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(54) **Device for screening off a space**

(57) Device (1) for screening off a space (2), comprising

- at least one roller system (5) driven by a drive unit for rolling and unrolling a screen (3) for screening off, entirely or partially, the space (2) in its closed position, the roller system (5) being provided with a winding element (6), provided for winding and unwinding the screen (3).
- a second element (7) provided on the screen (3) on the side opposite the winding element (6), transmission means being provided for producing the movement of the said second element (7) through the movement of the winding element (6),
- connection means (11), provided between the said winding element (6) and the said transmission means,

the said connecting means (11) at least at one of the extremities (12a, 12b) being installed to be rotatable in a firm connection (13,14) with the space (2) to be screened off, and the said connection means (11) being provided with two elements (15a, 15b), rotatable with respect to one another, the difference in speed between the movement of the second element (7) and the winding movement of the winding element (6) causing the two elements (15a, 15b), rotatable with respect to one another to be shifted with respect to one another through an angle, and provided with spring means (18) which, when unrolling the screen (3), will exert a spring force on at least one of the two elements (15a, 15b), rotatable with respect to one another, which spring force is working in the direction opposite to the force causing the angular displacement of the rotatable elements (15a, 15b).

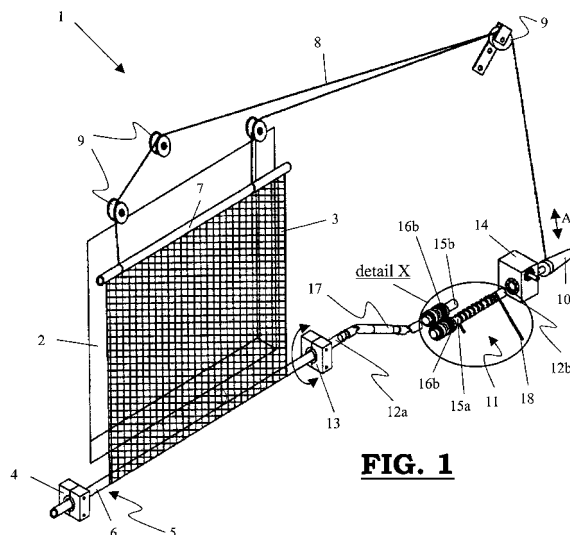


FIG. 1

Description

[0001] The invention relates to a device for screening off a space, comprising

- at least one roller system driven by a drive unit for rolling and unrolling a screen for screening off, entirely or partially, a space in its closed position, the roller system being provided with a winding element, designed for winding and unwinding the screen.
- a second element provided on the screen on the side opposite the winding element, the transmission means being provided for producing the movement of the said second element through the movement of the winding element,
- connection means, provided between the said winding element and the said transmission means.

[0002] Up to the present, various devices have been known for screening off a space. The most usual devices comprise a screen, which is lowered by means of a traction cable device connected to the upper edge of the screen and is rolled on a winding element at the bottom of the device. This winding element may be driven manually or automatically. Such a rolling screen for darkening an opening applied in the wall of a building is described in FR 25 63 860.

[0003] The problem of such a device is that when raising or lowering the screen occurs at a lower speed than rolling or unrolling the winding element, high tensile stresses may occur. In the opposite case also, the screen may be lowered or raised more rapidly than the speed of rolling and unrolling of the winding element, sagging of the screen may be prevented.

[0004] This problem can be resolved by providing a device, as described in DE 298 12 228, in which a ventilation curtain is described where winding occurs at the bottom, for stables and the like. A temperature controlled transmission motor is connected to a winding shaft and to a cord system. At the bottom, the curtain is connected to the winding shaft and at the top to a supporting batten, which is connected to the cord system. The connection to the winding shaft occurs through a universal joint and the connection to the cord system occurs by means of reversing rollers. The tube for winding the cord system is tapered.

[0005] With such a device the varying circumferential velocity per turn may be compensated when the curtain, at the bottom, is wound and unwound on and from a winding tube firmly mounted on bearings and because of which the diameter of this lower winding tube is permanently varying.

[0006] The disadvantage of such a system is that in theory it is perfectly possible to calculate everything, but in practice things are different because:

- not everybody will install the system in the same

way and therefore, in the end, the screen is not always wound up in the same manner as desired;

- owing to circumstances wrinkles may form which will render winding difficult;
- not all screens are of the same thickness and one cloth is more flexible than the other, because of which a different conical drum should be available for each type of canvas;
- depending on the weather conditions, i.e. hot, cold much or little wind, the cloth will wind in a different manner.

[0007] Other known devices comprise an upper and a lower roller system and a long flexible screen which is wound around the upper and the lower winding system, the screen being longer than the distance between the upper and the lower roller system. Each of these roller systems comprises a long tube-shaped roller, which may be connected to the extremity of the roller for rotatably attaching the extremity of the rollers opposite the window. The screen is wound and unwound from the rollers, while they are rotating around their respective longitudinal axis. For each roller, a drive is provided for driving the roller in one direction or the other, in order to wind the screen from one of the rollers unto the other. Such a system is described in U.S. 3,186,473.

[0008] The purpose of the invention is to provide a device for screening off a space, not having the disadvantages mentioned above and where for each type of device therefore, the flexible screen is kept stretched both when winding and unwinding.

[0009] This purpose is attained by providing a device for screening off a space, comprising:

- at least one roller system driven by a drive unit for rolling and unrolling a screen, which in closed position, screens off a space partly or entirely, the roller system being provided with a winding element, designed for winding and unwinding the screen,
- a second element provided on the screen on the side opposite the winding element, transmission means being provided for producing the movement of the said second element through the movement of the winding element,
- connection means, which are provided between the said winding element and the said transmission means, the said connection means, at least at one of the two extremities, being installed to be rotatable in a firm connection with the space to be screened off, and the said connection means being provided with two elements rotatable with respect to one another, the two elements rotatable with respect to one another being shifted through an angle with respect to one another, in case there is a difference of speed between the movement of the second element and the winding movement of the winding element, and being provided with spring means exerting a spring force on at least one of the two ele-

ments rotating with respect to one another, which is working in a direction opposite to the force of angular displacement of the rotatable elements, when unwinding the screen.

[0010] In such a manner, the screen will be stretched for both winding and unwinding.

[0011] Preferably, the said two elements rotatable with respect to one another are shafts, each provided with a gearwheel, the gearwheels having matching teeth and grooves.

[0012] In a preferred embodiment of the device according to the invention, the shaft situated on the side of the winding element, is connected to this winding element by means of a slidable universal joint, because of which the force of said shaft is transmitted to the winding element by means of the slidable universal joint.

[0013] In a first embodiment of a device according to the invention, said transmission means comprise a conical drum unto which a cord is wound and unwound, this cord being connected to the said second element, in such a manner that the winding movement of the winding element will move up and down the second element, because of which the screen will be moved up and down in order to shut off the said space entirely or partly.

[0014] In a second embodiment of a device according to the invention, the said second element is a second winding element and is designed for winding and unwinding the screen, the said space being entirely shut off and the said transmission means comprise a chain which is connected to the said second winding element, in such a manner that because of the winding movement of the winding element, the second winding element performs a winding and unwinding movement, because of which the screen is rolled or unrolled from the one winding element unto the other winding element.

[0015] The invention will now be further explained by means of the following detailed description of an embodiment according to the invention. This description is exclusively intended to produce a clarifying example and to indicate further advantages and particulars of this invention and therefore on no account may be interpreted as a restriction of the field of application of the invention or of the patent rights demanded for in the claims.

[0016] In this detailed description reference is made, by means of reference numbers, to the enclosed drawings of which:

- figure 1 is a perspective view of an embodiment of a device for screening off a space according to the invention, in which the screen is moved up and down;
- figure 2 is a perspective view of detail X as shown in figure 1.

[0017] In the embodiment of a device (1) for screening off a space (2) according to the invention, as represented in figure 1, a flexible screen (3) is provided being

wound and unwound at the bottom by means of a roller system (5) driven by a drive unit for, in its closed position, screening off a space (2) entirely or partly. The roller system (5) is provided with a winding element in the form of a winding roller (6), which is designed to wind and unwind the screen (3). On the side opposite the winding element (6), a second element is provided, i.e. a tube (7), which is attached to the screen (3). A cord (8) is provided on this tube (7), which is wound and unwound from a conical drum (10) by means of a pulley system (9). This conical drum (10), the pulley system (9) and the cord (8) constitute the transmission means ensuring the winding movement of the winding element (6) to be transferred into an up and down movement (A) of the screen (3).

[0018] In another embodiment of the device (1) for screening off a space (2), which is not represented in the figures, an upper roller system is provided as a second element in addition to the lower roller system. The screen (3) has a length, which is longer than the distance (X) between the upper and the lower roller system (5). The upper or the lower roller system (5) is provided with an upper or a lower winding element respectively in the form of a winding roller (6) which is provided in order to roll and to unroll the screen (3). In order to transmit the unwinding movement of the lower winding roller (6) to the upper winding roller, transmission means are provided, comprising a chain which has been provided on the upper and lower winding rollers (6). In this manner the screen (3) will be unwound from the one winding roller and wound onto the other winding roller and the other way round. Therefore the winding movement of the lower winding roller (6) is converted into a winding movement of the upper winding roller.

[0019] As represented in figure 2, connection means (11) have been provided between the said winding roller (6) and the said transmission means. At least at one of the two extremities (12a, 12b), these connection means (11) are installed to be rotatable in a firm connection with the space (2) to be screened off. Preferably, this is the extremity (12b), being situated on the drive side. More preferably, the connection means (11) on both extremities (12a, 12b) are installed to be rotatable in a firm connection, as represented in figure 1. At the extremity (12a) situated on the side of the winding roller (6), the firm connection is a holder (13), which is provided with roller brackets in which the winding roller (6) may rotate and which is installed on a fixed support of the space (2), which has to be screened off. On the other side of the screen (3), the winding roller (6) is likewise installed in a holder (4), which is provided with roller brackets in which the winding roller (6) may rotate. The other extremity (12b) of the connection means (11) is rotatably installed in a motor block (14) in which a motor has been applied for driving the device (1). However, the device (1) may also be driven manually. The other extremity (12b) of the connection means (1) being also installed in a holder, which is provided with roller brackets.

[0020] The connection means (11) are provided with two elements, rotatable with respect to one another, in the form of two shafts (15a, 15b), i.e. a first shaft (15a) on the side of the winding roller (6) and a second shaft (15b) on the side of the conical drum (10). Each of the two shafts (15a, 15b) is provided with a gearwheel (16a, 16b), the gearwheels (16a, 16b) having matching teeth and grooves. With a difference of speed between the movement of the tube (7) and the winding movement of the winding roller (6), the two shafts (15a, 15b) will turn to form an angle with respect to one another (see arrows B). The second shaft (15b) is provided with spring means in the form of a spiral spring (18) which is wound around this shaft and which, when unrolling the screen (3), will exert a spring force on the said shaft (15b), which is working in a direction opposite to the force causing the angular displacement (arrows B) of the rotating shafts (15a, 15b). In this manner, a situation in which the winding roller (6), might remain stationary when lowering the screen (3) and the second shaft might start to rotate around the first shaft (15b) (arrow C), will be avoided.

[0021] The second shaft (15b) is connected to this winding roller (6) by means of a sliding universal joint (17), because of which the force of said shaft (15b) is transmitted to the winding roller (6) through the sliding universal joint (17).

Claims

1. Device (1) for screening off a space (2), comprising

- at least one drive unit driven by a roller system (5) for rolling and unrolling a screen (3) for screening off the space (2) entirely or partially in its closed position, the roller system (5) being provided with a winding element (6), provided for winding and unwinding the screen (3),
- a second element (7), provided on the screen (3) on the side opposite the winding element (6), transmission means being provided for producing the movement of the said second element (7) through the movement of the winding element (6),
- connection means (11), provided between the said winding element (6) and the said transmission means, **characterized in that** at least at one of the extremities (12a, 12b) the said connection means (11) are installed to be rotatable in a firm connection (13, 14) with the space (2) to be screened off, and **in that** the said connection means (11) are provided with two elements (15a, 15b), rotatable with respect to one another, the difference in speed between the movement of the second element (7) and the winding movement of the winding element (6) causing the two elements (15a, 15b), rotatable with re-

spect to one another, to be shifted through an angle with respect to one another, and are provided with spring means (18) which, when unrolling the screen (3), will exert a spring force on at least one of the two elements (15a, 15b) which are rotatable with respect to one another, which spring force is working in the direction opposite to the force causing the angular displacement of the rotatable elements (15a, 15b).

2. Device according to claim 1, **characterized in that** said two elements, rotatable with respect to one another, are shafts (15a, 15b) each provided with a gearwheel (16a, 16b), the gearwheels (15a, 16b) having matching teeth and grooves.

3. Device according to claim 1 or 2, **characterized in that** the shaft (15b) situated on the side of the winding element (6), is connected to this winding element (6) by means of a sliding universal joint (17), because of which, the force of said shaft is transmitted to the winding element (6) through the sliding universal joint (17).

4. Device according to anyone of the claims 1 up to and including 3, **characterized in that** the said transmission means comprise a conical drum (10) on which a cord (8) is wound and unwound, this cord (8) being connected to the said second element (7), in such a manner that because of the winding movement of the winding element (6) the second element (7) is moving up and down, because of which the screen (3) is moved up and down in order to shut off, entirely or partly, the said space (2).

5. Device according to anyone of the claims 1 up to and including 3, **characterized in that** the said second element (7) is a second winding element and is designed to wind and unwind the screen (3), the said space (2) being shut off entirely, and **in that** the said transmission means comprise a chain, which is connected to the second said winding element, in such a manner that because of the winding movement of the winding element, the second winding element will perform a winding and unwinding movement, because of which the screen (3) is wound and unwound from the one winding element onto the other winding element.

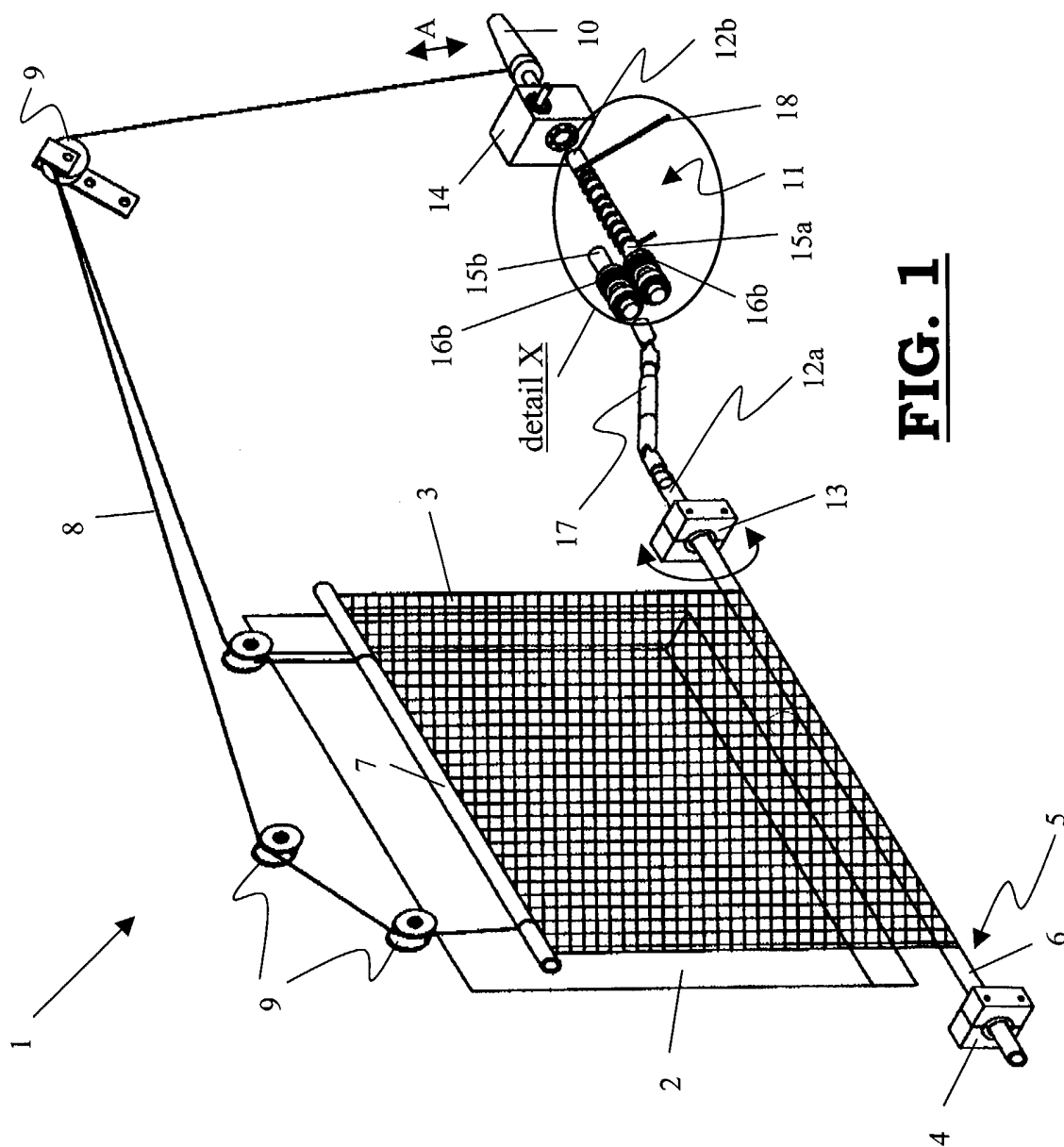


FIG. 1

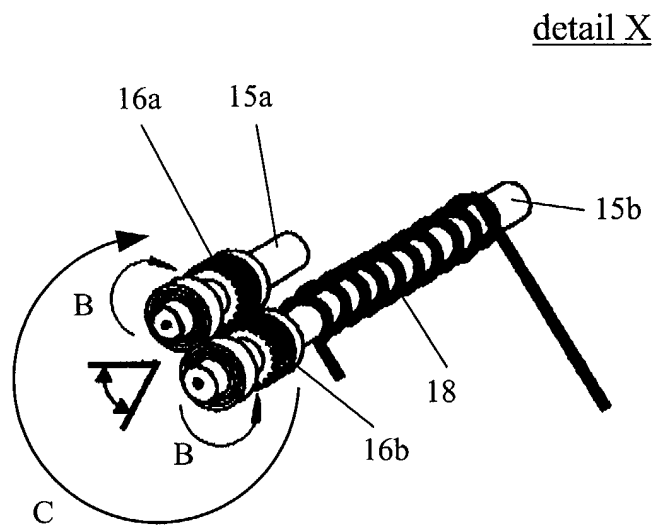


FIG. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 6751

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Place of search THE HAGUE		Date of completion of the search 23 October 2003	Examiner Geivaerts, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P4M001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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