In a tent roof having arched support elements (2, 3), over which a diaphragm (1) is stretched, at least three intersecting arched support elements (2, 3) are provided, whereby at least two support element ends (4) at a time are able to be fixed adjacent to one another on the foundation in an arch terminus area (12), at least three arch terminus areas (12) are provided, and traction elements (7) running approximately in an arched shape, which engage on the diaphragm (1), in particular on the diaphragm edge, are stretched toward the arch terminus areas (12).
The invention relates to a tent roof having arched support elements, over which a diaphragm is stretched.

In the field of tent construction, implementing tent roofs in so-called form-found diaphragm construction is known.

For example, a pavilion type tent is known from U.S. Pat. No. 5,345,962, in which the arched support structures stretch a light diaphragm, the tension of the diaphragm being maintained by support rods outside the tent roof between the arched support structures.

A polygonal, freestanding structure is described in U.S. Pat. No. 5,117,852, in which intersecting arched support elements enclose a miniaturized image of the footprint in the gable center.

Three-dimensional support structures having diaphragms are used for temporary or stationary construction designs in textile architecture in greatly varying implementations. These are predominately spatial diaphragm designs whose stability is directed to guying points on the ground. The mode of operation of anastomosis, i.e., oppositely curved, stretched diaphragm surfaces, has been described multiple times. In the field of diaphragm construction, these are usually approximately minimal areas. They are currently typically ascertained mathematically with the aid of computer programs, this process is also referred to form finding. By cutting the diaphragm material correctly for the material involved to size, wrinkling may be avoided and the diaphragm tension may be maintained via the cable-type traction means or traction elements engaging at the edge of the diaphragm, which are fastened to foundations, guyed supports, or to floor plates.

The invention is intended to improve a tent roof having arched support elements, over which a diaphragm is stretched, in such a way that it may cover the largest possible areal with low material outlay and permits rapid setup and/or teardown. For this purpose, the tent roof is spanned by at least three intersecting arched support elements, whereby at least two support element ends at a time are fixed adjacent to one another on the foundation in an arch terminus area and whereby at least three arch terminus areas are provided, and whereby traction elements, running approximately in an arch, which engage on the diaphragm edge are provided, which are stretched toward the arch terminus areas.

Furthermore, for this purpose the tent is preferably formed from three arched support elements, whereby two longitudinal arches and a transverse arch are provided as the arched support elements, whereby the longitudinal arches can have the same span width and the transverse arch can have a shorter span width different therefrom.

To improve the wind and weather resistance, the diaphragm is preferably manufactured from a weatherproof plastic for this purpose, whereby the diaphragm can also have a hood-like form similar to the surface of a laterally cut-off flat dome. Furthermore, the diaphragm may be assembled from individual partial areas for this purpose, whereby the individual partial areas have an anastomosis surface curvature in the form of a saddle surface. The tailored technical diaphragms are curved opposingly in particular over the sequence of high and low points and may counteract a strain by wind suction and pressure in this way.

To further improve the wind resistance, the tent may be stretched down via additional diaphragm areas, which represent lateral partial areas and are attached to the diaphragm edges on at least one gauzy point each to the foundation. For this purpose, the attached diaphragm areas preferably have a traction element at the lower diaphragm edge, which may be stretched down both to the two adjoining arch terminus areas and also to at least one gauzy point each on the foundation between the two arch terminus areas, whereby the attached diaphragm areas preferably are removable.

A further object of the invention is to form a statically integrally formed support structure. For this purpose, the support element ends are preferably fastenable on the foundation by a fastening device in an arch terminus area, whereby the support elements can be connected to one another non-positively at their intersection points.

In a preferred implementation, the arched support elements intersect one another in a single intersection point, whereby the material of the arched support elements can be elastic for further static tension.

At least three arched support elements which intersect one another are provided, whose ends are fixed, each two adjacent, on the foundation on at least three arch terminus areas. The traction elements running approximately in an arch shape on the diaphragm edge are also stretched toward these arch terminus areas. The tent roof is distinguished in that the traction elements at the edge of the diaphragm area each connect to arch terminus areas by traction, statically acting in such a way that stretching of the arched support elements is counteracted, whereby a statically integrally formed support structure arises in case of three arched support elements.

A further object of the invention is to store the tent in as space-saving a way as possible when it is not in a set-up state, whereby the individual parts should be manufactured from light materials for easier transport. For this purpose, the arched support elements may each comprise multiple partial pieces, which have bending-resistant connection elements for their connection, whereby the partial pieces can be formed by GRP tubes, which are connected in the tube interior by an elastic cable.

To provide a tent which may be both set up and also torn down in a short time, occupies little storage space in the torn-down state, and has low weight for simplified transport, the arched support elements are preferably formed from multiple partial pieces, approximately 2 m long, which may be assembled with the aid of bending-resistant connection elements. The partial pieces may comprise GRP tubes having a diameter of approximately 6 cm, and are connected in the tube interiors by an elastic cable, whereby the individual parts preferably can be engaged using a catch closure. The connection elements are preferably glued into the tube at the ends of the partial pieces, whereby counter pressure is being exerted by a sleeve pressed on from the outside. The terminals of the connection elements preferably have the form of a pin or a sleeve respectively, into which the pin opens and engages at its base in a snap mechanism. This snap mechanism is advantageously opened by actuating an element on the exterior side of the connection element. Connection elements may also be situated on the support element ends, where they engage in a connection element which is fastened using a universal joint on the arch terminus area. Six connection element halves are preferably located on the three arched support elements in the intersection point of the arched support elements, which are attached at the middle to a joint also having six halves. The
individual support elements may thus be put together rapidly for the setup, require little storage space, and have a low weight due to the GRP tubular construction.

A further goal of the invention is to leave the setup space of the tent preferably in the same state in which it was found. For this purpose, the arched support elements having their support element ends and the traction elements preferably end in floor plates which have been previously laid on the setup space. Because a statically integrally formed design already results therein, any further engagement in the ground of the setup space is unnecessary, as the tent is already fixed in place by its own weight. Nonetheless, if necessary the tent may be anchored still further to the ground using diaphragm areas and traction elements fastened thereon.

The invention is explained in greater detail hereafter on the basis of an exemplary embodiment shown in the drawing. Therein,

FIG. 1 shows a top view of the tent roof,

FIG. 2 shows a view of the tent roof from the front, and

FIG. 3 shows a view of the tent roof from the side.

FIG. 1 shows a tent having three arched support elements 2, 3 and a diaphragm 1 stretched over them. The three arched support elements 2, 3 intersect one another in their course and are connected to one another non-positively at the intersection point 6. The support element ends 4 are each assembled with a second support element end 4 in an arch terminus area 12 and are fixed on the foundation by a fastening device, such as a floor plate. The traction elements 7 which form the boundary terminus of the diaphragm 1 are also stretched toward the support element ends 4 at the arch terminus areas 12. They each connect two arch terminus areas 12 having floor plates and hold them together. Stretching of the arched support elements 2, 3 and movement of the arch terminus areas 12 or floor plates respectively apart from one another is thus counteracted. A pre-tension is applied to the traction elements 7, which is also transmitted to the diaphragm 1 lying above. An equilibrium of the forces of the arched support elements 2, 3 pressing outward and the constraining forces of the traction elements 7 arises in the arch terminus areas 12. The overall design thus forms a statically integrally formed system with three arched support elements 2, 3 and three arch terminus areas 12, which does not require any further gying of the diaphragm 1 to the foundation. Further diaphragm areas 5 may be attached to the diaphragm edges where the traction elements 7 are located. The closure is openable and the traction tensions of the traction elements 7 may be transmitted via the attached diaphragm areas 5, which are tensioned toward the ground via at least one gying point 9-11, into the ground. The attached partial areas 5 have traction elements 8 at the lower diaphragm edge to absorb tension, which are stretched down toward the two floor plates of the adjoining arch terminus areas 12, and also to at least one gying point 9-11 each on the foundation between the two arch terminus areas 12.

Two longitudinal arches 3 having a span width of approximately 14 m and a transverse arch 2 having a span width of approximately 11 m may be provided as the arched support elements 2, 3. They run approximately together at their ends. The spacing of the support element ends 4 is approximately 50 cm. The arched support elements 2, 3 intersect one another in an intersection point 6, which is located in the arch center of the transverse arch 2. An elastic material is used for the arched support element, which is brought into shape by traction cables during setup and keeps its shape due to the static force equilibrium already described after the traction elements 7 are pre-tensioned.

The diaphragm 1 is guided along the arched support elements 2, 3 in a tab around the arched support element and is fastened at the end of the tab, at the meeting point of tab and the two diaphragm areas pulling on the arched support element, by a traction cable. A reinforcement is attached on the interior side of the diaphragm facing away from the arched support element, which partially absorbs the traction tensions of the diaphragm 1. The above-mentioned traction cable is stretched along the arched support element, up to the particular support element end 4, where it is fixed on the arch terminus area 12. The traction element 7 in the diaphragm edge of the non-removable diaphragm 1 is also guided in a loop and stretched toward the arch terminus area 12. The gying is relayed by a cable terminal fitting to a tension system, which leads the cable to an eye fixed on the arch terminus area 12 or the floor plate respectively. Reinforcements by additional diaphragm and belts are attached to all edge areas on the diaphragm 1 or the diaphragm areas 5 respectively which border a gying point 9-11 or the arch terminus area 12.

FIG. 2 shows the tent according to the invention in a frontal view, and FIG. 3 in a side view, whereby the same reference numerals are used as in FIG. 1.

1. A tent roof comprising:
   - at least three arched support elements (2, 3), and
   - a diaphragm (1) stretched over said support elements (2, 3),

   wherein three of the at least three arched support elements (2, 3) intersect one another,
   - two support element ends (4) of the three support elements
     - at a given time positioned to be fixed adjacent to one another on a foundation in an arch terminus area (12),
     - forming three arch terminus areas (12), and
     - traction elements (7) running approximately in an arched shape, engage on edges of the diaphragm (1), and are stretched toward the arch terminus areas (12).

2. The tent roof according to claim 1, wherein additional diaphragm areas (5), are formed as lateral partial areas of the roof, said additional diaphragm areas (5) being attached to the diaphragm edges, and each of said additional diaphragm areas (5) being stretched downwardly toward the foundation at at least one gying point (9, 10, 11).

3. The tent roof according to claim 1, wherein the diaphragm (1) has a shape in the form of a surface of a laterally cut-off flat dome.

4. The tent roof according to claim 1, wherein the diaphragm (1) is comprised of individual partial areas, and the individual partial areas have an anticlastic surface curvature in the form of a saddle surface.

5. The tent roof according to claim 1, wherein the support elements (2, 3) are connected to one another non-positively at a point of intersection (6) of the support elements (2, 3).

6. The tent roof according to claim 1, wherein the support element ends (4) are adapted to be fixed to the foundation by a fastening device in an arch terminus area (12).

7. The tent roof according to claim 2, wherein the additional diaphragm areas (5) are removable.

8. The tent roof according to claim 2, wherein the additional diaphragm areas (5) each have a traction element (8) on a lower diaphragm area, said traction elements (8) being stretched down to both of two adjoining arch terminus areas.
(12) and also to at least one guying point (9, 10, 11) on the
foundation between the two adjoining arch terminus areas
(12).

9. The tent roof according to claim 1, wherein the roof is
formed from three arched support elements (2, 3).

10. The tent roof according to claim 1, wherein
said at least three arched support elements (2, 3) comprise
two longitudinal arches (3) and a transverse arch (2),
the two longitudinal arches (3) have equal span widths, and
the transverse arch (2) has a span width that is shorter than
the span widths of the two longitudinal arches (3).

11. The tent roof according to claim 1, wherein the arched
support elements (2, 3) intersect one another at a single inter-
section point (6).

12. The tent roof according to claim 1, wherein a material
of which the arched support elements (2, 3) are formed is an
elastic material.

13. The tent roof according to claim 1, wherein the arched
support elements (2, 3) each comprise multiple partial pieces,
and said partial pieces have bending-resistant connection ele-
ments for connection between said partial pieces.

14. The tent roof according to claim 13, wherein the partial
pieces are formed by GRP tubes, which are connected in
interiors of the tubes by an elastic cable.

15. The tent roof according to claim 13, wherein the con-
nection elements are attached at ends of the partial pieces, and
are glued into the tubes.

16. The tent roof according to claim 15, wherein the glued
connection elements receive counterpressure through an
externally attached sleeve.

17. The tent roof according to claim 13, wherein terminals
of the connection elements shaped in the form of a pin or a
sleeve into which a pin is received.

18. The tent roof according to claim 17, wherein a pin of the
connection element terminal engages in a snap mechanism at
a base of the pin upon connection.

19. The tent roof according to claim 18, wherein an open-
ing of the snap mechanism is performed by actuating an
element on an exterior side of the connection element.

20. The tent roof according to claim 1, wherein the arched
support elements (2, 3) are guided in at least one tab of the
diaphragm (1).

21. The tent roof according to claim 20, wherein the dia-
phragm (1) at an end of the tab guided around the arched
support elements (2, 3) is fastened to a traction cable at a
meeting point of the tab and the two diaphragm areas pulling
on the arched support element (2, 3).

22. The tent roof according to claim 21, wherein the trac-
tion cable is fastened under the arched support elements (2, 3)
to the diaphragm (1) and is stretched along the arched support
element (2, 3) to a particular support element end (4).

23. The tent roof according to claim 1, wherein the traction
elements (7) engaging on the edges of the diaphragm (1) are
comprised of a cable.

24. The tent roof according to claim 23, wherein the trac-
tion cable is guided in a loop of the diaphragm (1).

25. The tent roof according to claim 23, wherein the trac-
tion cable has a terminal fitting.

26. The tent roof according to claim 25, wherein the ter-
mi nal fitting of the traction cable is stretched using a stretch-
ing system toward the arch terminus area (12).

27. The tent roof according to claim 1, wherein reinforce-
ments by additional diaphragm areas (5) and belts are
attached to the diaphragm (1) on all boundary areas which
border a guying point (4, 9, 10, 11).

28. The tent roof according to claim 1, wherein the support
element ends (4) and the traction elements (7) are formed to
be fixed on floor plates in the arch terminus area (12).

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