

[54] ROOFING ASSEMBLY OF FLEXIBLE MATERIAL

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Related U.S. Application Data

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[52] U.S. Cl. 52/63; 52/83

[51] Int. Cl.² E04B 1/12

[58] Field of Search 52/80, 83, 63; 160/242, 160/243, 264

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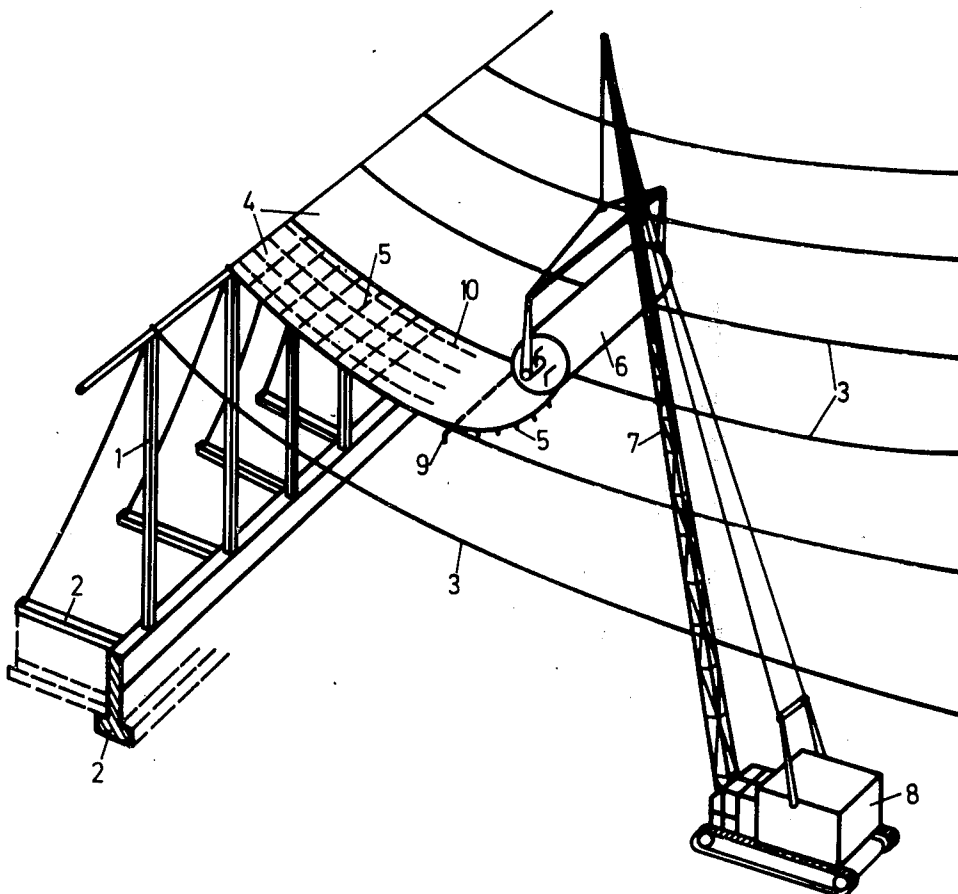
Primary Examiner—Henry C. Sutherland

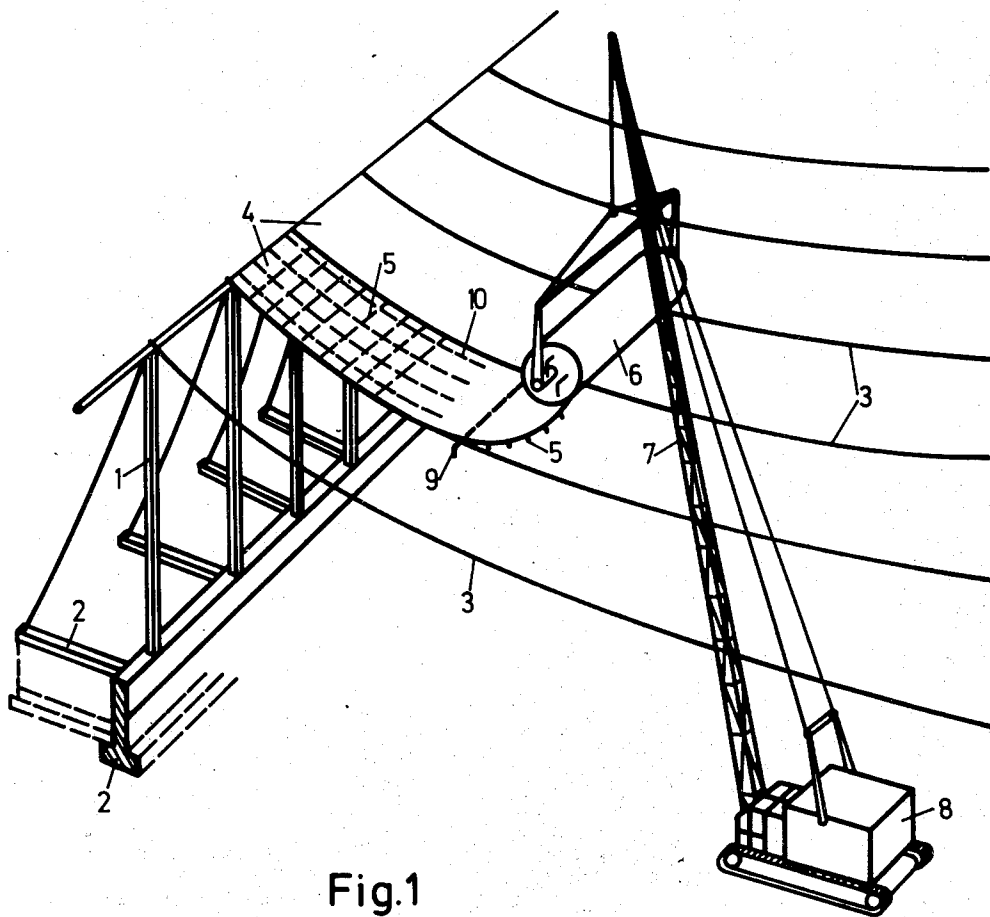
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[57] ABSTRACT

A roofing assembly made of flexible material and having roof membranes that can be rolled up into individual rolls and constructed of tear and weather resistant plastics or the like materials. The membranes may consist of several sandwich layers of plastic and are connected to the roof structure by carrying elements. Band-like carriers, such as flat bars, constructed of high strength steel, span at least across the carrying elements of the roof structure to support the membranes.

8 Claims, 5 Drawing Figures





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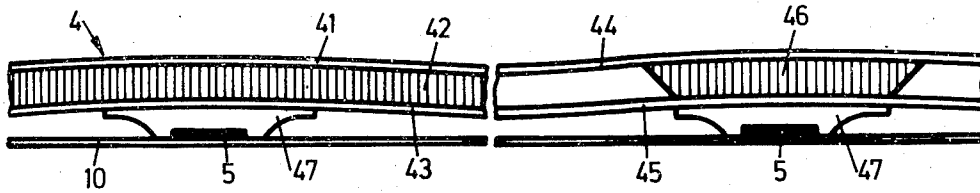


Fig. 2

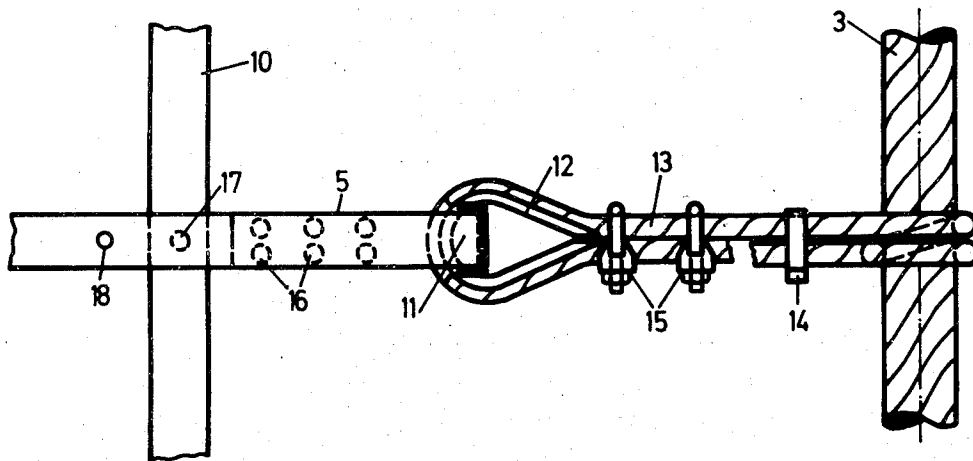


Fig. 3

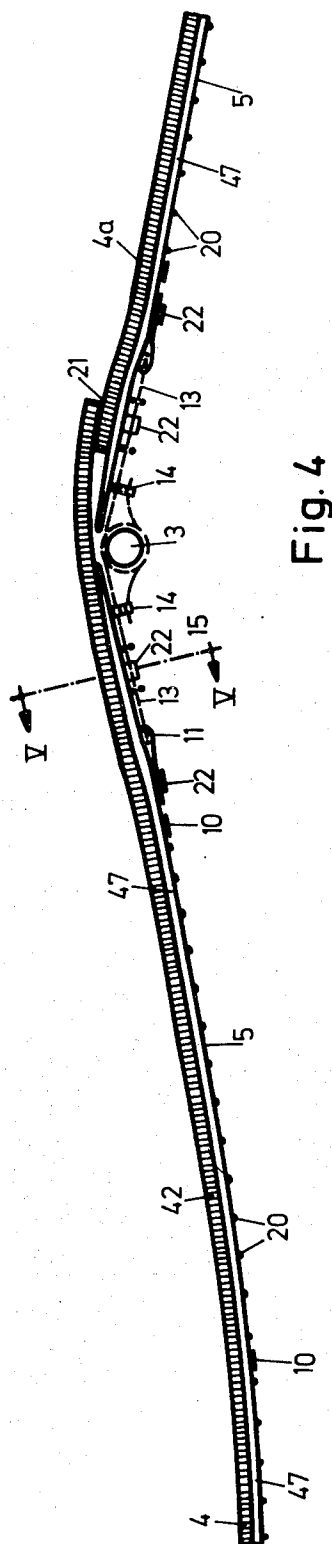


Fig. 4

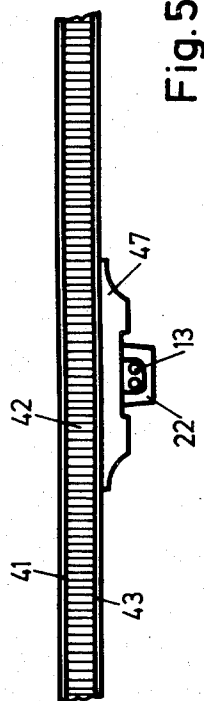


Fig. 5

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ROOFING ASSEMBLY OF FLEXIBLE MATERIAL

This is a continuation of application Ser. No. 320,483, filed Jan. 2, 1973, and now abandoned which in turn is a continuation of application Ser. No. 113,379 filed Feb. 8, 1971 and now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a roofing assembly of flexible material that may be rolled up and that is connected to a roof structure via carrying elements.

2. Description of Prior Art

It has been proposed elsewhere to use cables or other such carrying elements that span between building columns. Furthermore, it has been proposed to fabricate the roofing from flexible membranes that are superimposed on carrying wire ropes which are connected to the carrying elements of the roof structure.

SUMMARY OF INVENTION

It is an object of the present invention to provide a roofing assembly that can be easily erected and yet resists very high stresses. This is achieved by superimposing the membranes on load transfer member made of high strength materials which are spanning across the supporting elements of the roof structure.

It is advantageous to arrange the carrying flat bars across the long side of the membranes to permit an easy rolling and unrolling of the assembly and to facilitate the erection. To increase the strength in the longitudinal direction, it is advantageous to attach flexible tensile reinforcements made of steel or glass fibre reinforced plastics parallel to the long sides of the membranes and to the load transfer members.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated, by way of example, with reference to the embodiment shown in the accompanying drawings in which:

FIG. 1 is a schematic illustration of a roof construction utilizing the roofing assembly of the present invention;

FIG. 2 is a sectional side view, partly fragmented, of the flexible roofing sheet assembly;

FIG. 3 is a fragmented top view of an attachment;

FIG. 4 is a sectional side view illustrating the connection of two flexible roofing sheet assemblies; and

FIG. 5 is a cross section view along lines V — V of FIG. 4.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings and more particularly to FIG. 1, there is shown a roof construction having cables 3 supported on columns 1 and foundations 2. The anchorage of cables may take place on foundations 2. The roofing assembly 4 is unrolled parallel to cables 3. Each of the roofing membranes is superimposed on carrying flat bars 5 which are tension members, the projecting free ends of which will be connected to cables 3.

The roofing assembly 4 will be transported to the site in the form of rolls 6 and will be unrolled from a boom 7 of a crane 8 for securing to the ropes 3. To temporarily support roofing assembly 4 during erection, supports 9 will span across cables 3. The reinforcements across carrying flat bars 5 i.e. parallel to the long sides

of the roofing assembly, are designated by numeral 10.

As shown in FIG. 2, the construction of the roofing assembly 4 comprises essentially a weather-resistant outside skin 41, an insulating layer 42 and a supporting inside layer 43.

In the right hand part of FIG. 2, the supporting outside skin 44 and the inside skin 45 are made of transparent materials to obtain transparent or translucent areas. The insulating layer, which serves also as a secondary load transfer member, will be applied only in stripes 46 over the primary load transfer members 47 as well as along the longitudinal axis of the roofing assembly. The inside skin is connected to the primary load transfer members 47 by bonding or welding. These load transfer members 47 rest on flat bars 5. The members 47 are made preferably of a flexible plastic material. The load transfer members 47 have recesses on the underside which receive carrying flat bars 5. Carrying flat bars 5 may be connected to members 47 by plastic rivets or by melting the edges of the recess over embedded bars 5. The members 47 and carrying flat bars 5 may be superimposed on reinforcing flat bars 10.

If insulating layer 42 is omitted to obtain transparency, it is advantageous to perforate inside skin 43 to avoid condensation.

Referring now to FIG. 3, there is shown the construction wherein the bars 5 and the reinforcing flat bars 10 are connected to cables 3 which support the roofing assembly.

Near cables 3, carrying flat bars 5 are forming a loop that connects via thimble to carrying wire rope 13. The free end of carrying wire rope 13 is wound around cable 3 and fixed in this position by clamp hook 14. The opposite end of carrying wire rope 13 is led around thimble 12 and connected to itself by cable clamps 15. The connection of ends of carrying flat bars after forming loop 11 is done by weld points or rivets 16. Also, the connection between carrying flat bars 5 and the reinforcing flat bars 10 may be done by weld points or rivets 17. Furthermore, carrying flat bars 5 have perforations 18, through which may reach rivet-like protrusions of members 47.

Referring to FIG. 4, there is shown the connection of two roofing assemblies 4 and 4a to cable 3. It can be seen that each of the sandwich-like roofing assemblies 4 and 4a are superimposed on members 47 which are connected to carrying flat bars 5 by rivets 20. Near cables 3, the carrying flat bars 5 form loops 11 through which carrying wire ropes 13 are fed. The carrying wire ropes 13 are wound around cable 3 and held in position by clamp hooks 14. Reinforcements under carrying flat bars 5 are designated by the number 10. To resist uplift from wind, there is provided ties 22 that connect the ends of the carrying flat bars 5 and of the carrying wire ropes 13 with members 47. It can be seen that near cables 3 the carrying flat bars and the carrying wire ropes are free of assembly 4 and that assembly 4 is overlapping near cables 3. The overlap may be connected by bonding, welding or by other suitable means, i.e. zipper-like or snap button-like elements.

FIG. 5 shows a section along section lines V - V of FIG. 4 to illustrate the outside skin 41, insulating layer 42 and inside layer 43 on member 47. Ties 22 are connected to member 47 by bonding or welding.

It is advantageous to build the roofing membrane assembly 4 in the heretofore described form. It is, however, within the context of the invention to use any

other flexible roofing i.e. a single layer skin without insulating layer. The various layers of the roofing membrane may be connected to each other by bonding or welding. Also, the spacing of members 47 with the embedded carrying flat bars 5 depends on the maximum roof loads and on the strength of the roofing materials used. The carrying flat bars may preferably be made of steel but could also be made of glass fibre reinforced plastic or wire ropes.

1 Claim:

1. A roofing assembly comprising a substantially rectangular roof membrane made of one or more layers of flexible material, said membrane being superimposed on spaced apart load transfer members having a flat support surface connected to said membrane, said load transfer members being superimposed on and connected to a respective flexible load carrying tension member, said tension members being connected at their ends to a respective roof supporting main cable, said load transfer members and tension members extending transversely to the longitudinal axis of said membrane and between adjacent main cables.

2. A roofing assembly as claimed in claim 1 characterized in that tensile reinforcements extend across said tension members preferably at right angles and connected thereto.

3. A roofing assembly as claimed in claim 1 characterized in that the underside of the load transfer members is provided with a recess to receive said tension members.

4. A roofing assembly as claimed in claim 1 characterized in that the membrane is constructed from several layers, at least one layer being a weather-resistant exterior layer and one being a supporting interior layer, said layers connected to each other by spacing elements.

5. A roofing assembly as claimed in claim 4, characterized in that said spacing elements form a continuous insulating layer.

6. A roofing assembly as claimed in claim 1 wherein said load carrying tension members are flat bars.

7. A roofing assembly as claimed in claim 4 characterized in that said insulating layer is in the form of strip-like elements, and translucent exterior and interior layers are used.

8. A roofing assembly as claimed in claim 7, characterized in that said exterior and interior layers are transparent, and said interior layer being perforated in an area between said strip-like elements where the insulating layer is omitted.

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