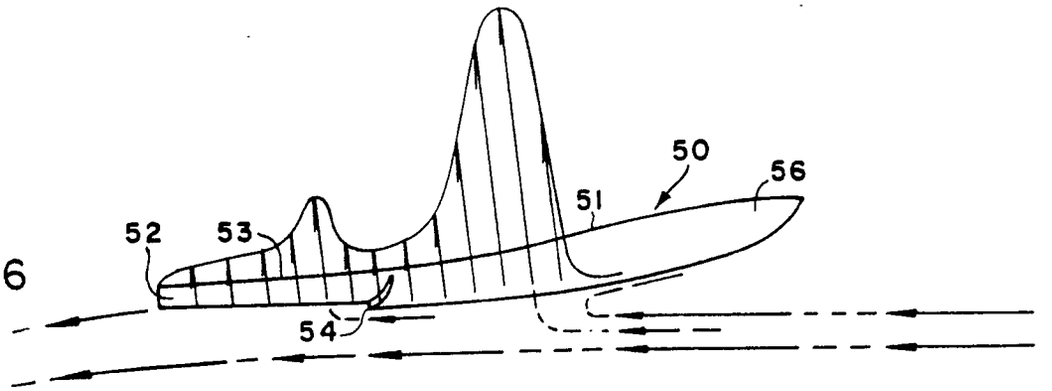


Fig.6



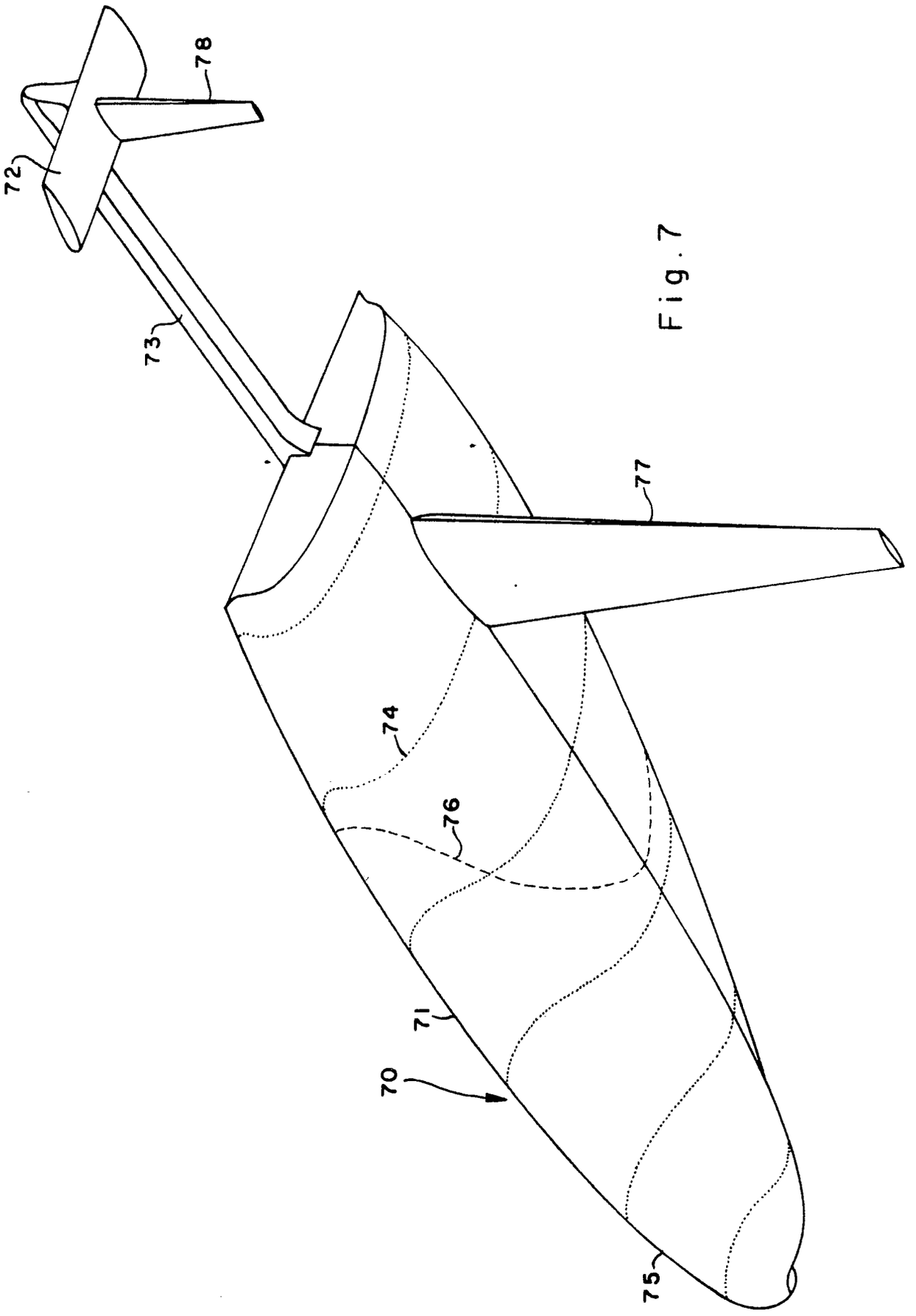


Fig.7

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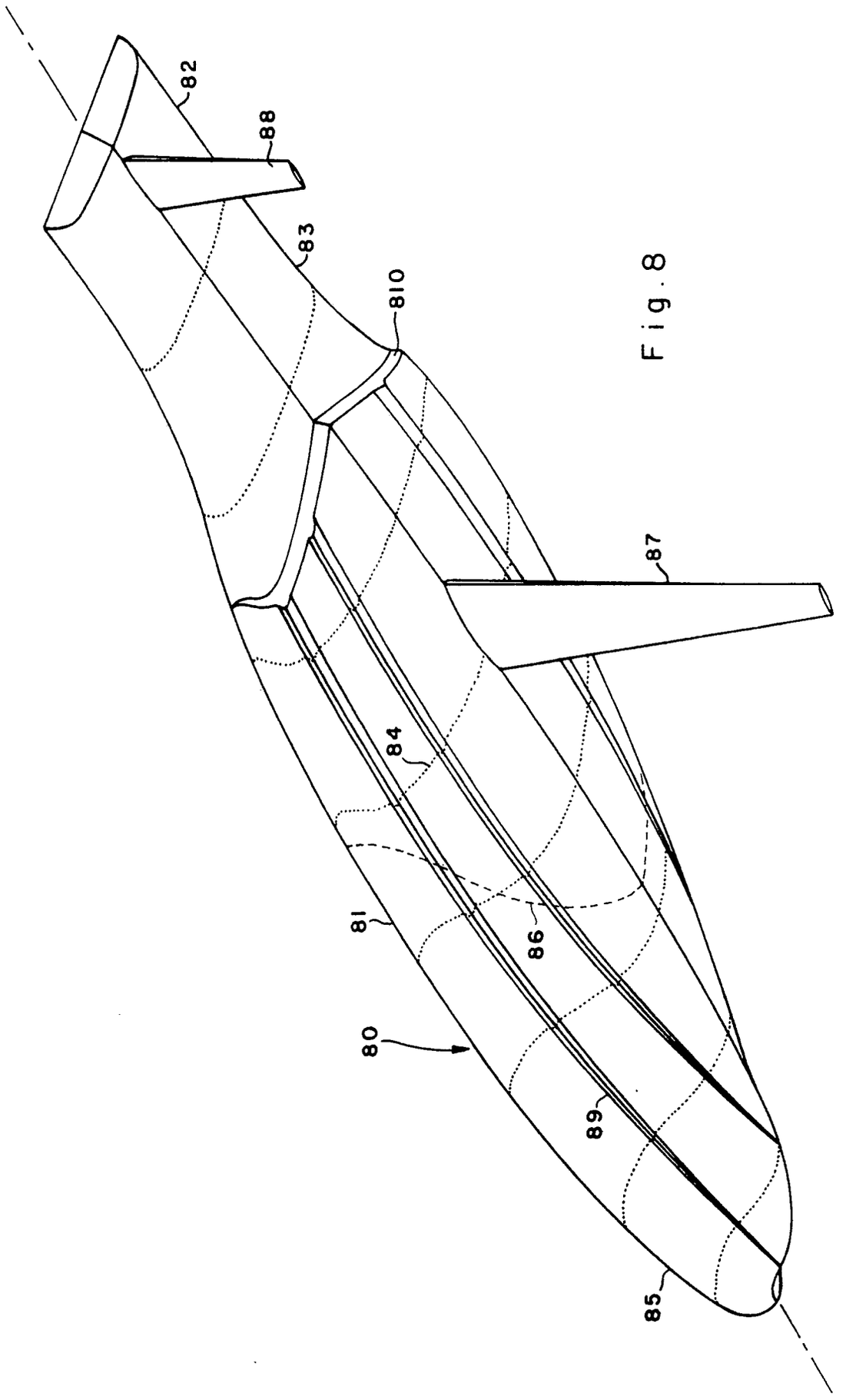

Fig.8

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EUROPEAN SEARCH REPORT

Application number
0017910
EP 80 10 1900

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	US - A - 3 648 640 (GRANGER) * Complete document *	1-5
	FR - A - 841 530 (GOTTHARD SACHSENBERG) * Complete document *	1,3,4,5
	US - A - 4 022 143 (KRENZLER) * Figures 1,3 *	6-9
	GB - A - 1 104 202 (FOX) * Complete document *	1,4-9

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
B 63 B 1/16

TECHNICAL FIELDS SEARCHED (Int.Cl.)
B 63 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24-07-1980	LUKAS

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