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(54) **A CANOPY.**

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Courier Press, Leamington Spa, England.

Description

The invention relates to a canopy panel comprising means for tensioning the panel, said means extending along edges of the panel in a curve extending inwardly between the panel corners (GB—A—637 114). The invention also relates to a canopy comprising a plurality of said panels and a method of erecting the canopy.

It is necessary in many applications to provide an overhead canopy for shelter or shade and particularly in agricultural situations to provide shade for plants. Many other applications also require the provision of overhead canopies to protect or shade articles which are placed outside to prevent degradation from ultra-violet light. In the past shade canopies have been provided using various types of structures to support either opaque awnings or shade cloths using a rigid frame structure or a large number of upright poles or posts to support the cloth. It is a disadvantage of such systems that the poles or posts must be closely spaced in order to prevent excessive sagging of the canopy fabric which is difficult from the point of view of cultivation or the placing of large objects beneath the canopy.

In US—A—2 051 643 a cloth house for protecting large surfaces is described which comprises one or more strips of cloth supported on wires extending between posts spaced around the perimeter of the cloth house. To resist against wind forces adjacent edges of the strips may be fixed to a cord or rope to provide a reinforced seam which may be attached to the supporting wires. Also, a reinforcing cord or rope may be provided at the other edges of the cloth. This known canopy of cloth house uses the supporting wires to prevent excessive sagging.

Another prior art canopy is described in CH—A—387 919 which comprises a single panel mounted on posts so as to permit sagging of the panel fabric, some of the posts being designed to permit drainage of water from the panel upper side.

GB—A—277 443 concerns a tent that may be raised to form a canopy. The tent or canopy is of rather small dimensions and sagging is generally not a problem in tents or canopies of this type.

A tent panel tensioning arrangement has been described in GB—A—637 114. In the known arrangement, the tent panel is tensioned by a separate cable or cord extending in an inward curve through a sleeve along the edge of the panel. While this arrangement operates to remove slack material from the central region of the panel, it tends to apply too much tension at the edges of the panel thereby making the panel prone to tearing at those points.

It is therefore an object of the invention to provide a canopy which will obviate or minimize the foregoing disadvantages in a simple yet effective manner or which will at least provide the public with a useful choice.

In accordance with the invention the canopy panel consists of stretch fabric and the tensioning means are inelastic or low stretch tendons fastening thereto at or adjacent the panel edges and the curve is a bell shaped curve being convex with respect to the panel edge adjacent the corners of the panel and concave with respect to the panel edge adjacent the mid-portion of the panel edge.

Preferably said fabric comprises a stretch knit fabric and said tendons comprise rope or webbing.

Preferably said fabric comprises knitted shade cloth and said tendons comprise webbing of the type commonly used for automotive seat belts.

Preferably said tendons are fastened to said fabric along the entire length of the tendons.

Preferably said tendons are sewn to the fabric.

Preferably the panel edges are substantially straight.

In a further aspect the invention consists in a canopy comprising an array of posts and a plurality of said panels stretched therebetween at the desired height, with the tendons being tensioned between the posts thereby at least partially straightening the curved tendons drawing fabric from the middle area of the panels and tensioning the panels.

Preferably said panels are rectangular and said posts are arranged in a rectangular array.

Preferably five said posts are provided in said rectangular array, thee being one said post at each corner and one post in the middle, and four said panels are provided, each panel being fastened first to the centre post and one corner post and then having the other two diagonally opposite corners drawn together with the adjacent corners of the adjacent panels at the mid-points of the sides of the rectangular array.

According to a still further aspect the invention consists in a method of erecting said canopy comprising erecting a plurality of posts in a predetermined array, and characterized by fastening diagonally opposite corners of each said panel to selected ones of said posts and drawing together the remaining corners of adjacent panels so as to tension said tendons and hence tension said stretch fabric.

Notwithstanding any other forms that may fall within its scope one preferred form of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a plan view of a fabric panel used in a canopy according to the invention,

Figure 2 is a plan view of a canopy according to the invention,

Figure 3 is a side elevation of the canopy shown in Figure 2,

Figure 4 is a cross-sectional elevation to an enlarged scale of the footing for a post used in the canopy according to the invention, and

Figure 5 is a cross-sectional elevation to an enlarged scale of the footing for a tie-down used in the canopy according to the invention.

In the preferred form of the invention a canopy particularly used as a shade canopy and using a fabric shade cloth is constructed as follows

although it will be appreciated that the invention may be utilized in any situation where it is desired to provide an overhead canopy.

The canopy is formed from a plurality of panels such as that shown at 1 in Figure 1 which may be formed from any desired stretch material and which in the preferred form of the invention are formed from knitted polyethylene shade cloth. A typical cloth is that made by Gale Pty. Ltd. of Australia as Elderado Weathershade. The panel may be of any desired size and may be formed from a single length of knitted cloth or from a number of lengths of cloth sewn together to form a large rectangular array. In the example of the invention shown in the accompanying drawings each panel may for example be approximately 50 feet (14.33m) along each side. Each panel is provided with inelastic or low stretch tendons fastened to the panel at or adjacent the panel edges. In the preferred form of the invention the tendons are formed from webbing 2 sewn to the panel fabric adjacent each edge. The tendons are formed from a type of webbing commonly used for automotive seat belts although it will be appreciated that other forms of webbing, rope or cable may be used in this application. The webbing is sewn continuously to the panel fabric in a curve extending inwardly between the panel corners 3 so that when the webbing is tensioned (as will be described below) the curve at least partially straightens drawing the fabric from the middle area 4 of the panel.

If the curve is a simple curve which is concave when viewed from the panel edge it has been found that a curve of this type over tensions the fabric in the areas adjacent the corners 3. It is therefore suggested to sew the webbing to the fabric in a bell shaped curve being convex with respect to the panel edge over the areas 2A adjacent the corners of the panel and concave with respect to the panel edge over the area 2B adjacent the mid-portion of the panel edge. The depth of the curve may be varied to suit the fabric used and the panel size but it has been found suitable with knitted polyetheylene shade cloth in panels 14.3m along each side to use a curve depth of 500 mm between the panel edge and the webbing at the mid-point of the side.

In one form of the invention the canopy may be erected using fourteen posts comprising twelve edge posts P1—P12 and two centre posts P13 and P14 as shown in Figure 2. The canopy may however be formed to any required size or configuration using a basic rectangular array of four panels 13 based on four corner posts P13, P5, P9 and P7 and a centre post P14. It will be appreciated that the basic rectangular array may be repeated any number of times to build up a shade canopy to cover the desired area.

Each edge post is supported by guy wires 7 which are anchored into the ground by any convenient anchor such as a block of concrete buried in the ground. The posts may similarly be supported on any suitable footing such as that shown in Figure 4. It is desirable that the posts can rock on the footing 16 to give an elastic structure which can move to absorb wind loadings or other abnornal loadings in use. The posts are further located by diagonal guy wires 10 which also serve to locate the centre posts P13 and P14.

Once the rectangular array of posts has been erected, fabric panels such as that shown in Figure 1 are positioned within the array and opposite diagonal corners of the panels are secured to the posts at the desired height which is normally at the top of the posts. In this manner the diagonally opposite corners of the panels are fastened to their adjacent posts P1, P3, P13, P5, P11, P14, P9 and P7. The remaining diagonally opposite corners of the panels are then drawn together with the adjacent corners of the adjacent panels at points P2, P4, p12, T1, T2, P6, P10 and P8. Where these points coincide with a post, i.e., around the perimeter of the canopy, they may then be fastened to that post. At the intermediate points T1 and T2 it is not necessary to provide a post but desirable to provide tie-down wires 5 (Fig. 5) from the tension point to an anchor block 6 buried in the ground. The tie-down wires 5 serve to restrain the canopy in windy situations and prevent upward bowing or ballooning.

The drawing together and tensioning operation may be performed by any suitable tensioning apparatus. As the corners are drawn together to points 11 the webbing tendons 2 are tensioned causing the curve of the webbing to straighten and tension the fabric across the entire area of the panels.

Once the panels have been drawn together and tensioned the edges of adjacent panels (outside the tendons) may be fastened together to form a continuous cover. The fastening may be by way of clips or lacing but preferably by sewing using a small hand held portable sewing machine.

The basic rectangular array of four panels 13 erected as described may be repeated to cover any desired area and it has been found that by using four such basic rectangular arrays it is possible to cover an area of one acre. The area so covered has the advantage that there are only five internal posts within the acre area leaving large free areas for cultivation or storage. The canopy formed according to the invention is very resilient and capable of withstanding high wind loadings and furthermore because it is an elastic tensioned structure the canopy is able to resist impact from various objects such as falling branches without significant damage to the canopy.

In this manner a canopy can be provided which is simple and easy to erect and which can cover large areas of land in a simple and cheap manner with the use of a minimum number of support posts.

Although the canopy has been described in a certain size and using a certain material it will be appreciated that the basic canopy system may be applied in many different applications requiring different canopy sizes and using different fabric to suit the intended application.

Claims

1. Canopy panel comprising means for tensioning the panel (1, 13), said means extending along edges of the panel (1, 13) in a curve extending inwardly between the panel corners (2A), characterized in that the panel (1, 13) consists of stretch fabric, and the tensioning means are inelastic or low stretch tendons. (2) fastened thereto at or adjacent the panel edges, and that said curve is a bell shaped curve being convex with respect to the panel edge adjacent the corners (2A) of the panel and concave with respect to the panel edge adjacent the mid-portion (2B) of the panel edge.

2. Canopy panel according to claim 1, characterized in that said fabric comprises a stretch knit fabric and said tendons (2) comprise rope or webbing.

3. Canopy panel according to claim 2, characterized in that said fabric comprises knitted shade cloth and said tendons (2) comprise webbing of the type commonly used for automobile seat belts.

4. Canopy panel according to any one of claims 1 to 3, characterized in that said tendons (2) are fastened to said fabric along the entire length of the tendons (2).

5. Canopy panel according to claim 4, characterized in that the tendons (2) are sewn to the fabric.

6. Canopy panel according to any one of claims 1 to 5, characterized in that said panel edges are substantially straight.

7. Canopy comprising an array of posts (P) and a plurality of panels (1, 13) according to any one of claims 1 to 6, characterized in that the panels (1, 13) are stretched between the posts at the desired height, with the tendons (2) being tensioned between the posts (P) thereby partially straightening the curved tendons (2), drawing the fabric from the middle area of the panels (1, 13) and tensioning the panels (1, 13).

8. Canopy according to claim 7, characterized in that said panels (1, 13) are rectangular and said posts (P) are arranged in a rectangular array.

9. Canopy according to claim 8, characterized in that five said posts (P) are provided in said rectangular array there being one said post at each corner (3) and one post in the middle and wherein four said panels (1, 13) are provided, each panel (1, 13) being fastened first to the centre post and one corner post and then having the other two diagonally opposite corners (3) of the panels drawn together with the adjacent corners (3) of the adjacent panels at the midpoints of the sides of the rectangular array.

10. Method of erecting a canopy according to claim 7, 8 or 9, comprising erecting a plurality of posts (P) in a predetermined array, characterized by fastening diagonally opposite corners (3) of each said panel (1, 13) to selected ones of said posts (P) and drawing together the remaining corners (3) of adjacent panels (1, 13) so as to tension said tendons (2) and hence tension said stretch fabric.

Patentansprüche

1. Überdachungspanel mit Einrichtungen zum Spannen des Panels (1, 13), wobei sich die Einrichtungen längs der Ränder des Panels (1, 13) in einer Kurve erstrecken, die sich zwischen den Panelecken (2A) nach innen erstreckt, dadurch gekennzeichnet, dass das Panel (1, 13) aus Stretchgewebe besteht und die Spanneinrichtungen unelastische oder wenig streckbare Spannglieder (2) sind, welche an oder nahe den Panelrändern befestigt sind, und dass die Kurve eine glockenförmige Kurve ist, die in bezug auf den Panelrand an den Ecken (2A) des Panels konvex und in bezug auf den Panelrand nahe dem Mittelteil (2B) des Panelrandes konkav ist.

2. Überdachungspanel nach Anspruch 1, dadurch gekennzeichnet, dass das Gewebe ein Stretchgewirke aufweist und dass die Spannglieder (2) ein Seil oder Gurtband aufweisen.

3. Überdachungspanel nach Anspruch 2, dadurch gekennzeichnet, dass das Gewebe gewirktes, Schatten spendendes Tuch aufweist und dass die Spannglieder (2) ein Gurtband aufweisen, wie es üblicherweise für Autosicherheitsgurte benutzt wird.

4. Überdachungspanel nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass die Spannglieder (2) an dem Gewebe auf der gesamten Länge der Spannglieder (2) befestigt sind.

5. Überdachungspanel nach Anspruch 4, dadurch gekennzeichnet, dass die Spannglieder (2) an das Gewebe angenäht sind.

6. Überdachungspanel nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass die Panelränder im wesentlichen gerade sind.

7. Überdachung mit einer Anordnung von Pfosten (P) und mit mehreren Panel (1, 13) nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, dass die Panel (1, 13) zwischen den Pfosten in der gewünschten Höhe gespannt sind, wobei die Spannglieder (2) zwischen den Pfosten (P) gespannt sind, wodurch die gekrümmten Spannglieder (2) teilweise geradegerichtet werden, das Gewebe aus dem Mittelbereich der Panel (1, 13) gezogen wird und die Panel (1, 13) gespannt werden.

8. Überdachung nach Anspruch 7, dadurch gekennzeichnet, dass die Panel (1, 13) rechteckig sind und dass die Pfosten (P) eine rechteckige Anordnung aufweisen.

9. Überdachung nach Anspruch 8, dadurch gekennzeichnet, dass fünf Pfosten (P) in der rechteckigen Anordnung vorgesehen sind, wobei sich ein Pfosten in jeder Ecke (3) und ein Pfosten in der Mitte befindet und wobei vier Panel (1, 13) vorgsehen sind, wobei jedes Panel (1, 13) zuerst an dem mittleren Pfosten und einem Eckpfosten befestigt worden ist und dann die anderen beiden, diagonal entgegengesetzten Ecken (3) der Panel zusammengezogen worden sind, so dass sich die benachbarten Ecken (3) der benachbarten Panel in den Mittelpunkten der Seiten der rechtekkigen Anordnung befinden.

10. Verfahren zum Errichten einer Überdachung nach Anspruch 7, 8 oder 9, beinhaltend das Errichten von mehreren Pfosten (P) in einer vorbestimmten Anordnung, gekennzeichnet durch Befestigen von diagonal entgegengesetzten Ecken (3) jedes Panels (1, 13) an ausgewählten Pfosten (P) und Zusammenziehen der übrigen Ecken (3) von benachbarten Panel (1, 13), so daß die Spannglieder (2) gespannt werden und dadurch das Stretchgewebe geapannt wird.

Revendications

1. Panneau de dais comprenant des moyens permettant de tendre ce panneau (1, 13), ces moyens s'étendant le long de bords du panneau (1, 13) suivant une courbe s'étendant vers l'intérieur entre les coins (2A) du panneau, caractérisé en ce que ce panneau (1, 13) est constitué d'un tissu étirable et les moyens de tension sont des tendeurs non élastiques ou faiblement étirables (2) fixés sur lui à l'endroit des bords du panneau ou à leur voisinage, et en ce que ladite courbe est une courbe en forme de cloche qui est convexe par rapport au bord du panneau au voisinage des coins (2A) de ce panneau et concave par rapport au bord du panneau au voisinage de la partie intermédiaire (2B) de ce bord de panneau.

2. Panneau de dais suivant la revendication 1, caractérisé en ce que le tissu est constitué par un tissu à maille extensible et les tendeurs (2) sont constitués par de la corde ou de la sangle.

3. Panneau de dais suivant la revendication 2, caractérisé en ce que le tissu est constitué de toile de store tricotée et les tendeurs sont constitués par de la sangle du type couramment utilisé pour les ceintures de sécurité pour automobile.

4. Panneau de dais suivant l'une quelconque des revendications 1 à 3, caractérisé en ce que les tendeurs (2) sont fixés sur le tissu sur toute la longueur de ces tendeurs (2).

5. Panneau de dais suivant la revendication 4, caractérisé en ce que les tendeurs (2) sont cousus sur le tissu.

6. Panneau de dais suivant l'une quelconque des revendications 1 à 5, caractérisé en ce que les bords du panneau sont sensiblement rectilignes.

7. Dais comprenant un jeu de poteaux (P) et plusieurs panneaux (1, 13) conformes à l'une quelconque des revendications 1 à 6, caractérisé en ce que les panneaux (1, 13) sont étirés entre les poteaux à la hauteur voulue, les tendeurs (2) étant tendus entre ces poteaux (P), de façon à raidir ainsi partiellement les tendeurs incurvés (2) à appliquer une traction sur le tissu à partir de la zone centrale des panneaux (1, 13) et à tendre ces panneaux (1, 13).

8. Dais suivant la revendication 7, caractérisé en ce que les panneaux (1, 13) sont rectangulaires et les poteaux (P) sont disposés suivant un agencement rectangulaire.

9. Dais suivant la revendication 8, caractérisé en ce qu'il est prévu cinq desdits poteaux (P) disposés suivant ledit agencement rectangulaire, avec un poteau à chaque coin (3) et un poteau au milieu, tandis qu'il est prévu quatre desdits panneaux (1, 13), chaque panneau (1, 13) étant fixé tout d'abord au poteau central et à un poteau de coin, les deux autres coins (3) des panneaux qui sont diagonalement opposés étant ensuite soumis à une traction en commun avec les coins adjacents (3) des panneaux adjacents aux points milieu des côtés de l'agencement rectangulaire.

10. Procédé d'érection d'un dais suivant la revendication 7, 8 ou 9, consistant à ériger plusieurs poteaux (P) suivant un agencement préfixé, caractérisé en ce qu'on fixe des coins diagonalement opposés (3) de chaque panneau (1, 13) à certains choisis desdits poteaux (P) et on soumet à une traction en commun les coins restants (3) des panneaux adjacents (1, 13) façon à mettre sous tension les tendeurs (2) et par conséquent à tendre le tissu étirable.

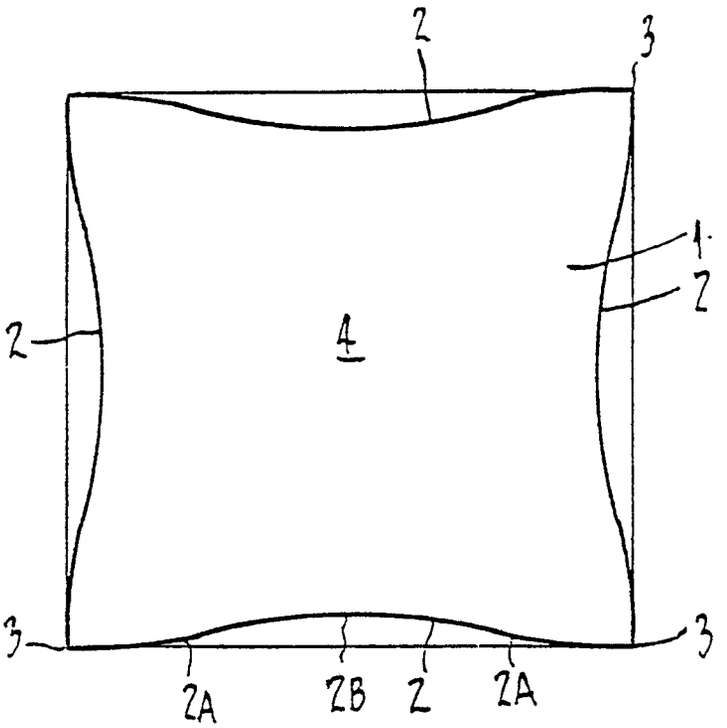


FIG. 1.

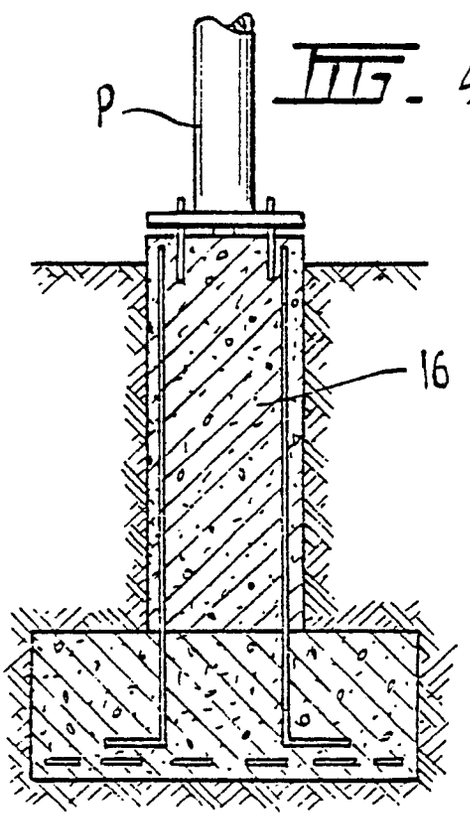


FIG. 4.

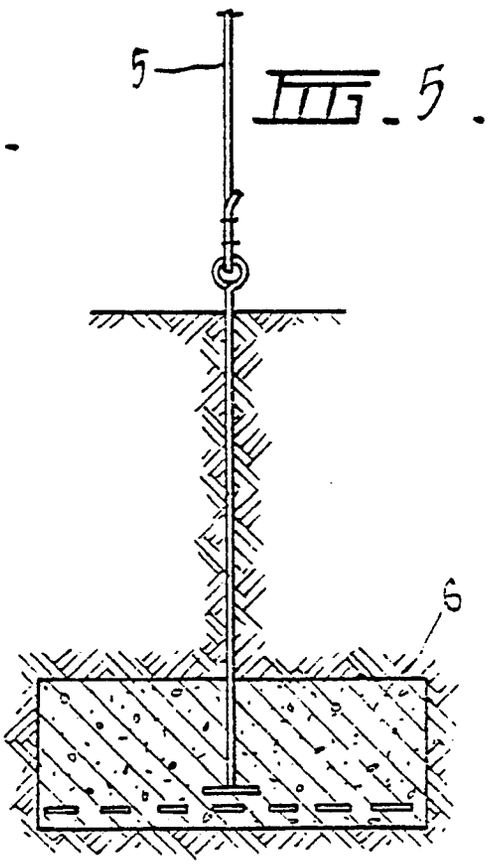


FIG. 5.

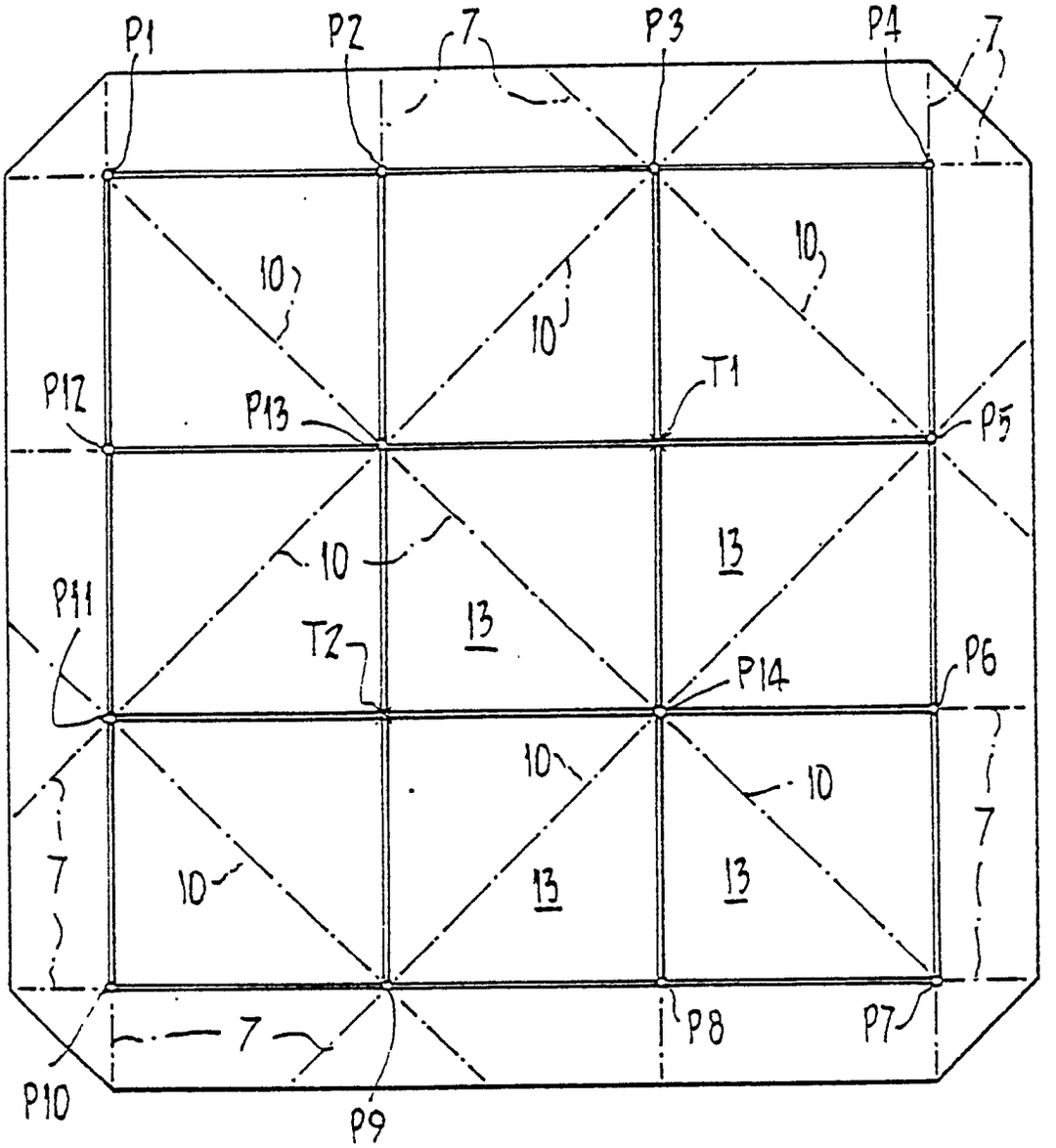
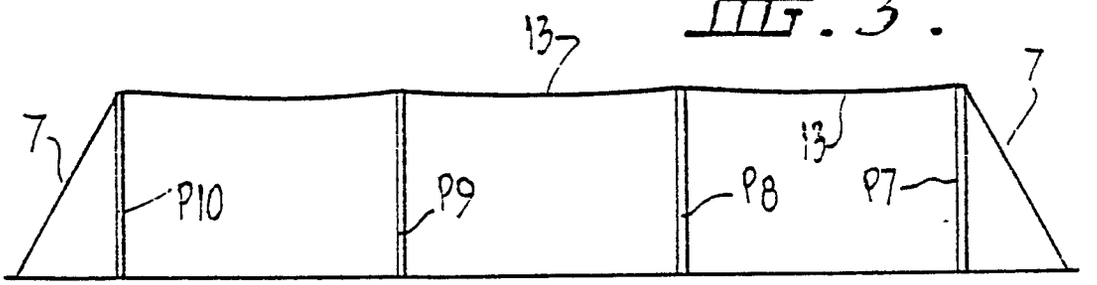

P1
P2
7
P3
P4
7
10
10
10
P12
P13
T1
P5
10
13
P11
T2
13
P14
P6
10
10
7
7
10
13
13
7
P8
P7
P10
P9

FIG. 2.

FIG. 3.


13
7
7
13
P10
P9
P8
P7