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(54) **SCREENING ARRANGEMENT WITH EXTENSIBLE SCREEN AND METHOD FOR PROVIDING VARIABLE SCREENING OF A WINDOW**

ABSCHIRMUNGSANORDNUNG MIT AUSZIEHBAREM SCHIRM UND VERFAHREN ZUR BEREITSTELLUNG EINER VARIABLEN ABSCHIRMUNG EINES FENSTERS

ARRANGEMENT D'UN ÉCRAN AVEC UN ÉCRAN EXTENSIBLE ET PROCÉDÉ DE FOURNIR UNE PROTECTION VARIABLE CONTRE LA VUE ET LE SOLEIL D'UNE FENÊTRE

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Description

Field of the invention

[0001] The present invention relates to a screening arrangement for adjusting the light intake of a window opening to be screened and comprising: an extensible screen having a predefined length between a first end portion and a second end portion, the extensible screen being made from a material with variable transparency in at least a first direction such that when traction is applied to the material in said first direction, the permeability of the material is increased, a roller shaft connected to drive means, the first end portion of the extensible screen being connected to the roller shaft, the extensible screen being wound on the roller shaft in a non-screening position and configured to be unwound from the roller shaft, under rotation of the roller shaft in an unwinding direction, to a deployed position at a well-defined end stop, corresponding to a first screening position, in which the extensible screen is in a first stretched state, and traction means configured to apply traction on the extensible screen to bring the extensible screen to a second screening position, in which the extensible screen is in a second stretched state and the permeability of the material is increased relative to the permeability of the first stretched state. The invention furthermore relates to a method for providing variable screening of a window.

Background of the invention

[0002] Screening arrangements positioned in front of a window to cover the window from direct sunlight in the screening position are common. Usually such a screening arrangement comprises a screen in the form of a blind or shade, such as a roller blind or a pleated blind. A roller blind is typically comprised of a flexible screen, typically made of fabric, arranged on a roller shaft. The fabric used can be of varying quality depending on the purpose. For instance, the fabric may be a light fabric, which allows a generous amount of light into the room. The fabric can otherwise be a thick fabric with a light impermeable coating to ensure a dark room. The problem with this type of roller blind is that it is difficult to adjust the amount of light. The only way to adjust the light intake is to vary the covering length of the blind. In the prior art, several attempts have been made in order to alleviate this problem.

[0003] One example is described in US2015/0191971 A1 which describes a screening arrangement of the kind mentioned in the introduction. In this arrangement, the screen comprises an elastic fabric provided with apertures. The screen is wound on a winding tube driven by a motor, and can be deployed to a length corresponding to the window. In the most simple embodiments, the load bar at the lower end edge of the screen is fixed in position relative to a stationary bolt or support at the lower end of the window, following which the screen is subjected to either a traction to widen the apertures, or relaxed to close the apertures. In a more developed embodiment, an arrangement of the kind mentioned in the introduction is devised, in which the arrangement is provided with tensioning means in the form of two winding tubes. Once the bottom part of the screen is in the deployed position, the first winding tube is locked, following which the screen is stretched by rotating the second winding tube. Another example is described in DE3520857 A1 which describes a screening arrangement, where the screen comprises a fabric provided with apertures. The screen is manually wound on a winding tube via a winding shaft, traction cords and a spring device.

[0004] A problem with these arrangements is that the arrangements are relatively complex and require complex operation. In the case of US2015/0191971 A1, unnecessary load on the motors is caused by the uneven forward/backward motion.

Summary of the invention

[0005] With this background it is the object of the invention to provide a screening arrangement, which is of a more simple structure and which provides a more even load on the drive means.

[0006] In a first aspect, this and further objects are met by a screening arrangement of the kind mentioned in the introduction, which is furthermore characterized in that the traction means comprises at least one traction cord in connection with the second end portion of the extensible screen and with the roller shaft and which is configured to apply a traction force on the extensible screen when the extensible screen is stretched from said first stretched state to said second stretched state in the second screening position by continuing rotation of the roller shaft in the unwinding direction after the extensible screen has been fully deployed from the roller shaft, and that a spring device is provided to provide pre-tensioning of the at least one traction cord.

[0007] By providing the traction means in the form of rotation of the roller shaft in the unwinding direction while at the same time the traction cord or cords in connection with the roller shaft are able to keep the second end portion of the extensible screen substantially stationary at the desired end stop, the roller shaft itself provides the desired stretching of the extensible screen to obtain the variable screening aimed at. Relative to the prior art, this is achieved in a simple manner, as the extensible screen after the fully deployed position is wound up reversely on the roller shaft to attain the second stretched state, in which the permeability of the extensible screen is increased. Hence, the transition from the first screening position to the second screening position is performed more or less automatically by the continued rotation of the roller shaft.

[0008] Depending on the predefined length of the extensible screen relative to the height of the window opening to be screened, the tension level of the extensible screen in the first stretched state may be chosen accord-

ing to the field of application of the screening arrangement in order to provide optimum freedom of choice. Hence, the predefined length may be chosen to correspond to the height of the window opening, or to exceed the height, or to be smaller than the height of the window opening to be screened.

[0009] Even though the invention is operable to any suitable connections between the traction cord or cords and the extensible screen on one hand and with the roller shaft on the other, it is presently preferred to incorporate a bottom bar connected to the second end portion of the extensible screen in one embodiment, and in another embodiment to connect the traction cord directly to the roller shaft. The bottom bar provides stability to the screen and distributes the forces acting on the material of the extensible screen. The bottom bar may be for instance a metal, plastic or wooden bar, either compact or as a profile element.

[0010] In a further embodiment, at least one pulley is arranged substantially parallel to and at a distance from the roller shaft, each traction cord being guided around the respective pulley such that the respective traction cord forms a loop between the roller shaft and the second end portion of the extensible screen, possibly via the bottom bar in such cases this is present. This allows the traction cord(s) to take a determined path towards the respective pulley while the screen is being unwound. With the pulleys, the traction cord is able to round the respective pulley and return towards the roller shaft. This is an advantage since operation of the roller shaft then first unwinds the extensible screen to its fully deployed position in which the entire length of the screen is unwound from the roller shaft, and continued operation of the roller shaft results in that the extensible screen winds back round the roller shaft, and thus reverses. At this point the traction cord is simultaneously wound onto the roller shaft. This results in a double traction force being applied onto the extensible screen, both from the torque acting on the roller shaft and from the traction cord in the opposite direction, which serves to hold the second end portion of the extensible screen substantially stationary.

[0011] In a preferred embodiment, the spring device comprises a spring-loaded pulley and a guide pulley. In this way, each traction cord may be looped back and the cord stroke is doubled. In turn, this provides for a compact design and a more constant spring force. Alternative configurations of such a spring device are however conceivable.

[0012] In an embodiment in which the extensible screen defines a screening plane in the deployed position, the screening arrangement further comprises a positioning element, preferably comprising a guide roller, having a positioning surface arranged to position the extensible screen in the predefined screening plane. The positioning element compensates for the deviation in the radial position of the extensible screen while being wound or unwound on the roller shaft.

[0013] In a further embodiment, the variable transparency is achieved by apertures in the material. When traction is applied to the material, the apertures may increase in size. This is an advantage since a material that may be elongated or stretchable thus may reveal apertures when traction is applied to it in order to increase light intake. The material of the extensible screen may be one of the following: a textile made with at least one of elastic, lamellae, knits, pleat, non-woven or the like. A textile with elastic properties may be simple to produce and may be versatile in installation. Also, an elastic textile may be made as variably stretchable as needed. Apertures may be naturally incorporated in the textile, such as a knitted textile. The apertures may also be applied afterwards, such as slits or holes. The apertures may also be provided as an effect of having a lamella structure. A lamella material may be either a textile or a stiff material made from a plastic or a metal.

[0014] In a structurally simple and presently preferred embodiment, the drive means comprises a tubular motor incorporated in the roller shaft.

[0015] Advantageously, the tubular motor is connected to a control system including calibration means such as a revolution counter and/or one or more sensors. Thus, any torque to be applied may be previously programmed. Further, the motor may be calibrated using the revolution counter possibly in combination with the one or more sensors in order to determine the point of deployment. When fully deployed, the torque may be adjusted in a specific mode for stretching the extensible screen. Further, a remote control may be used as well as a stationary switch. With such a motor driven screening arrangement, it is thus possible to pre-programme the torque to be applied to the roller shaft in order to go from the non-screening position to the first screening position which is detected and following which the desired extension or stretching of the extensible screen is obtained in the second screening position.

[0016] In one embodiment, the screening arrangement comprises a header arranged to cover at least the roller shaft at the top of the window and side rails, in which side portions of the extensible screen are guided. In addition to protecting the operational parts of the screening arrangement, this provides for a pleasant appearance.

[0017] In a second aspect, a method for providing variable screening is provided as defined in independent claim 17.

[0018] The advantages of the second aspect of the invention and further developed embodiments also applicable to the second aspect of the invention have been described in the above and reference is made thereto.

[0019] Further details are described, and further advantages stated, in the description of particular embodiments of the invention.

Brief description of the drawings

[0020] In the following the invention will be described in further detail by means of examples of embodiments

with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a screening arrangement in an embodiment of the invention;
Fig. 2 is a perspective view of a screening arrangement in an embodiment of the invention;
Figs 3a to 3c are schematic side views illustrating the operation of a screening arrangement in an embodiment of the invention;
Figs 4a and 4b are schematic side views illustrating the operation of a screening arrangement in an alternative embodiment of the invention;
Fig. 5a is a partial front view illustrating the material of a screening arrangement in an embodiment of the invention;
Fig. 5b is a partial front view illustrating another material of a screening arrangement in an embodiment of the invention; and
Fig. 6 is a detail view of a screening arrangement in an embodiment of the invention.

Description of detailed embodiments of the invention

[0021] In the following, embodiments of the first and the second aspects will be described in further detail. Figs 1 and 2 schematically illustrate embodiments of a screening arrangement 100 adapted to be arranged in a window (not shown). The window will be referred to only as "window" and the invention is in particular intended for use in a roof window, installed in an inclined roof surface. Directional terms such as "upper", "lower" etc. relate to the position shown in the drawings. The invention is in principle applicable to all types of windows for installation in all types of roofs, including flat roofs, and facades, however. The window has, in a manner known per se, at least one frame encasing a window opening to be screened. Elements having the same or analogous function are denoted by the same reference numerals throughout.

[0022] The screening arrangement 100 comprises an extensible screen 6 and has a predefined length between a first end portion 61 and a second end section 62, and is made from a material having variable transparency as will be described in further detail in the following. The first end portion 61 is connected to a roller shaft 1 connected to drive means (not shown) such that the extensible screen 6 may be wound up on and unwound from the roller shaft 1 under rotation thereof. The extensible screen 6 is typically rectangular, and the width of the extensible screen corresponds to or is slightly smaller than the length of the roller shaft. This may however be different depending on the specific installation, the width being defined between opposed side portions 63, 64. The roller shaft 1 is typically positioned at the top of the window, for instance fastened by suitable brackets to one of the frames of the window. Most commonly the roller shaft 1 is arranged horizontally at the top of the window. This is however not limiting for the screening arrangement 100 which may be suitably used in any direction depending on the size and shape of the window. The extensible screen 6 may thus be brought from a non-screening position in which the extensible screen 6 is wound more or less completely on to the roller shaft 1 and to one or more screening positions by moving the second end portion 62 downwards, hence typically in the direction towards the bottom of the window, as will be elaborated on below.

[0023] In the embodiment shown in Fig. 1, the screening arrangement 100 comprises a header 9 arranged to cover at least the roller shaft 1 at the top of the window and two side rails 10 in which the side portions 63, 64 of the extensible screen 6 is guided. Furthermore, the screening arrangement 100 comprises a bottom bar 4 connected to the free or second end portion 62 of the extensible screen 6.

[0024] In the embodiment shown in Fig. 1, the extensible screen 6 is provided with a plurality of apertures 8 in the material. The material may be characteristically elastic and/or have variable transparency. That is, a traction force applied to the material in the direction of arrows A may stretch or extend the material in order to reveal apertures 8 that may vary in size depending on the size of the traction force. The material with is shown in further detail in Fig. 5a, which illustrates schematically an embodiment of the specific shapes and configuration of the apertures 8 in the extensible screen 6. The extensible screen 6 may be provided with apertures 8 of different or equal size. In an unstretched, or substantially relaxed, state, the apertures 8 barely show, and hence there is little light permeability. In a stretched state, the apertures 8 are stretched and increased in size in at least the first direction, and thereby light intake from a window can be varied.

[0025] The extensible screen 6 may in general be formed by any textile made with at least one of elastic, lamellae, knits, pleat, non-woven or the like. In addition to distinct apertures 8 as shown, such apertures may hence also for instance be provided as interstices in a mesh, as indicated schematically in the embodiment of Fig. 2.

[0026] An example of a fabric with openings is described in WO 2011/150902 A1 in which the fabric or textile is elastic in a first direction and is substantially inelastic in a second direction and wherein openings, the size of which can be controlled according to the elasticity of the fabric, are formed in the fabric or textile when the textile is stretched in the direction in which the textile is elastic. This is illustrated in Fig. 5b, in which shows a sample cloth to be used in the extensible screen 6, in the form of a warp having a plurality of warp threads X of elastic fibres or yarns. Weft yarns Y are added by conventional joining techniques. The weft yarns Y are typically designed as threads and are here arranged in pairs, one behind the other. The weft yarns Y are substantially non-elastic, so that the screen, so that the screen may be stretched in the longitudinal direction, that is in the

direction of the warp yarns X, without significantly shrinking in the transverse direction, i.e. in the direction of the weft yarns Y.

[0027] In order to provide the traction force to vary the transparency, or light permeability, of the extensible screen 6, the screening arrangement 100 comprises traction means to bring the screening arrangement from a first screening position to a second screening position. Referring now in particular to Fig. 2 showing the details of the screening arrangement 100 in one embodiment, the bottom bar 4 being indicated only schematically for reasons of clarity, also the traction means comprising two traction cords 3 are shown in Fig. 2. The position of the roller shaft 1 is denoted by axis X1.

[0028] Generally, the wound up position is when the extensible screen 6 is fully withdrawn and the entirety of the window opening to be screened is exposed, i.e. a non-screening position. To compare, the deployed position is when the extensible screen 6 is unwound and deployed to cover the entire window opening in a first screening position. As will be described in further detail below, the extensible screen 6 is furthermore adapted to assume a second screening position, i.e. the position shown in Fig. 1, in which the material of the extensible screen 6 is in a second stretched state and is stretched to a higher level relative to the first stretched state and the apertures 8 are in a more open condition.

[0029] In the first screening position the extensible screen 6 is deployed, i.e. unwound from the roller shaft 1, and the extensible screen 6 is in a first stretched state. The position of the second end portion 62 of the extensible screen, or of the bottom bar 4, relative to the window opening to be screened is in a well-defined end point, which may be mechanically defined, for instance by an abutment, or controlled electronically by suitable programming of the drive means. The tension of the screening material of the extensible screen 6 in the first stretched state depends on the relation between the predefined length of the extensible screen 6 and the height of the window opening to be screened. In the present context, it is to be understood that this predefined length of the extensible screen 6 corresponds to the length of the screening material in a completely relaxed state of the extensible screen. The predefined length is configured relative to the height of the window opening to be screened in one of the following three manners:

i. the predefined length corresponds substantially to the height of the window opening such that the extensible screen 6 is substantially relaxed in the deployed position corresponding to the first screening positions. In this case, the first end portion 62 of the extensible screen 6 is the only portion in contact with the roller shaft 1 in the deployed position corresponding to the first screening position of the screening arrangement 100. During the continued rotation of the roller shaft 1 in the unwinding direction, the extensible screen 6 is wound up reversely on the roller shaft 1 until the second screening position has been reached, in which the extensible screen 6 is in its second stretched state and the desired light permeability, or transparency, has been reached;

ii. the predefined length exceeds the height of the window opening such that the extensible screen 6 is continued to be unwound from the roller shaft 1 from the first screening position until the extensible screen 6 has been fully deployed, i.e. when the first end portion 62 of the extensible screen 6 is the only portion in contact with the roller shaft 1 ..During the continued rotation of the roller shaft 1 in the unwinding direction, the extensible screen 6 is wound up reversely on the roller shaft 1, reaching first the tension corresponding to the first stretched state and further until the second screening position has been reached, in which the extensible screen 6 is in its second stretched state and the desired light permeability, or transparency, has been reached;

iii. the predefined length is smaller than the height of the window opening such that the extensible screen 6 is stretched in the deployed position corresponding to the first screening position. During the continued rotation of the roller shaft 1 in the unwinding direction, the extensible screen 6 is wound up reversely on the roller shaft 1 until the second screening position has been reached, in which the extensible screen 6 is in its second stretched state and the desired light permeability, or transparency, has been reached.

[0030] During unwinding of the extensible screen 6 from the wound up non-screening position to the fully deployed position of the first screening position, the bottom bar 4 may also be positioned in a number of intermediate positions in between to provide a variety of screening positions.

[0031] The configuration of the traction means in embodiments of the invention will now be described in some detail. As seen in Fig. 2, the screening arrangement 100 is provided with traction means in the form of at least one traction cord. In the embodiment of Fig. 2, two traction cords 3 are provided, one on each side of the extensible screen 6. The traction means including the rotational movement of the roller shaft 1 itself and the traction cords 3 are configured to apply the traction force on the extensible screen 6 such that the extensible screen 6 is stretched from said first stretched state to said second stretched state under rotation of the roller shaft 1. By having two traction cords 3, the load is more evenly distributed.

[0032] In the embodiment shown in Fig. 2, each traction cord 3 is connected to the second end portion 62 of the extensible screen 6 via the bottom bar 4 and to the roller shaft 1 in that a first end 3a is wound onto the roller shaft 1, here in the opposite direction of the winding of the extensible screen 6. Alternatively to connecting the traction cords 3 directly to the roller shaft 1 as shown,

the winding of the traction cords may also be provided on a separate winding reel. The winding reel may be connected directly to the roller shaft or via a suitable transmission mechanism such as a belt drive or a chain drive. The traction cord or cords may also assist in unwinding the extensible screen from the roller shaft.

[0033] A second end 3b of the traction cord 3 is arranged to be connected to a second end portion 62 of the extensible screen 6. As shown, the second end 3b of each traction cord 3 is connected to a spring device 5 accommodated in the bottom bar 4. Here, the spring device 5 comprises a tension spring directly connected to the second end 3b of the traction cord 3, but other arrangements are conceivable. Other configurations of such a spring device to provide pre-tensioning of the traction cord or cords include the provision of a spring device placed behind the header and/or side rails, and by forming the traction cord or cords at least partially by elastic portions.

[0034] In the embodiment of Fig. 2, the screening arrangement 100 further comprises at least one idler shaft or pulley 2, here two pulleys 2, one positioned at either side of the extensible screen 6 along an axis X2 to cooperate with a respective traction cord 3. The pulleys 2 are arranged substantially parallel to and at a distance from the roller shaft 1, each traction cord 3 being guided around the respective pulley 2 such that the respective traction cord 3 forms a loop between the roller shaft 1 and the second end portion 62 of the extensible screen 6, either directly to the second end portion or via the bottom bar 4. In the embodiment shown, the pulleys 2 are located near the end point for the travel of the extensible screen 6.

[0035] The roller shaft 1 may receive its driving torque to unwind and wind up the extensible screen 6 from a motor. Although not described in further detail, the drive means of the embodiment of Fig. 2 comprises a tubular motor incorporated in the roller shaft 1. The tubular motor is connected to a control system including calibration means such as a revolution counter and/or one or more sensors. The motor may be thus be configured to provide the screening arrangement 100 with a suitable torque at a suitable speed over predefined time periods.

[0036] Referring now also to Figs 3a to 3c, the operation of the screening arrangement 100 in one embodiment will be described in further detail. Elements having the same or analogous function as in the embodiments of Figs 1 and 2 are denoted by the same reference numerals throughout.

[0037] Before deployment, the extensible screen 6 is in a wound up, or collapsed, position in which the extensible screen is wound up on the roller shaft 1.

[0038] In Fig. 3a, a partially unwound extensible screen 6 is shown. In order to unwind the extensible screen 6, the roller shaft 1 is rotated in a first rotational direction (counter-clockwise in the embodiment shown) by the application of a torque indicated Mu in Fig. 3b and the extensible screen 6 moves in the direction of arrow U. During this movement, the traction cords 3 assist in pulling the bottom bar 4 and hence the second end portion 62 of the extensible screen 6 to unwind the extensible screen 6 from the roller shaft 1. Under normal conditions, the extensible screen 6 is subjected to only a slightly stretched state during this movement.

[0039] Fig. 3b illustrates the extensible screen 6 in a deployed position corresponding to a first screening position. The tension in the extensible screen 6, and the degree of deployment, is dependent on the relationship between the predefined length of the extensible screen 6 and the height of the window opening to be screened, as described in the above. In the embodiment in which the predefined length of the extensible screen 6 corresponds substantially to the height of the window opening to be screened, the deployed position is the also the position in which the extensible screen 6 is fully deployed, i.e. no more of the screen 6 is wound round the roller shaft 1, i.e. the first end portion 61 is the only portion in contact with the roller shaft 1. In this position the extensible screen 6 generally covers the window and the extensible screen is in a first stretched state. By "first stretched state" encompasses the possibilities that the screen is an a completely relaxed state, meaning that the screen is substantially not subjected to traction or other stretching load, and that the screen is subjected to a tensioning force, for instance in the case in which the height of the opening to be screened is larger than the predefined length of the extensible screen as completely relaxed.

[0040] The drive means of the screening arrangement is calibrated, for instance by a revolution counter, in order to detect the deployed position. On the basis of the calibration, the extent of the desired stretch of the extensible screen 6 is able to be determined and programmed into the control means. One simple manner of achieving the well-defined end point is by programming the control means to detect an increase in the power consumption of the tubular motor.

[0041] Fig. 3c illustrates a continuing rotation of the roller shaft in the first rotational direction and a torque indicated Mt is transferred to the roller shaft 1. During continued rotation, the extensible screen 6, which is in connection with the roller shaft 1, follows the roller shaft 1 in its continued rotational loop and is thus wound reversely on the roller shaft 1. By reversely wound is understood that the roller shaft 1 rotates beyond the deployed position of the extensible screen 6. Also present in Fig. 3c is a positioning element in the form of a guide roller 7, which ensures that the extensible screen 6 is kept in a substantially vertical position. The guide roller 7 thus compensates for the deviating radial position of the extensible screen 6 due to its position on the roller shaft 1. The screen 6 rounds the positioning element 7 and thus starts to move upwards again towards the collapsed position.

[0042] At the same time, the traction cord 3 continues to wind round the roller shaft 1. The effect of this is that

the roller shaft 1 draws the extensible screen 6 upwards, and the traction cord 3 draws the extensible screen 6 downwards as indicated by the arrow F_T. This double movement performs traction on the extensible screen 6 and thus separates the material of the extensible screen 6 to increase the permeability of the material, i.e. in the specific embodiment to widen the apertures 8, and the variable light permeability aimed at is achieved.

[0043] During unwinding of the extensible screen 6 from the roller shaft, the traction cord 3 is concurrently wound up on the roller shaft 1. As the windings of the extensible screen 6 on the roller shaft 1 decrease in diameter as the outermost layers are unwound, the spring device 5 compensates for the differences in unwound length of the extensible screen 6 relative to the wound up length of the traction cord 3.

[0044] As mentioned in the above, the roller shaft 1 is subjected to the torque indicated Mu and the extensible screen 6 moves in the direction of arrow U, while the traction cords 3 pull the bottom bar 4 downwards as shown in Fig. 3a. The relationship between the torque Mu and the force which the traction cords 3 influence the bottom bar 4 depends on several factors including the dimensioning of the roller shaft 1, the elasticity, thickness and predefined length of the extensible screen 6, of whether the traction cords 3 are wound up on a separate winding reel or on the roller shaft 1 itself, and if so, on a part of reduced diameter thereof; and last but not least the configuration and dimensioning of the spring device acting to provide a pre-tensioning of the traction cords 3.

[0045] Once the desired end-stop position has been reached in Fig. 3b, the traction cords 3 serve to hold the bottom bar 4 and hence the second end portion 62 of the extensible screen 6 substantially stationary by means of the force Ft indicated in Fig. 3b. The force Ft required to keep the bottom bar 4 stationary also depends on a number of factors as described in the above, including the magnitude of the torque Mt of the roller shaft 1. The torque Mt may either be of the same magnitude as the unwinding torque Mu, or different, just as a varying torque is also conceivable.

[0046] In the fully deployed position, i.e. when only the first end portion 61 is in connection with the roller shaft 1, the "cord reserve" inherent in the spring device 5 ensures proper functioning of the screening arrangement 100. At this turning point, the cooperation between the spring device and the traction cords 3 provide for the balancing of holding the bottom bar 4 (or the second end portion 62 at its desired end stop position) such that the extensible screen 6 is prohibited from pulling the bottom bar 4 upwards, just as it is ensured that the roller shaft 1 is able to wind the extensible screen 6 up reversely during the continued rotation in the unwinding direction. This is well within the skills of the person skilled in the art. It is also conceivable to provide this "cord reserve" in alternative embodiments, for instance by a tension spring arranged behind the side rail and connected to the traction cord, or by forming the traction cord partly or entirely from elastic portions.

[0047] In order to release the traction and to wind the extensible screen 6 to its collapsed position, the roller shaft 1 is subsequently rotated in a second rotational direction, opposite to the first rotational direction, and thus returns the extensible screen 6 on the roller shaft 1. The roller shaft 1 is then set to rotate further in the second rotational direction (clockwise in the embodiment shown), opposite to the direction shown in Figs 3a-3c. The initial movement of the extensible screen 6 in the return direction entails that the traction force, which the traction cords 3 influence on the bottom bar 4 to keep the bottom bar 4 and hence the second end portion 62 of the extensible screen 6 substantially stationary, is released when the roller shaft 1 rotates in the winding direction, and the extensible screen 6 relaxes from the second stretched state to the first stretched stated. The traction cords 3 will at the same pace unwind from the roller shaft 1 and follow the path of the extensible screen 6 until the extensible screen 6 is in a wound up position.

[0048] Figs 4a and 4b show an alternative embodiment, in which the extensible screen 6 and the traction cords 3 are arranged as previously around the roller shaft 1. However, the drive of the roller shaft 1 runs in the opposite direction to unwind and wind up the extensible screen 6, the unwinding direction being thus clockwise. This means also that the screen 6 rounds the positioning element 7 during the unwinding rather than during the traction. Such configuration allows a more compact design such that the extensible screen 6 and the traction cords 3 operate in substantially the same plane.

[0049] As mentioned, the suspension of the second end 3b of the traction cord 3 is preferably provided by a spring device, the simplest form being shown in Fig. 2. Alternatively or additionally, the tubular motor of the roller shaft 1 may be provided with torsion spring reels, or as shown in Fig. 6 a more complex device is shown. The bottom bar 4 in Fig. 6 accommodates the second end 3b of the traction cord 3 arranged in connection with a spring device 5 comprising a spring-loaded pulley 11 of which the spring-load is provided by a pressure spring, and the second end 3b of the cord is guided about a guide pulley 12. This spring device 5 provides a more even traction force and reduces the impulse force on the cord and thereby in turn the extensible screen 6 during winding and unwinding, in addition to being of a compact design and to the compensation properties described in the above.

[0050] The invention should not be regarded as being limited to the described embodiments. Several modifications and combinations of the different embodiments will be apparent to the person skilled in the art.

Claims

1. A screening arrangement (100) for adjusting the light intake of a window opening to be screened and com-

prising:

an extensible screen (6) having a predefined length between a first end portion (61) and a second end portion (62), the extensible screen (6) being made from a material with variable transparency in at least a first direction such that when traction is applied to the material in said first direction, the permeability of the material is increased,
a roller shaft (1) connected to drive means, the first end portion (61) of the extensible screen (6) being connected to the roller shaft (1), the extensible screen (6) being wound on the roller shaft (1) in a non-screening position and configured to be unwound from the roller shaft (1) under rotation of the roller shaft (1) in an unwinding direction, to a deployed position at a well-defined end stop, corresponding to a first screening position, in which the extensible screen (6) is in a first stretched state, and
traction means (3) configured to apply traction on the extensible screen (6) to bring the extensible screen (6) to a second screening position, in which the extensible screen (6) is in a second stretched state and the permeability of the material is increased relative to the permeability in the first stretched state,
characterized in that
the traction means (3) comprises at least one traction cord (3) having a first end (3a) in connection with the roller shaft (1) and a second end (3b) in connection with the second end portion (62) of the extensible screen (6), and which is configured to apply a traction force (Ft) on the extensible screen (6) when the extensible screen (6) is stretched from said first stretched state in the first screening position to said second stretched state in the second screening position by continued rotation of the roller shaft (1) in the unwinding direction after the extensible screen (6) has been fully deployed from the roller shaft (1), and that a spring device (5) is provided to provide pre-tensioning of the at least one traction cord (3).

2. A screening arrangement (100) according to claim 1, wherein the predefined length of the extensible screen (6) between the first end portion (61) and the second end portion (62) corresponds to a completely relaxed state of the extensible screen (6), and wherein the predefined length of the extensible screen (6) is configured relative to the height of the window opening to be screened as one of the following options:

i. the predefined length corresponds substantially to the height of the window opening such that the extensible screen (6) is substantially relaxed in the deployed position corresponding to the first screening position;
ii. the predefined length exceeds the height of the window opening such that the extensible screen (6) is relaxed and a portion of the extensible screen (6) other than the first end portion (61) remains on the roller shaft (1) in the first screening position; or
iii. the predefined length is smaller than the height of the window opening such that the extensible screen (6) is stretched in the deployed position corresponding to the first screening position.

3. A screening arrangement (100) according to claim 1 or 2, wherein a bottom bar (4) is connected to the second end portion (62) of the extensible screen (6).

4. A screening arrangement according to claim 3, wherein the first end (3a) of each traction cord (3) is connected directly to the roller shaft (1).

5. A screening arrangement (100) according to any one of claims 3 and 4, wherein the second end (3b) of the traction cord (3) is connected to the bottom bar (4).

6. A screening arrangement according to any one of claims 1 to 3, wherein each traction cord is in connection with the roller shaft via a winding reel, said winding reel being preferably connected to the roller shaft via a transmission mechanism such as a belt drive or a chain drive.

7. A screening arrangement (100) according to any one of the preceding claims, further comprising at least one idler shaft or pulley (2) arranged substantially parallel to and at a distance from the roller shaft (1), each traction cord (3) being guided around the respective idler shaft or pulley (2) such that the respective traction cord (3) forms a loop between the roller shaft (1) and the second end portion (62) of the extensible screen (6) or bottom bar (4).

8. A screening arrangement (100) according to any one of the preceding claims, wherein a header (9) is arranged to cover at least the roller shaft (1) at the top of the window, and side rails (10), in which side portions (63, 64) of the extensible screen (6) is guided.

9. A screening arrangement (100) according to any one of claims 3 to 8, wherein the spring device (5) is accommodated in the bottom bar (4) and the second end (3b) of each traction cord (3) is connected to the spring device (5), preferably via a spring-loaded pulley (11) and a guide pulley (12).

10. A screening arrangement according to any one of the preceding claims, wherein the spring device is provided behind the header and/or the side rails.

11. A screening arrangement according to any one of the preceding claims, wherein said the spring device comprises forming at least one traction cord with at least one elastic portion.

12. A screening arrangement (100) according to any one of the preceding claims, wherein the extensible screen (6) defines a screening plane in the deployed position and the screening arrangement (100) further comprises a positioning element, preferably comprising a guide roller (7), having a positioning surface arranged to position the extensible screen (6) in the predefined screening plane.

13. A screening arrangement (100) according to any one of the preceding claims, wherein the variable transparency of the screen (6) is achieved by apertures (8) in the material such that when traction is applied to the material in the first direction, the apertures (8) increase in size, at least in said first direction.

14. A screening arrangement (100) according to claim 13, wherein the material is one of the following: a textile made with at least one of elastic, lamellae, knits, pleat, non-woven or the like.

15. A screening arrangement (100) according to any of the preceding claims, wherein the drive means comprises a tubular motor incorporated in the roller shaft (1).

16. A screening arrangement (100) according to claim 15, wherein the tubular motor is connected to a control system including calibration means such as a revolution counter and/or one or more sensors, preferably said control system is configured to detect an increase in the power consumption of the tubular motor.

17. A method for providing variable screening of a window, the method comprising the steps of:

providing a screening arrangement (100) comprising an extensible screen (6) having a predefined length between a first end portion (61) and a second end portion (62),
providing a roller shaft (1) and connecting the first end portion (61) of the extensible screen (6) to the roller shaft (1),
winding at least a portion of the extensible screen (6) onto the roller shaft (1),
characterized by the steps of
providing traction means comprising at least one traction cord (3) having a first end (3a) and a second end (3b),
providing a spring device (5) for pre-tensioning of the at least one traction chord (3),
connecting the first end (3a) of the traction cord (3) to the roller shaft (1) and the second end (3b) to the second end portion (62) of the extensible screen (6),
unwinding the screen (6) by rotating the roller shaft (1) in a first rotational direction to a first screening position, in which the extensible screen (6) is in a first stretched state, and
applying a traction force to the extensible screen (6) by means of the at least one traction cord (3) to hold the second end portion (62) substantially stationary when the extensible screen (6) is stretched to a second stretched state by the traction force generated by applying a torque (Mt) to the roller shaft (1) in said first rotational direction such that the extensible screen (6) is reversed on the roller shaft (1).

18. The method according to claim 17, wherein the at least one traction cord (3) is simultaneously wound onto the roller shaft (1), thereby providing traction to the second end portion (62) of the extensible screen (6).

19. The method according to any of claims 17 or 18, further comprising the step of
releasing the traction by applying a torque to the roller shaft (1) in a second rotational direction opposite the first rotational direction, unwinding the at least one traction cord (3) and thereby relaxing the extensible screen (6), preferably comprising the further step of winding up the extensible screen (6) by applying a torque to the roller shaft (1) in said second rotational direction, thereby reversing the extensible screen (6), and further winding up of the extensible screen (6) on the roller shaft (1).

Patentansprüche

1. Abschirmungsanordnung (100) zum Anpassen des Lichteinfalls einer abzuschirmenden Fensteröffnung und Folgendes umfassend:

einen ausziehbaren Schirm (6), der eine festgelegte Länge zwischen einem ersten Endabschnitt (61) und einem zweiten Endabschnitt (62) aufweist, wobei der ausziehbare Schirm (6) aus einem Material mit variabler Transparenz in zumindest eine erste Richtung besteht, sodass, wenn in die erste Richtung eine Zugkraft auf das Material ausgeübt wird, die Durchlässigkeit des Materials erhöht wird,
eine Rollladenwelle (1), die mit einer Antriebseinrichtung verbunden ist, wobei der erste En-

dabschnitt (61) des ausziehbaren Schirms (6) mit der Rollladenwelle (1) verbunden ist, wobei der ausziehbare Schirm (6) in einer Nichtabschirmungsstellung um die Rollladenwelle (1) gewickelt und dazu ausgelegt ist, bei der Drehung der Rollladenwelle (1) in eine Abwickelrichtung von der Rollladenwelle (1) in eine ausgefahrene Stellung an einem klar definierten Anschlag abgewickelt zu werden, die einer ersten Abschirmungsstellung entspricht, in der sich der ausziehbare Schirm (6) in einem ersten ausgedehnten Zustand befindet, und
eine Zugeinrichtung (3), die dazu ausgelegt ist, eine Zugkraft auf den ausziehbaren Schirm (6) auszuüben, um den ausziehbaren Schirm (6) in eine zweite Abschirmungsstellung zu bringen, in der sich der ausziehbare Schirm (6) in einem zweiten ausgedehnten Zustand befindet und die Durchlässigkeit des Materials in Bezug zur Durchlässigkeit im ersten ausgedehnten Zustand erhöht ist,
dadurch gekennzeichnet, dass
die Zugeinrichtung (3) mindestens ein Zugseil (3) umfasst, das mit einem ersten Ende (3a) mit der Rollladenwelle (1) verbunden ist und mit einem zweiten Ende (3b) mit dem zweiten Endabschnitt (62) des ausziehbaren Schirms (6) verbunden ist, und die dazu ausgelegt ist, eine Zugkraft (Ft) auf den ausziehbaren Schirm (6) auszuüben, wenn der ausziehbare Schirm (6) vom ersten ausgedehnten Zustand in der ersten Abschirmungsstellung in den zweiten ausgedehnten Zustand in der zweiten Abschirmungsstellung ausgedehnt wird, indem die Rollladenwelle (1) weiter in die Abwickelrichtung gedreht wird, nachdem der ausziehbare Schirm (6) vollständig aus der Rollladenwelle (1) ausgefahren wurde, und dass eine Federvorrichtung (5) vorgesehen ist, um eine Vorspannung des mindestens einen Zugseils (3) vorzusehen.

2. Abschirmungsanordnung (100) nach Anspruch 1, wobei die festgelegte Länge des ausziehbaren Schirms (6) zwischen dem ersten Endabschnitt (61) und dem zweiten Endabschnitt (62) einem vollständig entspannten Zustand des ausziehbaren Schirms (6) entspricht und wobei die festgelegte Länge des ausziehbaren Schirms (6) in Bezug zur Höhe der abzuschirmenden Fensteröffnung nach einer der folgenden Optionen ausgelegt ist:

i. die festgelegte Länge entspricht im Wesentlichen der Höhe der Fensteröffnung, sodass der ausziehbare Schirm (6) in der ausgefahrenen Stellung, die der ersten Abschirmungsstellung entspricht, im Wesentlichen entspannt ist;
ii. die festgelegte Länge übersteigt die Höhe der Fensteröffnung, sodass der ausziehbare Schirm (6) entspannt ist und ein anderer Abschnitt des ausziehbaren Schirms (6) als der erste Endabschnitt (61) in der ersten Abschirmungsstellung auf der Rollladenwelle (1) verbleibt; oder
iii. die festgelegte Länge ist kleiner als die Höhe der Fensteröffnung, sodass der ausziehbare Schirm (6) in der ausgefahrenen Stellung, die der ersten Abschirmungsstellung entspricht, ausgedehnt wird.

3. Abschirmungsanordnung (100) nach Anspruch 1 oder 2, wobei eine untere Stange (4) mit dem zweiten Endabschnitt (62) des ausziehbaren Schirms (6) verbunden ist.

4. Abschirmungsanordnung nach Anspruch 3, wobei das erste Ende (3a) jedes Zugseils (3) direkt mit der Rollladenwelle (1) verbunden ist.

5. Abschirmungsanordnung (100) nach einem der Ansprüche 3 und 4, wobei das zweite Ende (3b) des Zugseils (3) mit der unteren Stange (4) verbunden ist.

6. Abschirmungsanordnung nach einem der Ansprüche 1 bis 3, wobei jedes Zugseil über einen Wickelteller mit der Rollladenwelle verbunden ist, wobei der Wickelteller vorzugsweise über einen Getriebemechanismus, zum Beispiel einen Bandantrieb oder Kettenantrieb, mit der Rollladenwelle verbunden ist.

7. Abschirmungsanordnung (100) nach einem der vorstehenden Ansprüche, ferner mindestens eine Laufwelle oder -rolle (2) umfassend, die im Wesentlichen parallel zur Rollladenwelle (1) und davon beabstandet angeordnet ist, wobei jedes Zugseil (3) um die entsprechende Laufwelle oder -rolle (2) geführt wird, sodass das entsprechende Zugseil (3) eine Schleife zwischen der Rollladenwelle (1) und dem zweiten Endabschnitt (62) des ausziehbaren Schirms (6) oder der unteren Stange (4) ausbildet.

8. Abschirmungsanordnung (100) nach einem der vorstehenden Ansprüche, wobei ein Kopfteil (9) angeordnet ist, um zumindest die Rollladenwelle (1) an der Oberseite des Fensters abzudecken, und Seitenschienen (10), in denen Seitenabschnitte (63, 64) des ausziehbaren Schirms (6) geführt werden.

9. Abschirmungsanordnung (100) nach einem der Ansprüche 3 bis 8, wobei die Federvorrichtung (5) in der unteren Stange (4) aufgenommen ist und das zweite Ende (3b) jedes Zugseils (3) mit der Federvorrichtung (5), vorzugsweise über eine federbelastete Rolle (11) und eine Führungsrolle (12), verbunden ist.

10. Abschirmungsanordnung nach einem der vorstehenden Ansprüche, wobei die Federvorrichtung hinter dem Kopfteil und/oder den Seitenschienen vorgesehen ist.

11. Abschirmungsanordnung nach einem der vorstehenden Ansprüche, wobei die Federvorrichtung das Ausbilden mindestens eines Zugseils mit mindestens einem elastischen Abschnitt umfasst.

12. Abschirmungsanordnung (100) nach einem der vorstehenden Ansprüche, wobei der ausziehbare Schirm (6) in der ausgefahrenen Stellung eine Abschirmungsebene definiert und die Abschirmungsanordnung (100) ferner ein Positionierungselement umfasst, vorzugsweise eine Führungswalze (7) umfassend, die eine Positionierungsfläche aufweist, die dazu angeordnet ist, den ausziehbaren Schirm (6) in der festgelegten Abschirmungsebene zu positionieren.

13. Abschirmungsanordnung (100) nach einem der vorstehenden Ansprüche, wobei die variable Transparenz des Schirms (6) durch Öffnungen (8) im Material erreicht wird, sodass sich die Öffnungen (8), zumindest in die erste Richtung, vergrößern, wenn eine Zugkraft in die erste Richtung auf das Material ausgeübt wird.

14. Abschirmungsanordnung (100) nach Anspruch 13, wobei das Material eines der folgenden ist: ein Textil, das elastisch ist und/oder mit Lamellen versehen ist und/oder gestrickt ist und/oder Falten aufweist und/oder ein Vliesstoff o. Ä. ist.

15. Abschirmungsanordnung (100) nach einem der vorstehenden Ansprüche, wobei die Antriebseinrichtung einen in die Rollladenwelle (1) integrierten Rohrmotor umfasst.

16. Abschirmungsanordnung (100) nach Anspruch 15, wobei der Rohrmotor mit einem Steuerungssystem verbunden ist, das eine Kalibrierungseinrichtung, zum Beispiel einen Drehungszähler und/oder einen oder mehrere Sensoren, aufweist, wobei das Steuerungssystem vorzugsweise dazu ausgelegt ist, einen Anstieg des Stromverbrauchs des Rohrmotors zu erfassen.

17. Verfahren zum Vorsehen einer variablen Abschirmung eines Fensters, wobei das Verfahren die folgenden Schritte umfasst:

Vorsehen einer Abschirmungsanordnung (100), die einen ausziehbaren Schirm (6) umfasst, der eine festgelegte Länge zwischen einem ersten Endabschnitt (61) und einem zweiten Endabschnitt (62) aufweist,
Vorsehen einer Rollladenwelle (1) und Verbinden des ersten Endabschnitts (61) des ausziehbaren Schirms (6) mit der Rollladenwelle (1),
Wickeln zumindest eines Abschnitts des ausziehbaren Schirms (6) auf die Rollladenwelle (1),
gekennzeichnet durch die folgenden Schritte
Vorsehen einer Zugeinrichtung, die mindestens ein Zugseil (3) umfasst, das ein erstes Ende (3a) und ein zweites Ende (3b) aufweist,
Vorsehen einer Federvorrichtung (5) zum Vorspannen des mindestens einen Zugseils (3),
Verbinden des ersten Endes (3a) des Zugseils (3) mit der Rollladenwelle (1) und des zweiten Endes (3b) mit dem zweiten Endabschnitt (62) des ausziehbaren Schirms (6), Abwickeln des Schirms (6) durch Drehen der Rollladenwelle (1) in eine erste Drehrichtung in eine erste Abschirmungsstellung, in der sich der ausziehbare Schirm (6) in einem ersten ausgedehnten Zustand befindet, und Ausüben einer Zugkraft auf den ausziehbaren Schirm (6) mittels des mindestens einen Zugseils (3), um den zweiten Endabschnitt (62) im Wesentlichen stationär zu halten,
wenn der ausziehbare Schirm (6) durch die durch Ausüben eines Drehmoments (Mt) auf die Rollladenwelle (1) in die erste Drehrichtung erzeugte Zugkraft in einen zweiten ausgedehnten Zustand ausgedehnt ist, sodass der ausziehbare Schirm (6) auf der Rollladenwelle (1) umgekehrt wird.

18. Verfahren nach Anspruch 17, wobei das mindestens eine Zugseil (3) gleichzeitig auf die Rollladenwelle (1) gewickelt wird, wodurch eine Zugkraft auf den zweiten Endabschnitt (62) des ausziehbaren Schirms (6) vorgesehen wird.

19. Verfahren nach einem der Ansprüche 17 oder 18, ferner den folgenden Schritt umfassend
Lösen der Zugkraft durch Ausüben eines Drehmoments auf die Rollladenwelle (1) in eine zweite Drehrichtung, die der ersten Drehrichtung entgegengesetzt ist, wodurch das mindestens eine Zugseil (3) abgewickelt wird und dadurch der ausziehbare Schirm (6) entspannt wird, vorzugsweise den weiteren Schritt des Aufwickelns des ausziehbaren Schirms (6) durch Ausüben eines Drehmoments auf die Rollladenwelle (1) in die zweite Drehrichtung und dadurch das Umkehren des ausziehbaren Schirms (6) und ferner das Aufwickeln des ausziehbaren Schirms (6) auf die Rollladenwelle (1) umfassend.

Revendications

1. Agencement (100) de protection par écran permet-

tant de régler l'admission de lumière d'une ouverture de fenêtre à protéger par écran et comprenant :

un écran extensible (6) présentant une longueur prédéfinie entre une première partie extrémité (61) et une deuxième partie extrémité (62), l'écran extensible (6) étant constitué d'une matière de transparence variable dans au moins une première direction de sorte que l'application d'une traction à la matière dans ladite première direction donne lieu à un accroissement de la perméabilité de la matière,
un arbre rouleau (1) lié à des moyens d'entraînement, la première partie extrémité (61) de l'écran extensible (6) étant liée à l'arbre rouleau (1), l'écran extensible (6) étant enroulé sur l'arbre rouleau (1) dans une position de non-protection par écran et configuré pour être déroulé de l'arbre rouleau (1) par rotation de l'arbre rouleau (1) dans un sens de déroulement jusqu'à une position déployée au niveau d'un arrêt d'extrémité bien défini, correspondant à une première position de protection par écran dans laquelle l'écran extensible (6) adopte un premier état tendu, et
des moyens de traction (3) configurés pour appliquer une traction sur l'écran extensible (6) afin d'amener l'écran extensible (6) jusqu'à une deuxième position de protection par écran dans laquelle l'écran extensible (6) adopte un deuxième état tendu et la perméabilité de la matière est accrue par rapport à la perméabilité dans le premier état tendu,
caractérisé en ce que
les moyens de tractions (3) comprennent au moins un cordon de traction (3) présentant une première extrémité (3a) en liaison avec l'arbre rouleau (1) et une deuxième extrémité (3b) en liaison avec la deuxième partie extrémité (62) de l'écran extensible (6), et qui est configuré pour appliquer une force de traction (Ft) sur l'écran extensible (6) lorsque l'écran extensible (6) est tendu dudit premier état tendu dans la première position de protection par écran jusqu'audit deuxième état tendu dans la deuxième position de protection par écran par rotation poursuivie de l'arbre rouleau (1) dans le sens de déroulement après que l'écran extensible (6) a été entièrement déployé de l'arbre rouleau (1), et **en ce qu'**un dispositif à ressort (5) est prévu pour assurer une mise en prétension de l'au moins un cordon de traction (3) .

2. Agencement (100) de protection par écran selon la revendication 1, dans lequel la longueur prédéfinie de l'écran extensible (6) entre la première partie extrémité (61) et la deuxième partie extrémité (62) correspond à un état complètement détendu de l'écran extensible (6), et dans lequel la longueur prédéfinie de l'écran extensible (6) est configurée par rapport à la hauteur de l'ouverture de fenêtre à protéger par écran selon l'une des options suivantes :

i. la longueur prédéfinie correspond sensiblement à la hauteur de l'ouverture de fenêtre de sorte que l'écran extensible (6) est sensiblement détendu dans la position déployée correspondant à la première position de protection par écran ;
ii. la longueur prédéfinie dépasse la hauteur de l'ouverture de fenêtre de sorte que l'écran extensible (6) est détendu et une partie de l'écran extensible (6) autre que la première partie extrémité (61) demeure sur l'arbre rouleau (1) dans la première position de protection par écran ; ou
iii. la longueur prédéfinie est inférieure à la hauteur de l'ouverture de fenêtre de sorte que l'écran extensible (6) est tendu dans la position déployée correspondant à la première position de protection par écran.

3. Agencement (100) de protection par écran selon la revendication 1 ou 2, dans lequel une barre inférieure (4) est liée à la deuxième partie extrémité (62) de l'écran extensible (6).

4. Agencement de protection par écran selon la revendication 3, dans lequel la première extrémité (3a) de chaque cordon de traction (3) est liée directement à l'arbre rouleau (1).

5. Agencement (100) de protection par écran selon l'une quelconque des revendications 3 et 4, dans lequel la deuxième extrémité (3b) du cordon de traction (3) est liée à la barre inférieure (4).

6. Agencement de protection par écran selon l'une quelconque des revendications 1 à 3, dans lequel chaque cordon de traction est en liaison avec l'arbre rouleau par le biais d'une bobine d'enroulement, ladite bobine d'enroulement étant de préférence liée à l'arbre rouleau par le biais d'un mécanisme de transmission tel qu'un entraînement par courroie ou un entraînement par chaîne.

7. Agencement (100) de protection par écran selon l'une quelconque des revendications précédentes, comprenant en outre au moins un arbre fou ou une poulie folle (2) agencé ou agencée sensiblement parallèlement à l'arbre rouleau (1) et à une certaine distance de celui-ci, chaque cordon de traction (3) étant guidé autour de l'arbre fou respectif ou de la poulie folle respective (2) de sorte que le cordon de traction respectif (3) forme une boucle entre l'arbre rouleau (1) et la deuxième partie extrémité (62) de l'écran extensible (6) ou la barre inférieure (4) .

8. Agencement (100) de protection par écran selon l'une quelconque des revendications précédentes, dans lequel un bandeau de couverture (9) est agencé de manière à recouvrir au moins l'arbre rouleau (1) en haut de la fenêtre et des rails latéraux (10) dans lesquels sont guidées des parties latérales (63, 64) de l'écran extensible (6).

9. Agencement (100) de protection par écran selon l'une quelconque des revendications 3 à 8, dans lequel le dispositif à ressort (5) est logé dans la barre inférieure (4), et la deuxième extrémité (3b) de chaque cordon de traction (3) est liée au dispositif à ressort (5), de préférence par le biais d'une poulie rappelée par ressort (11) et d'une poulie de guidage (12).

10. Agencement de protection par écran selon l'une quelconque des revendications précédentes, dans lequel le dispositif à ressort est disposé derrière le bandeau de couverture et/ou les rails latéraux.

11. Agencement de protection par écran selon l'une quelconque des revendications précédentes, dans lequel le dispositif à ressort comprend l'incorporation d'au moins une partie élastique dans au moins un cordon de traction.

12. Agencement (100) de protection par écran selon l'une quelconque des revendications précédentes, dans lequel l'écran extensible (6) définit un plan de protection par écran dans la position déployée, et lequel agencement (100) de protection par écran comprend en outre un élément de positionnement, de préférence comprenant un galet de guidage (7), présentant une surface de positionnement agencée de manière à positionner l'écran extensible (6) dans le plan de protection par écran prédéfini.

13. Agencement (100) de protection par écran selon l'une quelconque des revendications précédentes, dans lequel la transparence variable de l'écran (6) est obtenue grâce à des ouvertures (8) dans la matière de sorte que l'application d'une traction à la matière dans la première direction donne lieu à un accroissement de la taille des ouvertures (8), au moins dans ladite première direction.

14. Agencement (100) de protection par écran selon la revendication 13, dans lequel la matière est l'une des matières suivantes : un textile constitué d'une matière élastique et/ou de lamelles et/ou de tricots et/ou d'un plissé et/ou d'un non-tissé ou similaires.

15. Agencement (100) de protection par écran selon l'une quelconque des revendications précédentes, dans lequel les moyens d'entraînement comprennent un moteur tubulaire intégré à l'arbre rouleau (1).

16. Agencement (100) de protection par écran selon la revendication 15, dans lequel le moteur tubulaire est lié à un système de commande comportant des moyens d'étalonnage tels qu'un compte-tours et/ou un ou plusieurs capteurs, de préférence ledit système de commande est configuré pour détecter un accroissement de la consommation d'énergie du moteur tubulaire.

17. Procédé de fourniture d'une protection par écran variable d'une fenêtre, le procédé comprenant les étapes de :

fourniture d'un agencement (100) de protection par écran comprenant un écran extensible (6) présentant une longueur prédéfinie entre une première partie extrémité (61) et une deuxième partie extrémité (62),
fourniture d'un arbre rouleau (1) et liaison de la première partie extrémité (61) de l'écran extensible (6) à l'arbre rouleau (1),
enroulement d'au moins une partie de l'écran extensible (6) sur l'arbre rouleau (1),
caractérisé par les étapes de
fourniture de moyens de traction comprenant au moins un cordon de traction (3) présentant une première extrémité (3a) et une deuxième extrémité (3b),
fourniture d'un dispositif à ressort (5) destiné à mettre en prétension l'au moins un cordon de traction (3),
liaison de la première extrémité (3a) du cordon de traction (3) à l'arbre rouleau (1) et de la deuxième extrémité (3b) à la deuxième partie extrémité (62) de l'écran extensible (6),
déroulement de l'écran (6) par rotation de l'arbre rouleau (1) dans un premier sens de rotation jusqu'à une première position de protection par écran dans laquelle l'écran extensible (6) adopte un premier état tendu, et
application d'une force de traction à l'écran extensible (6) au moyen de l'au moins un cordon de traction (3) dans le but de maintenir la deuxième partie extrémité (62) sensiblement immobile lorsque l'écran extensible (6) est tendu jusqu'à un deuxième état tendu par la force de traction générée par application d'un couple (Mt) à l'arbre rouleau (1) dans ledit premier sens de rotation de sorte que le sens de l'écran extensible (6) est inversé sur l'arbre rouleau (1).

18. Procédé selon la revendication 17, dans lequel l'au moins un cordon de traction (3) est simultanément enroulé sur l'arbre rouleau (1) pour, de cette manière, appliquer une traction à la deuxième partie extrémité (62) de l'écran extensible (6).

19. Procédé selon l'une quelconque des revendications

17 ou 18, comprenant en outre l'étape de :
relâchement de la traction par application d'un couple à l'arbre rouleau (1) dans un deuxième sens de rotation opposé au premier sens de rotation, déroulement de l'au moins un cordon de traction (3) et, de cette manière, détente de l'écran extensible (6), comprenant de préférence l'étape supplémentaire d'enroulement de l'écran extensible (6) par application d'un couple à l'arbre rouleau (1) dans ledit deuxième sens de rotation, en inversant, de cette manière, le sens de l'écran extensible (6) et d'enroulement supplémentaire de l'écran extensible (6) sur l'arbre rouleau (1).

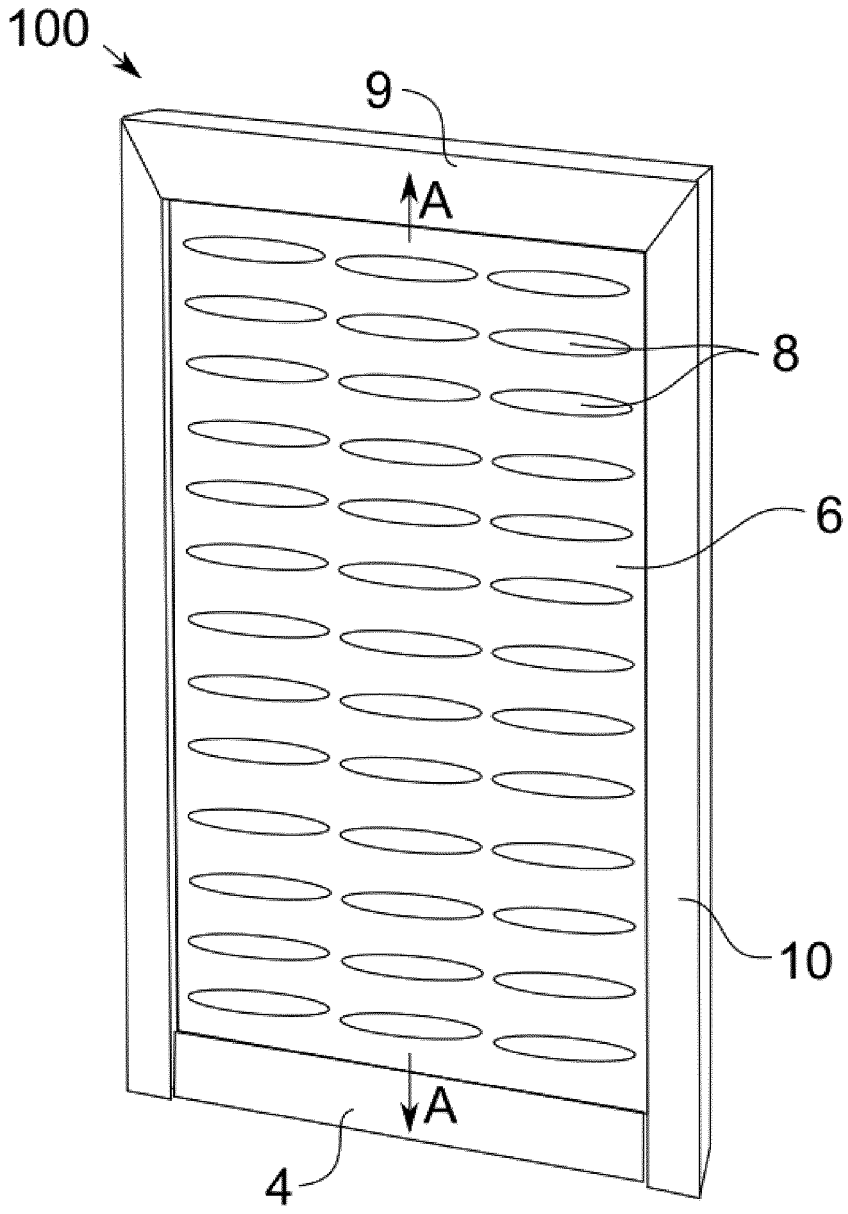

Fig. 1

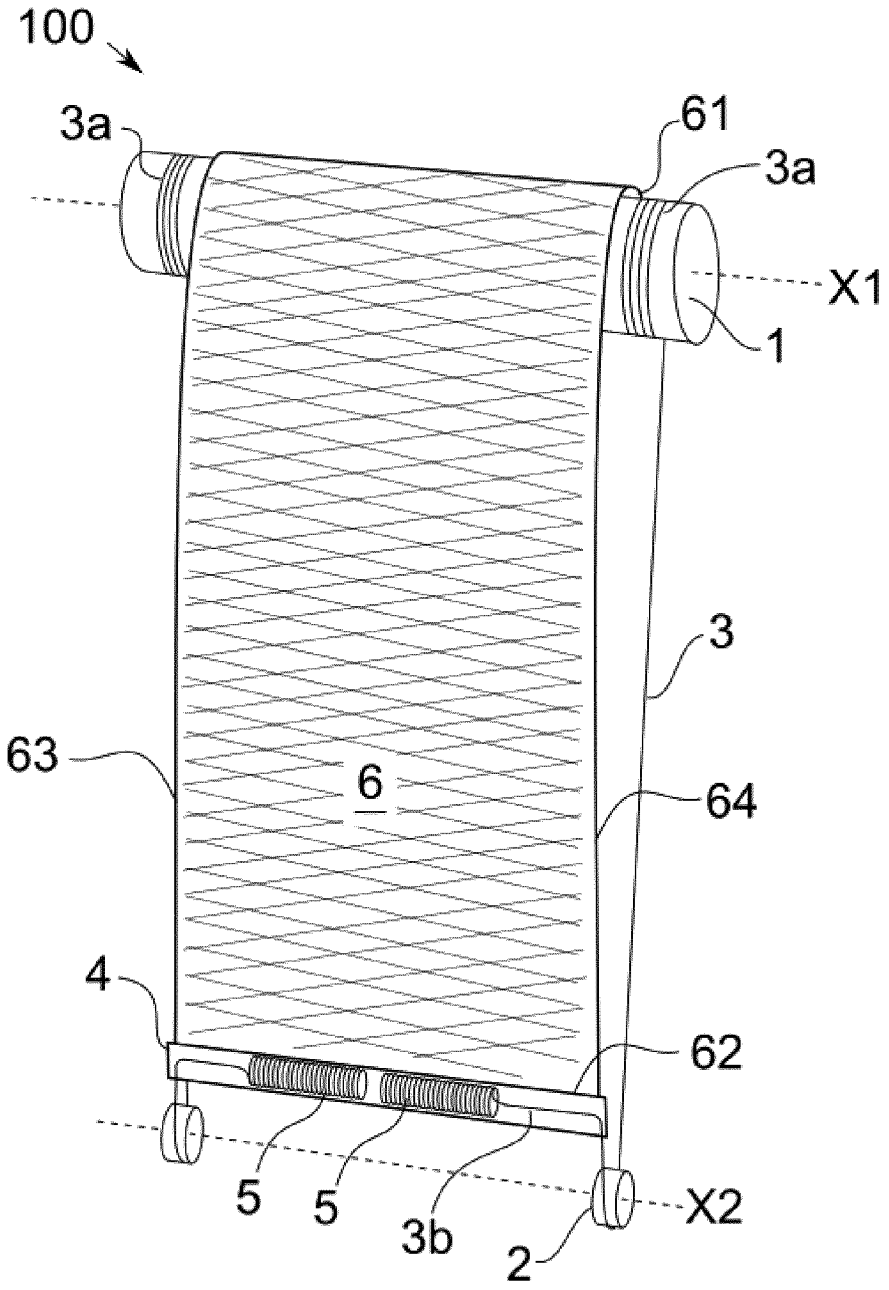

Fig. 2

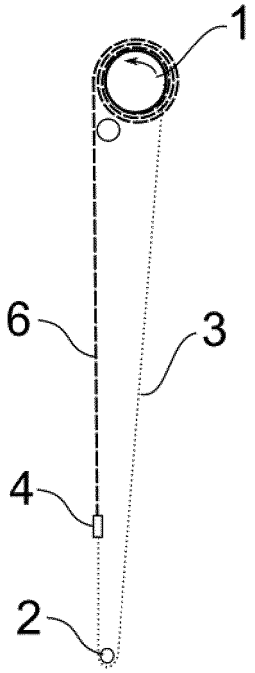

Fig. 3a

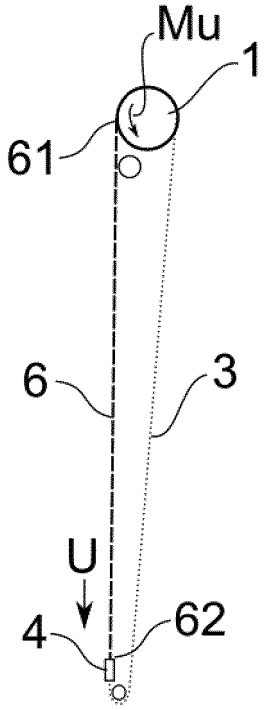

Fig. 3b

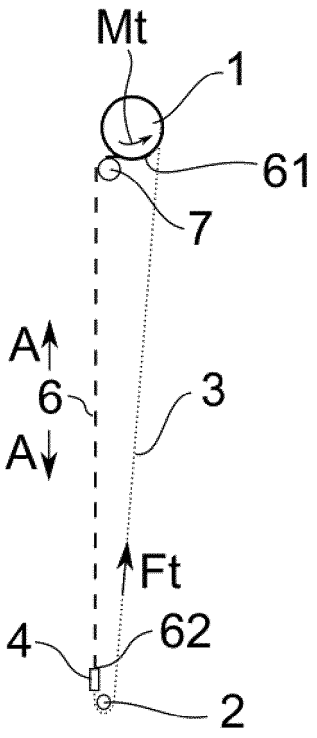

Fig. 3c

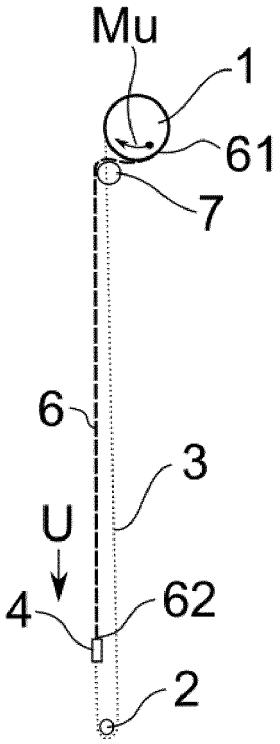

Fig. 4a

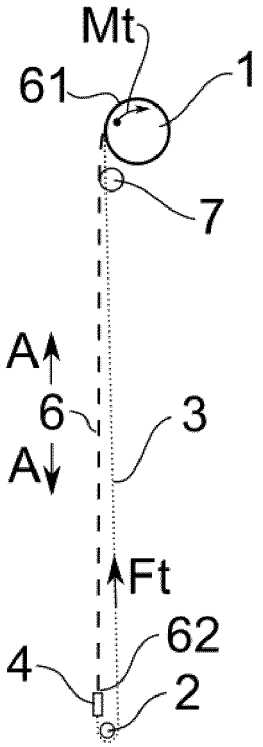

Fig. 4b

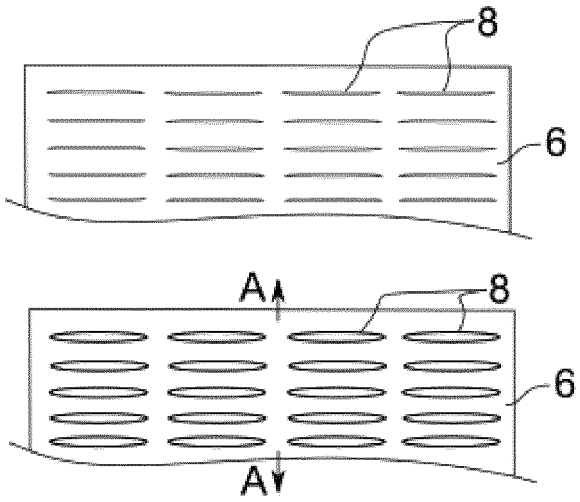

Fig. 5a

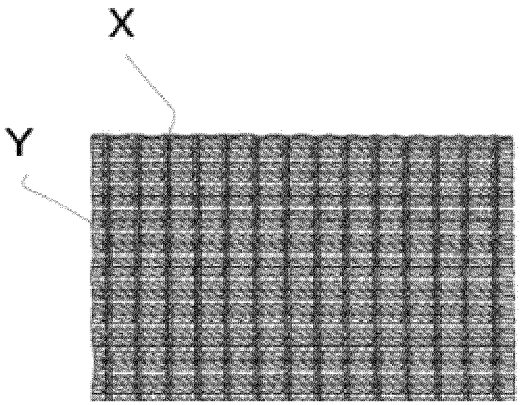

Fig. 5b

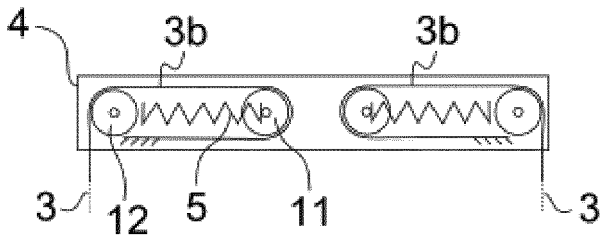

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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- DE 3520857 A1 **[0003]**
- WO 2011150902 A1 **[0026]**