(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 219 170 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.08.2010 Bulletin 2010/33

(51) Int Cl.:
G09F 17/00 *(2006.01)* ***G09F 15/00*** *(2006.01)*

(21) Application number: **09179872.8**

(22) Date of filing: **18.12.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **22.12.2008 DK 200801837**

(71) Applicant: **Visuel Holding ApS**
8600 Silkeborg (DK)

(72) Inventor: **Nørhede, Troels**
8600, Silkeborg (DK)

(74) Representative: **Tellefsen, Jens J. et al**
Patrade A/S,
Fredens Torv 3A
8000 Aarhus C (DK)

(54) Spider system

(57) This invention concerns a system for suspension of banners. The system comprises a plurality of flexible attachment means corresponding to the number of attachment points on the banner, a plurality of sheaves, said sheaves defines the attachment points of a geometrical figure, said geometrical figure is situated in a single plane, a plurality of wires for stretching the banner, said number of wires equals the number of sheaves, said wires are at a first end attached to the flexible means, said wires at a second end interacts with at least one winch, said at least one winch is capable of tightening and loosening the wires thereby suspending the banner into a plane parallel with the single plane of the geometrical figure, each wire interact with at least one sheave between the first and second end of the wire, said winch comprises an axis of rotation, said axis of rotation is perpendicular to the single plane, said winch is situated in the single plane.

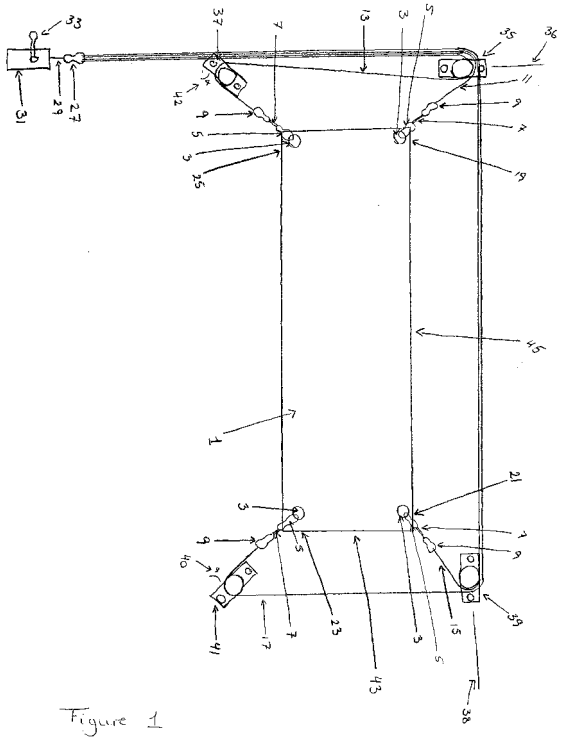


Figure 1

EP 2 219 170 A2

Description

Field of the Invention

[0001] The present invention relates to a system for suspension of banners on surfaces like walls and facades.

Background of the Invention

[0002] Advertising is essential for the survival of shops and firms. The advertising may be performed in different ways, e.g. in newspapers and magazines. However, another common way of advertising is to make use of banners suspended on facades, walls, floors, or roofs. Banners are easily changed and consequently one can advertise for specific events for only a short time.

[0003] Today, two different types of banners are typically used - a façade banner and a span banner. The façade banner is suspended in a frame, typically made of steel, which frame is present on one or more sides of the banner. When the banner is not present, the frame is still positioned on the wall or the surface in which the banner is to be mounted. The arrangement of the frames on the surface dictates the size of the banner.

[0004] The span banner is suspended along the surface with means attaching the corners of the banner to the surface. Complexity arises when trying to hang the banner sufficiently outstretched to accomplish the banner to be stretched out for longer periods of times. The banner can be positioned on for example a wall in different ways like suspended from the roof. When the banner is lowered from the roof and expanded into an appropriate position then the nethermost corners of the banners are to be fastened to the surface by means of a ladder, hydraulic lift or the like.

[0005] The fastening means can be fasteners of different types like bolts and screws. These fasteners many times destroy the surface upon which the banner is positioned. In addition, the banner is often attached with flexible means which eventually loosens more and more. Hence, the banner is not in an expanded position for a longer time. This means that the banner is an easy target for wind and rain, and that it is possibly torn from its position whereby the banner is destroyed/damaged by the wind and/or that the attachments are destroyed.

[0006] In order to position both the facade banner and the span banner correctly, it is necessary to employ two people at one time. Furthermore, if the banners are attached on higher surfaces a lifting platform is essential to obtain a required level of security.

Object of the Invention

[0007] It is the object of the following invention to create a system for suspension of a banner which may be suspended by one person alone without any risks for the persons installing the banner even though it is attached at an elevated surface.

[0008] Furthermore, it is the object of the present invention to create a system, which may keep the banners expanded constantly as well as making the suspension and detaching of the banner an easy and quick process.

Description of the Invention

[0009] The invention addresses these disadvantages by providing a system for suspension of banners wherein the system comprises

- a plurality of flexible attachment means corresponding to the number of attachment points on the banner;
- a plurality of sheaves, said sheaves defines the attachment points of a geometrical figure;
- said geometrical figure is situated in a single plane;
- a plurality of wires for stretching the banner, said number of wires equals the number of sheaves;
- said wires are at a first end attached to the flexible means, said wires at a second end interacts with at least one winch;
- said at least one winch is capable of tightening and loosening the wires thereby suspending the banner into a plane parallel with the single plane of the geometrical figure;
- each wire interact with at least one sheave between the first and second end of the wire
- said winch comprises an axis of rotation, said axis of rotation is perpendicular to the single plane
- said winch is situated in the single plane

[0010] The terms corner and attachment points are to be interpreted interchangeably.

[0011] By using this system it is easy to remove and replace a specific banner after the sheaves are mounted. In addition, the sheaves are small attachments to the surface. Thus, when no banners are present the façade of the building is still nice to look at.

[0012] The system comprises a plurality of wires, a plurality of sheaves, a winch, and flexible attachment means. The banner is attached by connecting attachment points on the banner to the flexible means and thereby to the wires which wires are engaged with one or more sheaves. The banner is extended to a suspended position using the winch, which will pull the wires thereby pulling the flexible means apart, such that the banner is extended/exposed.

[0013] The position and the distance between the sheaves are predefined since the length of and relationship between the wires is predefined by the distance between the different sheaves and the geometrical shape defined by the position of the sheaves forming a geometrical figure. However, the position of the sheaves defines a maximum size of the banner because smaller banners can be used due to the design of the system. This is due to the fact that the wires contain some additional length which enables them to be wound around the winch. When

a large banner is positioned within the geometrical figure a large amount of wire is wound around the winch while when a small banner is positioned only a small portion of the wire is wound around the winch.

[0014] A flexible means is attached to the banner with one end and with the other end it is attached to the wire. Hence, the flexible means is a connection between the wire and the banner. It may be made of natural or synthetic rubber which is durable with regard to wind and weather. In addition, attaching the banner to flexible means provides a resilient connection between the banner and the tightened wires. In this manner the banner will remain substantially outstretched under all conditions and time. Furthermore, the use of a winch makes it possible to retighten the banner if necessary.

[0015] This whole system is created as one overall package in which sheaves, wires and winch are ordered in a desired and predetermined size and shape. The system comes with a description where and how to mount the sheaves, how to attach the wires around the sheaves, and how to attach the banner to the flexible means attached to the wire.

[0016] In an advantageous embodiment the geometrical figure in the system for suspension of banners is a quadrangle, preferably a rectangle.

[0017] A common form of banners is quadrangles or rectangles which are practical and easy to read. However, also triangular shaped banners may be suspended in a suspension system formed as a quadrangular geometrical figure. This may be formed by attaching two wires to the same corner of the triangle. For example, if the triangle is situated with its top in an upright position the two upper wires are attached to the top of the triangle, by means of their respective flexible means.

[0018] Alternatively, geometrical figures like triangles or hexagons can be used for banners of a different shape. It is important to consider that the number of comers/sheaves of the geometrical figures is at least similar to the number of corners on the preferred banner. The choice of geometrical figure is a matter for the customer regarding the look of the banner. Thus, one is not limited to the types of geometrical figures mentioned.

[0019] Though it is a figure with corners, the shape of the geometrical figure may also suspend circular or oval banners if the banners are provided with bars preferably made of glass fibre between the attachment places, in order for the banner to keep the desired shape in its outstretched position.

[0020] In a further advantageous embodiment the system for suspension of banners as discussed above further comprises

- the banner comprises a first horizontal length and a first vertical length;
- the geometrical figure comprises a second horizontal length and a second vertical length;
- half of a difference between the second horizontal length and the first horizontal length defines a horizontal distance;
- half of a difference between the second vertical length and the first vertical length defines a vertical distance;
- the horizontal distance and the vertical distance defines sides of a right-angled triangle whereby a hypotenuse can be calculated;
- the winch is situated at a distance from the geometrical figure;
- a length of a first wire engaging with a first sheave and attaching to a first attachment point at the upper left corner of the banner is defined by the sum of the second vertical length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire;
- a length of a second wire engaging with the first sheave and a second sheave and attaching to a second attachment point at the lower left corner of the banner is defined by the sum of twice the second vertical length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire;
- a length of a third wire engaging with the first sheave and a third sheave and attaching to an third attachment point at the upper right corner of the banner is defined by the sum of the second vertical length, the second horizontal length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire;
- a length of a fourth wire engaging with the first, third and a fourth sheave and attaching to a fourth attachment point at the lower left corner of the banner is defined by the sum of twice second vertical length, the second horizontal length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire;

[0021] In a still further advantageous embodiment the system comprises a calculation routine for finding the length of each wire; said calculation routine comprises means for obtaining input relating to the first horizontal length, the first vertical length, the second horizontal length, the second vertical length, the horizontal distance, the vertical distance, the distance to the winch, the hypotenuse, and a slacking distance for the loosening and tightening of the wires; transferring said input to calculating means for calculating the length of each wire, which calculating means outputs the length of each wire.

[0022] The correct length of the individual wires is an essential feature in order for the overall system to function perfectly. The length of each wire depends on its final position. Each of the wires starts in a position near to the winch. Then, they engage with at least one sheave before they cross from the sheave to the banner.

[0023] As an example for a rectangular banner the sheaves shall be arranged in a geometrical figure corresponding to a rectangle larger than the banner. In each comer/attachment point of the geometrical figure a

sheave is arranged. All the wires engage with a first sheave and a first wire crosses from the sheave to a first corner (first attachment point) of the banner. A second wire is guided further and interacts with a second sheave before it crosses to attach to another corner of the banner (second attachment point). Now the two corners at the left side of the rectangular banner are connected to respective wires. The third wire interacts with the first sheave and is then guided along to interact with the third sheave (arranged at the same altitude as the first sheave) before crossing down and attaching with a third corner of the banner (third attachment point). The fourth wire interacts with the first sheave, the third sheave, and is guided to the fourth sheave arranged at the same altitude as the second sheave before it crosses up to attach to the last corner of the banner (fourth attachment point).

[0024] The length of the wires is calculated knowing the size of the geometrical figure and the size of the banner. The length needed for the crossing-over between the sheaves and the banner constitutes the hypotenuse of a right-angled triangle where the sides are defined by half of the differences between the size of the banner and the geometrical figure. The hypotenuse of the right-angled triangle can be calculated according to the Pythagorean Theorem which states that the sum of the squares of the sides and the right-angled triangle equals the square of the hypotenuse.

[0025] The length of the wire may be calculated in a similar though modified way for other geometrical figures and other types of banners than the one of a quadrangular shape like just described.

[0026] In addition, further correction can be made for the length added when the system comprises flexible attachment means and/or other modification like combining the wires to a single wire alone, which engages with the winch.

[0027] The length of the wires can easily be calculated by standard measures as previously described, and hence a calculation routine can be created for each of the different types of geometrical figures as well as the different types of banners. This enables one to easily and quickly find the length of the wires and hence is a great help in the process of production and in a process of minimizing calculation errors. Preferably the calculations can be performed in a spreadsheet of a computer program capable of performing calculating operations.

[0028] Multiple types of calculation routines are a possibility. For any of the calculation routines means for obtaining input can be a keyboard for typing e.g. the first horizontal length and the first vertical length, whereby this information is transferred to calculation means for automatically calculating the length of the wires, whereafter the length of the wires are transferred to outputting means. The outputting means can for example be a display, numbers in a spreadsheet, or information sent for example to a cutting machine, which then cuts the wires into the length ordered. The inputting means, calculating means, and outputting means can very well be a part of a computer program, where a single program executes all of the operations involving the use of the inputting means, calculating means, and outputting means. However, the means can as well be placed in different programs between which the information is transferred.

[0029] As an example, the banner itself can be designed on a computer in which case the first horizontal length and the first vertical length implicitly are present. In this design program, an icon, a link or similar can be present, which upon activation designs a suspension system as described in this application. The information regarding the first horizontal length and the first vertical length is upon activation transferred to a calculation routine, which can be pre-programmed with the optimal horizontal distance, the optimal vertical distance, the optimal distance to the winch, and the optimal slacking distance for loosening and tightening the wires for a banner of any given shape e.g. circular, rectangular etc. Hereafter, the length of the wires is calculated as well as the position of the sheaves. This can either be transferred further via electronic communication e.g. between computers/computer programs, or being extracted for manually processing the information and creating the spanning system.

[0030] Optionally, one or more of the distances, the second horizontal length or the second vertical length can be manually added to the calculation routine by putting in the distances or lengths in a pop-up box or by choosing between more pre-specified values. By introducing the second vertical length and the second horizontal length, the sheaves can be arranged at optimal positions e.g. to avoid that they are arranged at windows but are arranged where they are most efficiently masked.

[0031] Automatic transferral via electronic communication enables an order to be processed without the risk of typing errors. The wires are automatically cut into the calculated length and packed with the correct number of sheaves together with a specification defining the position of the sheaves and winch in this particular case.

[0032] Thus, it is to be understood that means for obtaining input relating to the first horizontal length, the first vertical length, the second horizontal length, the second vertical length, the horizontal distance, the vertical distance, the distance to the winch, the hypotenuse, and a slacking distance for the loosening and tightening of the wires need not all be put in for each banner but that some of them can be obtained as input using predefined values possibly by calculation as described above. Hereafter, the values are used as input for calculating the length of the individual wires.

[0033] In a further advantageous embodiment the system for suspension of banners discussed above further describe that

- each sheave comprises an outer housing and a means for rotation, said means for rotation comprises an axis of rotation, said axis of rotation is perpendicular to the single plane
- said means for rotation interacts with one or more

wires defining a path of the wires;

- said outer housing comprises a longitudinal axis
- said longitudinal axis defines an angle to the vertical axis of the single plan;
- said angle is defined by the path of the wires;
- said path defines that said one or more wires only interacts with said means for rotation during tightening of one or more wires.

[0034] Different types of sheaves can be used for the suspension banner. The simplest type of sheaves contains only means for rotation, while more sophisticated types contain additional features like an outer housing. The outer housing shields the means for rotation along with increasing the overall strength of the sheave. The orientation of the outer housing of the sheaves is essential for the durability of the wires. If the sheaves are positioned wrongly, the wires may come into contact with other parts than the means of rotation of the sheaves. This could for example be a steel housing used to fix the rotating part of the sheave to the wall. The interaction with such a part will expose the wire to both shear and tear from the sheave housing.

[0035] The term vertical axis is not to be interpreted as restricting this embodiment, only to be situated/used on vertical surfaces like walls.

[0036] In a further advantageous embodiment the second end of all the wires are combined by means of attachment with one single wire, said single wire engages with a winch, preferably the means of attachment is a snap hook.

[0037] Attaching more wires to a winch is troublesome in order to achieve an equal pull. This is due to the fact that the wires may slide respectively to each other and hence the overall relationship between the lengths of the wires is disrupted. If on the other hand all of the wires are attached at their second end for example with a snap hook to one wire and this wire then again is attached to the winch a more equal rewinding of all of the wires occurs. Hence, the system for suspension of the banner is more easily operated and the banner is tightened in a more sufficient way.

[0038] For different size banners it is possible to lengthen or shorten the individual wires at their combined attachment point, such that a banner of different size may be expanded by the system.

[0039] In a further advantageous embodiment the winch comprises means for automatically tightening and loosening the wires.

[0040] The winch may be operated by hand with a handle that is rotated one way for tightening and the other way for loosening. Alternatively, the wires are loosened just by disintegrating a lock.

[0041] Preferable, the winch is equipped with a motor in order to make the tightening and the loosening of the wires automatic. The motor may be activated by activating a button. The winch can also be provided with two buttons, one for tightening and one for loosening of the wires.

[0042] In another embodiment this activation may be controlled by a remote controller such that the tightening and the loosening of the banner may be performed from a different place. This could be of relevance for places where the winch is placed in a narrow place because the space is narrow were the banner is to be placed or in order to hide it from the surroundings due to possible risks of damage.

[0043] Alternatively, the remote control or a control situated in a distant place like inside a building can control more suspension systems at once. In this way more banners can be loosened and tightened at the same time. Hereby, the working procedures become leaner saving time and manual work.

[0044] In a further advantageous embodiment the flexible attachment means comprise at least one snap hook.

[0045] Choosing a snap hook as an attachment from the flexible means to the wires or from the flexible means to the banner enables a quick mechanism for attachment of the banner to the suspension system and also a quick and easy way to attach the wires together when the suspension system is not used.

[0046] The banner can be provided with ringlets, eyes or the like at the corners in order to enable a snap hook or similar easily to be fastened to the corner of the banner. The snap hook is drawn through the ringlet and locked on the other side. Furthermore, the snap hook can be with or without a lock mechanism in order for the snap hook to stay closed even at extreme weather conditions.

[0047] Providing the attachable means with a snap hook where attached to the wires enables the flexible attachment means to be replaced easily if they are damaged due to the weather.

[0048] In a further advantageous embodiment the wires comprises a metal core coated with an additional material, preferably plastic.

[0049] The wire connecting the winch with the banner can preferably be made from a metal core which is coated with plastic. Metal wires are strong and sustainable products even for thin wires. Coating the wire with plastic provide the wire with a more smooth and easier to handle surface. In addition, the plastic increases the durability since corrosion is prevented.

[0050] The plastic coating can be of different kinds. It can either be transparent and show the thin metal wire or it can attain one or more colours. These colours can be chosen in order to match the colours of the banner or to mask the wire along the wall.

[0051] In a further advantageous embodiment the sheaves are mounted on a wall.

[0052] The suspension system as described so far is a suspension system applied to walls. However, it is to be understood that the suspension system may be used on other surfaces in which a banner can be placed. Thus, the suspension system can be placed on floors or roofs inside, outside etc.

[0053] In addition, this suspension system with

sheaves of a small size is highly flexible regarding the geometrical shape and the small size of the sheaves. Hence, it can be placed in small surfaces between windows. In addition, the banner may be suspended over windows in case this may be preferred. Only small sheaves and wires are left when the banner is removed from the suspension system.

[0054] Furthermore, a method for suspension of banners using a plurality of flexible attachment means, a plurality of sheaves, a plurality of wires and a winch as discussed above comprising the following steps:

- mounting sheaves at attachment points of a geometrical figure defined in a single plane;
- mounting a winch at a distance from the geometrical figure; said winch comprises an axis of rotation; said axis of rotation is perpendicular to the single plane;
- said winch is situated in the single plane
- engaging a second end of each wire with the winch
- engaging the wires with at least one sheave
- engaging a first end of each wire with at least one flexible means
- attaching the flexible means to a banner
- activating the winch for tightening the wires, hereby tightening the banner into a plane parallel with the single plane defined by the geometrical figure.

[0055] At first a suspension system is ordered along with a banner of choice. The suspension system is mounted by placing the sheaves in positions determined by the manufacturer and screwed into the walls or the surface of choice. Hereby is achieved the same advantages as already mentioned above. The wires are engaged with one or more sheaves. The wires are attached to the winch at the opposite end.

[0056] To attach a banner, the wires are slacked till they are reachable and the banner is attached to the wires by way of the flexible means. Then the winch is activated, the wires are tightened, and as a result the banner is expanded at the place of choice.

[0057] The winch is once again activated when the banner is to be replaced or removed. The wires are slacked and the banner is lowered to a reachable position where it is possible to detach it from the flexible means. If another banner is to replace the removed banner the new banner is attached to the flexible means of the banner and the wires are tightened. If on the other hand no banner is to replace the removed banner, the wires are connected to one another and the wires are tightened by the winch. Only small sheaves and wires are left.

Description of the Drawing

[0058]

Fig. 1 illustrates a rectangular banner tightened within a suspension system.

Fig. 2 illustrates a sheave with a wire at the low end.

Fig. 3 illustrates a banner in a slacked position.

Fig. 4 illustrates a circular banner expanded in a suspension system comprising four sheaves.

Fig. 5 illustrates a quadrangular banner expanded in a suspension system comprising eight sheaves.

Detailed Description of the Invention

[0059] Fig. 1 illustrates a rectangular banner 1 suspended on a wall. This rectangular banner 1 contains ringlets 3 in which snap hooks 5 are engaged. These are situated in each corner of the rectangular banner. Connected to the snap hook 5 is a flexible means 7 on which other end another snap hook 9 is placed. This snap hook 9 is connected to a wire 11,13,15,17, which wire 11,13,15,17 expands each of the corners 19,21,23,25 of the banner into a given position determined by the overall length of the individual wires. Each wire engages with one or more sheaves 35,37,39,41 between the attachment to the banner and another snap hook 27. The snap hook 27 is further attached to a single wire 29. The single wire 29 engages a winch 31. The winch 31 contains a handle 33 for manually tightening and loosening the wire system. It is to be understood that other types of handles containing either manual or automatic activation can be chosen. The position of the sheaves defines the corners of a geometrical figure.

[0060] As also illustrated in Fig. 1, each of the corners 19,21,23,25 of the banner interacts with one sheave 35,39,41,37, respectively. From the lowest right corner 23 of the banner 1, a wire 17 interacts with the fourth sheave 41, is guided along the right side 43 of the banner 1, and interacts with the third sheave 39, is guided along the top side 45 of the banner 1, interacts with the first sheave 35 and then is guided down and interacts with the snap hook 27 at the winch 31. In the upper right corner 21 of the banner 1 a wire 15 engages with the third sheave 39, the wire is then guided along the top side 45 of the banner 1, and engages with the first sheave 35, where after the wire is guided down, and interacts with the snap hook 27 at the winch 31. The upper left corner 19 of the banner 1 is attached with a wire 11, which engages only with the first sheave 35 before it is guided down to the snap hook 27 at the winch 31. The lower left corner 25 of the banner 1 is attached to a wire 13 that engages with the second sheave 37, thereafter the wire is guided to the first sheave 35 and then the wire 13 is guided down to the winch 31.

[0061] Fig. 1 further illustrates that the position of the sheaves 35,37,39,41 is different with regard to the top side 45 of the banner 1. The first sheave 35 is situated with a longitudinal axis 36 perpendicular to the top side 45 of the banner 1 while the third sheave 39 has a longitudinal axis 38 horizontal to the top side 45 of the banner 1. In addition, the second 37 and the fourth 41 sheaves both define specific angles 40,42 with respect to the top side 45 of the banner 1. In this particular example, angles of 45 degrees are preferred.

[0062] The angling of the sheaves 35,37,39,41 are due to the fact that if they were not angled the wire 43 would interact with the sides 45 of the sheave 47 as illustrated in Fig. 2. Hereby, the surface of a plastic coated wire is damaged which can tear apart the plastic surface. This allows water and dirt to enter inside the wire and the metal core. This can over time destroy the suspension system.

[0063] Fig. 2 illustrates a close-up of one of the sheaves. The sheave 47 comprises an inner part 51, which is attached to the surface 49. The inner part 51 connects with a rotatable wheel 53, which rotates around a rotation axis 55 perpendicular to the wall 49. In order to keep the wire 43 in place and to achieve the best fixation of the sheave 47 as possible, an outer housing 57 is provided.

[0064] The path of the wire 43 is defined by the geometrical figure along with the position of the wire 43 in the geometrical figure. If the sheave 47 engaging with the wire 43 is positioned with its outer housing 57 interfering with the path of the wire 43 an interaction 59 between the outer housing 57 and the wire 43 is present. A constant mechanical interaction with the outer housing 57 can result in the wire being torn on the outside. However, this can be avoided by angling the sheaves with regard to the path of the wires in a way that the outer housing 57 of the sheave 47 does not interfere with the wire 43.

[0065] The sheave 47 can be made of different materials, but preferably the rotatable wheel 53 is made of plastic and the other parts 51,57 are made of metal. However, all parts 51,53,57 may be made of metal. Preferred metals are aluminium and stainless steel.

[0066] Fig. 3 illustrates a banner 61 in a slacked position. The banner 61 has been suspended on a wall 63, but the wires 65,67,69,71 are slacked in order to remove or change the banner 61. The banner 61 is almost touching the ground 73 when it is lowered to a reachable position. The winch 73 is activated and the wires 65,67,69,71 are loosened accordingly. This interaction can be performed by one person alone. The detachment of the banner 61 and an eventually replacement can also be performed by one person, alone.

[0067] Fig. 4 illustrates a circular banner 75 expanded in a suspension system comprising four sheaves 77, 79, 81,83 - a first sheave 77, a second sheave 79, a third sheave 81, and a fourth sheave 83, respectively. Four different wires 85,87,89,91 interacts with one or more of the sheaves 77,79,81,83 before they attach to four attachment points 93,95,97,99 situated on the banner 75. The first wire 85 engages with the first sheave 77 and crosses down and attaches to the first attachment point 93 in the upper left side of the banner 75. The second wire 87 engages with the first sheave 77 and the second sheave 79 before it crosses up and attaches to a second attachment point 99 on the lower left side of the banner 75. The third wire 91 engages with the first sheave 77 and the third sheave 81 before it crosses down and attaches to a third attachment point 95 on the upper right side of the banner 75. The fourth wire 89 engages the first sheave 77, the third sheave 81, and the fourth sheave 83 before it crosses up and attaches to a fourth attachment point 97 on the lower right side of the banner 75. At the other end of the four wires 85,87,89,91 they are attached to a single wire 101, which engages with a winch 103 for loosening or tightening the wires 85,87,89,91.

[0068] In order to fully expand the circular banner 75 bars preferably made from GRC (Glass-fibre Reinforced Concrete) are positioned in the banner 75 along the edge. The bars as illustrated in Fig. 4 are four different bars 105,107,109,111 situated between the different attachment points 93,95,97,99. A first bar 105 is situated between the first attachment point 93 and the third attachment point 95. A second bar 107 is situated between the third attachment point 95 and the fourth attachment point 97. A third bar 109 is situated between the fourth attachment point 97 and the second attachment point 99. A fourth bar 111 is situated between the second attachment point 99 and the first attachment point 93. It is to be understood that the number of bars can be any number like one, two, or four.

[0069] Fig. 5 illustrates a quadrangular banner 113 expanded in a suspension system comprising eight sheaves 115,117,119,121,123,125,127,129 - a first sheave 115, a second sheave 129, a third sheave 127, a fourth sheave 117, a fifth sheave 119, a sixth sheave 121, a seventh sheave 123, and an eight sheave 125. Only four of the sheaves 115,119,123,127 engage with the wires, while the other four sheaves 117, 121,125,129 are not engaged in this set-up. Four different wires 131,133,135,137 engages with one or more of the sheaves 115,119,123,127 before they attach to four attachment points 139,141,143,145 situated on the banner 113. The first wire 131 engages with the first sheave 115 and crosses down and attaches to the first attachment point 139 in the upper left corner of the banner 113. The second wire 137 engages with the first sheave 115 and the third sheave 127 before it crosses up and attaches to a second attachment point 145 on the lower left corner of the banner 113. The third wire 133 engages with the first sheave 115 and the fifth sheave 119 before it crosses down and attaches to a third attachment point 141 on the upper right corner of the banner 113. The fourth wire 135 engages the first sheave 115, the fifth sheave 119, and the seventh sheave 123 before it crosses up and attaches to a fourth attachment point 143 on the lower right corner of the banner 113. At the other end of the four wires 131,133,135,137 they are attached to a single wire 147, which engages with a winch 149 for loosening or tightening the wires 131,133,135,137.

[0070] Fig. 5 illustrates that a banner 113 with a number of attachment points 139,141,143,145 less than the number of sheaves 115,117,119,121,123,125,127, 129 can be successfully expanded by using only a part of the total number of sheaves 115,119,123,127. Banners with up to eight attachment points like four, six or eight attachment points can be expanded successfully

in the suspension system illustrated in Fig. 5 by using the number of sheaves corresponding to the number of attachment points.

[0071] As also illustrated in Fig. 1, each of the corners 19,21,23,25 of the banner interacts with one sheave 35,39,41,37, respectively. From the lowest right corner 23 of the banner 1, a wire 17 interacts with the fourth sheave 41, is guided along the right side 43 of the banner 1, and interacts with the third sheave 39, is guided along the top side 43 of the banner 1, interacts with the first sheave 35 and then is guided down and interacts with the snap hook 27. In the upper right corner 21 of the banner 1 a wire 15 engages with the third sheave 39, the wire is then guided along the top side 45 of the banner 1, and engages with the first sheave 35, where after the wire is guided down, and interacts with the snap hook 27 at the winch 31. The upper left corner 19 of the banner 1 is attached with a wire 11, which engages only with the first sheave 35 before it is guided down to the snap hook 27 at the winch 31. The lower left corner 25 of the banner 1 is attached to a wire 13 that engages with the second sheave 37, thereafter the wire is guided to the first sheave 35 and then the wire 13 is guided down to the winch 31.

Claims

1. A system for suspension of banners **characterised in that** the system comprises

   - a plurality of flexible attachment means (5,7,9) corresponding to the number of attachment points (19,21,23,25) on the banner (1);
   - a plurality of sheaves (35,37,39,41), said sheaves (35,37,39,41) defines the attachment points of a geometrical figure;said geometrical figure is situated in a single plane;
   - said number of wires equals the number of sheaves;
   - said wires (11,13,15,17) are at a first end attached to the flexible means (5,7,9), said wires at a second end interacts with at least one winch (31);
   - said at least one winch (31) is capable of tightening and loosening the wires thereby suspending the banner (1) into a plane parallel with the single plane of the geometrical figure;
   - each wire interact with at least one sheave between the first and second end of the wire
   - said winch (31) comprises an axis of rotation, said axis of rotation is perpendicular to the single plane
   - said winch (31) is situated in the single plane.

2. A system for suspension of banners according to claim 1 **characterised in that** the geometrical figure is a quadrangle, preferably a rectangle.

3. A system for suspension of banners according to claim 2 **characterised in that**

   - the banner (1) comprises a first horizontal length and a first vertical length;
   - the geometrical figure comprises a second horizontal length and a second vertical length;
   - half of a difference between the second horizontal length and the first horizontal length defines a horizontal distance;
   - half of a difference between the second vertical length and the first vertical length defines a vertical distance;
   - the horizontal distance and the vertical distance defines sides of a right-angled triangle whereby a hypotenuse can be calculated;
   - the winch (31) is situated at a distance from the geometrical figure;
   - a length of a first wire (11) engaging with a first sheave (35) and attaching to a first attachment point (19) at the upper left corner of the banner (1) is defined by the sum of the second vertical length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire (11);
   - a length of a second wire (13) engaging with the first sheave (35) and a second sheave (37) and attaching to a second attachment point (25) at the lower left corner of the banner (1) is defined by the sum of twice the second vertical length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire (13);
   - a length of a third wire (15) engaging with the first sheave (35) and a third sheave (39) and attaching to an third attachment point (21) at the upper right corner of the banner (1) is defined by the sum of the second vertical length, the second horizontal length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire (15);
   - a length of a fourth wire (17) engaging with the first (35), third (39) and a fourth (41) sheave and attaching to a fourth attachment point (23) at the lower left corner of the banner (1) is defined by the sum of twice the second vertical length, the second horizontal length, the hypotenuse, the distance to the winch, and a slacking distance for the loosening and tightening of the wire (17);

4. A system for suspension of banners according to claim 3 **characterised in that** the system comprises a calculation routine for finding the length of each wire (11,13,15,17); said calculation routine comprises means for obtaining input relating to the first horizontal length, the first vertical length, the second horizontal length, the second vertical length, the horizontal distance, the vertical distance, the distance

to the winch, the hypotenuse, and a slacking distance for the loosening and tightening of the wires; transferring said input to calculating means for calculating the length of each wire, which calculating means outputs the length of each wire.

5. A system for suspension of banners according to any of the preceding claims **characterised in that**

- each sheave (47) comprises an outer housing (57) and a means for rotation (53), said means for rotation (53) comprises an axis of rotation (55), said axis of rotation (55) is perpendicular to the single plane
- said means for rotation (55) interacts with one or more wires (43) defining a path of the wires;
- said outer housing (57) comprises a longitudinal axis (36,38)
- said longitudinal axis defines an angle (40,42) to the vertical axis of the single plan;
- said angle (40,42) is defined by the path of the wires;
- said path defines that said one or more wires only interacts with said means for rotation during tightening of one or more wires.

6. A system for suspension of banners according to any of the preceding claims **characterised in that** the second end of all the wires are combined by means of attachment (27) with one single wire (29), said single wire (29) engages with a winch (31), pref erably the means of attachment (29) is a snap hook.

7. A system for suspension of banners according to any of the preceding claims **characterised in that** the winch (31) comprises means for automatically tightening and loosening the wires.

8. A system for suspension of banners according to any of the preceding claims **characterised in that** the flexible attachment means (5,7,9) comprise at least one snap hook.

9. A system for suspension of banners according to any of the preceding claims **characterised in that** the wires comprises a metal core coated with an additional material, preferably plastic.

10. A system for suspension of banners according to any of the preceding claims **characterised in that** the sheaves (35,37,39,41) are mounted on a wall.

11. A method for suspension of banners according to any of the preceding claims comprising the steps of

- mounting sheaves (35,37,39,41) at attachment points of a geometrical figure defined in a single plane;
- mounting a winch (31) at a distance from the geometrical figure; said winch comprises an axis of rotation; said axis of rotation is perpendicular to the single plane;
- said winch is situated in the single plane
- engaging a second end of each wire (11,13,15,17) with the winch (31)
- engaging the wires (11,13,15,17) with at least one sheave (35,37,39,41)
- engaging a first end of each wire with at least one flexible means (5,7,9)
- attaching the flexible means (5,7,9) to a banner (1)
- activating the winch for tightening the wires, hereby tightening the banner into a plane parallel with the single plane defined by the geometrical figure.

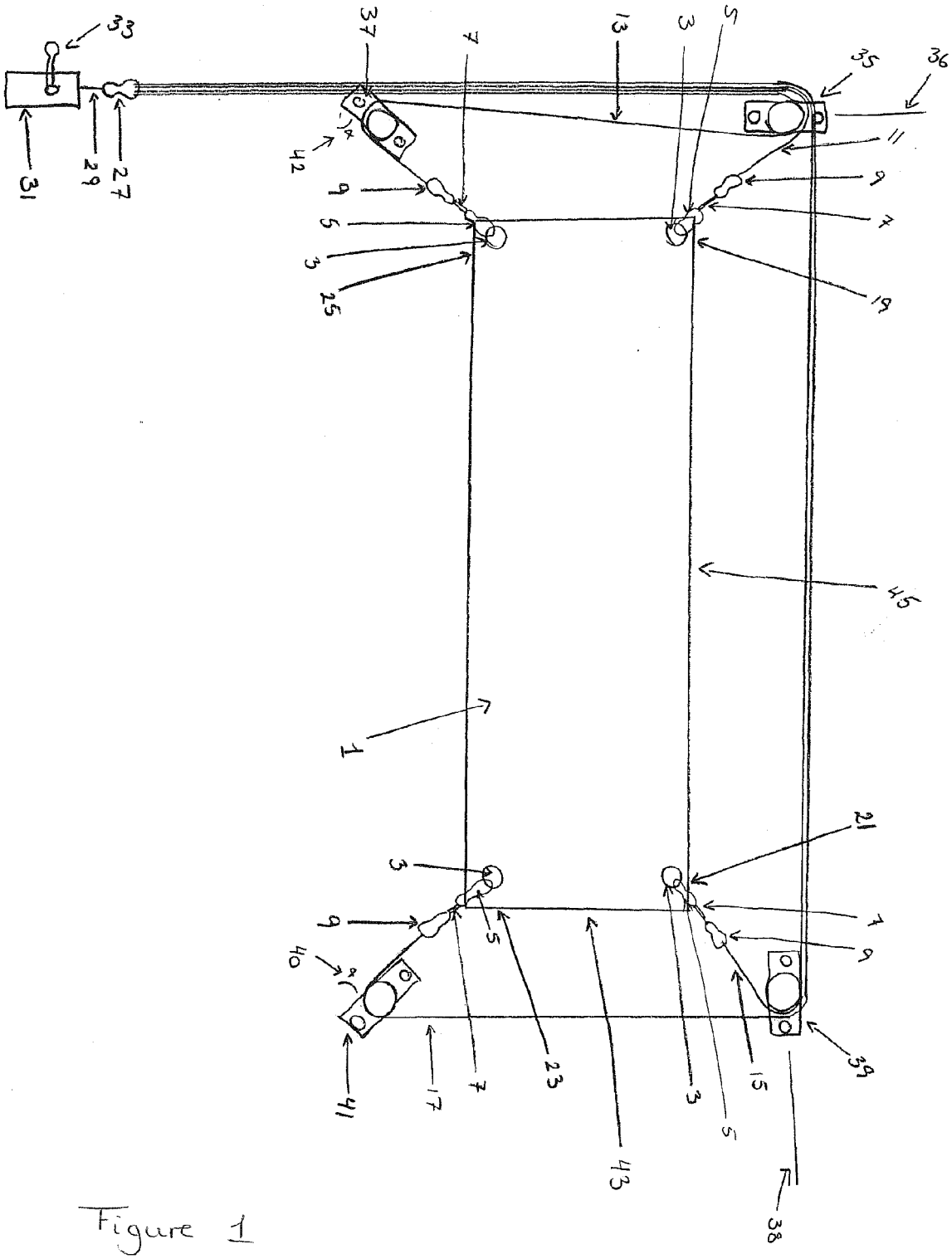

33
37
7
13
3
5
35
36
11
9
7
19
42
9
5
3
25
31
29
27
45
1
21
3
9
7
5
9
40
23
43
15
39
41
17
7
3
5
38

Figure 1

Figure 2

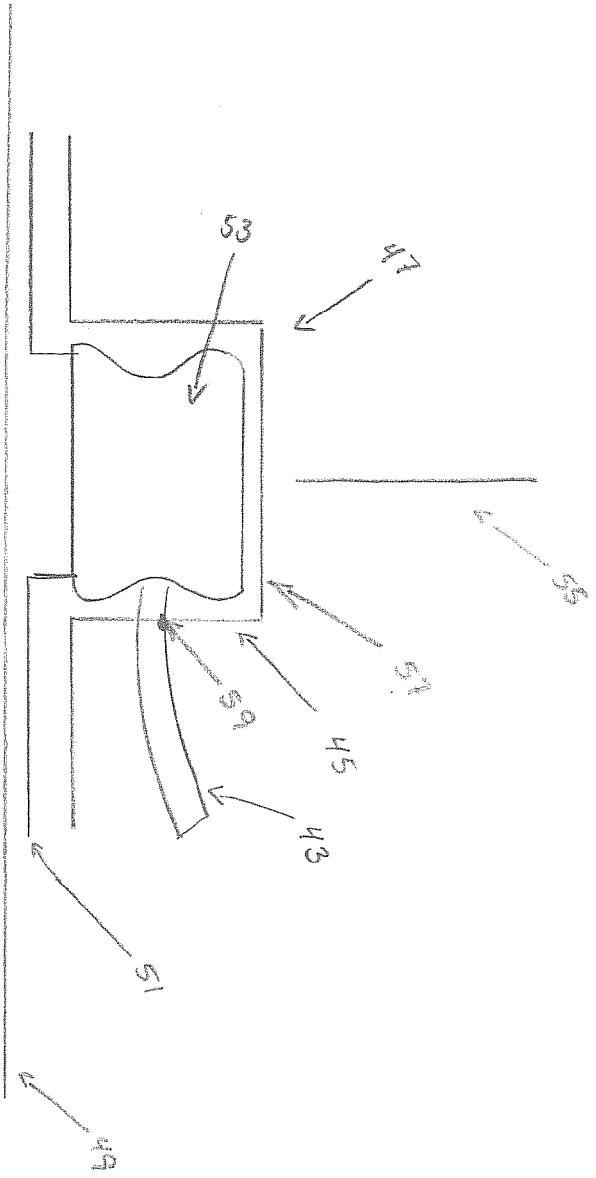


Figure 3

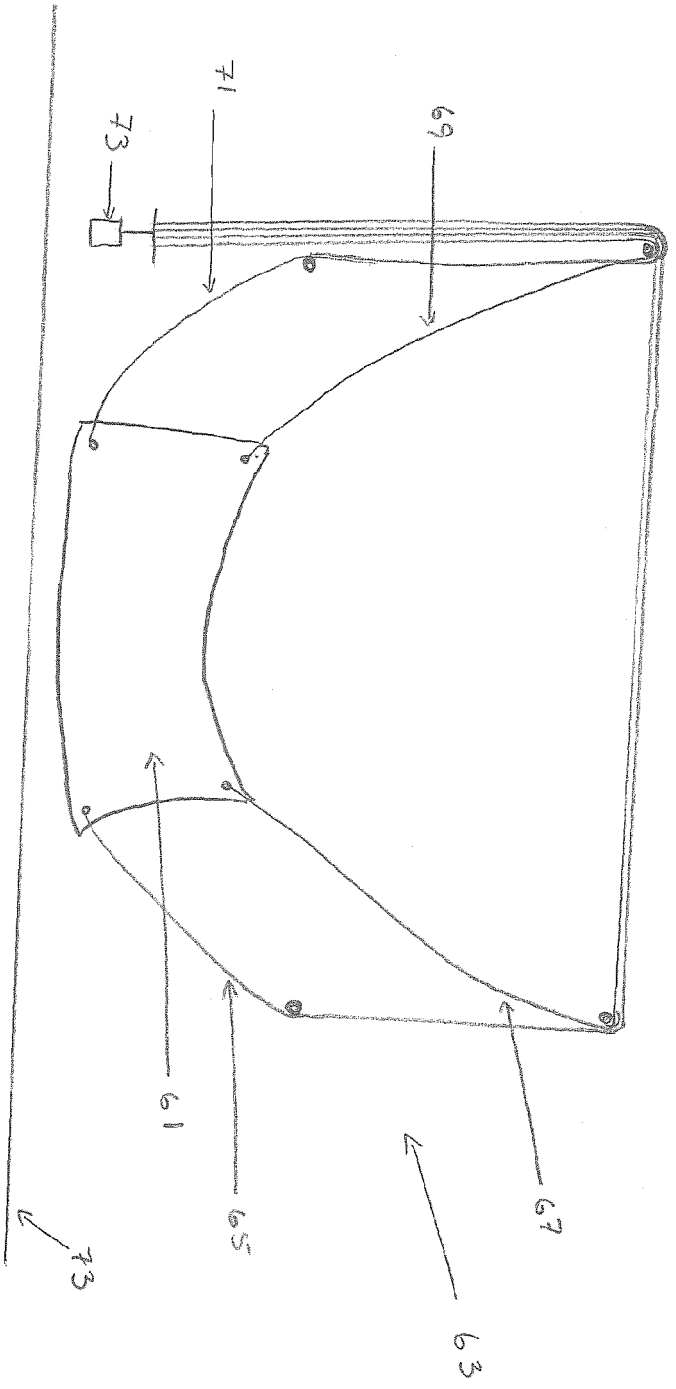


Figure 4

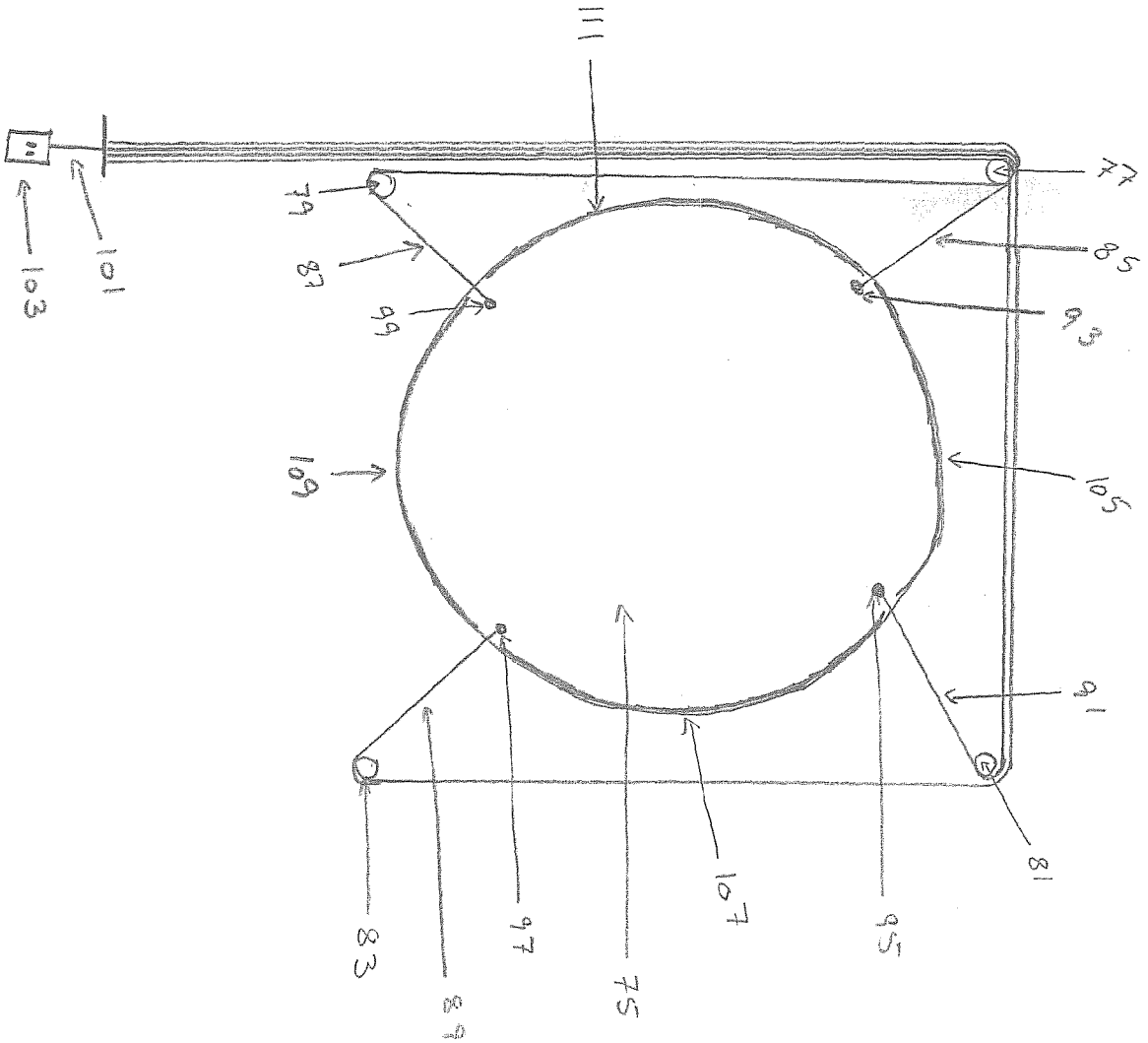
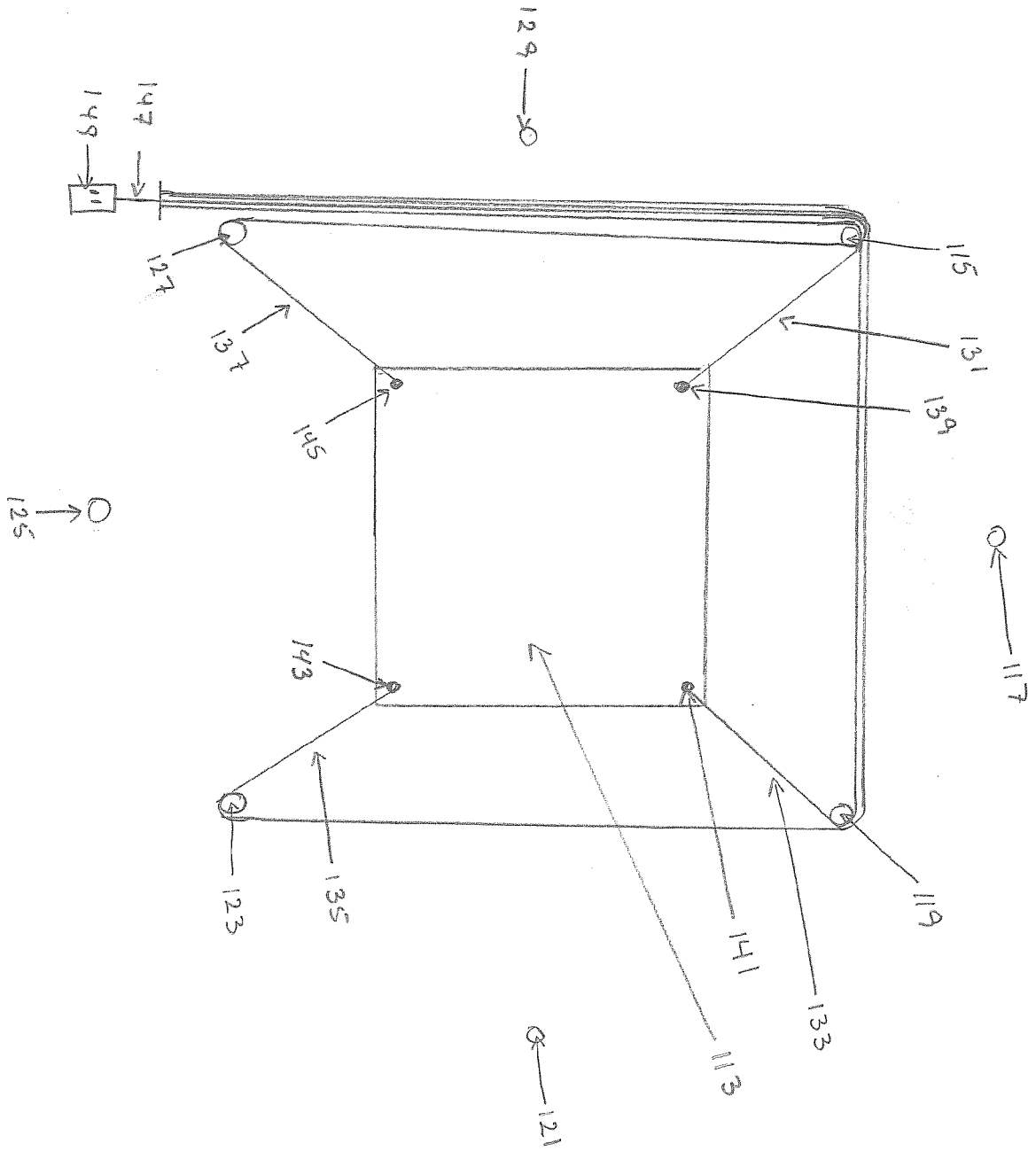


Figure 5


129
149
147
127
137
145
115
131
139
125
117
143
123
135
141
133
119
113
121