

[54] SPINNAKER CONSTRUCTION

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[52] U.S. Cl. .... **114/103**

[51] Int. Cl. .... **B63h 9/06**

[58] Field of Search ..... 114/103, 102, 39

[56] **References Cited**

**UNITED STATES PATENTS**

2,159,923	5/1939	Willard .....	114/103
3,174,453	3/1965	Lemoigne .....	114/103
3,356,059	12/1967	Ross .....	114/103

**FOREIGN PATENTS OR APPLICATIONS**

83,313	1/1963	France .....	114/103
325,763	6/1902	France .....	114/103

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[57] **ABSTRACT**

A spinnaker is formed having an upper region of a desired compound curvature formed by known means and a lower region, where the curvature is substantially in a horizontal plane only, formed of a plurality of flat panels and aerodynamic cells or panels. Each aerodynamic cell is formed having a built-in pocket with sides having a straight edge and a cambered edge extending therefrom with the cambered edges being connected by a rectangular piece of sail cloth. A cross section through said built-in pocket, taken through the length of the rectangular piece of sail cloth, forms an airfoil contour.

**8 Claims, 5 Drawing Figures**

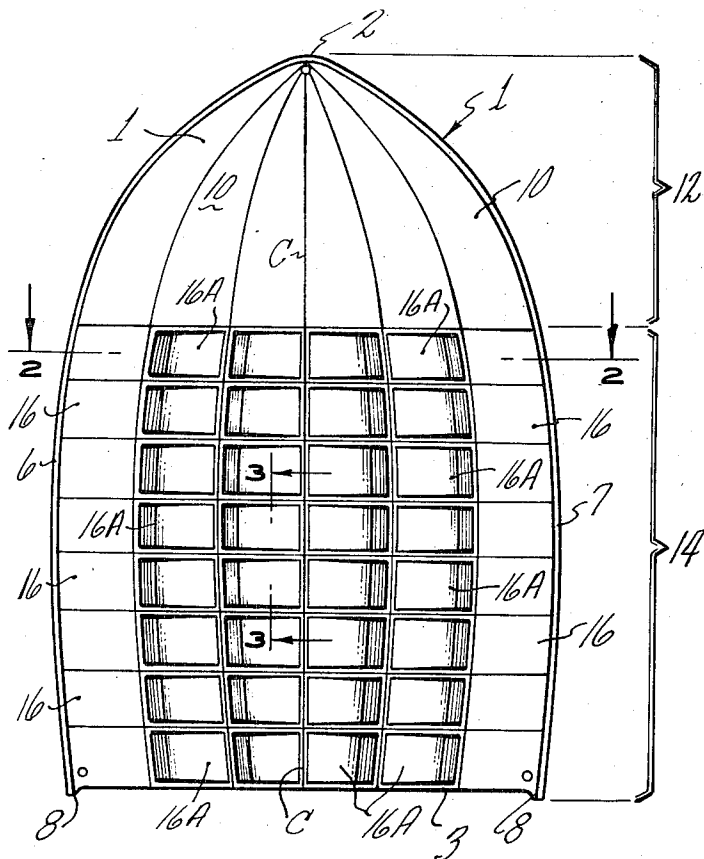


FIG. 1

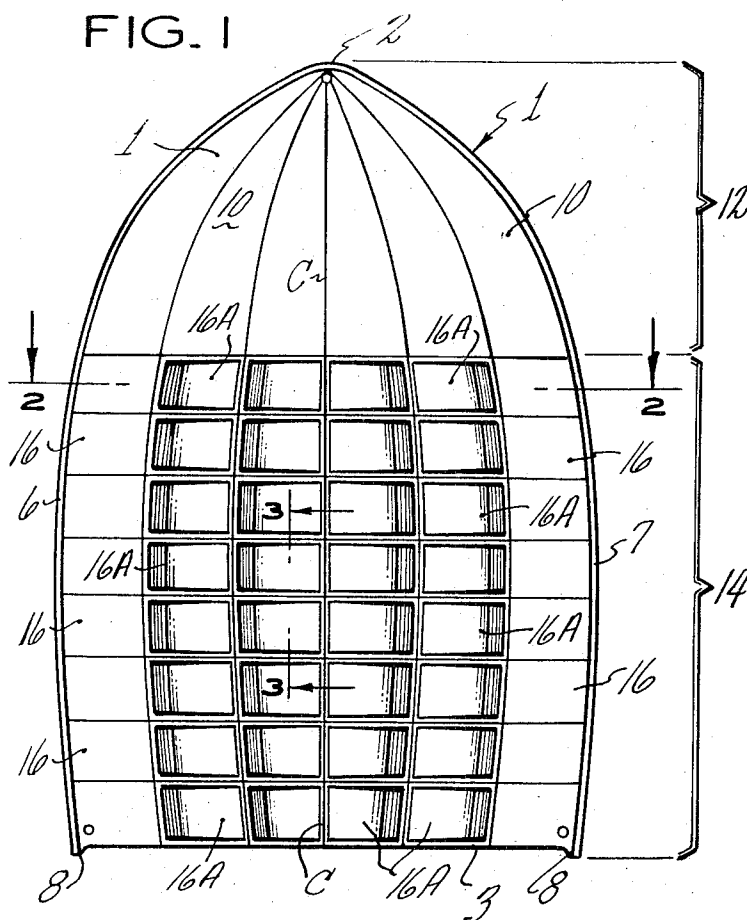


FIG. 3

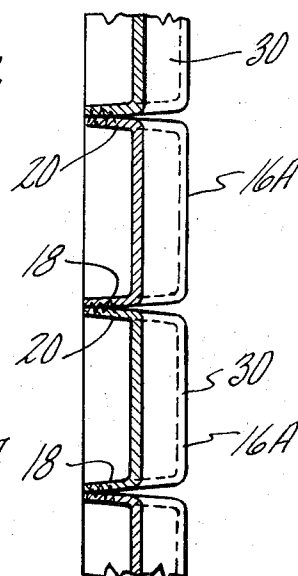


FIG. 2

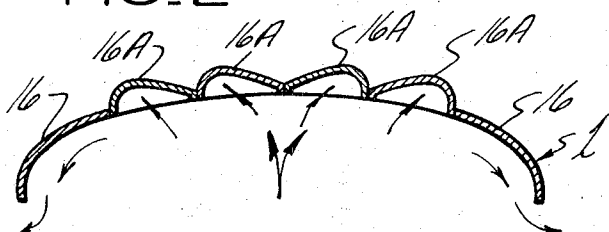


FIG. 4

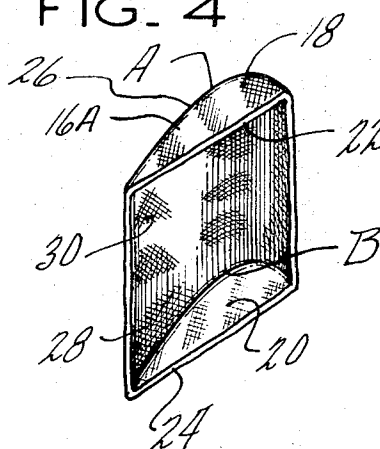
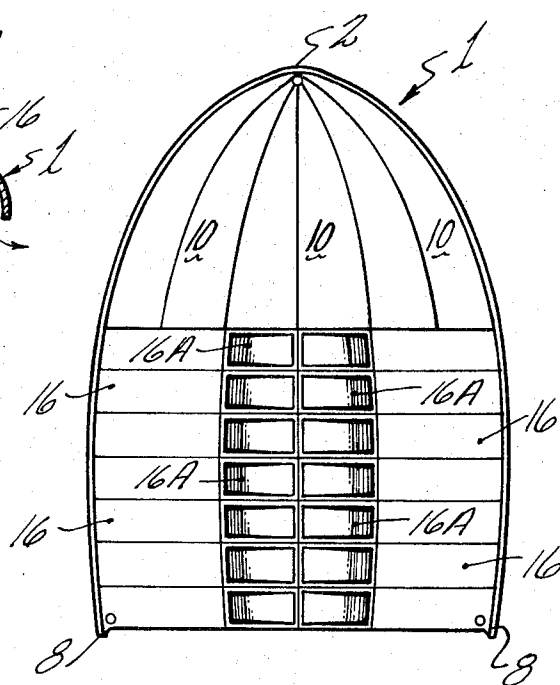


FIG. 5



## SPINNAKER CONSTRUCTION

### BACKGROUND OF THE INVENTION

This invention relates to the field of sails and contains improvements advancing the art, especially for the spinnaker. An aerodynamic sail construction of a spinnaker is shown in U.S. Pat. No. 3,356,059. A sail having pocket members is shown in U.S. Pat. No. 2,159,923.

### SUMMARY OF THE INVENTION

An object of this invention is to provide a spinnaker having a plurality of panels in the lower region, where curvature is substantially in a horizontal plane, with a plurality of panels which are aerodynamic panels or cells.

Another object of this invention is to provide a spinnaker in which the panels can be easily altered to have either a flat panel or an aerodynamic panel or cell.

Another object of this invention is to provide a spinnaker having a plurality of aerodynamic cells on each side of the center seam with the panels in a horizontal position, with the line of maximum camber of each aerodynamic cell being away from the center seam.

A further object of this invention is to provide an aerodynamic cell for a spinnaker, said cell being formed having two sides, each side having one straight edge and a cambered edge extending therefrom, each cambered edge forming an airfoil contour with its cooperating straight edge. The cambered edges are connected by a rectangular piece of sail cloth.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view of the rear of a spinnaker showing an arrangement of the panels forming the sail.

FIG. 2 is a section taken on the line 2—2 of FIG. 1.

FIG. 3 is an enlarged view of a section taken on the line 3—3 of FIG. 1.

FIG. 4 is a view of an aerodynamic cell used as a panel in the spinnaker.

FIG. 5 is a modification of the spinnaker shown in FIG. 1, with a center double row of aerodynamic cells.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, the spinnaker 1 is formed having a head 2, foot 3, leech-luffs 6, 7 and clews 8. The spinnaker 1 is shown formed of vertical gores 10 in the upper region 12 of substantial compound curvature. While vertical gores 10 have been shown, other type cuts can be used in this region, such as in the Hood Horizontal Spinnaker. The gores 10 provide a desired compound curvature, which is preferably spherical. This area is shown comprising approximately 35 percent to 40 percent of the sail height.

The lower region 14 of the spinnaker 1, where curvature is substantially in a horizontal plane only, is formed of a plurality of flat panels 16 and aerodynamic panels or cells 16A. A prior art spinnaker of substantially all flat panel construction in the lower region is shown in U.S. Pat. No. 3,356,059, referred to above. A flat panel 16 is a panel formed from sail cloth which would lie substantially flat on a flat surface. An aerodynamic cell or panel 16A is a panel having a built-in

pocket with sides 18 and 20, each shaped having a like straight edge 22 and 24, respectively, and a like cambered edge 26 and 28, respectively, spaced therefrom. The cambered edges 26 and 28 are connected by a rectangular piece of sail cloth 30 equally spacing the one side 18 from the other side 20. The like cambered edges, 26 and 28, each have their point of maximum camber A and B, respectively, located towards one end, thereby forming a like airfoil section with their cooperating straight edges 22 and 24, respectively. The size of the panel 16A is dictated by the length of the straight edges 22 and 24 and the width of the rectangular piece of sail cloth 30 between the sides 18 and 20.

Each cell 16A can be formed in any manner desired using one or more pieces of sail cloth. Large cells 16A could probably require more than one piece. The cells 16A are shown in a horizontal position, with the line of maximum camber A-B to one side. On the right side of the center seam C, the line of maximum camber A-B is located towards edge 7, and on the left side of the center seam C, the line of maximum camber A-B is located towards edge 6. In this position the sides 18 and 20 of the cells provide addition vertical lift while also acting as horizontal stabilizers where the adjacent sides of cells form a rib. While the aerodynamic panels or cells have been shown horizontal, a cell can be vertical with the line of maximum camber A-B located up or down to achieve a desired effect. FIG. 2 shows the effect of the wind in one direction to aid in keeping the spinnaker full. The air acting on each aerodynamic cell or panel provides a force to keep the spinnaker open.

All panels 16 and 16A within the spinnaker are connected around all their edges, such as by sewing, and outer panels around the spinnaker have edges forming the leech-luffs 6 and 7 and the foot 3. The edges of the sail cloth shown in FIGS. 1 through 5 have been given exaggerated thickness for clarification.

I claim:

1. An improved spinnaker comprising two main portions, an upper portion and a lower portion, said upper portion being formed of compound curvature with a lower edge, said lower portion extending from the lower edge of the upper portion to a foot, said lower portion having a center line, said lower portion being formed of a plurality of rectangular panels on each side of said center line, at least some of said panels on each side comprising aerodynamic cells, each aerodynamic cell being formed as a closed built-in pocket, each built-in pocket having a maximum depth nearer one end of the pocket, said maximum depth extending for a substantial distance across the pocket, the maximum depth of each pocket being positioned away from the center line.

2. An improved spinnaker as set forth in claim 1 wherein aerodynamic cells are arranged in a vertical line on each side of said center line.

3. An improved spinnaker as set forth in claim 1 wherein each pocket has two sides, each side being formed having a straight edge and a curved edge, the curved edge of each side having a point of maximum camber located towards one end, a length of sail material connecting said curved edges forming a built-in pocket having a maximum depth between the points of maximum camber of the curved edges of each side, said length of sail material having ends, said straight edges

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of said sides and the ends of said length of sail material forming a rectangle and being fixed in said lower portion of said spinnaker as a rectangular panel with the maximum depth being positioned away from the center line.

4. An improved spinnaker as set forth in claim 3 wherein the curved edge of each side has a like point of maximum camber located towards one end, the curved edge of each side forming a like air foil section with its cooperating straight edge.

5. An improved spinnaker as set forth in claim 3 wherein two aerodynamic cells are placed as adjacent rectangular panels in a vertical line with the sides of ad-

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jacent pockets forming a horizontal stabilizer.

6. An improved spinnaker as set forth in claim 3 where the curved edge of each side has a like point of maximum camber located towards one end.

7. An improved spinnaker as set forth in claim 6 wherein each side forms an airfoil section.

8. An improved spinnaker as set forth in claim 1 wherein the aerodynamic cells are arranged in two vertical rows on each side of said center line, adjacent vertical rows of aerodynamic cells on each side of said center line contacting each other on said center line.

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