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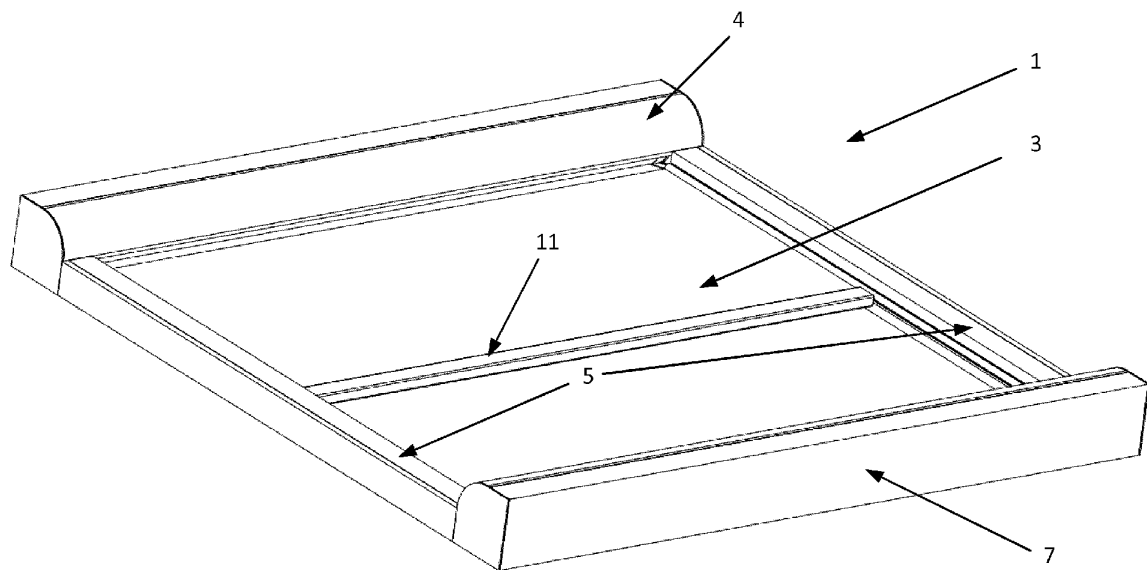
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SCREEN DEVICE WITH PULLING MECHANISM
- (57)

Screen device comprising a screen roller and a screen which is rollable onto and unrollable from this screen roller and is attached with a first side edge to the screen roller, wherein the screen device comprises a frame with at least a first protective casing and two lateral guides, wherein the first protective casing is configured to receive the screen roller and wherein the lateral guides

are configured to guide lateral side edges of the screen when the screen is rolled up and unrolled, characterized in that the screen device further comprises a pulling mechanism which is connected to a second side edge of the screen lying opposite the first side edge, wherein the frame further comprises a second protective casing for at least partially receiving the pulling mechanism.
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- FIG 1
- Processed by Luminess, 75001 PARIS (FR)
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Description

[0001] Screen device comprising a screen roller and a screen which is rollable onto and unrollable from this screen roller and is attached with a first side edge to the screen roller, wherein the screen device comprises a frame with at least a first protective casing and two lateral guides, wherein the first protective casing is configured to receive the screen roller and wherein the lateral guides are configured to guide lateral side edges of the screen when the screen is rolled up and unrolled.

[0002] Such screen devices are known and are typically placed at windows or doors as sunblind. In the most common embodiment the screen is upright in unrolled state. In other words, the lateral guides extend upward, typically substantially vertically, so that the screen also extends vertically in unrolled state. The force of gravity hereby has a great and constant influence on the proper operation of the screen device. More specifically, the force of gravity pulls the screen downward while the screen roller holds the screen on the upper side of the screen device. The screen roller and the force of gravity thus work together to roll up and unroll the screen and to keep the screen neatly flat.

[0003] Using such a typical screen device in an oblique or lying state, wherein oblique is defined as the plane of the screen forming in unrolled state an angle with the vertical direction, causes practical problems. Because the screen does not move vertically downward, in line with the direction of the force of gravity, when unrolling, the unrolling progresses less smoothly, or even problematically. It has also been found in practice that in partially or wholly unrolled state the screen itself does not extend neatly flat inside the frame of the screen device.

[0004] Screen devices whose screen can be placed at an angle are commercially available. These screen devices however always have an operational drawback, causing unstable operation of the system, or an economic disadvantage, making the system expensive.

[0005] It is an object of the present invention to provide a screen device wherein the screen can be placed at an angle or flat, and which is inexpensive.

[0006] For this purpose the invention is characterized in that the screen device further comprises a pulling mechanism which is connected to a second side edge of the screen lying opposite the first side edge, wherein the frame further comprises a second protective casing for at least partially receiving the pulling mechanism.

[0007] The invention is based on the insight that providing an additional protective casing is considerably simpler and cheaper than concealing a pulling mechanism in already existing elements of the screen device. This is because the pulling mechanism can be manufactured in simple manner, more cheaply and in more operationally reliable manner. The invention is further based on the insight that an additional protective casing has no appreciable adverse aesthetic effect for many applications wherein the screen is oriented obliquely or flat. By

providing a pulling mechanism the function of the force of gravity in a traditional, upward oriented screen device is at least partially taken over or compensated for. Hereby, the screen does keep operating optimally even if it is not positioned vertically. This means that rolling up and unrolling of the screen takes place smoothly, and also that the screen always remains neatly flat in a partially or wholly unrolled position.

[0008] The pulling mechanism preferably comprises a spring element. Spring elements are reliable and inexpensive. A spring element can be concealed in a protective casing. A spring element can also be selected in accordance with the desired pulling force and pulling length.

[0009] The pulling mechanism preferably further comprises a connecting element located between the spring element and the second side edge of the screen. By separating a connecting element from a spring element, the spring element can take a considerably larger and more robust form and the connecting element can be given a slim form in order to minimize visual impact. The connecting element more preferably comprises a pair of connecting elements to be connected close to opposite corners of the second side edge. The screen can hereby be pulled by the pulling mechanism in more balanced manner.

[0010] Preferably, the second protective casing is configured to substantially wholly receive the spring element and the lateral guides are further configured to guide the connecting element. Almost the entire pulling mechanism is thus concealed from view. More specifically, the spring element is concealed from view by the second protective casing and the connecting elements are concealed from view by the lateral guides.

[0011] The spring element preferably has in mounted state a bias so as to pull the screen when the screen is unrolled from the first protective casing. The screen roller is more preferably provided with a motor which is configured to pull the screen when the screen is being rolled up into the first protective casing. The spring element and the motor thus pull in opposite directions in order to tension the screen. The tension will cause the screen to extend in neatly flat manner. Due to the tension the screen will unroll when the motor unwinds and the screen will roll up when the motor pulls. When rolling up, the motor will typically also tension the spring further.

[0012] The screen device preferably further comprises a bottom slat which is connected to the second side edge of the screen. The bottom slat is more preferably guided between the lateral guides. The bottom slat ensures that the lower side or second side edge of the screen is always straight. The bottom slat can also distribute the pulling force of the pulling mechanism over the whole second side edge of the screen so that the pulling force engages on the screen more optimally.

[0013] Preferably, the lateral side edges of the screen are each provided with a thickened portion and the lateral guides are configured to hold the thickened portion over

substantially the whole length of the lateral guides. By providing thickened portions on the lateral side edges of the screen, and holding these thickened portions in the guide, a windproof screen is obtained. More specifically, the screen will extend in neatly flat manner, even when wind or other load engages on the screen. The screen hereby makes a more solid impression. Such a windproof screen is aesthetically superior to a non-windproof screen. The operation of such a windproof screen is also more stable than that of a non-windproof screen.

[0014] Each thickened portion preferably continues on the second side edge of the screen so as to form the connecting element. The thickened portion is typically performed by connecting a component, for instance a zipper, to the lateral side edges of the screen. By providing this component considerably longer, preferably roughly double the length of the side edges, the thickened portion can fulfil a dual function. On the one hand the thickened portion holds the screen in the lateral guides in order to obtain a windproof screen. On the other hand the thickened portion, more specifically the part of the thickened portion which protrudes beyond the lower edge of the screen, forms the connecting element to the spring. A further advantage is that no additional fastening need be provided between the connecting element and the screen. Such a dual function of the thickened portion has been found to be highly interesting in an economic sense, as well as being highly operationally reliable. Providing the connecting element requires no additional operations since the thickened portion is already connected to the lateral side edges of the screen. Because the strength of the connection between the thickened portion and the side edges of the screen has already been proven for years, the proper operation, particularly the proper connection between the connecting element and the screen, can also be guaranteed.

[0015] The pulling mechanism preferably comprises a roll-up element. The roll-up element preferably takes the form of a roll-up shaft holder to also hold the roll-up shaft in the second protective casing. The roll-up element is preferably configured to roll up the connecting element. The second protective casing is preferably configured to receive the roll-up element. The spring element is preferably operatively connected to the roll-up element to exert a torque on the roll-up element. Such a construction with a spring element which exerts a torque on a roll-up element, wherein the roll-up element rolls up the connecting element and thereby exerts a pulling force on the connecting element, has been found to be an efficient way of working. In such a construction the different elements such as the spring, the roll-up element, the connecting element, the protective casing and the guides can be selected to perform their function and co-act optimally.

[0016] The roll-up element preferably comprises a roll-up shaft which is configured to extend in the second protective casing and which comprises the spring element. The roll-up shaft preferably comprises for each connect-

ing element a shaft cap. The shaft cap preferably takes the form of a roll-up shaft holder. The shaft cap functions on one hand as roll-up element and on the other provides for a correct positioning of the roll-up shaft in the second protective casing.

[0017] The roll-up element preferably comprises two roll-up elements which are each provided with a spring element and which are each connected to a connecting element. By providing to roll-up elements the screen can be pulled independently on the left and on the right. This simplifies mounting and assembly of the pulling mechanism, while increasing the cost price on the other hand.

[0018] The invention will now be further described with reference to an exemplary embodiment shown in the drawing.

[0019] In the drawing:

figure 1 shows a screen device according to an exemplary embodiment of the invention;

figure 2 shows an exploded view of the screen device of figure 1;

figure 3 shows a detail of an embodiment of a spring element; and

figure 4 shows a detail of a connecting element which is connected to a second side edge of the screen.

[0020] The same or similar elements are designated in the drawing with the same reference numerals.

[0021] Figure 1 shows a screen device 1 according to a preferred embodiment of the invention in an assembled state. The figure shows that the screen device is preferably self-supporting. This means that the components of the screen device are preferably not formed integrally by and/or with other structural elements such as windows, support beams, wall or roof components and/or other systems. This also means that the components of the screen device can be manufactured, supplied and installed to place the screen device without the presence of any special elements or parts being required.

[0022] Figure 1 shows the screen device 1, which forms a frame. The frame is formed by a first protective casing 4 which is provided on either side with a lateral guide 5 for guiding the screen 3. The frame further comprises a second protective casing 7. The first protective casing 4 and the second protective casing 7 are preferably provided opposite each other and preferably run substantially parallel to each other. The lateral guides 5 are preferably also provided opposite each other and preferably run substantially parallel to each other. Protective casings 4, 7 and lateral guides 5 form the outer elements of the frame of screen device 1. A screen 3 is provided inside the frame. Screen 3 can be rolled up onto the screen roller located in the first protective casing 4, making the frame open. This allows sunlight to shine through the frame unimpeded. Screen 3 can also be wholly unrolled, whereby the screen fills almost the whole frame. In this state the sunlight is prevented from shining through the frame to maximum extent, this prevention

being subject to the properties of the screen. A screen can be configured to fully black out and to partially black out, and can be provided with or without water-repellent coating. It is further noted that a screen that fully blacks out may still allow light to pass at the position of the thickened portions, this depending on the manner in which the thickened portion is provided. The screen can further be in intermediate positions lying between the rolled-up and unrolled position, as shown in figure 1. The amount of sunlight shining through the frame can thus be controlled by adjusting the position of the screen.

[0023] Figure 1 shows that the screen is connected to a so-called bottom slat 11. The term bottom slat comes from traditional screen devices, wherein the bottom slat is always located at the bottom of the screen. In the screen device according to the invention the bottom slat is not necessarily located at the bottom of the screen, but the term bottom slat is still used for the analogy with a traditional screen device. Bottom slat 11 extends substantially parallel to the protective casings 4, 7. In the unrolled and/or rolled-up position of the screen the bottom slat 11 can preferably be received at least partially in respectively the second protective casing 7 and/or first protective casing 4. In another embodiment bottom slat 11 is always located between first protective casing 4 and second protective casing 7. Bottom slat 11 typically extends between lateral guides 5 and is preferably shape-compatible with the lateral guide 5 at both ends in order to be held at least partially thereby.

[0024] Guiding is defined as the movement being bounded in at least one of the three, preferably in two of the three directions of movement. Tolerances can be provided here which allow for some movement in the bounded direction of movement but which prevent a movement outside the tolerance zone. Bottom slat 11 is guided by lateral guides 5, which means that the bottom slat is bounded in a movement in its longitudinal direction and is bounded in a movement perpendicularly of the frame. Guiding is further defined as direct or indirect guiding. The bottom slat can thus be directly bounded in its movement by the lateral guides, or the bottom slat can be provided with auxiliary elements which make contact with the lateral guides in order to provide the bounding of the movement.

[0025] The application of screen device 1 according to the invention preferably refers to skylights. More specifically, the application preferably relates to windows which form an angle with the upward direction. The invention is however principally not limited to this application. More specifically, the invention can also be used to provide a normal upright window with sun protection. The invention also allows for special situations wherein the screen opens and closes in a different direction, and for instance allows the screen to be closed from right to left or vice versa, or from bottom to top, while a traditional screen can close only from top to bottom.

[0026] The screen is preferably a cloth, which is also referred to as a screen in Dutch. The lateral guides 5 are

configured to guide the screen. This means that the lateral guides 5 hold the screen in order to make the screen more windproof. In practice this is realized by providing a zip on the lateral side edges of the screen, which zip is held in the lateral guide by the auxiliary profile. Such a system is known commercially as a zip screen. The invention is not limited to this specific embodiment. The skilled person will appreciate that a thickened portion other than a zip can be provided on the lateral side edges of the screen to achieve the same functionality. When a different thickened portion is provided, a lateral guide, optionally provided with an auxiliary profile, can be configured to be shape-compatible for holding the thickened portion and allowing it to slide in the lateral guide so that the screen is able to unroll and roll up.

[0027] Figure 1 shows the screen device 1 separately of the window. When screen device 1 is placed on a skylight, provisions are preferably made to allow for drainage. The frame can thus for instance be placed on feet (not shown) so that a gap is created between the window and the whole screen device 1. The feet can be provided under the lateral guides 5 and/or the protective casings 4, 7. Alternatively, at least one of the protective casings can be provided with slot drains (not shown) which allow water which has found its way into the frame and/or into the casing to flow away.

[0028] Figure 2 shows an exploded view of a screen device according to the invention. The figure shows some (but not all) elements of the screen device. Figure 2 shows the basic elements from which the screen device 1 according to the invention is preferably constructed. Screen device 1 has a screen roller 2. Two screen roller holders 20 and 21 are preferably provided to hold screen roller 2 in protective casing 4. A screen roller holder can also be referred to as shaft cap. The screen roller holder 20 is configured to connect screen roller 2 to a motor 10 or other roll-up mechanism. Motor 10 is preferably of the tube motor type, wherein motor 10 is placed into screen roller 2 for the most part. The screen roller holder 21 is configured to connect the screen roller in bearing-mounted manner to a side cover 43 of protective casing 4. Screen roller 2 is thus positioned and held in protective casing 4 and it is ensured that screen roller 2 can rotate in order to roll up and unroll the screen 3. Screen roller 2 typically has a groove to which a side edge of screen 3 is connected. The connection between screen roller 2 and screen 3 is known and is therefore not described in further detail.

[0029] Screen 3 extends on one hand between screen roller 2 and bottom slat 11. The distance between screen roller 2 and bottom slat 11 can change by rolling up and unrolling the screen onto and from the screen roller 2. In figure 2 the portion of the screen which is rolled up onto screen roller 2 is designated with numeral 31. On the other hand the screen 3 extends between the lateral guides 5. The distance between lateral guides 5 is fixed. The edges with which screen 3 lies adjacently of the lateral guides are referred to as the lateral side edges of

screen 3. At the position of the lateral side edges the screen 3 is provided with a thickened portion 12 so that the lateral side edges of screen 3 can be held in or by the lateral guide 5. This principle is known commercially and allows windproof screens to be made. The thickened portion is preferably formed by a zip element. The zip element can be connected to the lateral side edges of the screen by welding or stitching the zip element onto the screen.

[0030] The first protective casing 4 is preferably constructed with a base profile 40. The base profile can be formed by extrusion or by folding plate material. A cover profile 41 is provided on base profile 40 in order to close the casing. Cover profile 41 serves as a cover in the event that screen roller 2 must be installed and/or uninstalled. Protective casing 4 further comprises two side covers 42 and 43. The side covers are preferably symmetrical. Side cover 42 is configured, optionally via an intermediate element, for connection to motor 10. A fixed, non-rotatable connection is preferably provided here between the motor and the side cover 42, such that the motor is able to realize a torque between side cover 42 on one side and screen roller 2 on the other. Side cover 43 is configured, optionally via an intermediate element, for connection to the screen roller holder 21.

[0031] Lateral guides 5 preferably each comprise a base profile 50, a further profile 51 and an auxiliary profile 53. The further profile 51 can be removed from base profile 50 in order to open the guide and remove the auxiliary profile 53. When the further profile 51 is connected to the base profile 50, a channel is created in which auxiliary profile 53 fits and inside which the thickened portions 12 on the lateral side edges of screen 3 are typically held. The ends of bottom slat 11 are preferably further held between the further profile 51 and the base profile 50.

[0032] The second protective casing 7 preferably has a similar construction to the first protective casing 4 and preferably comprises a base profile 70 which is more preferably identical to the base profile 40 of the first protective casing 4. Base profile 70 can be formed by extrusion or by folding plate material. Provided on base profile 70 is a cover profile 71 which is preferably identical to cover profile 41, which cover profile 71 is configured to close the second protective casing. Alternatively, the cover profile 71 of the second protective casing 7 differs from the cover profile 41 of the first protective casing 4, for instance in order to optimize water infiltration. Provided in first protective casing 4 is a slot where the screen can enter/exit the protective casing. In second protective casing 7 a similar slot is not necessary, enabling cover profile 71 to take a different form. Cover profile 71 serves as a cover in the event that the roll-up shaft 14, discussed in more detail below, must be installed and/or uninstalled. The second protective casing 7 further comprises two side covers 72 and 73, which are preferably identical to side covers 42 and 43. The side covers 72 and 73 preferably take a symmetrical form. Side cover 72 is configured, optionally via an intermediate element, for connection

to spring element 8, to be discussed in more detail below. A fixed, non-rotatable connection is preferably provided here between the spring element and the side cover 72, such that the spring can realize a torque between side cover 72 on one side and roll-up shaft 14 on the other. Side cover 73 is configured, optionally via an intermediate element, for connection to the roll-up shaft holder 15.

[0033] The second protective casing 7 is configured to at least partially screen a pulling mechanism. In the embodiment of figure 2 this pulling mechanism comprises a spring element 8, a connecting element 9 and a roll-up shaft 14. Each of these elements is described in more detail below.

[0034] Roll-up shaft 14 is preferably similar or identical to screen roller 2. Roll-up shaft 14 extends in second protective casing 7 and is mounted therein similarly to the screen roller 2 in first protective casing 4. Instead of a motor 10, a spring element 8 is provided in roll-up shaft 14. This spring element 8 provides for a torque on roll-up shaft 14. In other words, spring element 8 is configured to transmit a rotational force from side cover 72 to roll-up shaft 14.

[0035] Connecting element 9 extends between screen 3 and roll-up shaft 14. For this purpose the connecting element 9 is connected on one side to roll-up shaft 14 and connected on the other side to screen 3. In the shown preferred embodiment connecting element 9 is provided on either side of screen 3 in order to realize a balanced pulling force on screen 3 in order to keep screen 3 neatly flat at all times. In a further preferred embodiment, described further below, connecting element 9 is formed by an extension of the thickened portion 12 on the lateral side edges of the screen. In this embodiment the thickened portion 12 and the connecting element 9 are one and the same component, wherein it functions as thickened portion at the position of the connection to screen 3 and functions as connecting element where it extends between roll-up shaft 14 and screen 3.

[0036] Because roll-up shaft 14 produces a torque, connecting element 9 is pulled. It will be apparent to the skilled person how the roll-up device and direction of spring force can be adapted to each other in order to achieve this result. Connecting element 9 is tensioned almost constantly, wherein the tensioning force may or may not depend on the position of screen 3. Hereby, connecting element 9 constantly pulls on screen 3 in the unrolling direction. This allows the screen to be held neatly stretched. This also allows for rolling up and unrolling of the screen by rotation of the motor 10. When motor 10 unrolls screen roller 2, connecting element 9 pulls on the screen in order to ensure the unrolling. When motor 10 rolls up screen roller 2, spring element 8 is tensioned further via connecting element 9 and roll-up shaft 14.

[0037] In a manner similar to that in which motor 10 is connected to screen roller 2, spring element 8 is also connected to roll-up shaft 14 in the embodiment as shown in figure 2. A spring element 8 which is suitable to be

connected in such a manner is shown in more detail in figure 3. It will however be apparent to the skilled person that this is only one embodiment, and that the spring element can also be embodied in different ways. A spring, for instance a torsion spring, can thus be connected to a roll-up element on the left and on the right in second protective casing 7, which makes providing a roll-up shaft 14 unnecessary. This allows connecting elements 9 to be pulled in an alternative manner. As a further alternative, a coil spring is provided and a pulley mechanism is provided in the protective casing in order to pull on connecting elements 9 via the coil spring.

[0038] Roll-up shaft 14 is preferably provided with two shaft caps 15 which function as roll-up element. Because these shaft caps 15 also function as holder of the roll-up shaft in the shown embodiment, these shaft caps 15 are also referred to as roll-up shaft holders 15. In an alternative embodiment (not shown) the roll-up element can also be formed separately from the shaft holders, so that these two functions are performed by different parts. The roll-up element is preferably provided with a recess in its periphery in order to enhance the rolling up of the connecting element. Owing to the recess, the connecting element can be rolled up correctly onto a predetermined location on the shaft without the connecting element sliding or shifting on the shaft due to the rolling up.

[0039] Figure 3 shows a spring element 8 which can be mounted at least substantially wholly in a roll-up shaft to exert a torque on the roll-up shaft. More specifically, the torque is realized between roll-up shaft 14 and side cover 72. For this purpose spring element 8 has a connector 80 for connection to side cover 72 in a manner such that rotation of the connector 80 relative to side cover 72 is prevented. In the embodiment this is realized by a non-circular form coupling. The skilled person will appreciate that other connections are also possible, for instance a glue connection, screw connection or other connection.

[0040] Connector 80 is fixedly connected, via a shaft 84, to one outer end of a spiral spring 85. Shaft 84 is held substantially centred in roll-up shaft 14 by means of two positioning discs 81, 82. These positioning discs 81 and 82 are rotatable relative to the shaft, so that roll-up shaft 14 can rotate freely relative to shaft 84. Spring element 8 further comprises a carrier disc 83 which can be placed in roll-up shaft 14 in order to prevent a rotation between roll-up shaft 14 and carrier disc 83. This can be realized in simple manner by providing a non-circular shape compatibility between the inner side of roll-up shaft 14 and the outer side of carrier disc 83. Alternatively, the carrier disc can be connected to roll-up shaft 14 via a screw or other connection. The carrier disc is rotatable relative to the shaft 84. The carrier disc is further connected fixedly to a second end of spiral spring 85. Shaft 84 preferably runs through spiral spring 85 in order to keep spiral spring 85 correctly positioned. This construction allows a large and inexpensive spiral spring 85 to be built into a roll-up shaft 14 in order to exert a minimal, predetermined torque

on roll-up shaft 14. This type of spring element 8 is also referred to as a torsion spring and is for instance used for gates and spring-loaded roller blinds.

[0041] Figure 4 shows a detail of a lateral side edge of screen 3 at the position of bottom slat 11. The figure shows that a thickened portion 12 in the form of a zip element is welded onto screen 3 and continuous or transposes integrally into connecting element 9. This imparts to the zip element or the thickening part a dual function, i.e. that of the thickened portion 12 and of the connecting element 9. This construction ensures that connecting element 9 is connected firmly to screen 3 without any additional operations. This construction also ensures that a screen can be manufactured in a traditional manner, wherein only the length of the thickening part, typically the zip element, need be considerably larger than is traditional in order also to function as connecting element 9 in addition to thickened portion 12.

[0042] The above described exemplary embodiments serve solely for the purpose of illustrating the invention and are not intended to limit the scope of protection.

Claims

1. Screen device comprising a screen roller and a screen which is rollable onto and unrollable from this screen roller and is attached with a first side edge to the screen roller, wherein the screen device comprises a frame with at least a first protective casing and two lateral guides, wherein the first protective casing is configured to receive the screen roller and wherein the lateral guides are configured to guide lateral side edges of the screen when the screen is rolled up and unrolled, **characterized in that** the screen device further comprises a pulling mechanism which is connected to a second side edge of the screen lying opposite the first side edge, wherein the frame further comprises a second protective casing for at least partially receiving the pulling mechanism.
2. Screen device according to claim 1, wherein the pulling mechanism comprises a spring element.
3. Screen device according to claim 2, wherein the pulling mechanism further comprises a connecting element located between the spring element and the second side edge of the screen.
4. Screen device according to claim 3, wherein the connecting element comprises a pair of connecting elements to be connected close to opposite corners of the second side edge.
5. Screen device according to claim 3 or 4, wherein the second protective casing is configured to substantially wholly receive the spring element and wherein

the lateral guides are further configured to guide the connecting element.

6. Screen device according to any one of the foregoing claims 2-5, wherein the spring element has in mounted state a bias so as to pull the screen when the screen is unrolled from the first protective casing. 5
7. Screen device according to any one of the foregoing claims, wherein the screen roller is provided with a motor which is configured to pull the screen when the screen is being rolled up into the first protective casing. 10
8. Screen device according to any one of the foregoing claims, wherein the lateral side edges of the screen are each provided with a thickened portion and wherein the lateral guides are configured to hold the thickened portion over substantially the whole length of the lateral guides. 15
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9. Screen device according to claim 8 and any one of the claims 3-5, wherein each thickened portion continues on the second side edge of the screen so as to form the connecting element. 25
10. Screen device according to any one of the foregoing claims, wherein the pulling mechanism comprises a roll-up element. 30
11. Screen device according to the foregoing claim and any one of the claims 3-5 and 10, wherein the roll-up element is configured to roll up the connecting element. 35
12. Screen device according to any one of the claims 10-11, wherein the second protective casing is configured to receive roll-up element.
13. Screen device according to any one of the claims 10-12 and any one of the claims 2-6, wherein the spring element is operatively connected to the roll-up element to exert a torque on the roll-up element. 40
14. Screen device according to any one of the claims 10-13, wherein the roll-up element comprises a roll-up shaft which is configured to extend in the second protective casing and which comprises the spring element, wherein the roll-up shaft preferably comprises a shaft cap for each connecting element. 45
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15. Screen device according to claim 4 or 9 and according to any one of the claims 10-13, wherein the roll-up element comprises two roll-up elements which are each provided with a spring element and which are each connected to a connecting element. 55

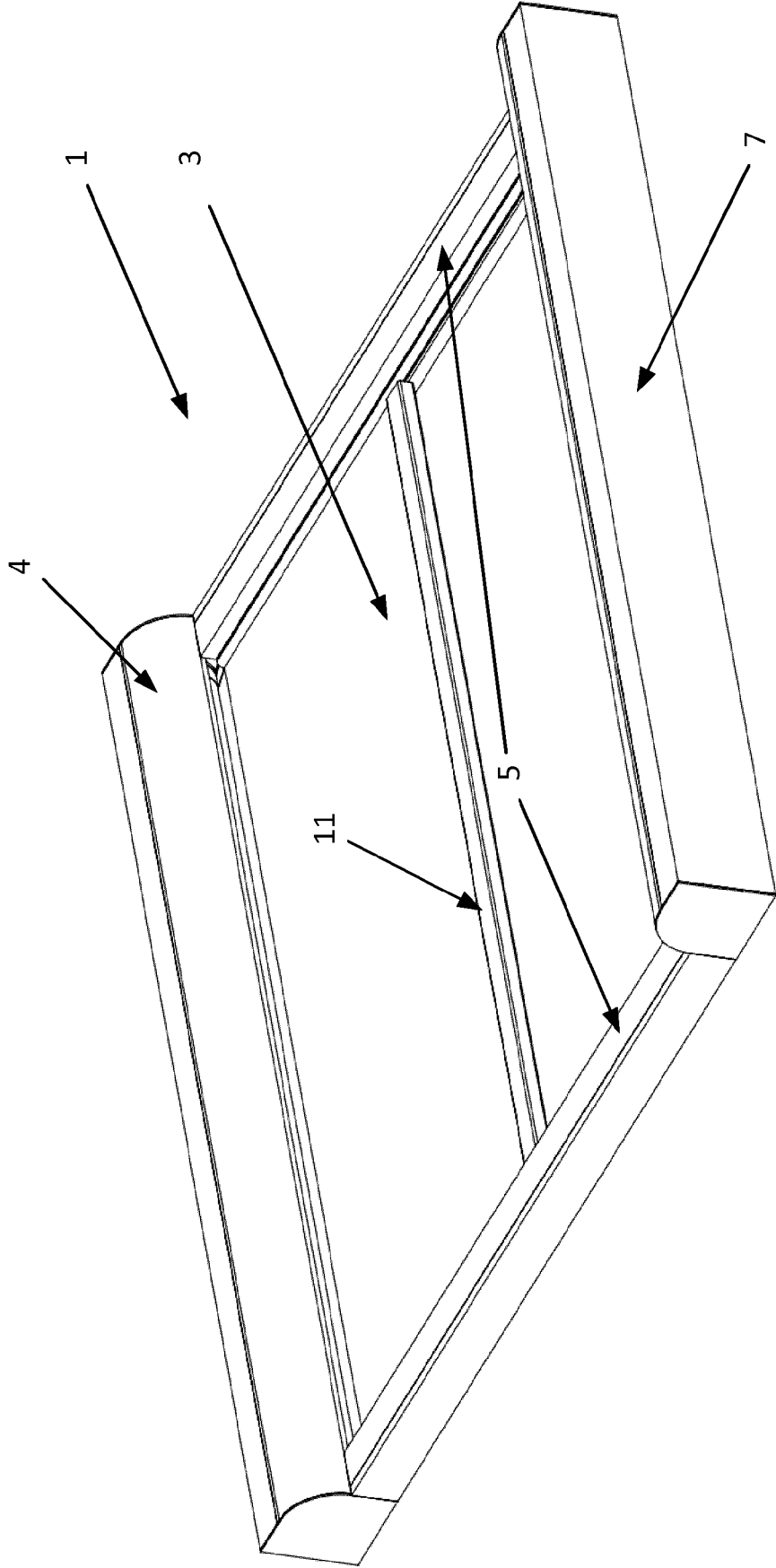


FIG 1

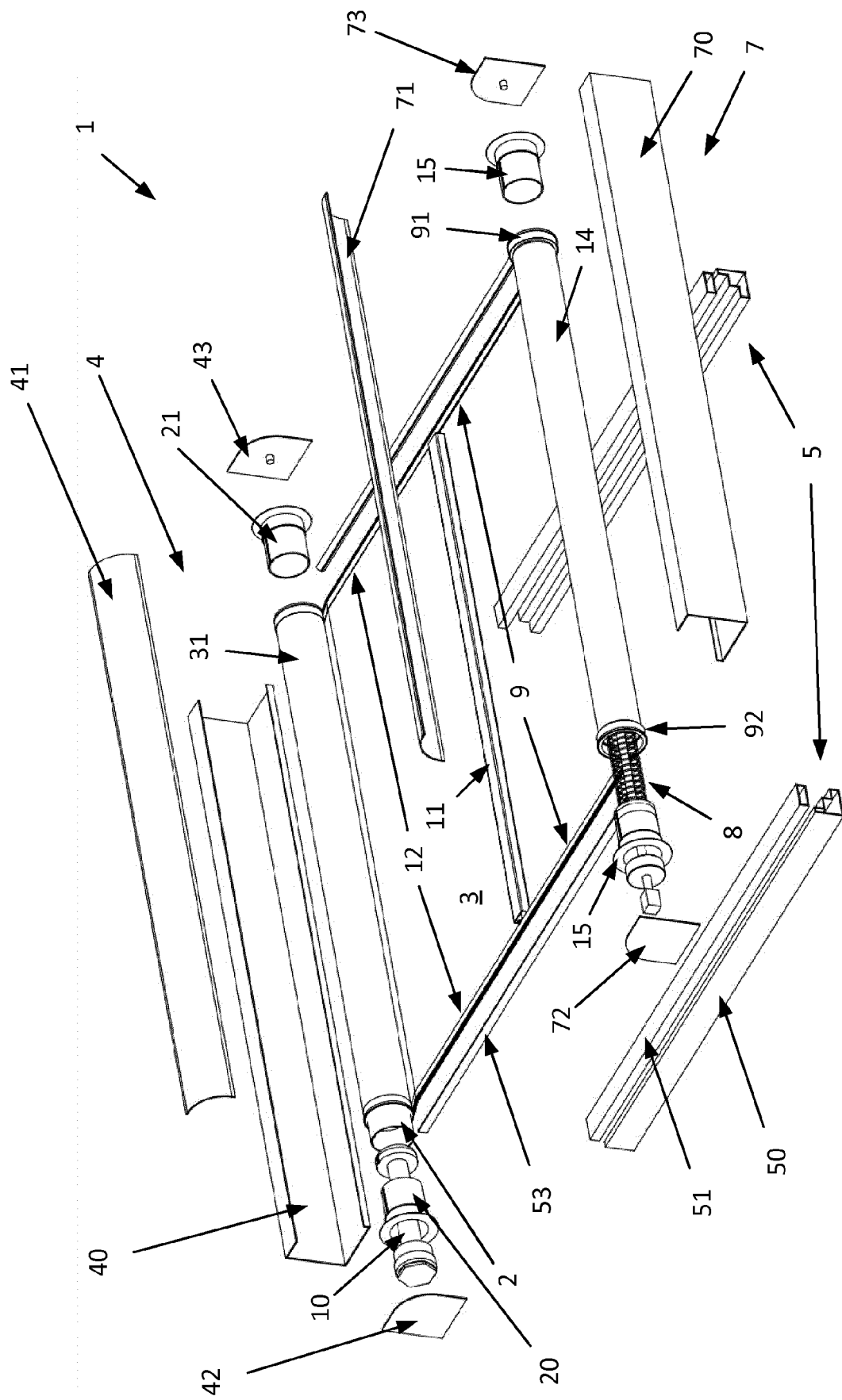
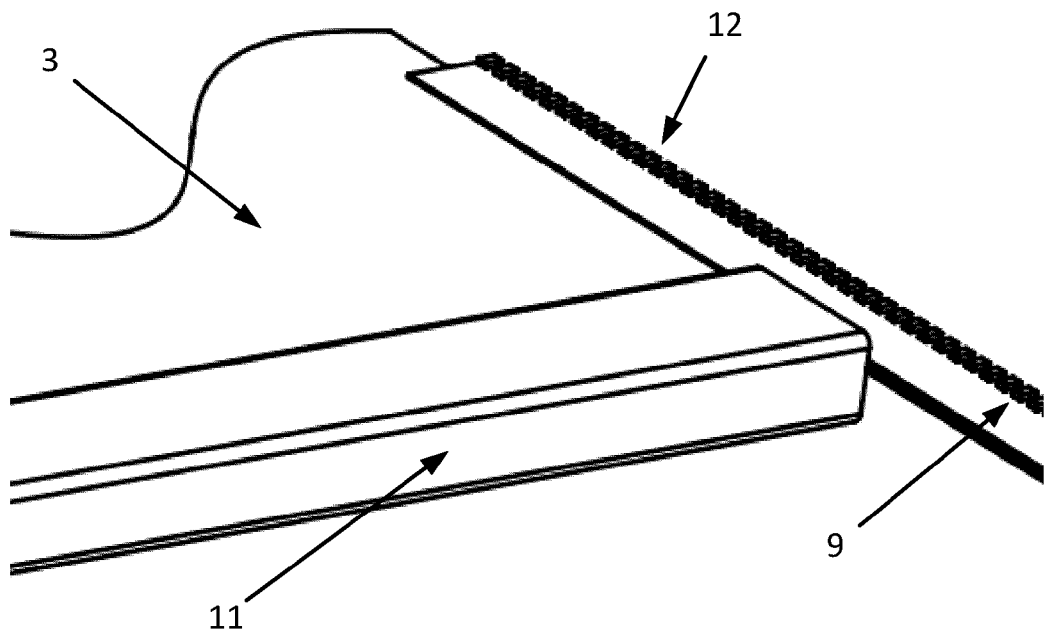
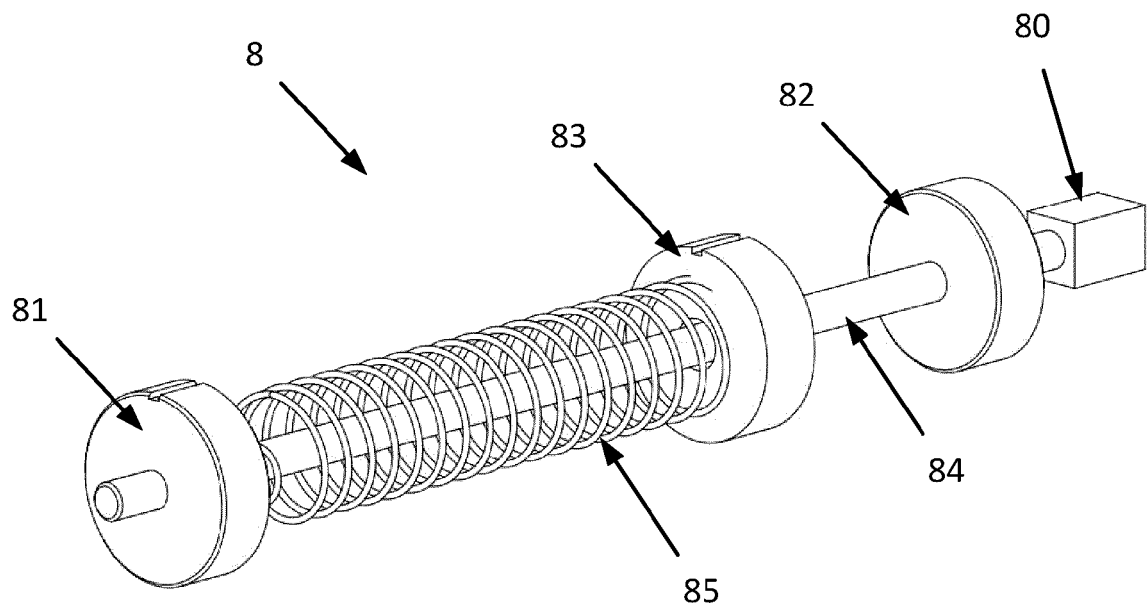


FIG 2





EUROPEAN SEARCH REPORT

Application Number

EP 23 18 2653

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 783 072 A1 (LUTRON ELECTRONICS CO [US]) 9 July 1997 (1997-07-09) * column 4, line 35 - column 13, line 55; figures 1,2,6,7, 16, 17 * -----	1-7, 10-14	INV. E06B9/40 E06B9/42 E06B9/62 E04F10/06
X	EP 3 351 719 A1 (VKR HOLDING AS [DK]) 25 July 2018 (2018-07-25) * paragraphs [0020] - [0034]; figures 1,2 *	1,2,6	
X	DE 20 2013 004692 U1 (WEINOR GMBH & CO KG [DE]) 14 June 2013 (2013-06-14) * paragraphs [0022] - [0027]; figure 1 * -----	1-8	
X	DE 297 23 473 U1 (GOLDNER HORST H [DE]) 24 December 1998 (1998-12-24) * page 12, lines 14-23; claims 1,15-17,23; figure 4 * -----	1-7, 10-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 October 2023	Examiner Kofoed, Peter
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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