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(54) Inflatable marine radar reflector.

(57) An inflatable marine radar reflector (1) has a square octahedral reflector (3) of silver-coated nylon mesh encapsulated in a co-polymer laminate secured within an inflatable cover (2). The cover (2) is polyhedral in shape when inflated and has fourteen faces.

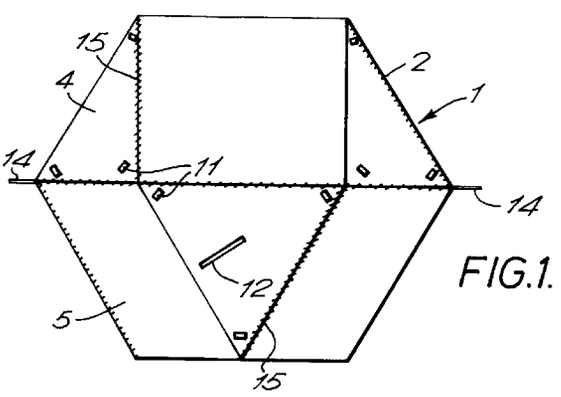

FIG.1.

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This invention relates to radar reflector and to radar reflective material used therein.

At present, a radar reflector typically comprises reflecting planes of radar reflective material. The radar reflectors may be used together with a hydrogen balloon for wind tracking purposes or may be for maritime use. In either case they need to be light in construction capable of being folded for storage and transit.

Known radar reflectors currently use a high quality nylon mesh which is coated with silver which in turn is proofed after metallization with a protective, radar transparent coating which protects the coated mesh against abrasion and environmental conditions. Typically, the mesh size is designed to be responsive to radar systems using 6.0 and 9.0 GHz and suitably has a hole spacing of 8.0 per centimetre. However, different mesh sizes are used for different applications.

A problem with existing radar reflective material of this known flexible type is that it tends to be susceptible to damage despite the application of the protective coating to the strands of the mesh.

Susceptibility to damage is a particular problem in maritime applications and it has been previously proposed to provide an inflatable reflector in which an outer cover protects the reflector within from damage. However, such known reflectors have been bulky and large in volume. This means that, in an emergency, they take too long to inflate.

An object of the present invention is to provide an improved radar reflector and radar reflective material.

According to the present invention there is provided a radar reflector comprising a reflector secured within an inflatable cover, the cover when inflated being polyhedral in shape. Preferably the cover is geometrically designed as a faceted cube in which the corners of a cube have been cut away to provide fourteen faces. The cover may be made of suitable pliant or flexible material such as a synthetic polymer material, for example, a polyurethane material.

The reflector is preferably a square octahedral reflector of silver-coated nylon mesh encapsulated in a co-polymer laminate. The reflector may be secured within the cover by means of ties.

The invention also includes a radar reflective material comprising a flexible radar reflective layer encapsulated within a flexible radar transparent membrane. The membrane may comprise first and second flexible radar transparent layers so that the radar reflective material is a laminate with the reflective layer interposed between. Preferably the radar reflective layer is a metallized mesh reflector and the radar transparent layers may either consist of layers of polyethylene co-polymer which are fused to the mesh and through the mesh or the first layer may be a backing layer such as nylon sheet material and the second layer may be a polyurethane coating.

The inflatable reflector of the present invention is primarily designed as a life-raft-mounted reflector, but may be employed as a general marine safety aid.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is an elevation of the cover of the radar reflector in accordance with the invention;

Figure 2 is a plan view of Figure 1;

Figure 3 is a view of the reflector to be positioned within the cover;

Figure 4 is a detailed view of the connection between the reflector and the cover; and,

Figure 5 is a diagrammatic perspective view of the reflector when extended by inflation of the cover.

In the drawings an inflatable radar reflector (1) comprises a cover (2) and a reflector (3).

The cover (2) comprises a top half cover (4) and a bottom half cover (5). The half covers (4,5) are cut from suitable master templates.

The reflector (3) comprises three panels (6, 7, 8) heat welded at their intersections with glass reinforced tape corners (9) for mounting twelve securing eyelets (10).

In making up the top half cover (4) and the bottom half cover (5), loops (11) are provided on the internal surfaces as indicated in Figures 1 and 2. An air valve (12) is also provided for inflation. The corner loops (11) are fitted by welding, twelve to each cover half.

In order to assemble the reflector (3) to the cover (2), the corners of the reflector (3) are marked and are offered to the correspondingly numbered corner loops (11) of the cover halves (4,5). The reflector corners are then secured by means of flexible ties (13) which pass through the corner loops (11) on the cover (2) and the eyelets (10) on the reflector - see Figure 4 which shows the ties (13) extended in the inflated state of the radar reflector.

The cover halves (4,5) are cut from planar material to provide seven panels and then the panels are drawn together to provide the half polyhedral shape of the radar reflector. The reflector (3) is then tied in position to the cover halves (4,5) and each half formed to shape by three mating seams (15) of each half being welded. Finally, the two halves (4,5) are connected by welding each of the six seams connecting the top and bottom cover halves (4,5). The cover (2) is then fitted with eyelets (14) as shown in Figure 2.

The radar reflector (1) of the present invention is tested to a pressure of 1.0 psi and has a burst pressure of about 4.0 psi.

In use, the radar reflector (1) is designed to be mounted on a life-raft. The eyelet arrangement (14) and shape of the cover (2) allow it to be mounted in a variety of ways according to the needs of a particular life-raft design. For example, it may be secured by stays or mounted on a mast. On larger life-rafts the reflector can be mounted internally by suspension from

a suitable part of the life-raft structure.

The radar reflector (1) of the present invention is normally in collapsed state and although inflation could be by mouth, it is preferred that inflation would normally be by means of the topping up pump supplied in the life-raft or by other more convenient inflation means. On inflation of the cover, the panels (6,7,8) of the reflector (3) are tensioned within the cover into square octahedral shape as shown in Figure 5.

The cover preferably comprises polyurethane-coated nylon with a smooth polyurethane inner side and a rougher nylon outer side. The reflective material of the reflector comprises silver-coated nylon, the silver having been deposited upon the strands of a nylon mesh by a conventional deposition process. The metallized mesh is then encapsulated within layers of polyethylene copolymer which are heated during manufacture to fuse the layers to the mesh and to each other to form a durable radar reflective composite.

The polyhedral shape of reflector cover in accordance with the invention is an improvement over known spherical reflectors and has several advantages, for example:

the cover construction allows ease of manufacture permitting the reflector to be readily positioned and secured within the cover before welding;

the polyhedral shape permits assembly from flat panels; and,

the polyhedral shape of the cover reduces the internal volume over known reflectors, permitting quicker inflation in an emergency.

Claims

1. A radar reflector comprising a reflector secured within an inflatable cover, the cover when inflated being polyhedral in shape.

2. A radar reflector according to claim 1, wherein the cover when inflated has fourteen faces.

3. A radar reflector according to claim 1 or 2, wherein the cover is a synthetic polymer material.

4. A radar reflector according to any one of the preceding claims, where the reflector is a square octahedral reflector.

5. A radar reflector according to any of the preceding claims, wherein the reflector is made of silver-coated nylon mesh encapsulated in a copolymer laminate.

6. A radar reflector according to any one of the preceding claims, wherein the reflector is secured within the cover by means of ties.

7. A radar reflective material comprising a flexible radar reflective layer encapsulated within a flexible radar transparent membrane.

8. A radar reflective material according to claim 7, wherein the membrane comprises first and second flexible radar transparent layers whereby the radar reflective material comprises a laminate with the reflective layer interposed between the flexible radar transparent layers.

9. A radar reflective material according to claim 7 or 8, wherein the radar reflective layer is a metallized mesh reflector and the radar transparent layers comprise synthetic polymer material.

10. A radar reflector according to claim 1, wherein the reflector comprises radar reflective material in accordance with any one of claims 7 to 9.

11. A life-raft including a radar reflector in accordance with any one of claims 1 to 6 or 10.

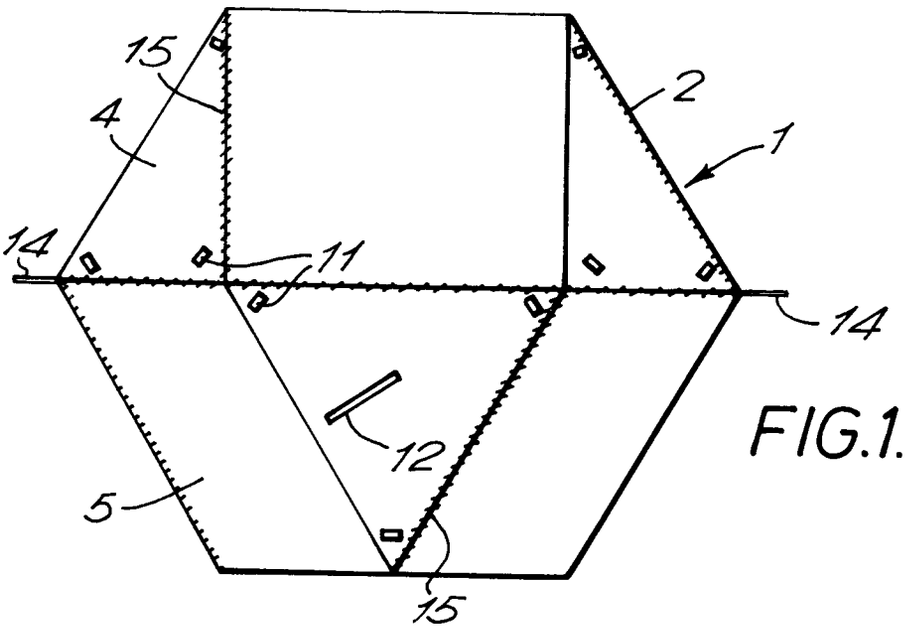

FIG.1.

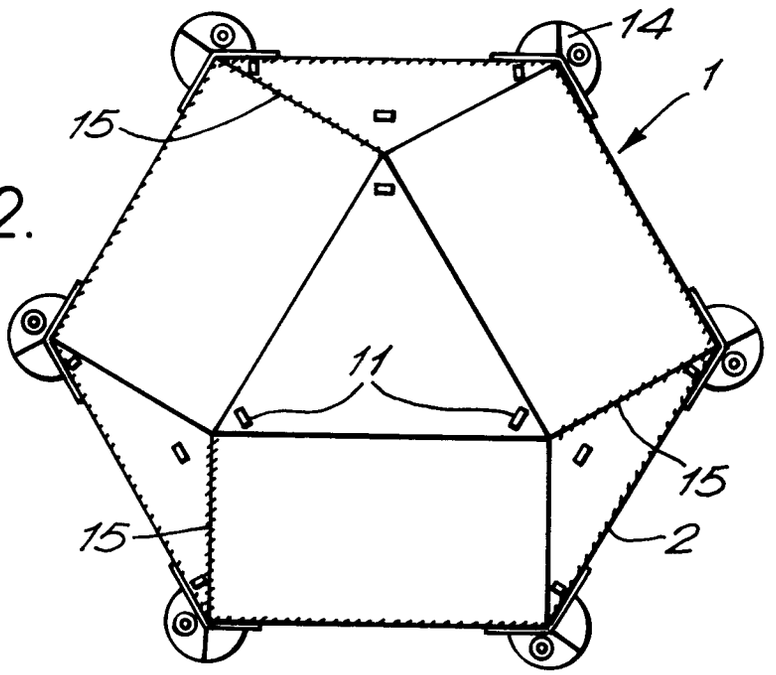

FIG.2.

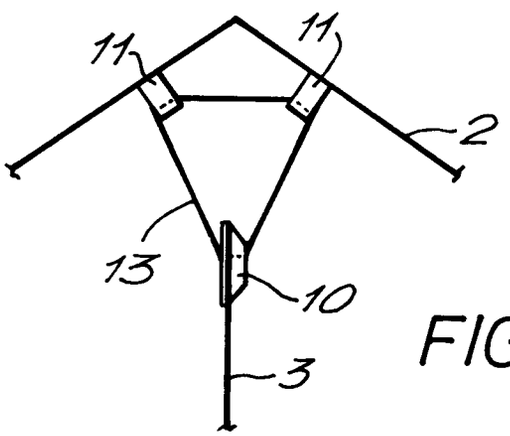

FIG.4.

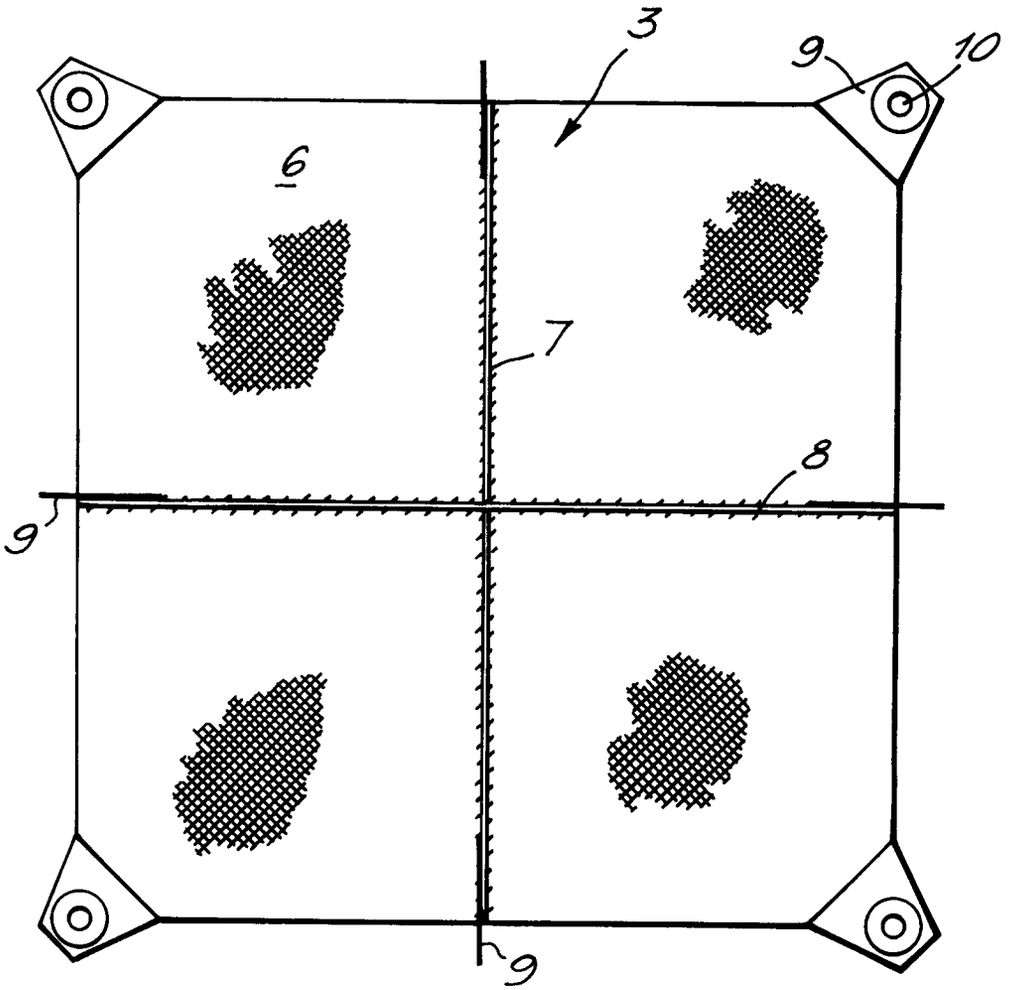

FIG.3.

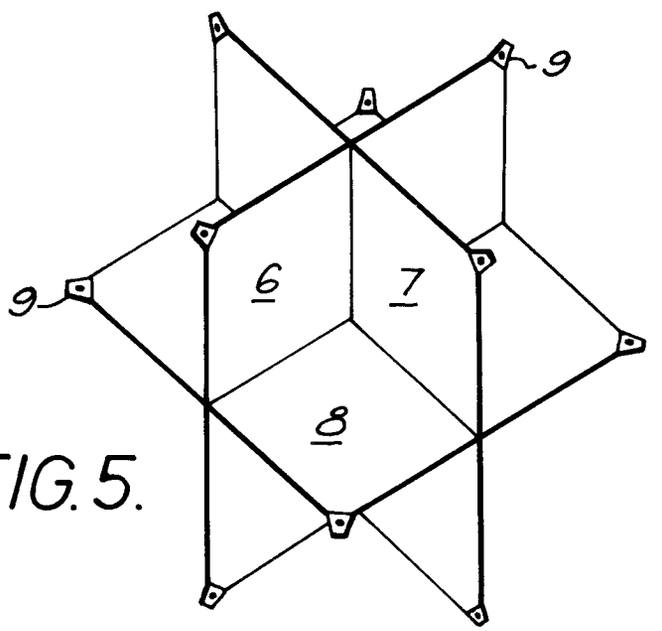

FIG.5.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 3002

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.5)
X Y	EP-A-0 148 635 (PLESSEY OVERSEAS) * page 3, line 16 - page 5, line 14 * * page 6, line 1 - line 9; claims 1-10; figure 2 * ---	1,3 4,6,10, 11	H01Q15/20
Y	GB-A-2 189 079 (BRITISH AEROSPACE) * page 1, right column, line 69 - line 109; claims 1-6; figure * ---	4,6,10, 11	
X A	EP-A-0 010 711 (BAYER) * page 2, line 1 - page 4, line 23 * ---	7 8,9	
A	DE-A-3 032 085 (AUTOFLUG) * page 5, paragraph 3 - page 6 * ---	1,2,10, 11	
A	EP-A-0 182 274 (SCHÄFER) * page 9, line 11 - page 12, line 16 * * page 15, line 19 - line 30; figures 1,2 * ---	1,3-6, 10,11	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-4 980 688 (DOZIER,JR.) * column 2, line 12 - line 25 * -----	1,3-6,10	H01Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01 JULY 1992	ANGRABEIT F. F. K.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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