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(71) Applicant: **Bettega, Roberto**
36035 Marano Vicentino VI (IT)

(72) Inventor: **Bettega, Roberto**
36035 Marano Vicentino VI (IT)

(74) Representative: **Maroscia, Antonio**
Maroscia & Associati Srl
Piazza del Castello, 26
36100 Vicenza (IT)

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(54) **SYSTEM FOR COVERING AND SHADING A GROUND AREA**

(57) A covering and shading system (1) with a pair of bearing poles (2A, 2B) for supporting a shaft (4), a pair of tensioning poles (5A, 5B) for supporting pulleys (8A, 8B), a sheet element (9) adapted to be wound/unwound on the shaft (4), means (13) for rotating the drive shaft (4), a first cable (16) returned on the pulleys (8A, 8B) with ends (17A, 17B) connected to the element (9), a second cable (19) with one end (20B) interacting with the shaft (4) and one end (20A) interacting with the first cable (16), a third cable (23) with one end (24A) interacting with the first cable (16) and the opposite end (24B) connected to elastic counteracting means (26). The means (13) com-

prise a drum (14) on which the end (20B) is wound and the elastic means (26) are housed in one of the bearing poles (2B) and comprise a spring (27) which extends coaxial therewith to be protected from the outside environment. The spring (27) has a portion (27') connected to the end (24B) and a portion (27'') secured to the lower end (3) of the pole (2B) which has a pulley (29) for returning the third cable (23). The end (20B) is wound on the drum (14) in an orthogonal direction from top to bottom and the ends (20A, 20B, 24A) are placed above the shaft (4) to avoid any contact and risk of injury to users.

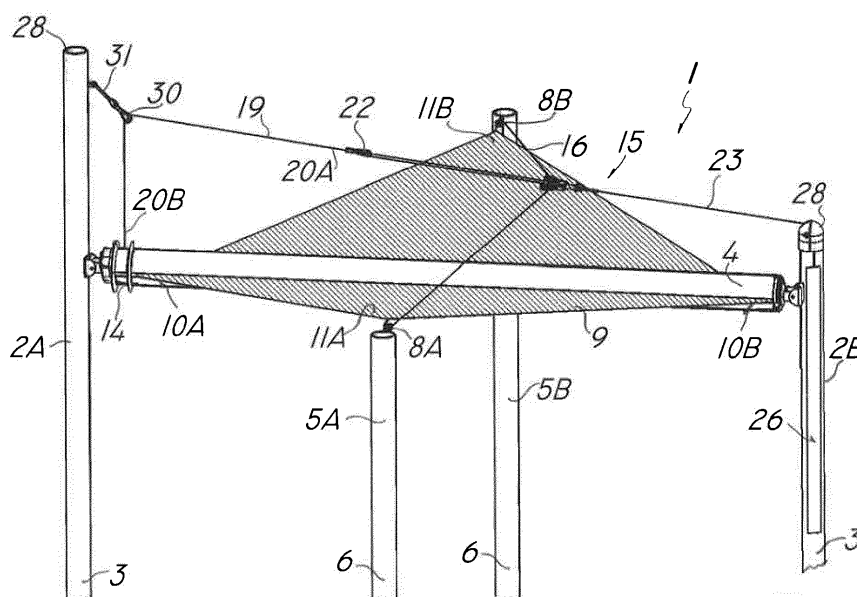


FIG. 2

Description

Field of The Invention

[0001] The present invention generally finds application in the field of outdoor covers and particularly relates to a system for covering and shading a ground area.

Background art

[0002] Systems have been long known in the field of outdoor covers, which are designed to wind and unwind a flexible sheet element for covering a ground area.

[0003] Generally, these cover systems comprise a shaft rotating about a substantially horizontal axis supported by a first pair of bearing poles.

[0004] Furthermore, the shaft is rotatably driven along the axis of rotation by driving means for winding and unwinding the flexible covering and shading sheet element.

[0005] Nevertheless, these driving means have the drawback of being only configured for driving the flexible sheet element and cannot keep the it under tension while it is being driven.

[0006] In an attempt to obviate this drawback covering and shading systems have been developed, which are adapted to constantly keep the flexible sheet element under tension while it is being wound and unwound.

[0007] EP2765254 discloses a covering and shading system comprising a plurality of cables wound on respective pulleys for winding and unwinding a flexible sheet element.

[0008] Furthermore, the sheet element is connected to elastic counteracting means which are adapted to constantly keep it under tension as it is being driven.

[0009] In particular, the elastic means comprise a spring which is fitted in a box-like enclosure having one end connected to a bearing pole and another end connected to a pair of vertical-axis fixed pulleys.

[0010] A first drawback of this arrangement is that the elastic counteracting means are exposed to the outside environment, and hence to the risk of damage or deterioration over time.

[0011] Another drawback of this arrangement is that the counteracting means are placed in the upper end of the bearing pole and cannot be easily accessed by an operator.

[0012] EP2216460 discloses a covering and shading system comprising a flexible sheet element which is selectively wound on a rotating shaft by means of a plurality of cables connected to elastic counteracting means coaxially fitted in a bearing pole.

[0013] Furthermore, the bearing pole comprises a hoist system interposed between the counteracting means and one of the cables for keeping the flexible sheet element under tension during winding and unwinding.

[0014] A first drawback of this arrangement is that the provision of the hoist increases complexity in the construction and maintenance on the entire system.

[0015] Another drawback of this arrangement is that the driving means comprise a winch which is installed on the bearing pole and can be entirely accessed by a user, who is thus exposed to the risk of contacting the tensioned cables of the system.

[0016] A further drawback of these arrangements is that the elastic counteracting means must exert a very high pull force on the cables to keep the sheet element under constant tension over time.

Technical Problem

[0017] In view of the prior art, the technical problem addressed by the present invention is to provide a system for covering and shading a ground area that is able to wind and unwind a flexible sheet element to keep it under constant tension while ensuring user safety.

Disclosure of the invention

[0018] The object of the present invention is to solve the aforementioned problem, by providing a system for covering and shading a ground area that is highly efficient and relatively cost-effective.

[0019] A particular object of the present invention is to provide a system as described hereinbefore that can tension the flexible sheet element during winding and unwinding.

[0020] Another particular object of the present invention is to provide a system as described hereinbefore that can afford totally safe user operation.

[0021] Another object of the present invention is to provide a system as described hereinbefore that is able to protect the elastic counteracting means of the flexible sheet element from the outside environment.

[0022] Yet another object of the present invention is to provide a covering and shading system as described hereinbefore, that can both reduce installation times and afford easy maintenance.

[0023] These and other objects, as more clearly explained hereinafter, are fulfilled by a system for covering and shading a ground area as defined in claim 1, such system comprising a first pair of ground-anchored vertical bearing poles which are adapted to support a shaft rotating about a substantially horizontal axis, a second pair of ground-anchored vertical tensioning poles, on each side of the shaft, wherein each of the poles of the second pair is adapted to support a respective pulley.

[0024] The system further comprises a flexible covering/shading sheet element which may be wound/unwound on the shaft between a fully unwound open end position and a fully wound closed end position, driving means adapted to promote controlled rotation of the shaft about the axis of rotation, a first cable transversely returned on the fixed-axis pulleys with opposite ends connected to the flexible sheet element, a second cable with a driving end interacting with the shaft and an opposite

driven end adapted to longitudinally interact with the first cable, and a third cable having an upper end adapted to longitudinally interact with the first cable and the lower end connected to elastic counteracting means adapted to keep the flexible sheet element under tension while it is being wound and unwound.

[0025] In addition, the driving means comprise a drum, which is rigidly joined to the shaft on which the driving end of the second cable is wound.

[0026] In a peculiar aspect of the invention, the elastic counteracting means comprise a spring, which is housed in one of the bearing poles, to be entirely protected from the outside environment. Furthermore, the spring has an upper portion connected to the lower end of the third cable and a lower portion secured to the lower end of the bearing pole that houses it. The bearing pole that houses the spring has a respective pulley at its upper end for returning the third cable.

[0027] Furthermore, the driving end of the second cable is wound on the drum in a direction substantially orthogonal to the ground from top to bottom and the driven end and the driving end of the second cable and the upper end the third cable are placed above the shaft and the flexible sheet element, to prevent any inadvertent contact and risk to users.

[0028] This arrangement affords constant tensioning of the flexible sheet element while the latter is being wound and unwound.

[0029] The particular position of the elastic counteracting means facilitates total protection from the outside environment and allows the operator to operate under totally safe conditions.

[0030] In addition, all the moving parts are spaced away from the operator to prevent any risk of contact with the tensioned cables of the system.

[0031] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief Description of The Drawings

[0032] Further features and advantages of the invention will be more apparent from the detailed description of a preferred, non-exclusive embodiment of a system for covering and shading a ground area, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIGS. 1 and 2 are perspective views of a covering and shading system of the invention according to first and second operating configurations respectively;

FIG. 3 is an enlarged perspective view of the system of Fig. 1;

FIG. 4 is an enlarged perspective view with a respective magnification of the system of Fig. 2;

Figs. 5 and 6 show schematic top views of the system of Fig. 1 and Fig. 2 respectively.

Detailed description of a preferred exemplary embodiment

[0033] Particularly referring to the figures, there is shown a system 1 for covering and shading a ground area, which is preferably adapted for use in outdoor areas such as gardens, swimming pools or awnings in civil and commercial environments or for other similar applications.

[0034] As shown in FIGS. 1 and 2, the system 1 comprises at least one first pair of vertical bearing poles 2A, 2B with lower ends 3 anchored to the ground, which are adapted to support a shaft 4 rotating about a substantially horizontal axis X.

[0035] The shaft 4 may be supported at a predetermined height from the ground which can be selectively varied by a user by appropriate adjustment means, not shown.

[0036] Furthermore, the system 1 comprises at least one second pair of vertical tensioning poles 5A, 5B, which are anchored to the ground by their respective lower ends 6 and placed on each side of the shaft 4.

[0037] In particular, each of the tensioning poles 5A, 5B of the second pair is adapted to support, at the upper end 7, a respective pulley 8A, 8B having a fixed axis Z, whose operation will be described below.

[0038] As best shown in FIGS. 5 and 6, the fixed axis of rotation Z of these pulleys 8A, 8B is substantially vertical.

[0039] As shown in the figures, the system 1 comprises a flexible covering/shading sheet element 9 that can be wound/unwound on the shaft 4 between a fully unwound open end position and a fully wound closed end position.

[0040] The flexible sheet element 9 may be a "sail"-type element and have a substantially rectangular shape with a pair of corners 10A, 10B attached to the longitudinal ends 12A, 12B of the shaft 4 and a pair of free corners 11A, 11B situated on each side of the shaft 4, each facing a tensioning pole 5A, 5B of the second pair of poles.

[0041] As is known per se, as the size of the flexible sheet element 9 changes, the bearing poles 2A, 2B and the tensioning poles 5A, 5B may be moved toward or away from each other to increase or decrease the covered ground area.

[0042] As is known per se, the shaft 4 comprises driving means 13 adapted to promote controlled rotation of the shaft 4 about the axis of rotation X to thereby unwind the flexible sheet element 9 and move the pair of free corners 11A, 11B closer to their respective tensioning poles 5A, 5B.

[0043] Likewise, the driving means 13 may be actuated to rotate the drive shaft 4 in the opposite direction to wind the sheet element 9 and move the pair of free corners 11A, 11B away from their respective tensioning poles 5A, 5B.

[0044] As shown in FIGS. 1 and 2, the driving means 13 may be accommodated at a longitudinal end 12A of

the rotating shaft 4 proximate to one of the bearing poles 2A and may comprise a drum 14 of well-known type which is rigidly joined to the shaft 4.

[0045] Also, the driving means 13 may comprise an electric motor coupled to the drum 14, and adapted to promote the rotation of the shaft 4 at a variable rotation speed, and means may be provided for remote control of the motor, not shown.

[0046] Alternatively, the driving means 13 may comprise alternative manual means including a crank, not shown, which can be selectively coupled to the drum 14 for operation in case of emergency and power outage.

[0047] As is known per se, the driving means 13 may further comprise an automatically or manually operable limit-stop device when the flexible sheet element 9 is in a fully unwound and/or fully wound positions to turn off or stop the rotation of the rotating shaft 4.

[0048] The covering and shading system 1 comprises a plurality of cables 15 which are designed to wind and unwind the flexible sheet element 9 in combination with the driving means 13.

[0049] In particular, the system 1 comprises a first cable 16 that is transversely returned on the vertical fixed-axis pulleys 8A, 8B and having opposite ends 17A, 17B connected to the free corners 11A, 11B of the flexible sheet element 9.

[0050] Conveniently, these fixed-axis pulleys 8A, 8B may be mounted to their respective tensioning poles 5A, 5B in a distal position with the interposition of a rigid or partially elastic tension wire 18.

[0051] Furthermore, the covering/shading system 1 comprises a second cable 19 with one driven end 20A longitudinally interacting with the first cable 16 and one opposite driving end 20B interacting with the rotating shaft 4, wound on the drum 14.

[0052] As shown in FIGS. 1, 2, 5 and 6, an intermediate portion 16' of the first cable 16 may have a substantially W-shaped profile and be wound around a pair of first movable pulleys 21A, 21B having a vertical axis Z, which are transversely aligned with each other.

[0053] A second movable pulley 22 with a vertical axis Z may be interposed between the pair of first movable pulleys 21A, 21B in a longitudinally offset position relative to the latter and may be connected to the driven end 20a of the second cable 19.

[0054] Therefore, the first cable 16 is sequentially wound on a fixed-axis pulley 8A located on a tensioning pole 5A, a movable pulley 21A of the first pair, the second movable pulley 22, the other movable pulley 21B of the first pair and the other fixed-axis pulley 8B located on the other tensioning pole 5B.

[0055] As the driving means 13 are actuated, the drum 14 surrounds the respective driving end 20B of the second cable 19 to longitudinally move the driven end 20A interacting with the first cable 16 by means of the second movable pulley 22 toward a bearing pole 2A and as a result to transversely move the free corners 11A, 11B of the sheet element 9 toward the respective tensioning

poles 5A, 5B.

[0056] Furthermore, the system 1 comprises a third cable 23 having an upper end 24A adapted to longitudinally interact with the first cable 16 and connected to the pair of first movable pulleys 21A, 21B having a vertical axis Z via respective tension wires 25.

[0057] Advantageously, the third cable 23 comprises a lower end 24B, opposite to the upper end 24A, which is connected to elastic counteracting means 26 adapted to keep the flexible sheet element 9 under tension while it is being wound and unwound.

[0058] In a peculiar aspect of the invention, the elastic counteracting means 26 are housed in one of the bearing poles 2B and comprise a spring 27 which extends coaxial to the bearing pole 2B that houses it, so that the elastic means 26 will be entirely protected from the outside environment, as shown in the embodiment of the figures.

[0059] Alternatively, the elastic means 26 may be selected from the group comprising springs, hydraulic pistons, swinging counterweights and bands made of polymeric material with elastic properties.

[0060] Advantageously, the spring 27 may be selected from the group comprising helical springs, air springs, gas springs and magnetic springs.

[0061] The spring 27 has an upper portion 27' directly connected to a lower end 24B of the third cable 23 and a lower portion 27" directly secured to the lower end 3 of the bearing pole 2B that houses it, with no interposed means for reducing the pull force, as best shown in FIGS. 3 and 4.

[0062] Therefore, the elastic counteracting means 26 may be fully extended when the flexible sheet element 9 is in the open end position and will be fully retracted when the element 9 is in the closed end position.

[0063] This configuration facilitates easy and quick installation of the whole covering and shading system 1.

[0064] Advantageously, the system 1 may comprise adjustment means, not shown, for manual or automatic adjustment of the pull force of the spring 27, which are located at the bearing pole 2B that houses the latter.

[0065] The adjustment means may be totally accessible from the outside by the user and may be placed at the lower end 3 of the bearing pole 2B that houses the spring 27, preferably at the lower portion 27" thereof.

[0066] As shown in FIGS. 3 to 6, the bearing pole 2B which houses the spring 27 may have, at its upper end 28, a respective pulley 29 having a fixed horizontal axis Y for returning the third cable 23.

[0067] The fixed horizontal axis Y of this pulley 29 is substantially transverse to the axis of rotation X of the shaft 4.

[0068] Therefore, this pulley 29 interacts with the third cable 23 in an intermediate position between the movable pulleys 21A, 21B of the first pair and the spring 27 housed in the bearing pole 2B.

[0069] Furthermore, this pulley 29 may be entirely inserted in its respective bearing pole 2B for the third cable 23 to form an angle of about 90° at the upper end 28 of

the pole and to reduce the tensioning force that acts on the spring 27.

[0070] Likewise, as shown in FIGS. 1 and 2, the bearing pole 2A opposite to the one that houses the spring 27 comprises a respective pulley 30 having a fixed horizontal axis Y for returning the second cable 19, which is located above the driving means 13 and the drum 14.

[0071] According to a further peculiar aspect of the invention, the driving end 20B of the second cable 19 which interacts with the rotating shaft 4 may be wound on the drum 14 in a direction substantially orthogonal to the ground from top to bottom.

[0072] Furthermore, the driven end 20A and the driving end 20B of the second cable 19 and the upper end 24A of the third cable 23 are placed above the shaft 4 and the flexible sheet element 9, as shown in FIGS. 1 and 2.

[0073] This particular configuration prevents any inadvertent contact and risk of injury to users.

[0074] Conveniently, the fixed-axis pulley 30 which returns the second cable 19 may be mounted to its respective bearing pole 2A in a distal position with the interposition of a rigid or partially elastic tension wire 31.

[0075] By this arrangement, the second cable 19 also forms an angle of about 90° above the drum 14 to reduce the tensioning force that acts on the driving means 13.

[0076] An operating sequence of the covering and shading system during winding/unwinding of the flexible sheet element 9 will be now described, with particular reference to FIGS. 1 to 6.

[0077] In particular, when the flexible sheet element 9 is in the closed end position and is entirely wound on the rotating shaft 4, the elastic counteracting means 26 are fully retracted, as shown in FIGS. 1, 3 and 5.

[0078] In this operating state, the pair of first movable pulleys 21A, 21B connected to the third cable 23 and the second movable pulley 22 connected to the second cable 19 are placed at a predetermined distance from each other. Furthermore, the driving end 20B of the second cable 19 opposite to the second movable pulley 22 is only partially wound on the drum 14.

[0079] As the driving means 13 or the crank are actuated, the drum 14 winds the driving end 20B of the second cable 19, thereby causing the second movable pulley 22 to longitudinally move toward the bearing pole 2A opposite to the one that houses the spring 27.

[0080] Since the first cable 16 is wound on the second movable pulley 22, the translational movement of the latter will pull the first cable 16 and, as a result, will move the free transverse corners 11A, 11B of the flexible sheet element 9 connected to the ends 17A, 17B of the first cable 16 to move toward their respective tensioning pole 5A, 5B.

[0081] While the second movable pulley 22 moves, the pair of movable pulleys 21A, 21B connected to the upper end 24A of the third cable 23 will longitudinally move away from the second movable pulley 22, thereby causing the elastic counteracting means 26 to extend, as shown in FIG. 4.

[0082] Therefore, while the movable pulleys 21A, 21B having a vertical axis Z move, the flexible sheet element 9 is constantly under tension and the elastic means 26 continuously counteract the weight of the flexible sheet element 9 and the driving means 13.

[0083] When the sheet element 9 has to be returned to the closed end position, the longitudinal movement of the second movable pulley 22 toward the pole 2B that houses the spring 27 will cause the release of the elastic means 26 toward the lower end 3, back to their retracted position.

[0084] It will be appreciated from the foregoing that the system fulfills the intended objects and particularly affords constant tensioning of the flexible sheet element during winding and unwinding, while ensuring user safety.

[0085] All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0086] While the system has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Industrial Applicability

[0087] The present invention may find application in industry, because it can be produced on an industrial scale in the construction and installation of tensile structures.

Claims

1. A system (1) for covering and shading a ground area, comprising:

- at least one first pair of substantially vertical bearing poles (2A, 2B), which are anchored to the ground and adapted to support a shaft (4) rotating about a substantially horizontal axis (X);
- at least a second pair of substantially vertical tensioning poles (5A, 5B), which are anchored to the ground on each side of said shaft (4), said tensioning poles (5A, 5B) being adapted to support respective pulleys (8A, 8B);
- a flexible covering/shading sheet element (9) adapted to be wound/unwound on said shaft (4) between a fully unwound position and a fully wound position;
- driving means (13) for promoting controlled rotation of said shaft (4) about said axis of rotation (X);
- a first cable (16) transversely returned on said pulleys (8A, 8B) and having opposite ends (17A,

17B) connected to said flexible sheet element (9);

- a second cable (19) with a driving end (20B) interacting with said shaft (4) and of the opposite driven end (20A) adapted to longitudinally interact with said first cable (16);

- a third cable (23) with an upper end (24A) adapted to longitudinally interact with said first cable (16) and a lower end (24B) connected to elastic counteracting means (26) to keep said sheet element (9) under while it is being wound and unwound;

wherein said driving means (13) comprise a drum (14), which is rigidly joined to said shaft (4) on which said driving end (20B) of said second cable (19) is wound;

characterized in that said elastic counteracting means (26) comprise a spring (27), which is housed in one of said bearing poles (2B) to be completely protected from the outside environment, said spring (27) having an upper portion (27') connected to said lower end (24B) of said third cable (23) and a lower portion (27'') secured to the lower end (3) of the bearing pole (2B) that houses it, said bearing pole (2B) housing said spring (27) having at its upper end (28) a respective pulley (29) for returning said third cable (23), said driving end (20B) of said second cable (19) being wound on said drum (14) in a direction substantially orthogonal to the ground from top to bottom, said driven end (20A) and said driving end (20B) of said second cable (19) and said upper end (24A) of said third cable (23) being placed above said shaft (4) and said flexible sheet element (9), to prevent any inadvertent contact and risk to users.

2. System as claimed in claim 1, **characterized in that** said spring (27) is selected from the group including helical springs, air springs, gas springs and magnetic springs.

3. System as claimed in claim 1, **characterized in that** the bearing pole (2A) opposite to the one that houses said spring (27) comprises a respective pulley (30) having a fixed horizontal axis (Y) for returning said second cable (19).

4. System as claimed in claim 1, **characterized in that** said flexible sheet element (9) comprises a substantially rectangular shape with a pair of corners (10A, 10B) attached to the longitudinal ends (12A, 12B) of said shaft (4) and a pair of free corners (11A, 11B) placed on each side of said shaft (4), said free corners (11A, 11B) facing said tensioning poles (5A, 5B).

5. System as claimed in claim 1, **characterized in that** said driving means (13) are housed at the longitudi-

nal end (12A) of said shaft (4) opposite to said spring (27).

6. System as claimed in claim 1, **characterized in that** an intermediate portion (16') of said first cable (16) has a substantially W-shaped profile and is wound around a pair of first transversely aligned movable pulleys (21A, 21B) having a vertical axis (Z), and a second movable pulley (22) having a vertical axis (Z) interposed between said first movable pulleys (21), and longitudinally offset from the latter, said second movable pulley (22) being connected to said driven end (20A) of said second cable (19).

7. System as claimed in claim 1, **characterized in that** said pair of first movable pulleys (21) having a vertical axis (Z) are connected to said upper end (24A) of said third cable (23) via respective tension wires (25).

8. System as claimed in claim 1, **characterized in that** said pair of fixed-axis pulleys (8A, 8B) are mounted to their respective tensioning poles (5A, 5B) with the interposition of a rigid or partially elastic tension wire (18).

9. System as claimed in claim 1, **characterized in that** said driving means (13) comprise an electric motor coupled to said drum (14), control means being provided for remote actuation of said motor.

10. System as claimed in claim 9, **characterized in that** said driving means (13) comprise alternative manual means including a crank which is adapted be selectively coupled to said drum (14) for actuation thereof in case of emergency and power outage.

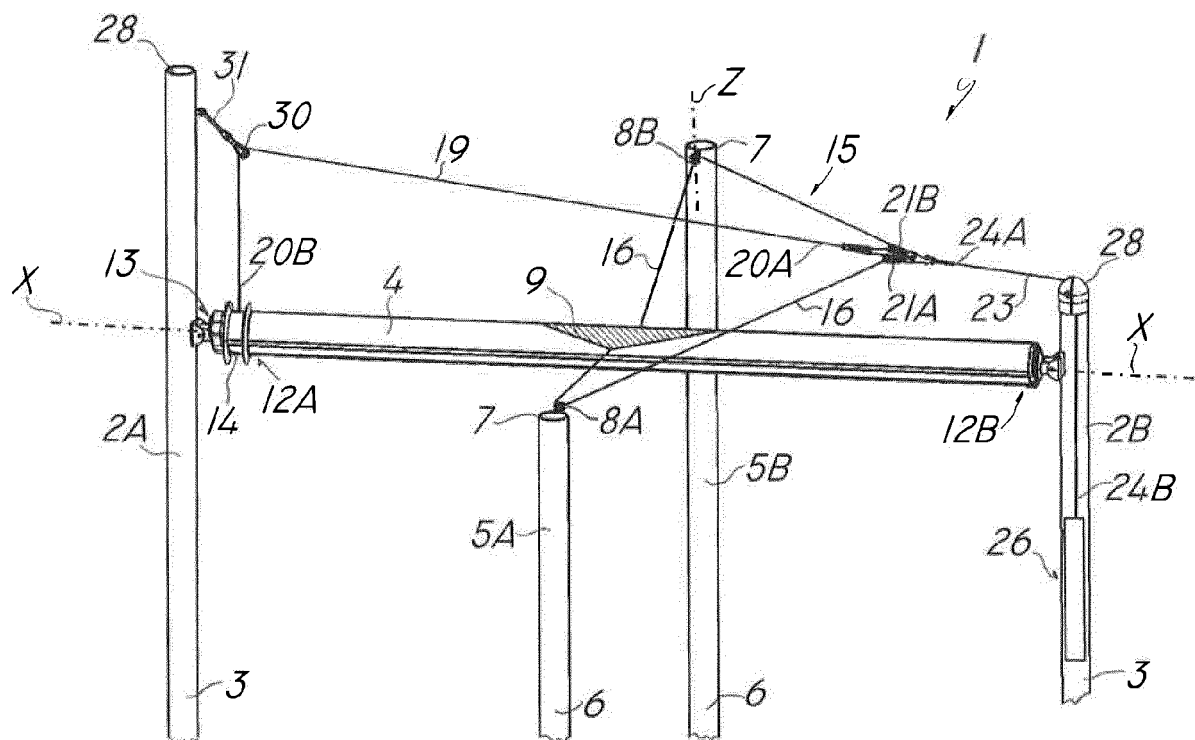
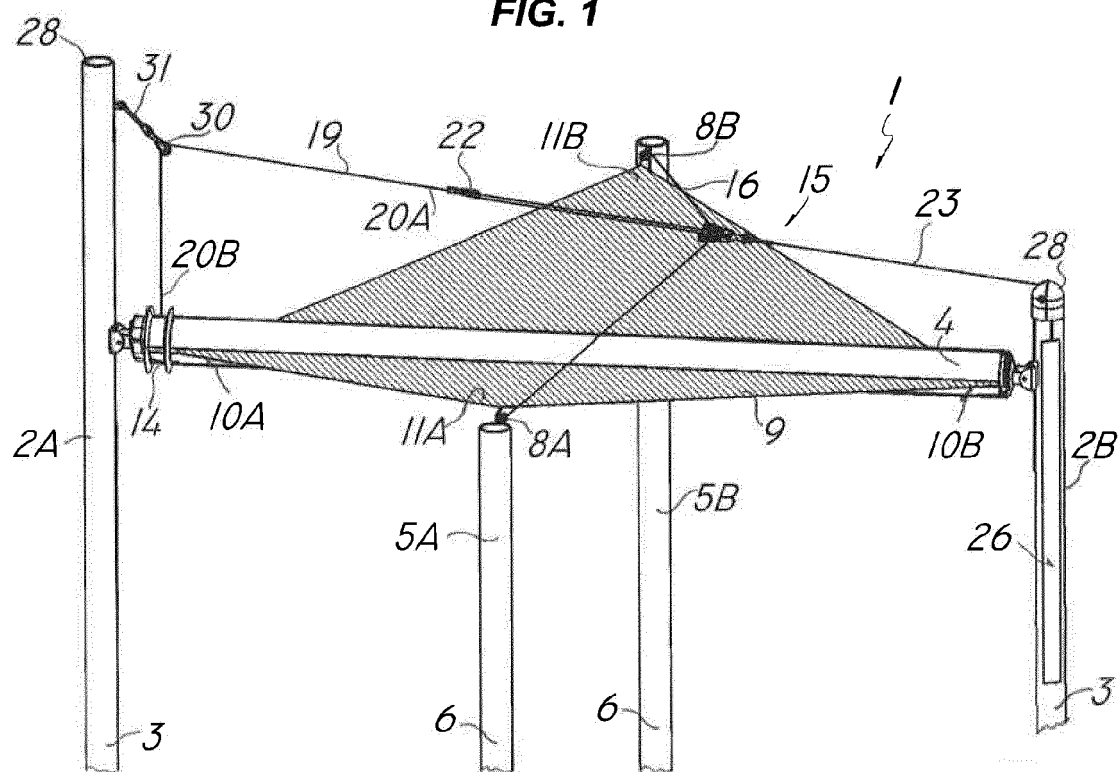
**FIG. 1**

FIG. 2

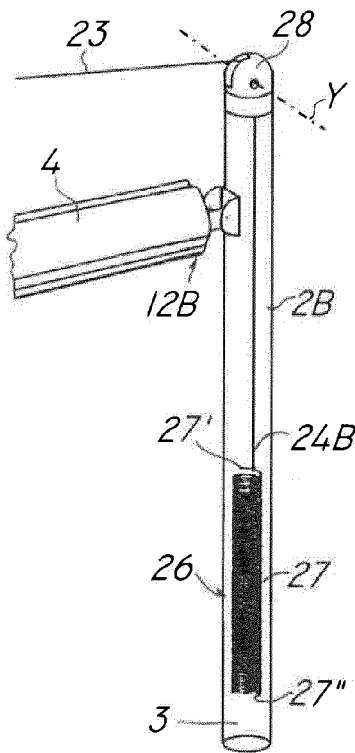


FIG. 3

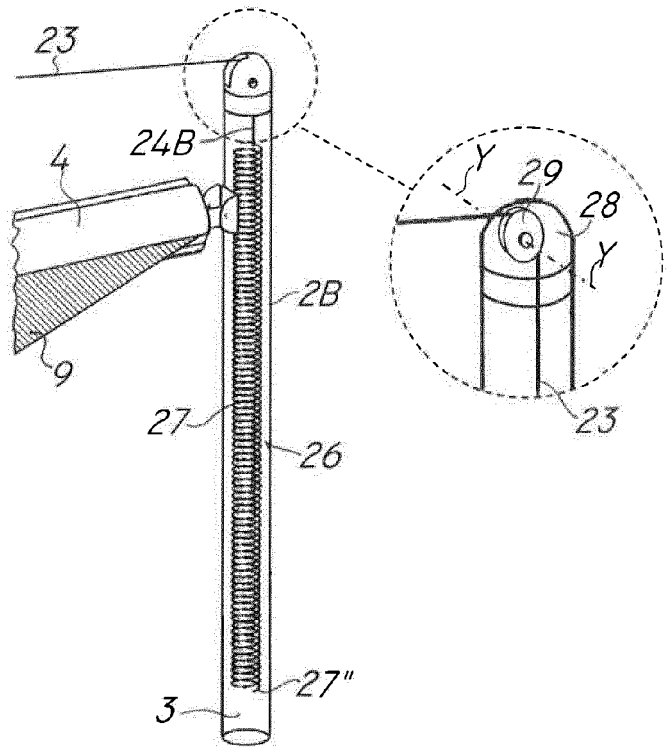


FIG. 4

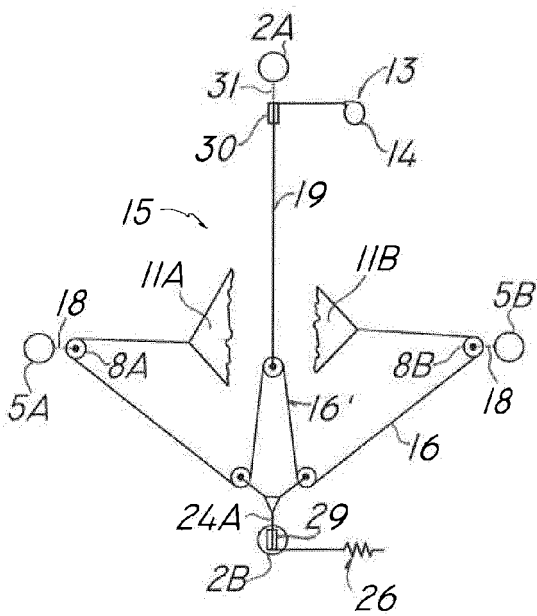


FIG. 5

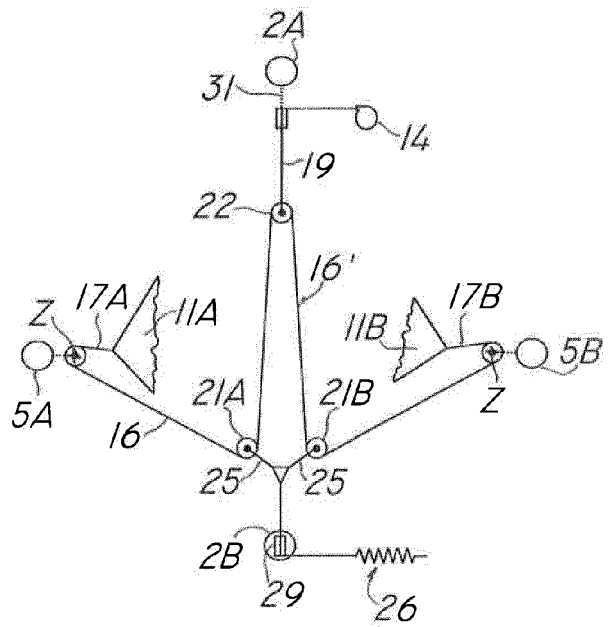


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 19 15 7074

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 July 2019	Examiner Cornu, Olivier
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 15 7074

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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08-07-2019

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REFERENCES CITED IN THE DESCRIPTION

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