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(54) Sunblind.

(57) Sunblind comprising vertical arms (2), pivot arms (4) hingeably connected therewith and struts (9) provided therebetween and being slidable relative to one of said arms. To a winding cylinder (5) for a screen (6) a cable drum (11) is connected from which a cable (12) extends downwardly through the vertical arm (2), around the hinge point (3) between both arms and towards the slidable end of the strut (9), said cable (12) with its end being attached to a tension spring (15) or alike which is connected to the respective arm. Further it is possible, that the cable (12), after passing the hinge point (3), extends around a roll (13) which through a tension spring (15) or alike is connected with the slidable end of the strut (9), and wherein the end of the cable (12) is directly attached to the respective arm. The dimension and positioning of said strut (9) are such, that the distance over which the slidable end of the strut (9) slides is less than half the cable length wound onto or wound off, respectively, the cable drum (11).

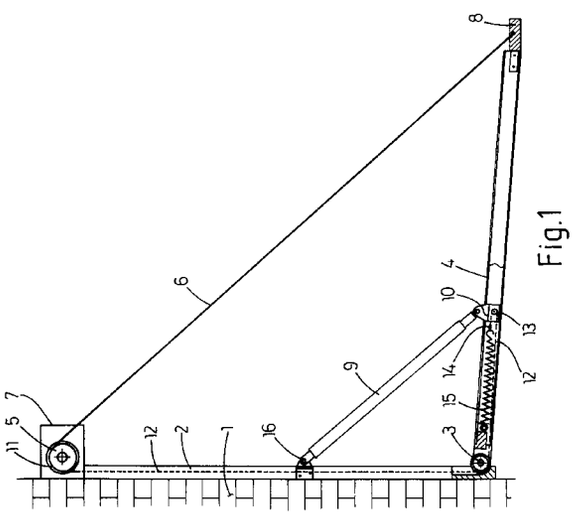

Fig.1

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The invention relates to a sunblind comprising vertical arms to be attached to the front of a building or alike, pivot arms hingeably connected to the lowermost ends of said vertical arms, a horizontal winding cylinder for a screen provided at the uppermost end of the vertical arms, the free end of said screen being attached to the free ends of the pivot arms, and further comprising struts extending between each pair of vertical arm and corresponding pivot arm, wherein each of said struts is slidable along one of said arms and is attached to the other of said arms.

It is noted, that in such a type of sunblind the vertical arms may comprise (part of) the front or alike itself, such that strictly no vertical arms are present, but the front acts as such. For the sake of simplicity hereinafter the indication "vertical arms" is maintained, but one should keep in mind the above.

In sunblinds of this type the screen defines a large engagement surface for the wind in the folded out position of the sunblind, in which the pivot arms extend substantially horizontally (perpendicularly to the front). Thus measures have to be taken to avoid, that the sunblind, especially the pivot arms, are lifted by the wind. In a known type of sunblind the struts are attached to the pivot arms and are slidable along the vertical arms with their opposite ends. The slidable ends of the struts are spring loaded, for example through a tension or compression spring. Using this spring load one tries to create a downwardly directed force maintaining the screen in the folded out position.

It is a disadvantage of this known sunblind that the downwardly directed force decreases while folding out the sunblind, such that in the position in which the largest downwardly directed force is needed (the completely folded out position of the sunblind) said downwardly directed force is the smallest.

Further it is known to create a downwardly directed force in the folded out position of the sunblind by providing the free ends of the pivot arms of ballast means. It is disadvantageous however that as a result pivoting the pivot arms from the folded out towards the collapsed position is rendered more difficult and that, in automatically driven sunblinds, the power needed for collapsing is increased.

It is an object of the invention to provide a sunblind of the type referred to above with which the mentioned disadvantages can be removed in a simple, but nevertheless effective way.

According to a first solution the sunblind according to the invention is characterized in that connected to the winding cylinder there is a cable drum which, during winding the screen onto the winding cylinder, unwinds a cable and vice versa, wherein said cable extends downwardly through a vertical arm and around the hinge point between said arm and the corresponding pivot arm, further around a roll connected to the slidable end of the strut and back again in the direction of the hinge point, the cable end being attached to one end of a spring means that with its other end is connected to the respective arm, and wherein the dimensions and positioning of said strut are such that the distance over which the slidable end of the strut slides along the respective arm when the pivot arm pivots is less then half the cable length wound onto or wound off, respectively, the cable drum.

When moving the sunblind from the collapsed position towards the folded out position a certain amount of cable length is wound onto the cable drum. Meanwhile the slidable end of the strut will slide along the respective arm over less then half this wound on cable length. This means that the end of the cable has to move away from the hinge point, such that the spring means is increasingly loaded. The force created by the spring means thus increases, such that the force applied onto the slidable end of the strut increases too and the sunblinds experiences with increasing degree of folding out an increasing force promoting said folding out. In the maximally folded out position of the sunblind the maximum force is applied which results in a maximum downwardly directed force.

The sunblind according to the invention offers a number of further advantages apart from the downwardly directed force increasing with increasing degree of folding out. Because the downwardly directed force applied by the spring means increases while folding out the sunblind, said spring means can be mounted with only a feeble prestressing in the collapsed position, thus simplifying the assemblage. In the presently used sunblinds a spring has to be mounted highly prestressed for guaranteeing that in the folded out position of the sunblind still some spring load remains. Finally the connection between the winding cylinder and cable drum leads to a feed back of the force created by the spring means and the winding force applied onto the screen, such that moving the sunblind from the folded out position towards the collapsed position can be realised with a lower torque (moment), thus allowing the application of a more light weighted and thus cheaper drive.

Apart from the embodiment described before, in which the cable extends around a roll connected to the slidable end of the strut and with its end is attached to a spring means, a further possibility exists, which however is based on the same principle. The sunblind, in which this further possibility is applied, according to the invention is characterized in that connected to the winding cylinder there is a cable drum which, during winding the screen onto the winding cylinder, unwinds a cable and vice versa, wherein said cable extends downwardly through a vertical arm and around the hinge point between said arm and the corresponding pivot arm, further around a roll connected to the slidable end of the strut through a spring means and back again in the direction of the

hinge point and is connected to the respective arm, and wherein the dimensions and positioning of said strut are such that the distance over which the slidable end of the strut slides along the respective arm when the pivot arm pivots is less then half the cable length wound onto or wound off, respectively, the cable drum. Now the cable extends around a roll, which is connected to the slidable end of the strut through a spring means. Basically the operation of this embodiment is identical to the operation of the embodiment described before; the only difference is that now for creating a certain downwardly directed force the spring means should apply a force twice as large as the force applied by the spring means according to the previous embodiment.

Preferably the spring means is a tension spring. Such an embodiment is constructively simple but nevertheless reliable.

In a preferred embodiment of the sunblind according to the invention the slidable end of the strut is provided in a pivot arm. In such a case the other end of the strut is hingeably connected to a vertical arm of the sunblind (or, as mentioned previously, directly to the front or alike). In such a case the spring means is provided in and attached to the respective pivot arm. However it is noted that the sunblind has a corresponding operation if the slidable end of the strut is provided in a vertical arm, whereas the other end of the strut is hingeably connected to the respective pivot arm.

Further it is advantageous if, in correspondence with another embodiment of the sunblind according to the invention, the cable drum is directly attached to the winding cylinder and has a diameter corresponding therewith. The wound off cable length then substantially corresponds with the wound on screen length and vice versa.

Further it is possible, that the sunblind according to the invention is constructed such, that the winding cylinder comprises a shock absorbing device. Such a shock absorbing device may comprise, in a way known per se, a torsion spring.

Finally an embodiment of the sunblind according to the invention is mentioned in which the winding cylinder is driven by a motor. Such a motor can have a small torque because the construction according to the invention requires little driving power.

Hereinafter the invention will be elucidated further referring to the drawing, in which a number of embodiments of the sunblind according to the invention are illustrated.

Fig. 1 shows a first embodiment of the sunblind according to the invention in a side elevational view and in folded out position;

fig. 2 shows the sunblind of fig. 1 in the collapsed position;

fig. 3 shows a detail of fig. 1 on a larger scale, and

fig. 4 shows in correspondence with fig. 2 a detail of an alternative embodiment of the sunblind according to the invention.

The sunblind illustrated in fig. 1 and fig. 2 is provided with vertical arms 2 to be attached to the front of a building 1 or alike. At the lowermost end of the vertical arms 2 pivot arms 4 are connected through hinges 3. Generally each sunblind will comprise two sideways distanced vertical arms 2 and two corresponding pivot arms 4.

At the uppermost end of the vertical arms 2 a horizontally (perpendicularly to the plane of drawing) extending winding cylinder 5 for a screen 6 is provided. As usual said winding cylinder 5 is positioned in a protective housing 7. Of course this protective housing 7 comprises a (not illustrated) passage for the screen 6.

With its free end directed away from the winding cylinder 5 the screen is connected to the free ends of the pivot arms 4 or, as is visible in fig. 1, to a profiled bar 8 interconnecting the free ends of said pivot arms 4. Further the winding cylinder 5 may comprise a (not illustrated) driving motor and an absorption device (not illustrated too), which in a way known per se may be a torsion spring.

Between each pair of corresponding vertical arm 2 and pivot arm 4 a strut 9 extends that in the shown embodiment with its one end is hingeably connected to the vertical arm 2 and with its other end is hingeably connected to a sliding block 10, which is housed slidably to and fro in the pivot arm 4.

On the winding cylinder 5 a cable drum 11 for a cable 12 is provided. The cable 12 extends downwardly through a vertical arm 2 and around hinge 3 between said vertical arm 2 and corresponding pivot arm 4 and runs further around a roll 13, connected to the sliding block 10 and back again in the direction of hinge 3. The end 14 of the cable is connected to one end of a tension spring 15, which with its other end is attached to the pivot arm 4.

For a description of the operation of the sunblind according to the invention now firstly reference is made to the position illustrated in fig. 2, in which the sunblind is fully collapsed. The screen 6 is for its greater part wound onto the winding cylinder 5, whereas the cable drum 11 has wound off a corresponding cable length. The sliding block 10 attached to the end of the strut 9 is positioned near to the free end of the respective pivot arm 4, whereas the cable 12 extends from the hinge 3 through the pivot arm 4, around roll 13 and back again in the direction of the hinge, and is attached with its end 14 to the tension spring 15, which is attached to the pivot arm 4. While unfolding the sunblind the winding cylinder 4 winds off screen 6, whereas simultaneously the cable drum 11 winds on a corresponding cable length of the cable 12.

During moving the sunblind from the position shown in fig. 2 towards the position shown in fig. 1 the

sliding block 10 moves over a certain distance along pivot arm 4. Now for the invention it is essential that the dimensions and positioning of the strut 9 are such, that the distance, over which the sliding block 10 slides along the pivot arm 4 while pivoting the pivot arm from the positions shown in fig. 2 towards the positions shown in fig. 1 is less then half the cable length wound onto the cable drum 11. As a result the end 14 of the cable 12 cannot assume a fixed position but will be distanced further from the hinge 3. Thus the tension spring 15, starting from the position illustrated in fig. 2, will be elongated such that in the position shown in fig. 1 it applies a larger tensile force than in the position shown in fig. 2. Finally this leads in fig. 1 to a force on the sliding block 10 directed to the left, such that onto the pivot arm 4 a downwardly directed force will be exerted.

As a result of the illustrated construction of the sunblind the downwardly directed force onto the pivot arm 4 increases while increasing the degree of unfolding the sunblind. Further, through the cable 12 which is tensioned as a result of the spring load of the tension spring 15 and through the connection between the cable drum 11 and the winding cylinder 5 a feed back occurs onto the screen 6, such that winding it on while collapsing the sunblind is simplified. As a result if a drive motor is applied the required torque will be reduced considerably.

In fig. 3 the characterizing section of the sunblind according to the invention is indicated again on a larger scale. Visible is a section of the vertical arm 2, a section of the pivot arm 4 hingeably connected therewith at the hinge 3 and the strut 9 extending between the vertical arm 2 and the pivot arm 4. At a fixed hinge point 16 the strut 9 is connected to the pivot arm 2, whereas the opposite end of the strut is connected to the sliding block 10 which can slide relative to the pivot arm 4. The cable 12 extends downwardly through the vertical arm 2, around the hinge 3 and towards the roll 13 mounted on the sliding block 10 and back again in the direction of the hinge 3. The end 14 of the cable 12 is connected to one end of the tension spring 15, of which the other end is hooked on a pin 17 being connected to the pivot arm 4. Of course the tension spring 15 may be replaced by another appropriate spring means, such as a compression spring.

In fig. 4 an alternative embodiment of the sunblind is illustrated. The difference with the embodiment shown in fig. 3 is, that the cable 12 after having passed hinge 3 runs around a roller 18 which is connected to one end of a tension spring 19. With its opposite end the tension spring 19 is connected to the sliding block 10. The end 14 of the cable 12 is directly attached to the pivot arm 4, for example in a plate shaped member 20 fixed therein.

Basically the operation of the embodiment of the sunblind illustrated in fig. 4 does not differ from the operation of the embodiment illustrated in fig. 3. However, in the case of the same downwardly directed force applied onto the pivot arm 4 the force applied by the spring 19 will be twice as much as the force applied by spring 15.

In the embodiments mentioned before the tension springs always are provided in the pivot arm 4. However, it is of course possible too that the tension springs are provided in the vertical arm 2, while the sliding block 10 is slidable in the vertical arm 2 too, whereas the opposite end of the strut is hingeably attached at a fixed locations of the pivot arm 4.

For obtaining a symmetrical load onto the sunblind preferably the previously described constructive elements are provided in each pair of corresponding vertical arm 2 and pivot arm 4. However, this is not necessary for the operation of the sunblind according to the invention.

The invention is not limited to the embodiments described previously, which can be varied widely within the scope of the invention. Thus the invention too relates to sunblinds of which the vertical arms are not present, but where the front of the building acts as such. The principle of the connections between the spring means and the winding cylinder with increasing downwardly directed force with increasing unfolding does not change.

Claims

1. Sunblind, comprising vertical arms to be attached to the front of a building or alike, pivot arms hingeably connected to the lowermost ends of said vertical arms, a horizontal winding cylinder for a screen provided at the uppermost end of the vertical arms, the free end of said screen being attached to the free ends of the pivot arms, and further comprising struts extending between each pair of vertical arm and corresponding pivot arm, wherein each of said struts is slidable along one of said arms and is attached to the other of said arms, **characterized** in that connected to the winding cylinder there is a cable drum which, during winding the screen onto the winding cylinder, unwinds a cable and vice versa, wherein said cable extends downwardly through a vertical arm and around the hinge point between said arm and the corresponding pivot arm, further around a roll connected to the slidable end of the strut and back again in the direction of the hinge point, the cable end being attached to one end of a spring means that with its other end is connected to the respective arm, and wherein the dimensions and positioning of said strut are such that the distance over which the slidable end of the strut slides along the respective arm when the pivot arm pivots is less then half the cable length wound onto or wound off, respectively, the cable

drum.

2. Sunblind, comprising vertical arms to be attached to the front of a building or alike, pivot arms hingeably connected to the lowermost ends of said vertical arms, a horizontal winding cylinder for a screen provided at the uppermost end of the vertical arms, the free end of said screen being attached to the free ends of the pivot arms, and further comprising struts extending between each pair of vertical arm and corresponding pivot arm, wherein each of said struts is slidable along one of said arms and is attached to the other of said arms, **characterized** in that connected to the winding cylinder there is a cable drum which, during winding the screen onto the winding cylinder, unwinds a cable and vice versa, wherein said cable extends downwardly through a vertical arm and around the hinge point between said arm and the corresponding pivot arm, further around a roll connected to the slidable end of the strut through a spring means and back again in the direction of the hinge point and is connected to the respective arm, and wherein the dimensions and positioning of said strut are such that the distance over which the slidable end of the strut slides along the respective arm when the pivot arm pivots is less then half the cable length wound onto or wound off, respectively, the cable drum.

3. Sunblind according to claim 1 or 2, **characterized** in that the spring means is a tension spring.

4. Sunblind according to one of the claims 1-3, **characterized** in that the slidable end of the strut is provided in a pivot arm.

5. Sunblind according to one of the claims 1-4, **characterized** in that the cable drum is directly attached to the winding cylinder and has a diameter corresponding therewith.

6. Sunblind according to one of the claims 1-5, **characterized** in that the winding cylinder comprises an absorption device.

7. Sunblind according to one of the claims 1-6, **characterized** in that the winding cylinder is driven by a motor.

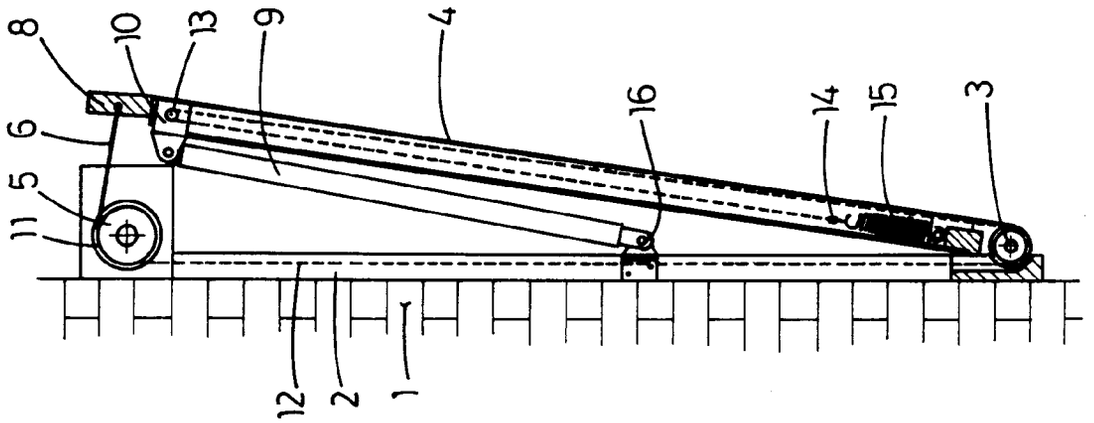

Fig.2

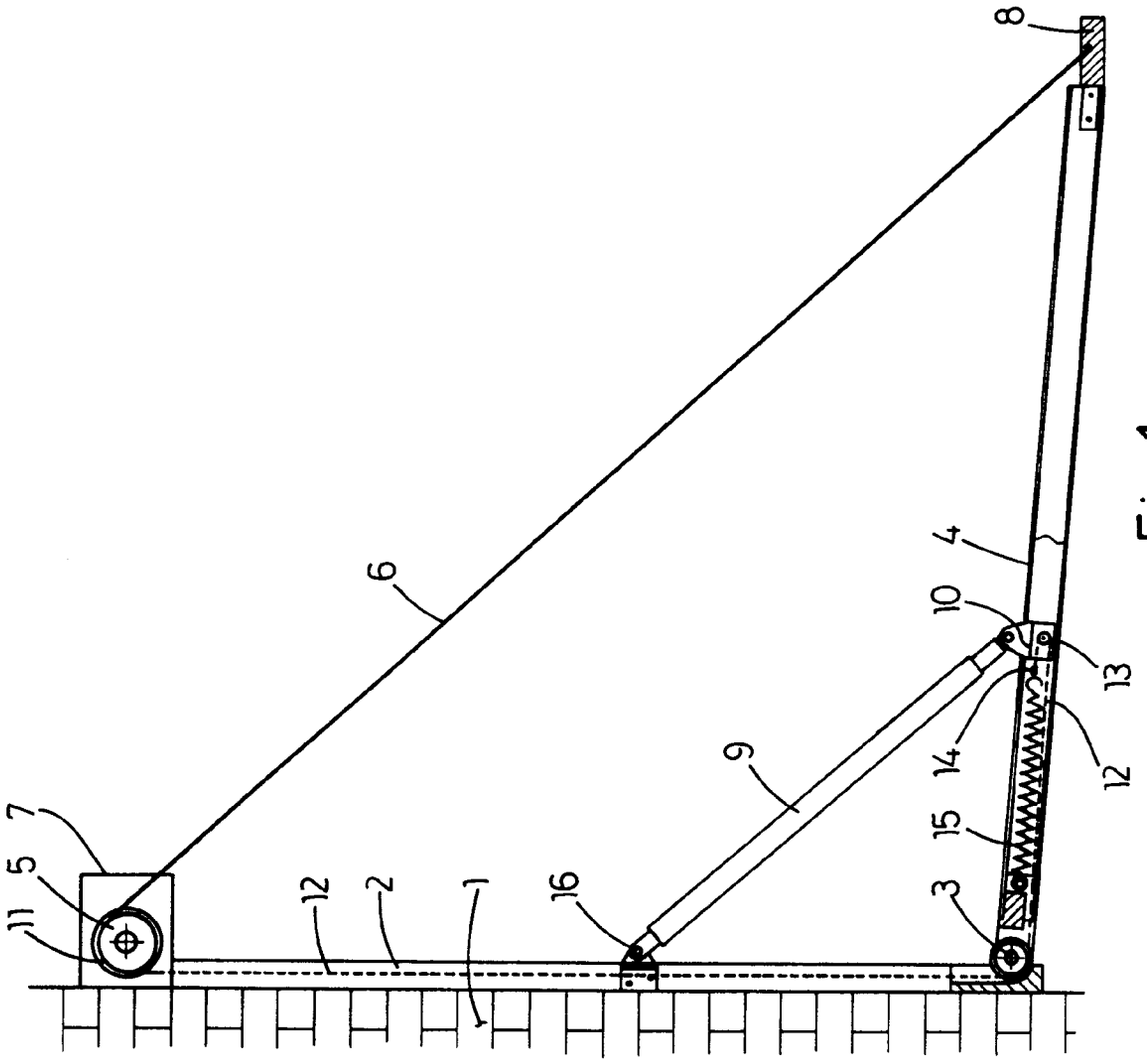

Fig.1

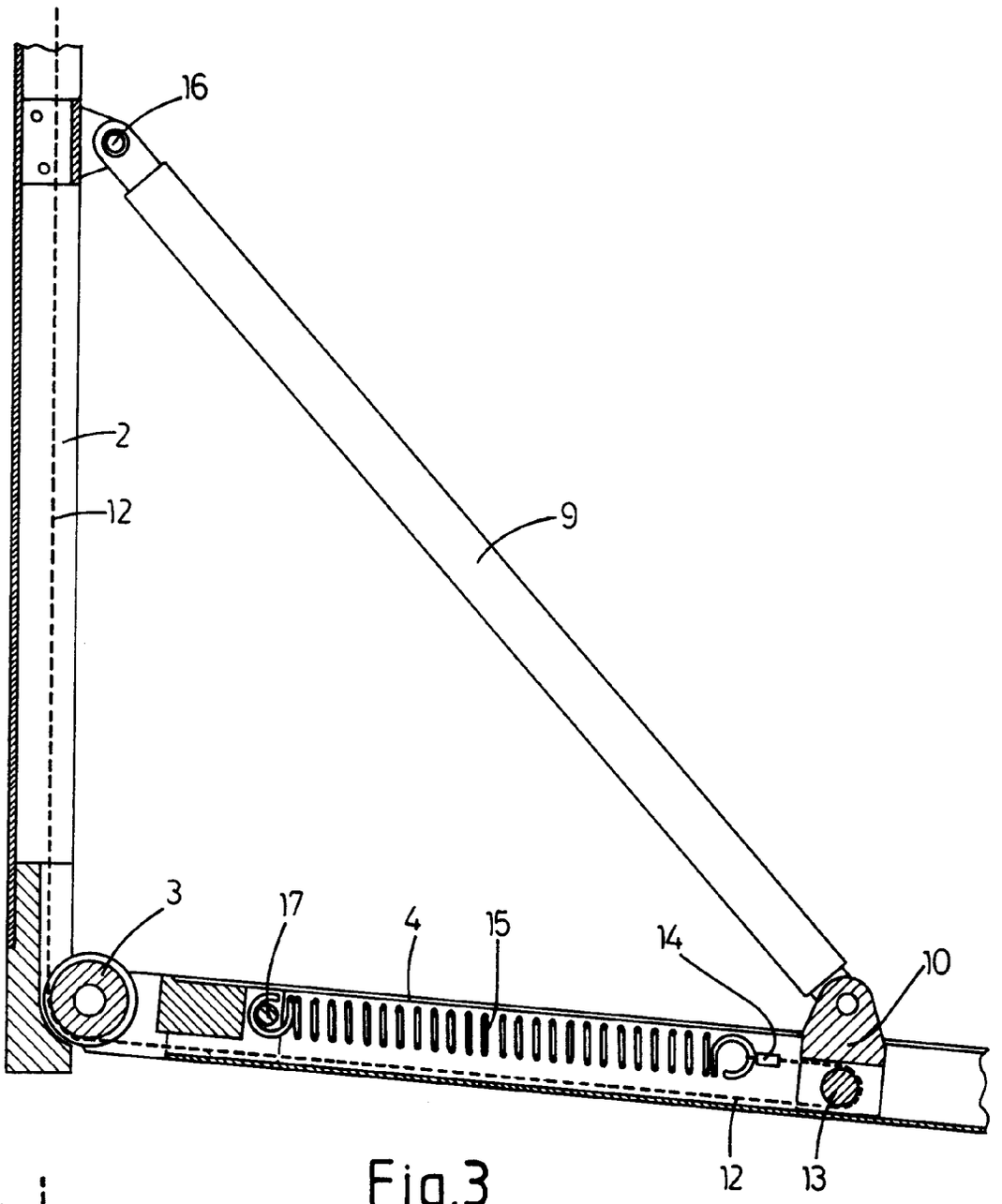

Fig.3

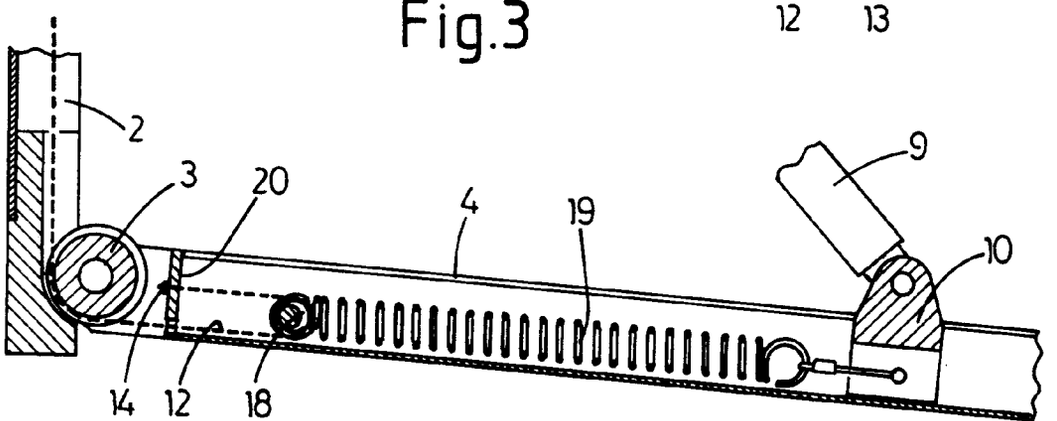

Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 92 20 3988

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-1 742 437 (DAVENPORT) * page 1, line 32 - page 2, line 95; figures 1-5 *	1-3,5	E04F10/06
A	DE-B-2 212 893 (FA. JUSTIN HÜPPE) * column 2, line 15 - column 4, line 28; figures 1,2 *	1,2,5	
A	CH-A-407 803 (RÜTTIMANN) * page 1, line 30 - page 2, line 46; figures 1-5 *	1-3,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02 MARCH 1993	AYITER J.

CATEGORY OF CITED DOCUMENTS

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