United States Patent

Figge

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[45] Apr. 18, 1972

[54] QUASI-ISOTROPIC SANDWICH CORE

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[73] Assignee: **The United States of America as represented by the Secretary of the Army**

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[52] **U.S. Cl.**.....**161/47,** 156/174, 156/177, 156/179, 156/433, 156/443, 161/57, 161/58, 161/141

[51] **Int. Cl.**.....**B32b 5/12,** B32b 5/26

[58] **Field of Search**.....161/DIG. 4, 55, 57–59, 161/47, 78, 68, 84, 85, 141; 156/161, 171, 173–181, 190

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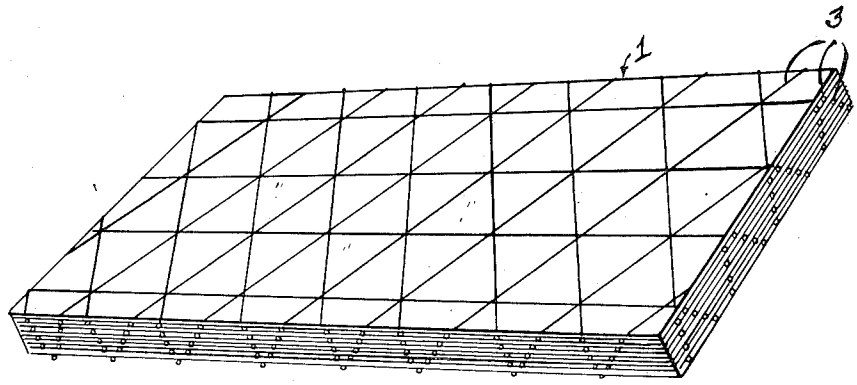
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[57] **ABSTRACT**

A structural core consisting of a winding of fibrous filaments which are wound upon a jig, each filament being disposed upon the preceding one whereby the winding defines parallel rows of tetrahedrons, half of which point upwards, the other half downwards. Sandwiched, in spaced relation, between the windings of filaments are sheets of fiberglas cloth. The dimensions of the sheets are coextensive with the dimensions of the winding.

7 Claims, 4 Drawing Figures



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Fig. 1.

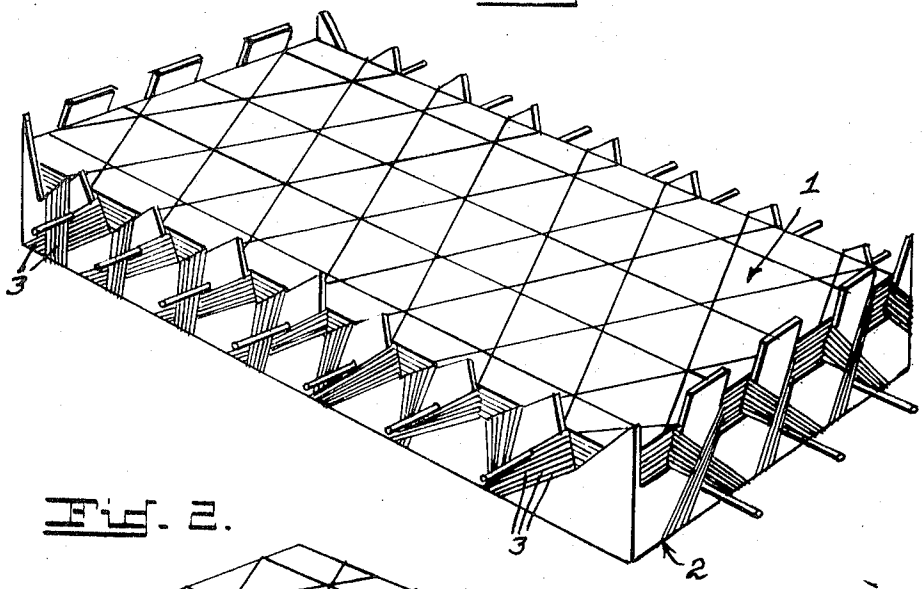


Fig. 2.

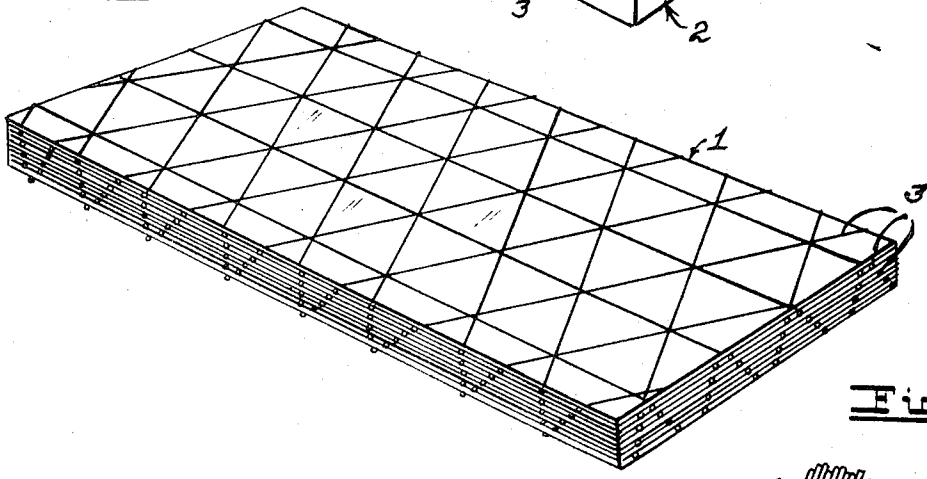


Fig. 4.

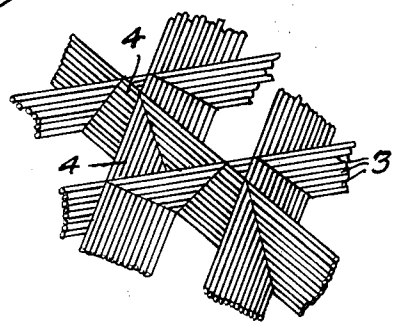
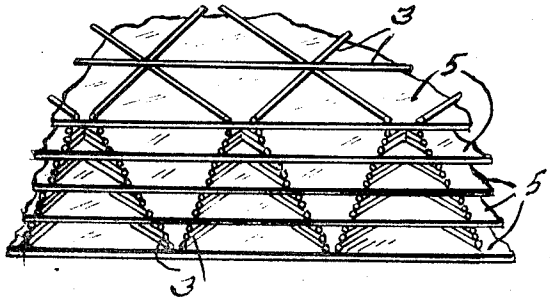


Fig. 3.



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QUASI-ISOTROPIC SANDWICH CORE

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

Existing structural cores consist chiefly of a pair of walls, with the core material being bonded between them. This led to difficulties in bonding and the structural core lacked load carrying strength, the strength being only in a perpendicular direction to the face walls.

The present invention provides a structural core of lightweight, high strength, nonporous and fail safe and having quasi-isotropic load carrying properties including tension, compression, bending rigidity and torsional rigidity. The winding of the fibrous filaments is described in my co-pending application, ser. no. 39,597 filed May 20, 1970.

It is therefore a principal object of this invention to provide a structural core consisting of a series of sheets interposed between windings of fibrous filaments.

It is another object to provide a structural core that is lightweight and having quasi-isotropic load carrying properties including tension, compression, bending, rigidity and torsional.

Other objects and advantages will be apparent from the following description and drawings, in which,

FIG. 1 is a perspective view of the jig used in fabricating the core of this invention, the core being shown therein;

FIG. 2 is a perspective view of the finished core of this invention;

FIG. 3 is an enlarged edge detail showing the sheets in place between the windings of the core, and

FIG. 4 is a detail perspective of the windings of the fibrous filaments without the sheets to show the tetrahedronal shape of the windings.

Referring in detail to the drawing, reference character 1 indicates, generally, the sandwich core of this invention. The jig employed in forming the core 1 is designated generally by 2. Fibrous filaments 3 are wound on jig 2 in the same manner as described in the aforesaid co-pending application in which the filaments 3 are wound to form tetrahedrons 4, half of which point upwards and half of which point downwards.

Sheets 5 of a material such as fiberglas are interposed among the flaments 3 in spaced, stacked relation, as shown. The number of sheets used will depend upon the strength of the core desired. Five sheets are shown in FIG. 3. Sheets 5 will be of a dimension whereby they will fit within the jig 2.

While the core 1 is shown to be a flat panel, other shapes may be obtained by use of a jig of another configuration; such as cylindrical, etc.

When the overhanging filaments are cut off the finished core 1 will present a compact structural member which may be trimmed for use as desired.

The filaments 3 and sheets 5 will be bonded as described in the co-pending application by application of an epoxy resin.

It will be apparent from the foregoing, that a lightweight yet strong structural core has been provided that will lend itself to a wide variety of uses, such as in aircraft, boat and like structures.

What is claimed is:

1. As an article of manufacture, a unitary structural core comprising a winding of interwoven fibrous filaments and a series of sheets disposed between said windings, wherein said winding comprises a series of fibrous filaments disposed one above the other, said winding defining a series of tetrahedrons, said tetrahedrons pointing upwards and downwards in alternate sequential relation.

2. A structural core as set forth in claim 1 wherein said sheets are of fiberglas.

3. A structural core as set forth in claim 1 wherein said sheets are arranged in equally spaced relation in said winding.

4. A structural core as set forth in claim 1 wherein said sheets are disposed in said winding whereby the sheets are separated by at least one winding of said fibrous filaments.

5. A structural core as set forth in claim 1 wherein each said sheet is of a dimension equal to the completed core.

6. A structural core as set forth in claim 1 wherein said tetrahedrons are equilateral tetrahedrons.

7. The structural core of claim 6 in which the sides of the tetrahedrons defined by the winding are disposed in continuous intersecting planes.

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