SUN PROTECTION DEVICE

The invention concerns a sun protection device according to the preamble of claim 1.

A sun protection roller blind is known from document DE 101 61 159 A1. This sun protection roller blind forms a sun or light protection device, which is installed in particular on windows of buildings. The sun protection roller blind described there includes a fabric which can be rolled and consists of a plurality of rods forming lamellae lying parallel to each other, which held together by connection means in the form of stainless steel bands. The rods consisting of synthetic material or metal respectively lie at a certain distance with respect to each other, so that a distance is maintained between two adjoining rods as to form a light slit. The rods are of tubular construction and designed in such a way that each rod forms a continuous surface on its external side. The stabilisation elements which connect the rods are designed in such a way that the fabric is flexible around axes parallel to the longitudinal axes of the rods.

Thanks to the flexible arrangement of the stabilisation elements, the fabric can be rolled up on a shaft and unrolled therefrom again.

The advantage of this arrangement is that the sizes of the light slits can be result from selection of the distances between the rods.

The shortcoming is that the closed tubular design of the rods requires a large quantity of material for its production.

Another shortcoming is the time required for the production of the fabric is undesirably large. The rods must be produced first of all as separate parts. Then, the individual rods must be oriented in such a way that they lie exactly

parallel at a distance from each other. To do so, the rods must be connected to each other by the means of connection, in particular through laser welding or gluing operations.

A further sun protection roller blind is known from DE 20 2009 033 437 A, which presents a fabric which can be rolled up on a shaft, with a multiple arrangement of lamellae, whose longitudinal axes extend at a distance parallel to each other and transversal to the roll-up direction of the fabric. Light slits are provided between two neighbouring lamellae. A corrugated sheet is provided to form the arrangement of lamellae, a sheet which extends in longitudinal direction, i.e. in the roll-up direction over the whole length of the fabric. The structure of lamella is embedded into the corrugated sheet. The light slits are punched into the corrugated sheet between the lamellae. Corrugated sheets can be arranged alongside each other to obtain larger widths of fabrics in such a way that each lamella extends over all corrugated sheets. To do so, all the corrugated sheets extend over the full width of the fabric.

The shortcoming here is that the connection of individual corrugated sheets requires a large amount of construction work.

To be able to roll up the fabric so formed on a shaft, the corrugated sheets must be flexible so that they can be laid around the shaft. After a plurality of roll-up and unroll operations carried out, there is the danger that the corrugated sheets deform permanently and hence lose their target shapes, which cannot only influence the sun protection function but also the roll-up ability of the fabric.

To prevent this effect, stabilisation elements in the form of stainless steel bands can be installed on the back of the fabric, for example by laser welding, which extends over the whole length of the corrugated sheet. The result is that the lamella structure of the fabric is kept also after a plurality of roll-up and unroll operations. The shortcoming here is however that the installation of the stabilisation elements involves an undesirable surplus of construction and increased amount of material, which raises the manufacturing cost of the fabric.

The object of the invention is then to provide a sun protection device of the type above mentioned, which can be produced rationally and cost-efficiently with high functionality.

The features of claim 1 should satisfy this object. Advantageous forms of embodiment and suitable further developments of the invention are described in the depending claims.

The sun protection device according to the invention includes a sun protection curtain which can be rolled up on a shaft. The sun protection curtain consists of an arrangement of lamellae connected one after the other over joint connections in the roll-up direction, which respectively exhibit a multiple arrangement of lamella segments and are of rigid construction so that they keep their shape when being rolled up on the shaft. The same goes accordingly for unrolling the sun protection curtain from the shaft.

The basic idea of the invention hence consists in structuring the sun protection curtain in such a way that only the joint connections between the individual lamellae are mobile and can then ensure the necessary adaptation of form of the sun protection curtain when it is rolled up on or unrolled from the shaft. The individual lamellae conversely are of rigid construction and consequently dimensionally stable, i.e. they do not deform during the roll-up or unrolling operation.

Thanks to the dimensional stability of the lamellae, said elements present high inherent stability without additional stabilisation elements so that even after a plurality of roll-up and unrolling operations carried out, their shapes are preserved perfectly and are consequently not exposed to wear-induced malfunctions. The joint connections between the lamellae perform movements during the roll-up and unrolling operations, which are also wear-free, i.e. even the joint connections remain unchanged after a plurality of roll-up and unrolling

operations and are not exposed to any malfunctions. The sun protection curtain of the invention hence presents a heavy-duty, long-term stable construction.

Another essential advantage consists in the possibility of manufacturing the sun protection curtain according to the invention at reduced production costs, rationally and cost-efficiently.

Important is here that the lamellae exhibit a high inherent stability thanks to their robustness and consequently must be stabilised by additional elements such as metal bands or similar. The sun protection curtain exhibits thereby a small number of individual parts and can thus be produced cost-efficiently.

Particularly advantageously, the lamella are formed as a single piece and extend over the full width of the sun protection curtain.

This enables further reduction of the number of parts of which the sun protection curtain is composed.

In a variation of the invention, each lamella consists of an extruded part, whereas in such a case, each lamella consists of synthetic material or aluminium.

In a second variation of the invention, each lamella consists of a shaped and punched part, whereas in such a case, each lamella consists of stainless steel or of aluminium.

Both these variations enable a rational and cost-efficient production of the lamellae.

Particularly advantageously, each lamella exhibits on its upper edge a first joint connection and on its lower edge a second joint connection, complementary to the first joint element, whereas the first joint element on the upper edge of a

lamella and the second joint element of the connecting lamella mesh into one another to form a joint connection.

Since the joint elements are designed as a single piece with the respective lamellae to form the joint connection, the number of individual parts of the sun protection curtain is further reduced, whereby the manufacturing costs necessary to the production of the sun protection curtain are particularly low. Particularly advantageously is here that in addition to the complementary joint connections at the lamellae to form the joint connection there is no need to provide further fastening means for coupling the joint elements. Far more, the complementary joint elements only need to be inserted into one another, which provides a particularly straightforward and rapid assembly of the sun protection curtain.

According to a further advantageous embodiment of the invention, all the lamellae are designed identically.

To do so, the whole sun protection curtain can be assembled by the multiple use of only one part. This enables a particularly rationally manufacture of the sun protection curtain, whereas also the costs can be kept small for the bearing bracket and the logistics during the manufacture of the sun protection curtain.

Particularly advantageously, not only the individual lamella are designed identically. Furthermore, each lamella exhibits a multiple arrangement of identical lamella segments.

To do so, a constant sun protection curtain of the sun protection curtain is provided over the whole length of the sun protection curtain.

Particularly advantageously, each lamella segment exhibits a first partial segment with at least one light slit, whereas a second light impervious partial segment is connected to the upper edge of the first partial segment, which protrudes outwardly over the first partial segment.

Since the light slits of the lamella segments are shielded by the second protruding partial segments arranged thereon and outwardly, i.e. in the direction of the incident sunlight, direct solar radiation through the light slits is prevented and only rays of sunlight can penetrate through the light slits in a narrowly limited angular sector, whereby only a limited, controlled quantity of light flows through the light slits.

The invention will be depicted below using the drawings. The figures are as follows:

Figure 1 shows a schematic diagram of an exemplary embodiment of the sun protection device according to the invention.

Figure 2 shows a section of the sun protection curtain of the sun protection device according to figure 1.

Figure 1 shows the essential components of the sun protection device 1 according to the invention, which can be used in particular as a sun protection on windows of buildings and similar.

The sun protection device 1 includes a sun protection curtain 2 which can be rolled up and unrolled on a shaft 3. Figure 1 shows the sun protection curtain 2 rolled up on the shaft 3. The sun protection curtain 2 is than oriented on a vertical plane and lies in the opening of a window or similar.

The sun protection curtain 2 according to the invention consists of a multiple arrangement of individual lamellae 4. Figure 2 shows two lamellae coupled together 4, which are oriented on the vertical plane of the sun protection curtain 2 rolled up on the shaft 3, as represented in figure 1.

The lamellae 4 are respectively of rigid construction i.e., they exhibit such a great material thickness that they are dimensionally stable and not flexible.

The lamellae 4 may consist of extruded parts according to a first embodiment. The lamellae 4 consist of synthetic material or aluminium in such a case.

Alternately, the lamellae 4 may consist of shaped and punched parts. In such a case, the lamellae 4 consist of aluminium or of stainless steel.

In such a case, the lamellae 4 are designed as a single piece and extends over the full width of the sun protection curtain 2, which typically can be equal to one or even several meters. The maximal widths which can be produced are typically up to three metres. Lamellae 4, consisting of extruded parts, can be produced in widths up to approx. six metres.

The heights of the lamellae 4, i.e. their elongations in the y-direction, are considerably smaller than their widths. Typically, the heights of the lamellae 4 lie in the region between 30 mm and 60 mm.

In the present exemplary embodiment, the sun protection curtain 2 consists of a multiple arrangement of lamellae 4 designed identically. Each lamella 4 consists again of a multiple arrangement of lamella segments 5 designed identically. Figure 3 shows an enlarged individual representation of such a lamella segment 5.

Each lamella segment 5 includes a first partial segment 6, which is arranged in the arrangement according to figure 2 to extend on a vertical plane (y-z-plane). This partial segment 6 comprises an arrangement of light slits 7 which extend substantially over the full width of the lamella 4. The individual light slits 7 can be separated by webs which are parts of the partial segment 6.

A second partial segment 8, designed as completely light impervious, is connected to the light slit 7 above the first partial segment. As can be seen in particular on figure 3, the second partial segment 8 consists of a section 8a, extending in the x-direction, connected to the upper edge of the first partial segment 6, to which is connected a section 8b situated in the y-direction. A section

8c extending in the y-direction is again connected to this section 8b. These three sections 8a-8c form a rectangular profile piece on the external side of the lamella 4, which is facing the incident sun rays (represented with S in figure 2). A section 8d of the second partial segment 8, extending obliquely upwards, emerges before this rectangular profile piece and continues up to the lower edge of the first partial segment 6 of the following lamella segments 5.

This configuration of the lamella segments 5 vastly prevents direct solar radiation through the light slits 7. Far more, the incident sunlight only reaches a narrow angular sector after reflection on the boundary surfaces of the lamella segment 5, in particular of the section 8d of the second partial segment 8, through the light slits 7. This specific configuration of the structure of the lamella segments 5 enables to keep the incidence of light through the light slits 7 under control.

In the previous instance, the lamella segments 5 are sized in such a way that the heights, i.e. the elongations in the y-direction of the first partial segments 6 are equal to approx. 1.5 mm and those of the second partial segments 8 approx. 5 mm. The depths of the lamella segments 5, i.e. their elongations in the x-direction are equal to approx. 4 mm.

As can be seen in figure 2, the individual lamella 4 are arranged behind one another in the y-direction and hinged connected to one another via joint connections 9. A first joint element 10 is provided on each lower edge of a lamella 4 to form the joint connections, whereas a second joint element 11, complementary to the first joint element 10, is provided on the upper edge of the lamella 4.

The joint elements 10, 11 are designed as a single piece with the respective lamella 4 and extend preferably over the full width of the lamella 4, whereas the cross-sections of the joint elements 10, 11 remain constant over the full width.

The first joint element 10 exhibits a substantially circular cross-section whereas the joint element 10 encloses a cavity, which presents an exit discharge on the lower side. Alternately, the first joint element 10 may be hook-shaped.

The joint element 11, which is to do so of complementary design, exhibits at a free end a circular cross-sectional widening.

To obtain the joint connection 9, the circular cross-sectional widening of the second joint element 11 is pushed into the cavity of the first joint element 10. The result is the joint connection 9, so that the two lamellae 4, which are connected this way, can be swung against one another on the x-y-plane.

Due to their robustness, the lamellae 4 remain dimensionally stable when rolling up the sun protection curtain 2, so that they do not bend during the roll-up operation. During the roll-up operation, only the joint connections 9 will move, whereby the sun protection curtain 2 is wound around the shaft 3. The same goes during unrolling the sun protection curtain 2 from the shaft 3.

Metal bands or similar, running in the roll-up direction, can be fixed to improve the rolling-up and unrolling of the sun protection curtain 2 on the shaft 3. Alternately clips or similar can be snapped into the cavities of the individual lamella segments 5.

List of reference signs

(1) Sun protection device
(2) Sun protection curtain
(3) Shaft
(4) Lamella
(5) Lamella segment
(6) Partial segment
(7) Light slit
(8) Partial segment
(8a) Section
(8b) Section
(8c) Section
(8d) Section
(9) Joint connection
(10) Joint element
(11) Joint element

Patent claims

1. A sun protection device (1) having a sun protection curtain (2) which can be rolled up on a shaft (3), characterised in that the sun protection curtain (2) consists of an arrangement of lamellae (4) connected one after the other over joint connections (9) in the roll-up direction, which respectively exhibit a multiple arrangement of lamella segments (5) and are of rigid construction so that they keep their shape when being rolled up on the shaft (3).

2. The sun protection device according to claim 1, characterised in that the lamellae (4) are formed as a single piece and extend over the whole width of the sun protection curtain (2).

3. The sun protection device according to claim 2, characterised in that each lamella (4) consists of an extruded part.

4. The sun protection device according to claim 3, characterised in that each lamella (4) consists of a synthetic material or aluminium.

5. The sun protection device according to claim 2, characterised in that each lamella (4) consists of a shaped or punched part.

6. The sun protection device according to claim 5, characterised in that each lamella (4) consists of stainless steel or of aluminium.

7. The sun protection device according to one of the claims 1 to 6, characterised in that the lamellae (4) are of identical structure.

8. The sun protection device according to one of the claims 1 to 7, characterised in that each lamella (4) exhibits a multiple arrangement of identical lamella segments (5).

9. The sun protection device according to one of the claims 1 to 9, characterised in that in each lamella segment (5) a first partial segment (6) exhibits an arrangement of light slits, whereas a second light impervious partial segment (8) is connected to the upper edge of the first partial segment (6), and the second segment protrudes outwardly over the first partial segment (6).

10. The sun protection device according to one of the claims 1 to 9, characterised in that each lamella (4) exhibits at its upper edge a first joint element (11) and at its lower edge a second joint element (10) which is complementary to the first joint element, whereas the first joint element (11) on the upper edge of a lamella (4) and the second joint element (10) of the connecting lamella (4) mesh into one another to form a joint connection (9).

SUN PROTECTION DEVICE

The invention concerns a sun protection device according to the preamble of claim 1.

Such a sun protection device is disclosed in DE 103 27 451 B4. It is in the form of a roller blind which consists of lamellae connected to each other. each lamella contains a substantially smooth back, a lower side with a countersunk groove, which extends substantially over the whole length of the lamella, an upper side which carries a connecting trim which can be connected in a positively locking manner with the groove on the lower side of another lamella, and which is designed in such a way that the connecting trim can be inserted into the groove in longitudinal direction of the groove but cannot be removed from the groove in the transversal direction of the groove, **at least one light slit in the connecting trim** and a front side with a rounded indentation, extending in the longitudinal direction of lamellae, which is delineated by two surfaces, tilted downwards to the lower side of the lamellae and formed below the height of the light slits, from which the lower surface falls more flatly than the upper and is connected to a substantially vertically oriented joint plane of the lamella, which produces a rib. The lamellae can be formed further in such a way that they present several overlapping ribs.

Document DE 10 2004 043 573 B3 concerns a lamella for roller shutter which is built as a single piece from sheet metal in a roll forming process. The lamella for roller shutter contains a trim continuous over its length, which is curved at its longitudinal edge by forming a channel, a lamella body from which upper side a trim extends and from which the channel is spaced apart, and a slit contained in the lamella body which is continuous over the length of the roller shutter lamella and which opens away from the trim downwards, whereas the slit is designed in such a way that the channel of another roller shutter lamella , of the same design, can be hooked therein, whereas the height of the trim up to the lower edge of the channel corresponds to 30% - 60% of the height of the lamella

body and the height of the slit corresponds to 40% - 80% of the height of the trim.

A sun protection roller blind is known from document DE 101 61 159 A1. This sun protection roller blind forms a sun or light protection device, which is installed in particular on windows of buildings. The sun protection roller blind described there includes a fabric which can be rolled and consists of a plurality of rods forming lamellae lying parallel to each other, which held together by connection means in the form of stainless steel bands. The rods consisting of synthetic material or metal respectively lie at a certain distance with respect to each other, so that a distance is maintained between two adjoining rods as to form a light slit. The rods are of tubular construction and designed in such a way that each rod forms a continuous surface on its external side. The stabilisation elements which connect the rods are designed in such a way that the fabric is flexible around axes parallel to the longitudinal axes of the rods.

Thanks to the flexible arrangement of the stabilisation elements, the fabric can be rolled up on a shaft and unrolled therefrom again.

The advantage of this arrangement is that the sizes of the light slits can be result from selection of the distances between the rods.

The shortcoming is that the closed tubular design of the rods requires a large quantity of material for its production.

Another shortcoming is the time required for the production of the fabric is undesirably large. The rods must be produced first of all as separate parts. Then, the individual rods must be oriented in such a way that they lie exactly parallel at a distance from each other. To do so, the rods must be connected to each other by the means of connection, in particular through laser welding or gluing operations.

A further sun protection roller blind is known from DE 20 2009 033 437 A, which presents a fabric which can be rolled up on a shaft, with a multiple arrangement of lamellae, whose longitudinal axes extend at a distance parallel to each other and transversal to the roll-up direction of the fabric. Light slits are provided between two neighbouring lamellae. A corrugated sheet is provided to form the arrangement of lamellae, a sheet which extends in longitudinal direction, i.e. in the roll-up direction over the whole length of the fabric. The structure of lamella is embedded into the corrugated sheet. The light slits are punched into the corrugated sheet between the lamellae. Corrugated sheets can be arranged alongside each other to obtain larger widths of fabrics in such a way that each lamella extends over all corrugated sheets. To do so, all the corrugated sheets extend over the full width of the fabric.

The shortcoming here is that the connection of individual corrugated sheets requires a large amount of construction work.

To be able to roll up the fabric so formed on a shaft, the corrugated sheets must be flexible so that they can be laid around the shaft. After a plurality of roll-up and unroll operations carried out, there is the danger that the corrugated sheets deform permanently and hence lose their target shapes, which cannot only influence the sun protection function but also the roll-up ability of the fabric.

To prevent this effect, stabilisation elements in the form of stainless steel bands can be installed on the back of the fabric, for example by laser welding, which extends over the whole length of the corrugated sheet. The result is that the lamella structure of the fabric is kept also after a plurality of roll-up and unroll operations. The shortcoming here is however that the installation of the stabilisation elements involves an undesirable surplus of construction and increased amount of material, which raises the manufacturing cost of the fabric.

Document EP 0 034 198 AI relates to a door batten for a covering member door or a roller door, consisting of a hollow profile with an external shell and an internal shell which enclose a cavity and are curved into one another in the form

of claws on their longitudinal sides to form joint elements. The internal shell and/or the external shell have in the region between a joint element and the neighbouring smaller side of the cavity, a beading extending in the longitudinal direction.

The object of the invention is then to provide a sun protection device of the type above mentioned, which can be produced rationally and cost-efficiently with high functionality.

The features of claim 1 should satisfy this object. Advantageous forms of embodiment and suitable further developments of the invention are described in the depending claims.

The sun protection device according to the invention includes a sun protection curtain which can be rolled up on a shaft. The sun protection curtain consists of an arrangement of lamellae connected one after the other over joint connections in the roll-up direction, which respectively exhibit a multiple arrangement of lamella segments and are heavy-duty so that they keep their shape when being rolled up on the shaft. The same goes accordingly for unrolling the sun protection curtain from the shaft. Each lamella segment exhibits a first partial segment with an arrangement of light slits, whereas a second light-impervious partial segment is connected to the upper edge of the first partial segment, which protrudes outwardly over the first partial segment. The partial segment exhibits a rectangular-shaped profile piece which faces the incident sun rays, Said partial segment has a tilted section emerging at the profile piece. Each lamella exhibits at its upper edge a first joint element and at its lower edge a second joint element, which is complementary to the first joint element, whereas the first joint element on the upper edge of a lamella and the second joint element of the connecting lamella mesh into one another to form a joint connection. The second joint element is connected to a section of the profile piece and protrudes into the cavity enclosed by the profile piece.

The basic idea of the invention hence consists in structuring the sun protection curtain in such a way that only the joint connections between the individual lamellae are mobile and can then ensure the necessary adaptation of form of the sun protection curtain when it is rolled up on or unrolled from the shaft. The individual lamellae conversely are of rigid construction and consequently dimensionally stable, i.e. they do not deform during the roll-up or unrolling operation.

Thanks to the dimensional stability of the lamellae, said elements present high inherent stability without additional stabilisation elements so that even after a plurality of roll-up and unrolling operations carried out, their shapes are preserved perfectly and are consequently not exposed to wear-induced malfunctions. The joint connections between the lamellae perform movements during the roll-up and unrolling operations, which are also wear-free, i.e. even the joint connections remain unchanged after a plurality of roll-up and unrolling operations and are not exposed to any malfunctions. The sun protection curtain of the invention hence presents a heavy-duty, long-term stable construction.

Another essential advantage consists in the possibility of manufacturing the sun protection curtain according to the invention at reduced production costs, rationally and cost-efficiently.

Important is here that the lamellae exhibit a high inherent stability thanks to their robustness and consequently must be stabilised by additional elements such as metal bands or similar. The sun protection curtain exhibits thereby a small number of individual parts and can thus be produced cost-efficiently.

Particularly advantageously, the lamella are formed as a single piece and extend over the full width of the sun protection curtain.

This enables further reduction of the number of parts of which the sun protection curtain is composed.

In a variation of the invention, each lamella consists of an extruded part, whereas in such a case, each lamella consists of synthetic material or aluminium.

In a second variation of the invention, each lamella consists of a shaped and punched part, whereas in such a case, each lamella consists of stainless steel or of aluminium.

Both these variations enable a rational and cost-efficient production of the lamellae.

According to the invention, each lamella exhibits on its upper edge a first joint connection and on its lower edge a second joint connection, complementary to the first joint element, whereas the first joint element on the upper edge of a lamella and the second joint element of the connecting lamella mesh into one another to form a joint connection.

Since the joint elements are designed as a single piece with the respective lamellae to form the joint connection, the number of individual parts of the sun protection curtain is further reduced, whereby the manufacturing costs necessary to the production of the sun protection curtain are particularly low. Particularly advantageously is here that in addition to the complementary joint connections at the lamellae to form the joint connection there is no need to provide further fastening means for coupling the joint elements. Far more, the complementary joint elements only need to be inserted into one another, which provides a particularly straightforward and rapid assembly of the sun protection curtain.

According to a further advantageous embodiment of the invention, all the lamellae are designed identically.

To do so, the whole sun protection curtain can be assembled by the multiple use of only one part. This enables a particularly rationally manufacture of the sun protection curtain, whereas also the costs can be kept small for the bearing bracket and the logistics during the manufacture of the sun protection curtain.

According to the invention, not only the individual lamella are designed identically. Furthermore, each lamella exhibits a multiple arrangement of identical lamella segments.

To do so, a constant sun protection curtain of the sun protection curtain is provided over the whole length of the sun protection curtain.

Particularly advantageously, each lamella segment exhibits a first partial segment with at least one light slit, whereas a second light impervious partial segment is connected to the upper edge of the first partial segment, which protrudes outwardly over the first partial segment.

Since the light slits of the lamella segments are shielded by the second protruding partial segments arranged thereon and outwardly, i.e. in the direction of the incident sunlight, direct solar radiation through the light slits is prevented and only rays of sunlight can penetrate through the light slits in a narrowly limited angular sector, whereby only a limited, controlled quantity of light flows through the light slits.

The invention will be depicted below using the drawings. The figures are as follows:

Figure 1 shows a schematic diagram of an exemplary embodiment of the sun protection device according to the invention.

Figure 2 shows a section of the sun protection curtain of the sun protection device according to figure 1.

Figure 1 shows the essential components of the sun protection device 1 according to the invention, which can be used in particular as a sun protection on windows of buildings and similar.

The sun protection device 1 includes a sun protection curtain 2 which can be rolled up and unrolled on a shaft 3. Figure 1 shows the sun protection curtain 2

rolled up on the shaft 3. The sun protection curtain 2 is than oriented on a vertical plane and lies in the opening of a window or similar.

The sun protection curtain 2 according to the invention consists of a multiple arrangement of individual lamellae 4. Figure 2 shows two lamellae coupled together 4, which are oriented on the vertical plane of the sun protection curtain 2 rolled up on the shaft 3, as represented in figure 1.

The lamellae 4 are respectively of rigid construction i.e., they exhibit such a great material thickness that they are dimensionally stable and not flexible.

The lamellae 4 may consist of extruded parts according to a first embodiment. The lamellae 4 consist of synthetic material or aluminium in such a case.

Alternately, the lamellae 4 may consist of shaped and punched parts. In such a case, the lamellae 4 consist of aluminium or of stainless steel.

In such a case, the lamellae 4 are designed as a single piece and extends over the full width of the sun protection curtain 2, which typically can be equal to one or even several meters. The maximal widths which can be produced are typically up to three metres. Lamellae 4, consisting of extruded parts, can be produced in widths up to approx. six metres.

The heights of the lamellae 4, i.e. their elongations in the y-direction, are considerably smaller than their widths. Typically, the heights of the lamellae 4 lie in the region between 30 mm and 60 mm.

In the present exemplary embodiment, the sun protection curtain 2 consists of a multiple arrangement of lamellae 4 designed identically. Each lamella 4 consists again of a multiple arrangement of lamella segments 5 designed identically. Figure 3 shows an enlarged individual representation of such a lamella segment 5.

Each lamella segment 5 includes a first partial segment 6, which is arranged in the arrangement according to figure 2 to extend on a vertical plane (y-z-plane).

This partial segment 6 comprises an arrangement of light slits 7 which extend substantially over the full width of the lamella 4. The individual light slits 7 can be separated by webs which are parts of the partial segment 6.

A second partial segment 8, designed as completely light impervious, is connected to the light slit 7 above the first partial segment. As can be seen in particular on figure 3, the second partial segment 8 consists of a section 8a, extending in the x-direction, connected to the upper edge of the first partial segment 6, to which is connected a section 8b situated in the y-direction. A section 8c extending in the y-direction is again connected to this section 8b. These three sections 8a-8c form a rectangular profile piece on the external side of the lamella 4, which is facing the incident sun rays (represented with S in figure 2). A section 8d of the second partial segment 8, extending obliquely upwards, emerges before this rectangular profile piece and continues up to the lower edge of the first partial segment 6 of the following lamella segments 5.

This configuration of the lamella segments 5 vastly prevents direct solar radiation through the light slits 7. Far more, the incident sunlight only reaches a narrow angular sector after reflection on the boundary surfaces of the lamella segment 5, in particular of the section 8d of the second partial segment 8, through the light slits 7. This specific configuration of the structure of the lamella segments 5 enables to keep the incidence of light through the light slits 7 under control.

In the previous instance, the lamella segments 5 are sized in such a way that the heights, i.e. the elongations in the y-direction of the first partial segments 6 are equal to approx. 1.5 mm and those of the second partial segments 8 approx. 5 mm. The depths of the lamella segments 5, i.e. their elongations in the x-direction are equal to approx. 4 mm.

As can be seen in figure 2, the individual lamella 4 are arranged behind one another in the y-direction and hinged connected to one another via joint connections 9. A first joint element 10 is provided on each lower edge of a lamella 4 to

form the joint connections, whereas a second joint element 11, complementary to the first joint element 10, is provided on the upper edge of the lamella 4.

The joint elements 10, 11 are designed as a single piece with the respective lamella 4 and extend preferably over the full width of the lamella 4, whereas the cross-sections of the joint elements 10, 11 remain constant over the full width.

The first joint element 10 exhibits a substantially circular cross-section whereas the joint element 10 encloses a cavity, which presents an exit discharge on the lower side. Alternately, the first joint element 10 may be hook-shaped.

The joint element 11, which is to do so of complementary design, exhibits at a free end a circular cross-sectional widening.

To obtain the joint connection 9, the circular cross-sectional widening of the second joint element 11 is pushed into the cavity of the first joint element 10. The result is the joint connection 9, so that the two lamellae 4, which are connected this way, can be swung against one another on the x-y-plane.

Due to their robustness, the lamellae 4 remain dimensionally stable when rolling up the sun protection curtain 2, so that they do not bend during the roll-up operation. During the roll-up operation, only the joint connections 9 will move, whereby the sun protection curtain 2 is wound around the shaft 3. The same goes during unrolling the sun protection curtain 2 from the shaft 3.

Metal bands or similar, running in the roll-up direction, can be fixed to improve the rolling-up and unrolling of the sun protection curtain 2 on the shaft 3. Alternately clips or similar can be snapped into the cavities of the individual lamella segments 5.

List of reference signs

(1) Sun protection device
(2) Sun protection curtain
(3) Shaft
(4) Lamella
(5) Lamella segment
(6) Partial segment
(7) Light slit
(8) Partial segment
(8a) Section
(8b) Section
(8c) Section
(8d) Section
(9) Joint connection
(10) Joint element
(11) Joint element

Patent claims

1. A sun protection device (1) having a sun protection curtain (2) which can be rolled on a shaft (3), which consists of an arrangement of lamellae (4) connected one after the other over joint connections (9) in the roll-up direction, which respectively exhibit a multiple arrangement of lamella segments (5) and are heavy-duty so that they keep their shape when being rolled up on the shaft (3), characterised in that each lamella segment (5) exhibits a first partial segment (6) with an arrangement of light slits (7), whereas a second light-impervious partial segment (6) is connected to the upper edge of the first partial segment (6), which the second segment protrudes outwardly over the first partial segment (6), Whereas the partial segment (6) exhibits a rectangular-shaped profile piece (8), which faces the incident sun rays, and presents an upwardly inclined section, emerging thereby, and that each lamella (4) exhibits at its upper edge a first joint element (11) and at its lower edge a second joint element (10) which is complementary to the first joint element, whereas the first joint element (11) at the upper edge of a lamella (4) and the second joint element (10) of the connecting lamella (4) mesh into one another to form a joint connection (9).

2. The sun protection device according to claim 1, characterised in that the lamellae (4) are formed as a single piece and extend over the whole width of the sun protection curtain (2).

3. The sun protection device according to claim 2, characterised in that each lamella (4) consists of an extruded part.

4. The sun protection device according to claim 3, characterised in that each lamella (4) consists of a synthetic material or aluminium.

5. The sun protection device according to claim 2, characterised in that each lamella (4) consists of a shaped or punched part.

6. The sun protection device according to claim 5, characterised in that each lamella (4) consists of stainless steel or of aluminium.

7. The sun protection device according to one of the claims 1 to 6, characterised in that the lamellae (4) are of identical structure.

8. The sun protection device according to one of the claims 1 to 7, characterised in that each lamella (4) exhibits a multiple arrangement of identical lamella segments (5).

9. The sun protection device according to one of the claims 1 to 8, characterised in that each lamella (4) exhibits at its upper edge a first joint element (11) and at its lower edge a second joint element (10) which is complementary to the first joint element, whereas the first joint element (11) on the upper edge of a lamella (4) and the second joint element (10) of the connecting lamella (4) mesh into one another to form a joint connection (9).