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54 A sail.

57 A sailcloth which is structured to resist stress developed in the corners (12, 14) at the foot and in a peak at the head (16) comprises an arrangement of the warp yarns (20) in radiating directions with respect to the center of stress.

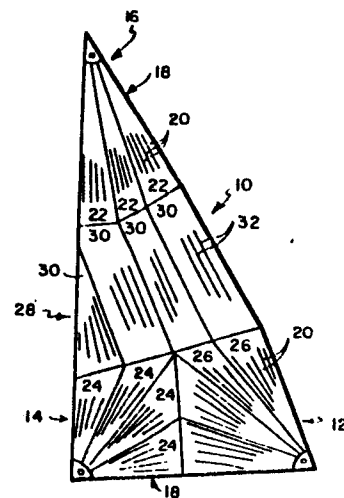


FIG. 4

A_Sail

A very significant consideration in sail making is to so fabricate the sail that it will absorb maximum stress with minimum distortion. This is generally done by cutting the fabric into panels so that the yarns in the fabric run parallel to the stress lines in the sail. Near the corners of the sail, the stress lines generally run radially outward from the corners. It is, accordingly, the purpose of this invention to so construct a sail fabric that it has yarns which run radially outward and so approximate the stress pattern at the corner of the sail.

As herein illustrated, the invention resides in a sail fabric in which are incorporated warp yarns which radiate from a central apex outward. The sailcloth may be comprised of warp yarns adhesively bonded to one side of a dimensionally stable sheet of plastic or between two sheets of dimensionally stable sheets of plastic or between a sheet of dimensionally stable plastic and a woven fabric or combined with weft yarns and bonded thereto at their crossings.

The invention will now be described in greater detail with reference to the accompanying drawings, wherein:

FIG. 1 is a fragmentary plan view of a fabricated material wherein warp yarns are disposed in a radiating array on a film substrate and adhered thereto;

FIG. 1A is a fragmentary section of the warp yarns disposed between two films;

FIG. 1B is a fragmentary section of the warp yarns disposed between a film and a woven fabric;

FIG. 2 is a plan view of a fabricated panel wherein the warp yarns are disposed in a radiating array on a woven fabric and adhered thereto;

FIG. 3 is a plan view of a fabricated panel wherein the warp yarns are disposed in a radiating array in conjunction with a substrate of weft yarns and adhesively secured thereto at their crossing;

FIG. 4 is a plan view depicting how this fabric is used to form the corners of a sail to provide for efficient use of the warp yarns with regard to the stresses concentrating in the corners of the sail;

FIG. 5 diagrammatically illustrates in plan view the formation of successive panels; and

FIG. 6 diagrammatically illustrates structure for disposing the warp yarns in radiating arrays.

Referring to the drawings, FIG. 4, there is shown a sail of generally triangular configuration, the three corners 12, 14 and 16 of which are comprised of truncated triangular panels 18 structured according to this invention with radiating warp yarns 20. At the head 16 of the sail, there are three panels 22. At the tack corner 14, there are four panels 24 and at the clew

corner 12, there are four panels 26. The panels 18 are sewn together side-by-side along their adjacent edges. The body 28 of the sail is comprised of panels 30 of conventionally woven fabric wherein the warp yarns 32 are parallel. As thus fabricated, the radiating warp yarns 20 in the panels comprising the corners of the sail carry the tensile load from the body of the sail to the corners thereof, thereby reducing and controlling the stretch and distortion of the sail and the sail camber. As illustrated, there are three triangular panels at the peak of the sail and four in each corner at the foot of the sail. It is to be understood, however, that there may be a lesser or greater number of panels at the head and foot of the sail.

In accordance with the invention as herein illustrated, the warp yarns 20 in the aforesaid truncated triangular panels are arranged in arrays in which the yarns radiate, that is, diverge with respect to each other in a direction toward the base of the panel. The triangular panels at the head and foot of the sail are structured by laying the warp yarns 20 in radiating arrays relative to each other as shown in FIG. 1 and securing them to a substrate P. The substrate P may be comprised of a sheet of plastic. The warp yarns 20 are adhesively secured to the sheet of plastic. Alternatively, the radiating arrays of warp yarns 20 may be interposed between two sheets of plastic as shown in FIG. 1A or between a sheet of plastic and a woven fabric F as shown in FIG. 1B. FIG. 2 illustrates incorporating the

radiating warp yarns 22 in a conventionally woven fabric F comprised of warp yarns 20 and weft or filling yarns 34. FIG. 3 illustrates a fabric wherein the radiating warp yarns 20 are combined with weft yarns 36 and adhesively secured at their crossings.

The warp yarns comprising the arrays of radiating lengths of yarn are disposed in radiating relation to each other and bonded to a substrate or incorporated in a woven fabric by employing a warp yarn guider 38, FIG. 6, with variable spacing. The composite structure is then cut and trimmed to appropriate length and configuration, FIG. 5, according to location in the sail structure.

The yarns may be natural or synthetic and the sheet material is desirably a dimensionally stable plastic, for example, dacron.

CLAIMS:

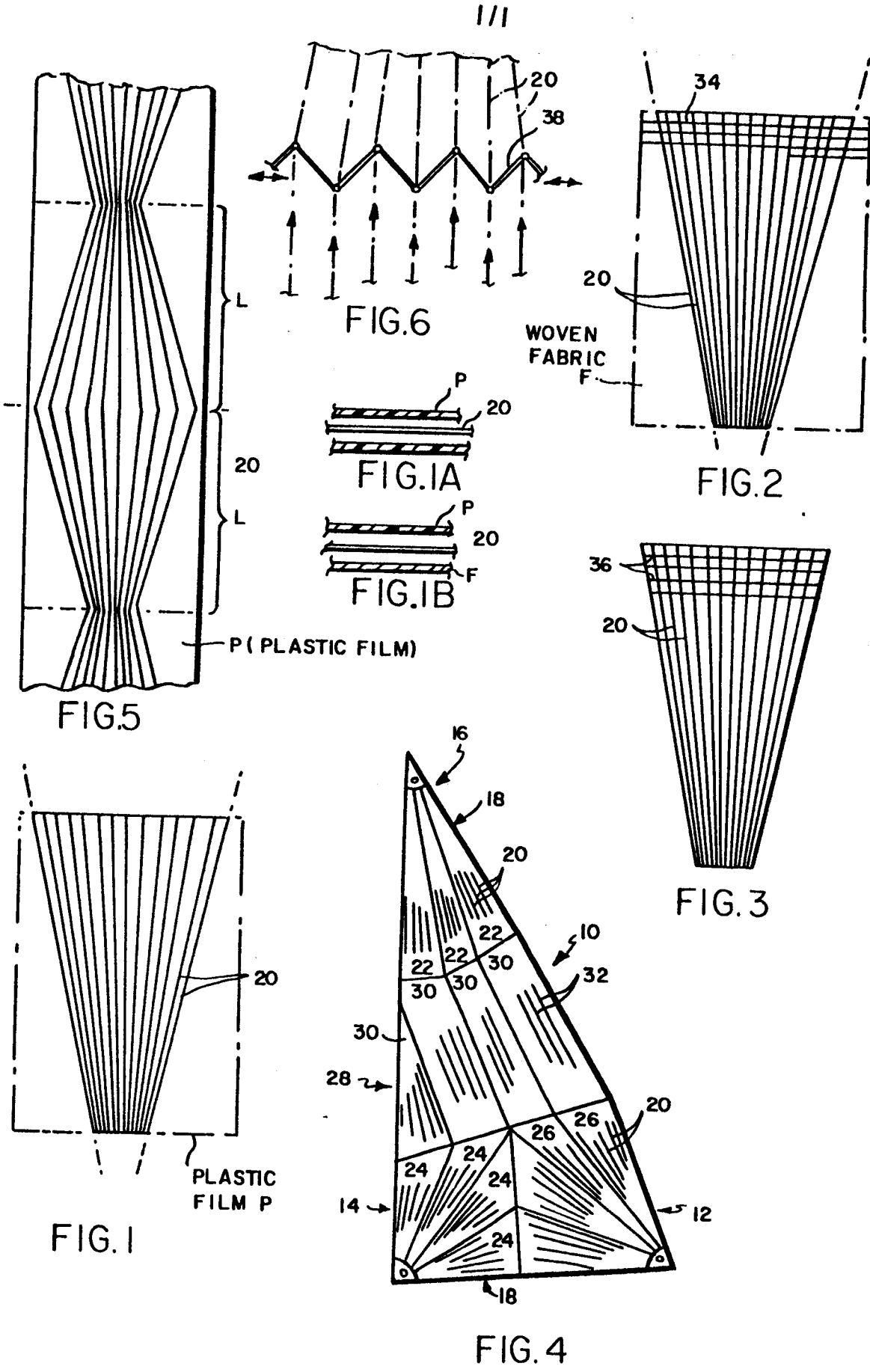
1. A sailcloth comprising a plurality of radiating warp yarns (20) adhesively bonded to a dimensionally stable sheet of plastic (9).
2. A sailcloth comprising a plurality of radiating warp yarns (20) adhesively bonded between two sheets of dimensionally stable plastic (P).
3. A sailcloth comprising a plurality of radiating warp yarns (20) bonded between a dimensionally stable sheet of plastic (P) and a woven fabric (F).
4. A sailcloth comprising a plurality of radiating warp yarns (20) combined with weft yarns (36) and bonded thereto.
5. A sailcloth panel of generally triangular configuration comprising a fabricated structure embodying an array of yarns (20) which diverge relative to each other from the apex toward the base.
6. A sailcloth panel of truncated triangular configuration comprised of a dimensionally stable ply of sheet material, to one side of which is attached an array of yarns (20) which diverge relative to each other from the apex to the base.

7. A sailcloth panel of truncated triangular configuration comprised of a dimensionally stable woven fabric in which is incorporated an array of warp yarns (20) which diverge relative to each other from the apex to the base.

8. A sailcloth panel of truncated triangular configuration comprised of warp and weft yarns (20, 36) secured at their crossings wherein the warp yarns (20) diverge relative to each other from the apex to the base.

9. A sailcloth characterized by a plurality of radiating warp yarns (20).

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EUROPEAN SEARCH REPORT

0224729

Application number

EP 86 11 5211

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, P	EP-A-0 191 216 (SOBSTAD) * Abstract; figure 1 *	1, 2, 3 5, 6, 7 9	B 63 H 9/06
A	US-A-1 786 838 (FISHER) * Claim 1; figure 1 *	1, 4, 5 8	
A	FR-A- 325 386 (LIEUTER) * Whole document *	4, 8	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			B 63 H B 64 D D 03 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-03-1987	Examiner DE SCHEPPER H.P.H.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			