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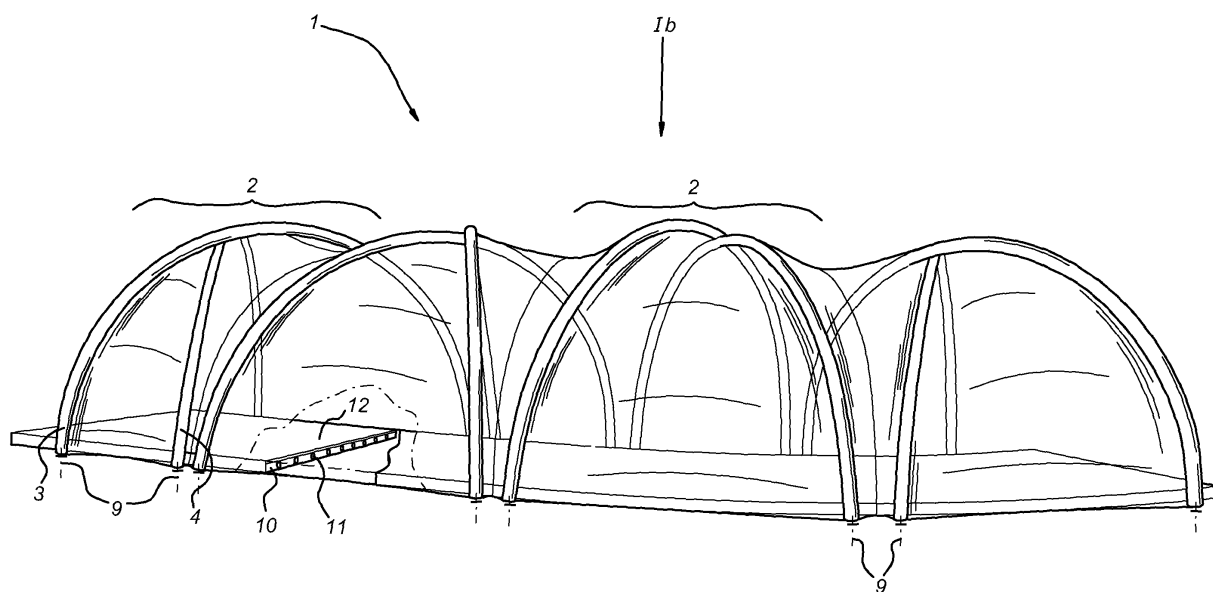
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(54) **Dome-shaped roofing**

(57) Dome-shaped roofing composed of a number of adjoining roofing sections. Each roofing section is approximately trapezoidal when it is not in the erect position. Gastight ducts extend from the opposite corners. When these ducts are pressurized and anchored in the ground

or the like, an arch-shaped roofing section is produced. This arch shape may be promoted further by making the reinforcing material of the ducts, and more particularly the longitudinal fibres thereof, of different lengths, resulting in a prefabricated curvature of the ducts.

**Fig 1a**



## Description

**[0001]** The present invention relates to a dome-shaped roofing comprising a number of adjoining and interconnected roofing sections.

**[0002]** Such roofings are generally known in the prior art. Roofings are used as temporary or permanent structures.

**[0003]** In the prior art, various kinds of roofing sections are used, including straight sections and different corner sections, in order in this way to create a pathway or track. As a result thereof, substantial demands are placed on the stock management of the various sections, while the costs increase considerably due to the use of different sections.

**[0004]** It is an object of the present invention to provide a roofing which is simple to construct and is suitable both for permanent and temporary use. This roofing should be made from relatively inexpensive parts, but this should not have any impact on the quality or the appearance of the roofing.

**[0005]** This object is achieved with a roofing as described above in that a roofing section comprises a sheet which is trapezoidal when projected onto the base surface and has ducts extending from each of its corners to the diagonally opposite corner, which contains a pressurized gas.

**[0006]** By using sheets which are trapezoidal when projected onto the ground surface and have ducts extending crosswise for introducing a gas such as air, each desired track or pathway can be obtained. By placing two roofing sections against one another but the opposite way around, "effectively" a straight section is created. If roofing sections are placed against one another with the same (short or long) side, a bend is created.

**[0007]** By using ducts which can be filled with air, the structure can be made very lightweight and therefore no special foundation work needs to be carried out. As a rule, the only requirement is anchoring to the ground. Such anchoring may take the form of a simple screw anchor or different anchor which is preferably fastened near the free end of the ducts. The ducts may be delimited by the sheet which forms the roofing section, but they may also be completely or partially independent thereof. At the crossing, the ducts may be attached to one another and/or to the sheet.

**[0008]** If the ducts are manufactured separately from the sheet, it is possible to use a fibre-reinforced material which has a much greater strength than the strength of the sheet. This makes it possible to also use strong fibres, such as glass fibres, carbon fibres or aramide fibres.

**[0009]** If fibres extending in the longitudinal direction are used to further increase the strength of the ducts, it is possible to produce such fibres in different lengths, as a result of which the ducts are already precurved without a gas, such as air, having been introduced.

**[0010]** Fastening means are arranged between the roofing sections. These may consist of any fastening

means known in the prior art.

**[0011]** According to an advantageous embodiment of the invention, hook-and-loop (Velcro) fasteners, other strip or cable structures are used between two adjoining roofing sections. Other fastening structures are also possible. Depending on the use, such a fastening should also form a seal. This applies in particular when there are great differences between the interior and the exterior of the roofing. However, it is also possible for adjoining roofing sections to partially overlap one another, more particularly for the sheet of a roofing section to partially overlap the other roofing section and to be attached to the latter in some way.

**[0012]** The roofing according to the present invention can be fitted in a very simple manner.

**[0013]** A ground anchor may be fitted prior or subsequent to the installation of the folded-up or rolled-up roofing sections. Thereafter, the roofing sections are attached to the ground anchor and then air or another gas is introduced into the ducts. If desired, a common distribution line may be provided in order to keep the ducts under a permanent pressure. The structure is erected by increasing the air pressure in the ducts, which renders the use of lifting equipment superfluous. This makes installation and dismantling quicker and easier.

**[0014]** In such a manner, relatively large spans can be achieved. Widths of 2-20 m and more, in particular approximately 10 m, near the ground surface are possible. The length of the roofing sections may vary and is, for example, between 3 and 7 m. Because the roofing sections in their folded-up/rolled-up state only take up a fraction (about 1/100) of their volume in the erected state, they are particularly suitable for temporary use. Examples of the latter are ice-skating rinks. In this case, it is obviously necessary to make provisions on the ground in order to be able to achieve such an ice-skating rink. In addition, it is advantageous if, in such a case, the sheet material of the roofing sections is designed in such a manner that heat loss is limited as far as possible. To this end, various kinds of coating can be applied to the sheet of the roofing section. According to an advantageous embodiment, the sheets are of transparent design, at least near the side walls of the roofing section. These may optionally be opened. This can be achieved by making it possible to fold the sheet used. Depending on the application, the upper side may be of non-transparent design. At locations with large amounts of (sun)light, it is possible to install solar collectors and the like.

**[0015]** Another application of the dome-shaped roofing is the creation of a pathway. Particularly in regions with adverse climate conditions, protection against the environment may be desirable. Such adverse conditions may be a high or low temperature and/or a lot of wind. Depending on the circumstances, climate control devices may be provided which optimize the climate within the dome-shaped roofing. This may comprise both heating and cooling. Depending on the application, the sheet of the dome-shaped roofing will be provided with a coating.

**[0016]** The sheet material used may be any material known in the prior art, such as ethylene terephthalate. If desired, reinforcing structures may be provided in the sheet, which may or may not be visible. The gas pressure inside the ducts will be selected as a function of the diameter of the ducts, the demands regarding strength which they have to meet and the size of the roofing. By way of example, a value of approximately 5 atmosphere is mentioned.

**[0017]** In one particular variant, it is possible for a roofing section to be provided with a side entrance/exit.

**[0018]** With the present invention, it is also possible to erect permanent structures. In case of any damage, it is very easy to replace a roofing section.

**[0019]** The invention will be explained in more detail below with reference to an exemplary embodiment illustrated in the drawing, in which:

Figs. 1a-b diagrammatically show a dome-shaped roofing in which the roofing sections are placed in different positions, in side view and top view, respectively; and

Fig. 2 shows a roofing section according to the present invention in the folded-out state and in projection on the base surface.

**[0020]** In Figs. 1a, b a dome-shaped roofing is denoted by reference numeral 1. It consists of various roofing sections 2. Each section 2 is identical, but by means of different positioning it is possible to create straight sections and bends, as is clear from Figs. 1a, b.

**[0021]** The roofing sections are fastened to the ground by means of anchors 9. These may be simple screw anchors which are attached to the roofing sections in any desired way.

**[0022]** The present case concerns an ice-skating rink, which is the reason why the ground or floor 10 is provided with lines 11 through which a refrigerant flows. A layer of ice 12 is present on the ground or floor 10.

**[0023]** Fig. 2 illustrates details of a roofing section which is shown in the folded-out state. This is shown as a projection. It will be understood that the actual shape will be different as a result of the vaulted design. Gas ducts 3 and 4 are present and therefore, a fibre reinforcement 5 has been provided. The latter consists of longitudinal fibres 6 having a length which differs to such a degree that when the ducts 3 are pressurized and not fixed at the corners 15, at least part of the desired convex shape or curve is created. Fixing with anchors 9 provides a further guarantee that the convex shape is created.

**[0024]** The ducts 3 and 4 are attached to a sheet 8. Such an attachment may be effected by bonding. It is also possible to omit an attachment and to accommodate the ducts in a seam in a loose manner. The ducts may extend both on the outside and on the inside. In the present case, the ducts are arranged on the inside (in the erect position of the roofing sections), attached by means of being accommodated in a seam which is situ-

ated on the inside (or outside) of the roofing. The seam for the bottom duct is, for example, situated on the inside, while that for the top duct is situated at the bottom. Thus, the sheet can be in the form of a surface between the ducts.

**[0025]** The edge strips are provided with bands 13 of hook-and-loop fastening material (Velcro) or a cable connection. As a result, it is possible to attach adjoining roofing sections to one another using a simple strip, which, depending on the embodiment, creates a substantially sealed attachment.

**[0026]** The roofing sections are supplied in rolled-up or folded-up form. At the point of use, they are arranged lying next to one another in the desired shape and connected to any anchoring which may be present. Subsequently, air or another gas is introduced in the ducts. To this end, the ducts may be provided with valves which are not shown in any more detail and which prevent the air from escaping without any further action being required. After having been inflated, a strong structure is obtained which is suitable for temporary use and for relatively long periods. The roofing sections may be attached either after the individual roofing sections have been erected or before, while they are being positioned relative to one another.

**[0027]** If desired, the roofing may be shored up at the end of a track or pathway formed in this way in the longitudinal direction thereof.

**[0028]** The present invention provides a particularly effective solution for temporary and permanent roofings.

**[0029]** Upon reading the above description, those skilled in the art will immediately be able to think of variants and further applications. These lie within the scope of the attached claims.

## Claims

1. Dome-shaped roofing (1), comprising a number of adjoining and interconnected roofing sections (2), **characterized in that** a roofing section (2) comprises a sheet (8) which is trapezoidal when projected onto the base surface (10) and has ducts (3, 4) extending from each of its corners to the diagonally opposite corner, which contains a pressurized gas.
2. Roofing according to Claim 1, in which the walls of these ducts comprise a fibre reinforcement (5) extending in the longitudinal direction thereof, the fibres (6) being of different lengths, depending on their position in the duct wall.
3. Roofing according to one of the preceding claims, comprising anchoring means (9) which can be arranged in the ground and extend in (line with) these ducts (3, 4).
4. Roofing according to one of the preceding claims,

comprising transparent side walls.

5. Roofing according to one of the preceding claims, wherein two ducts are arranged crosswise and are attached to one another at the crossing. 5
6. Roofing according to one of the preceding claims, wherein the free end of a roofing section is provided with fastening means (13) for attachment to an adjoining roofing section. 10
7. Ice-skating rink comprising a dome-shaped roofing according to one of the preceding claims and a heat exchanger (11) arranged on the ground. 15
8. Pathway comprising a tubular roofing according to one of the preceding claims.
9. Pathway according to Claim 8, provided with a climate control device. 20
10. Roofing section (2) for producing a dome-shaped roofing, comprising a trapezoidal sheet (8) having gastight ducts (3, 4) extending from its corners, which ducts are provided with a gas supply/discharge opening as well as a reinforcement extending in the longitudinal direction of the ducts, which reinforcement comprises longitudinal fibres (6), the length of these longitudinal fibres on one side of this sheet being greater than on the other side of this sheet in order to create an arch-shaped appearance when these ducts are pressurized. 25 30

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Fig 1a

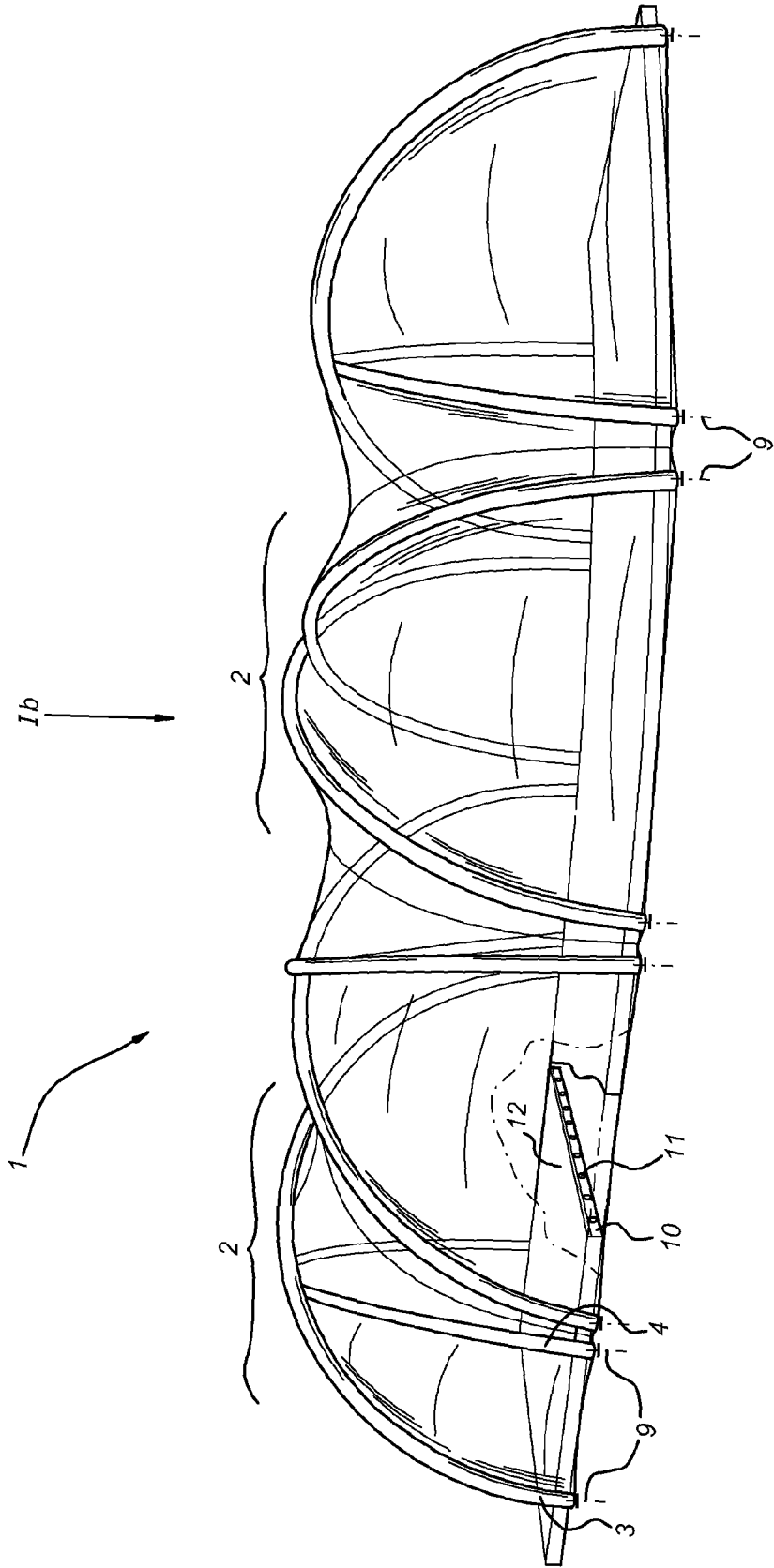


Fig 1b

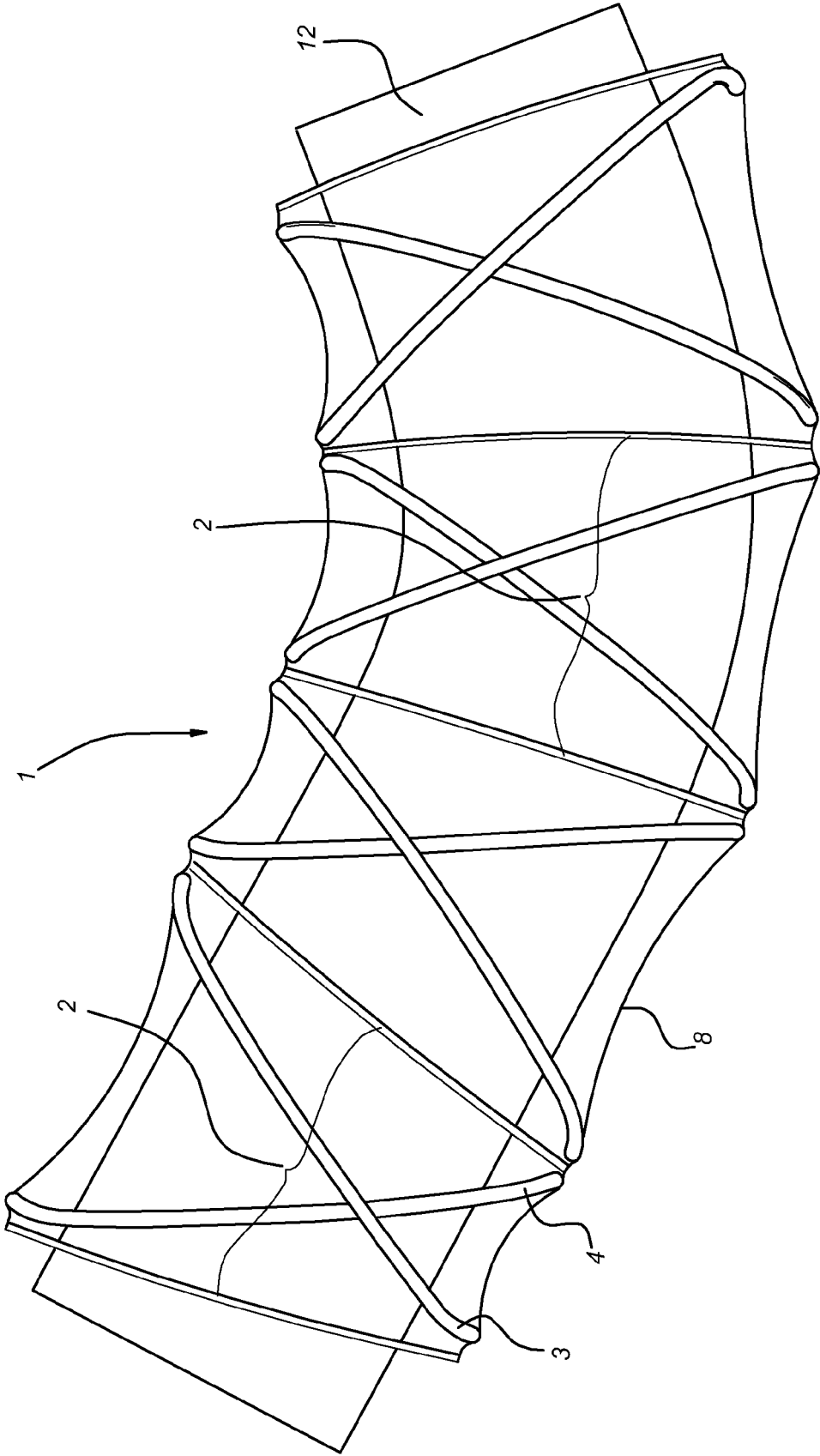


Fig 2

