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(54) **A window screening arrangement and a braking device for use therein**

(57) A window screening arrangement comprising a screening member (4) connected between a suspension bar (2) and a movable bottom bar (3) and a cord arrangement (5, 6) with at least two separate cord members (5a, 5b; 6a, 6b) for parallel guidance of the bottom bar (3) and the screening member (4) is provided with a braking device acting on the cord arrangement (5, 6) to enable arresting the screening member (4) in any arbitrary position of the bottom bar (3).

The braking device comprises a friction member (20) arranged at the bottom bar (3) or the suspension bar (2) and acting on the cord members (5a, 5b; 6a, 6b) of the cord arrangement (5, 6) with a variable frictional force.

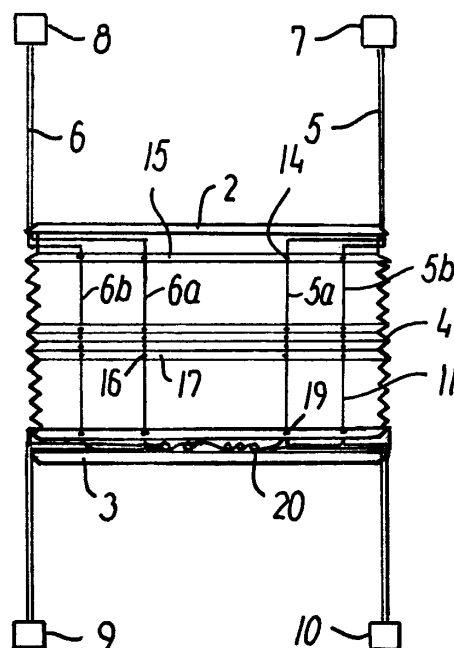


FIG. 2

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Description

[0001] The present invention relates to a screening arrangement, in particular for a window arranged in a mainly rectangular window opening and comprising a frame with substantially parallel upper and lower horizontal frame members as well as side members extending between said upper and lower members in substantial parallel vertical planes, said screening arrangement comprising

a rolled-up or folded screening member connected at an upper end with a suspension bar and at its free lower end with a movable bottom bar extending between said side members of the frame structure, a cord arrangement for parallel guidance of the bottom bar and the screening member and comprising at least two separate cord members which from a first set of fastening members connected with said upper frame member are carried through the bottom bar to a second set of fastening members connected with said lower frame member, and a braking device acting on the cord arrangement to enable arresting the screening member in any arbitrary position of the bottom bar between the upper and lower frame members.

[0002] In window screening arrangements comprising a suspension bar arranged at the sash or main frame top member of the window a cord arrangement of the type defined above is frequently used so secure parallel guidance of the bottom bar and thereby the screening web to be moved in parallel relationship to the top and bottom members of sash or main frame structure with a minimum mutual vertical displacement of the ends of the bottom bar.

[0003] In other arrangements comprising suspension and bottom bars which are both freely movable with respect to the top and bottom members of the sash or main frame structure to enable arbitrary positioning of the screening web in the window opening and, in particular in connection with use of a screening arrangement in a roof or skylight window installed in an inclined roof it is common to use a cord arrangement comprising two or four separate cord members which, on one hand are carried through the suspension member for parallel guidance thereof and, on the other act to stabilize the screening web to keep it tensioned to avoid downwards curving of the web.

[0004] In US-A-1,766,730 a screening arrangement is disclosed having a bottom bar that can be arrested in a bottom position as well as a number of intermediate positions by means of a releasable spring-loaded mechanism in the bottom bar comprising a pawl engageable with a number of recesses in the side members of the window, whereby the bottom bar can be parked in a corresponding number of predetermined positions. This prior art arresting mechanism suffers from the disadvantages,

however, that manual operation by the user is required, on one hand, for each desired arresting position and, on the other hand high demands are made to the mounting to secure positioning of the recesses in exactly the same height in each side member.

[0005] In EP-B-0 725 885 a screening arrangement of the kind defined above is disclosed in which a braking device acting with a permanent frictional force on cord members of the cord arrangement is used in cooperation with cord tensioning spring members associated with the cord fastening members to enable arresting of the bottom bar in an arbitrary position against the force from a spring-loaded roller bar used as suspension member for the screening web.

[0006] Experiences with this prior art arrangement have revealed, however, that malfunction of the braking device may occur mainly caused by production tolerances and wear, whereby permanent arresting of the bottom bar in a desired position fails and, in result the operational comfort of the arrangement is significantly reduced.

[0007] On the background of the latter prior art arrangement it is the object of the invention to provide a screening arrangement and a braking device for use in such an arrangement, in which the above-mentioned disadvantage has been remedied to secure arresting of the bottom bar and correct tensioning of the screening web connected therewith in arbitrary positions intermediate the top and bottom members of the sash or main frame structure of the window. Thereby, an aesthetically appealing overall impression of the screening device is provided and the operational comfort is improved regardless of the particular position of the screening web with respect to the window opening.

[0008] According to the invention this object is met by means of a screening arrangement of the kind defined, which is characterized in that the braking device comprises a friction member arranged at the bottom bar or the suspension bar and acting on the cord members of the cord arrangement with a variable frictional force.

[0009] By the use of a friction member, which can be of relatively simple design, acting on the cord members of the cord arrangement with a variable frictional force, failing tensioning of the cord members caused by production tolerances or general wear of the cord arrangement can be compensated for. Thereby, correct tensioning of the cord members and the screening device is maintained and the screening arrangement is secured against unintentional upwards or downwards movement of the screening web. Moreover, the friction member acting on the cord arrangement with a variable frictional force produces a braking action on the cords, whereby the operational comfort is improved, to reduce the force necessary for operation while maintaining the possibility of parking the screening web in any arbitrary position independent of the use of the screening arrangement in a stationary window or a window having an openable sash structure. In addition, the friction member of the

invention may be designed to improve controlled action on the cord members of the cord arrangement to avoid intertwining of the cord members, whereby a further contribution to improved comfort and security of operation is obtained.

[0010] Preferred embodiments of the screening arrangement are stated in dependent claim 2 to 6.

[0011] In a particular preferred embodiment the friction member is arranged in the bottom bar as a separate removable unit.

[0012] A simple, well-functioning design of the friction may be obtained, according to a further preferred embodiment in that the friction member is formed from an integral piece of spring wire bent to provide a substantially closed geometrical configuration comprising an outer part and an inner part connected with each other by a common wire section forming a pivot axis for said outer and inner parts.

[0013] According to a further development the screening arrangement may comprise at least two separate screening devices each with a screening member connected between suspension and bottom bars and an individual cord arrangement, whereby the bottom bar of an upper screening device is coupled with the suspension bar of a lower screening device, said friction member being arranged in the bottom bar of the lower screening device.

[0014] The invention also relates to a braking device for use in a screening device as defined in the foregoing. According to the invention such a braking device is characterized in that it comprises a friction member arrangeable in a bottom bar of the screening arrangement as a separate removable unit acting on cord members of a cord arrangement of the screening arrangement with a variable frictional force.

[0015] Preferred embodiments of this braking device are stated in dependent claims 8 and 9.

[0016] In the following the invention will be explained in further detail with reference to the accompanying schematical drawings, in which

fig. 1 shows a window provided with an embodiment of a screening device according to the invention having a screening member designed as a pleated blind,

fig. 2 shows a cord arrangement for use in the embodiment of fig. 1,

figs. 3 and 4 show in further detail an embodiment of a braking device for use in the cord arrangement in fig. 2 and a preferred arrangement thereof in a bottom bar of the screening arrangement, and
fig. 5 shows a further embodiment of a screening arrangement comprising two screening devices coupled with each other.

[0017] The screening arrangement 1 illustrated in fig. 1 comprises a screening web 4 in the form of a pleated blind, upper and lower ends of which are connected with

a suspension bar 2 and a bottom bar 3, respectively, both of which are suspended to be freely movable in the window opening. For parallel guidance of the screening arrangement a cord system is provided comprising two separate cord arrangements 5 and 6 which are connected with an upper part of the window by a set of fastening members 7 and 6 and with a lower part of the window by a set of fastening members 9 and 10. A number of cord members 11 passing through the individual pleats of the pleated web 4 serve to stabilize the web and may, in principle be connected with a rolling-up mechanism (not illustrated) disposed in the suspension bar 2.

[0018] As shown in fig. 2 a relatively simple cord system for the particular embodiment in fig. 1 of a screening arrangement comprising a pleated blind may be obtained by forming each of the two separate cord arrangements 5 and 6 of two cord members 5a, 5b and 6a, 6b, respectively.

[0019] From the associated fastening member 7 and 8, respectively, both cord members of each of cord arrangements 5 and 6 extend along the upper part of the associated window side member 12 and 13, respectively down to the suspension bar 2 and continue into the interior of the suspension bar from one towards the other end thereof.

[0020] Inside the suspension bar 2 the two cord members 5a, 5b and 6a, 6b of cord arrangements 5 and 6, respectively are separated and carried out through holes 14 in a bottom wall 15 of the suspension bar 2 and further through holes 16 in the individual pleats 17 of the pleated web 4. Thereby, the cord arrangements 5 and 6 serving parallel guidance of the screening arrangement provides at the same time the pleat stabilizing cords 11, whereby a separate rolling-up mechanism as mentioned above may be dispensed with.

[0021] At the lower end of the web 4 the cord members 5a, 5b and 6a, 6b are carried through holes 19 in an upper wall of the bottom bar 3 to be united inside the bottom bar, in which each of cord arrangements 5 and 6 are extended towards the end of the bottom bar opposite to the end of introduction into the suspension bar 2. After the passage through the bottom bar 3 each of cord arrangements 5 and 6 continues along the window side member 12 or 13 opposite to the side member, along which the upper part of the cord arrangement extends between the associated fastening member 7, 8 and the suspension bar, and is connected with the lower part of the window by fastening members 9 and 10.

[0022] As apparent from fig. 2 the cord members of cord arrangements 5 and 6 will at each change of direction, e.g. at the transition between the window side members 12 and 13 and the suspension and bottom bars 2 and 3 be exposed frictional force caused by engagement of the cord members with the suspension and bottom bars 2 and 3. As a result thereof, in a common situation of operation, in which it is desired e.g. to move the bottom bar 3 downwards from a parked position, a force of operation will be required which overcomes the

frictional force. By the user this effect will be perceived as a braking effect. which is at its maximum in the start of the movement. At the same time the tensioning of the cord members between the bottom bar and the set of upper fastening members 7 and 8 will increase, whereas the tensioning of the cord members between the bottom bar 3 and the set of lower fastening members 9 and 10 will decrease, which will be perceived by the user as a decrease of the braking effect enabling easy downwards movement of the blind.

[0023] According to the invention the screening arrangement is provided with a braking device which as shown in fig. 2 comprises a friction member 20 disposed in the bottom bar 3 to act on the cord members 5a, 5b and 6a, 6b of the cord arrangements 5 and 6 with a variable frictional force, by which compensation can be provided for lacking cord tensioning resulting e.g. from production tolerances such as slightly different length of the individual cord members or from wear of the cord arrangements 5 ad as a result of the common usage thereof.

[0024] Preferably, the friction member 20 is disposed in the bottom bar 3 as a separate removable unit, although in principle it could also be fixed with or integrated in the bottom bar.

[0025] In the embodiment illustrated in fig. 3 and 4, the friction member 20 is formed from an integral piece of spring wire which is bent to provide a substantially closed geometrical configuration comprising an outer part 21 with wire sections 21a and 21b forming opposite frame members of a flat, substantially rectangular frame having and an inner part 22 formed in extension of wire section 21b of the outer part and having wire sections 22a and 22b forming frame members of a smaller substantially rectangular, flat frame extending substantially parallel to the wire sections 21a and 21b of the outer part 21, of which the wire section 21b forms a common pivot axis for the outer and inner parts 21 and 22. A wire section 22c of the inner part 22 connecting the wire sections 22b and 21b of the inner and outer parts 22 and 21, respectively, is bent relative to wire section 21b to dispose the smaller rectangular frame formed by the inner part 22 in a plane forming an inclination angle with the plane of the rectangular frame formed by the outer part 21, which in the illustrated embodiment may be approximately 45° in the unstressed condition of the friction member. The inclination angle may take different values and is primarily determined on an experimental basis from available information of possible production tolerances for the cord arrangements 5 and 6.

[0026] In the embodiment shown having two separate cord arrangements 5 and 6 the friction member 20 is disposed at a point in the bottom bar 3 intermediate the closest points of entrance for separate cord members of the cord arrangements 5 and, i.e. as shown the cord members 5b and 6b. As illustrated the friction member 20 is engaged by the cord members of both cord arrangements in such a way that the parallel wire sections

21a, 22a, 22b and 21b of the outer and inner parts 21 and 22 are passed in sequential order by all cord members with alternating passage below wire section 21a, above wire section 22a, below wire section 22b and above wire section 21b.

[0027] In the same way as in the example described above the movability of the outer and inner parts 21 and 22 of the friction member 20 with respect to each other in dependence on the tensioning of the cord arrangements entails that in a common situation of operation, in which it is desired to move the bottom bar 3 downwards, it will be necessary due to the frictional forces acting on the cord arrangements to apply a force overcoming the frictional force. This will be perceived by the user as a braking effect having it's maximum in the start of the movement. At the same time the tensioning of the cord sections between the bottom bar 3 and the upper fastening members 7 and 8 will increase, whereas the tensioning of the cord sections between the bottom and the lower fastening members 9 and 10 will decrease, which will be perceived by the users as a decreasing braking effect and easier downwards movement of the blind.

[0028] By use of the braking device of the invention this perception of the effect will be enhanced , since as result of an increased cord tensioning the outer and inner parts 21 and 2 of the friction member 29 will be squeezed towards each other to reduce the inclination angle between the two parts, whereby the friction between the cord members and the wire sections 21a, b and 22 a, b engaged thereby will reduce due to reduction of the included angle α of the circumferential part of each of wire sections 21a, b and 22 a, b engaged by the cord members.

[0029] As disclosed in EP-B-0 725 885 the equilibrium of the forces in each cord arrangement can be expressed by the formula

$$S_1 = S_2 * e^{\mu\alpha},$$

wherein S_1 and S_2 are the tensioning of the cord member before and after passage of the friction member 20, whereas μ is the friction of the cord member against each wire section of the friction member engaged thereby and α is he included angle.

[0030] Even if a reduced braking effect for the screening arrangement is obtained, the cord arrangements will remain completely tensioned and the screening arrangement will not move unintentionally. At the same time, due to the variable frictional force acting on the cord arrangements a certain braking effect will be provided, whereby the comfort of operation is improved, since the force of operation can be reduced while at the same time preserving the possibility of parking the screening arrangement in an arbitrary position regardless of the use of the screening arrangement in a stationary window or an openable sash structure.

[0031] Instead of using a movable suspension bar 2 as shown in figs. 1 and 2 the suspension bar may be connected with the top frame member of the window as known in the art.

[0032] In the embodiment shown in fig. 5 the screening arrangement of the invention comprises two separate screening devices 1' and 100 with individual cord arrangements for parallel guidance of the screening web of each of the screening devices. As illustrated an upper screening device 100 may comprise a spring-loaded rolling blind having a web 104 of translucent or lightproof material, one end of which is connected with a suspension bar in the form of a conventional spring-loaded roller bar 102 arranged in the upper part of the window opening, whereas the opposite end is connected with a bottom bar 103. A lower screening device 1' may comprise a pleated blind of the form shown in fig. 1 with a suspension bar 2', which is coupled with the bottom bar 103 of the upper screening device 100, and a pleated web 4' connected in one end with the suspension bar 2' and in the opposite end with a bottom bar 3'.

[0033] A braking device 12' of the same design and function as shown in figs. 3 and 4 and described above may as shown be incorporated in the bottom bar 3' of the lower screening device 1' or alternatively in the bottom bar of the upper screening device 100 or in both of said bottom bars.

[0034] The screening arrangement of the invention is not limited to the embodiments shown in the figures and described above. In general the screening device may be used in connection with all kinds of window openings of rectangular form including facade windows, roof windows and skylights. Moreover, the screening device may of any conventional type including roller blinds, pleated blinds, sunshades, venetian blinds, insect screens and the like.

[0035] Likewise, the cord arrangement and braking device of the present invention may be used in connection with a universal mounting and parallel guidance arrangement as disclosed in WO-A-98/32944, in which the cord members of the cord arrangement are carried through a separate mounting bar designed for releasable interconnection with the bottom bar of screening device, or, in a dual screening arrangement as shown in fig. 5 between the bottom bar of the upper screening device and the suspension bar of the lower screening device.

[0036] The invention may further be used in a screening arrangement incorporating electrical drive means for unidirectional movement of a screening web such as a spring-loaded rolling blind from the rolled-up non-screening position to the rolled-out screening position.

[0037] A screening arrangement according to the invention with a screening member of lightproof material such as a roller blind for darkening purposes may as well known for such arrangements incorporate light sealing members in connection with the side members of the sash or main frame structure as well as the bottom

bar of the screening arrangement.

Claims

1. A screening arrangement, in particular for a window arranged in a mainly rectangular window opening and comprising a frame with substantially parallel upper and lower horizontal frame members as well as side members (12, 13) extending between said upper and lower members in substantial parallel vertical planes, said screening arrangement comprising

a rolled-up or folded screening member (4) connected at an upper end with a suspension bar (2) and at its free lower end with a movable bottom bar (3) extending between said side members of the frame structure,

a cord arrangement (5, 6) for parallel guidance of the bottom bar (3) and the screening member (4) and comprising at least two separate cord members (5a, 5b; 6a, 6b) which from a first set of fastening members (7, 8) connected with said upper frame member are carried through the bottom bar (3) to a second set of fastening members (9, 10) connected with said lower frame member, and

a braking device acting on the cord arrangement (5, 6) to enable arresting the screening member (4) in any arbitrary position of the bottom bar (3) between the upper and lower frame members,

characterized in that the braking device comprises a friction member (20) arranged at the bottom bar (3) or the suspension bar (2) and acting on the cord members (5a, 5b; 6a, 6b) of the cord arrangement (5, 6) with a variable frictional force.

2. A screening arrangement as claimed in claim 1, **characterized** in that said friction member (20) cooperates with a cord tensioning member arranged in connection with one of said fastening members.
3. A screening arrangement as claimed in claim 1 or 2, **characterized** in that said friction member (20) is arranged in the bottom bar (3) as a separate removable unit.
4. A screening arrangement as claimed in claim 1, 2 or 3, **characterized** in that said friction member (20) is formed from an integral piece of spring wire bent to provide a substantially closed geometrical configuration comprising an outer part (21) and an inner part (22) connected with each other by a common wire section (21b) forming a pivot axis for said outer and inner parts (21, 22).

5. A screening arrangement as claimed in claim 4, **characterized** in that the outer and inner parts (21, 22) of the friction member (20) are engaged by the cord members (5a, 5b; 6a, 6b) of the cord arrangement (5, 6) to be moved with respect to each other in dependence of the tensioning of the cord members (5a, 5b; 6a, 6b). 5

6. A screening arrangement as claimed in any of the preceding claims, **characterized** by comprising at least two separate screening devices (1', 100) each with a screening member (4', 104) connected between suspension and bottom bars (2', 102; 3', 103) and an individual cord arrangement, whereby the bottom bar (103) of an upper screening device (100) is coupled with the suspension bar (2') of a lower screening device (1'), said friction member (20') being arranged in the bottom bar (3') of the lower screening device (1') and/or the bottom bar (103) of the upper screening device (100). 10
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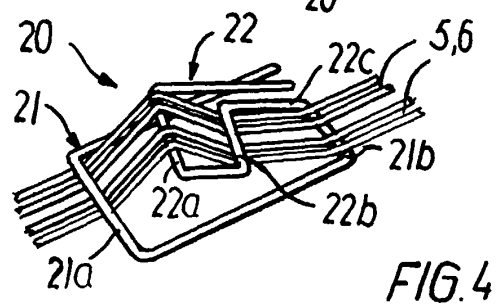
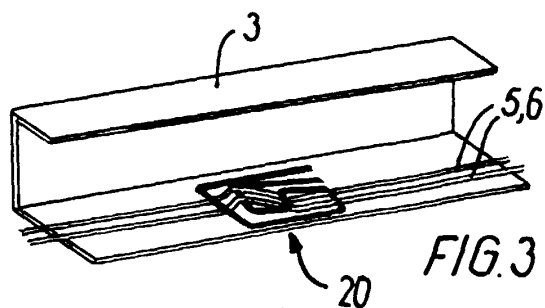
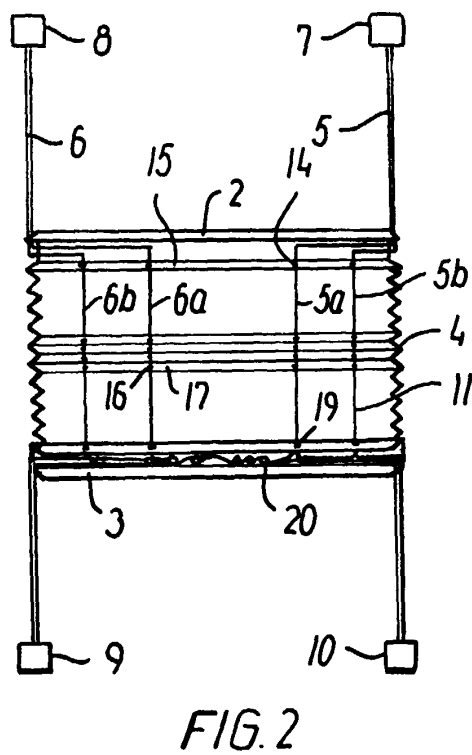
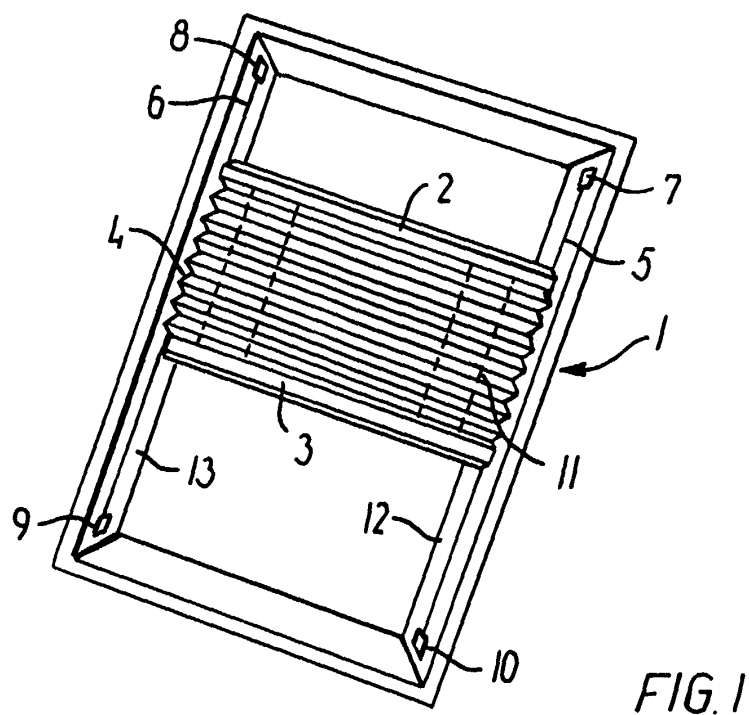
7. A braking device for use in connection with a screening device as claimed in any of the preceding claims, **characterized** in that it comprises a friction member (20) arrangeable in a bottom bar (3) of the screening arrangement as a separate removable unit acting on cord members (5a, 5b; 6a, 6b) of a cord arrangement (5, 6) of the screening arrangement with a variable frictional force. 25
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8. A braking device as claimed in claim 7, **characterized** in that said friction member (20) is formed from an integral piece of spring wire bent to provide a substantially closed geometrical configuration comprising an outer part (21) and an inner part (22) connected with each other by a common wire section (21b) forming a pivot axis for said outer and inner parts (21, 22). 35

9. A braking device as claimed in claim 8, **characterized** in that the outer and inner parts (21, 22) of the friction member (20) are engaged by the cord members (5a, 5b; 6a, 6b) of the cord arrangement (5, 6) to be moved with respect to each other in dependence of the tensioning of the cord members (5a, 5b; 6a, 6b). 40
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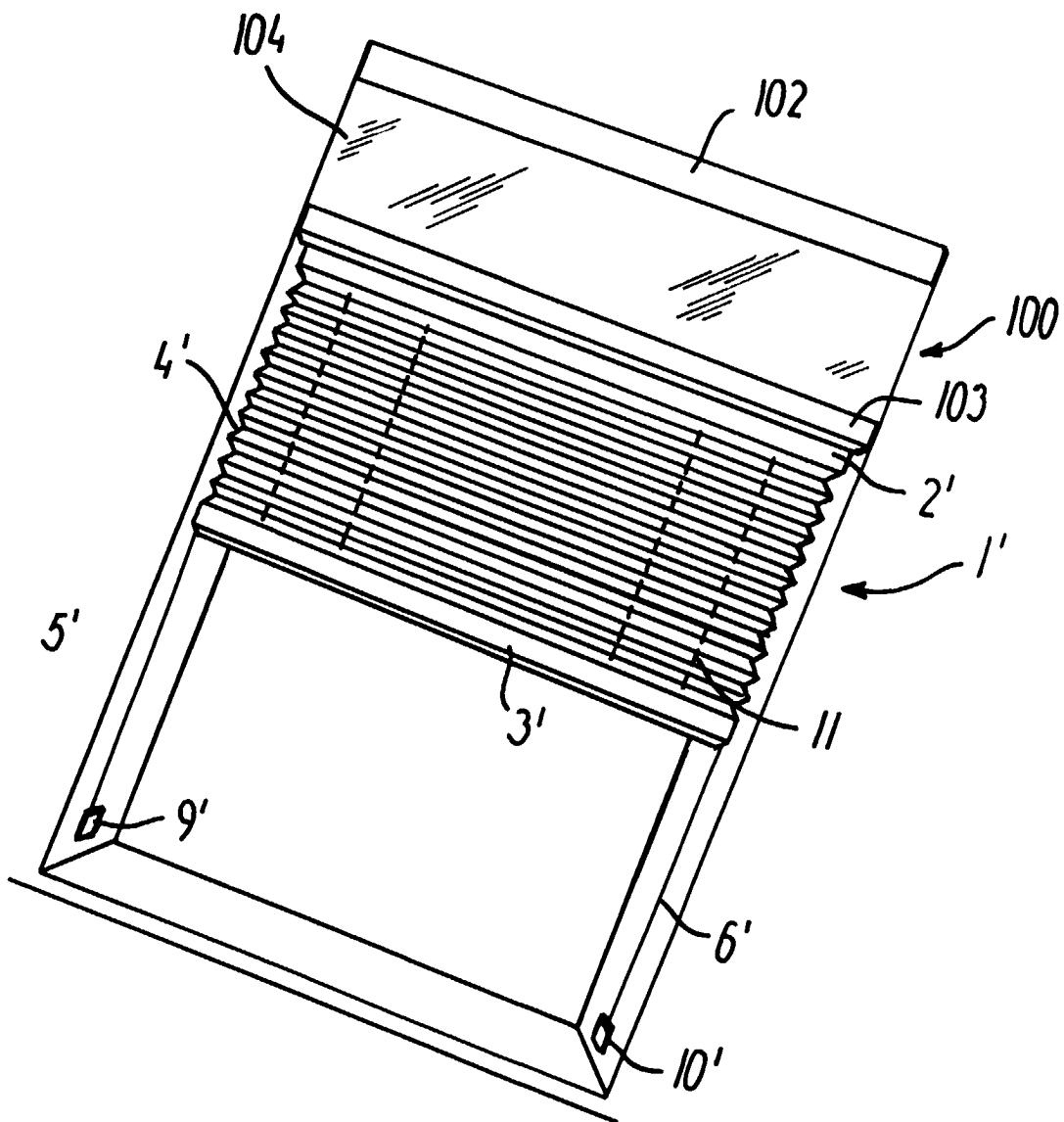


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
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Y	* column 4, line 30 - column 4, line 51; figures 19,20 *	6	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E06B
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 5 May 2000	Examiner Knerr, G
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**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. The members are as contained in the European Patent Office EDP file on
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