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(54) **RETRACTABLE SECURITY GRATE**

(57) Object of the present invention is a retractable security grate, provided with a bar winding and packing system which allows a dimension reduction of the casing needed to house the grate when it is completely lifted,

since it allows to pack the bars by exploiting the horizontal dimension of the casing in addition to the space available in vertical direction.

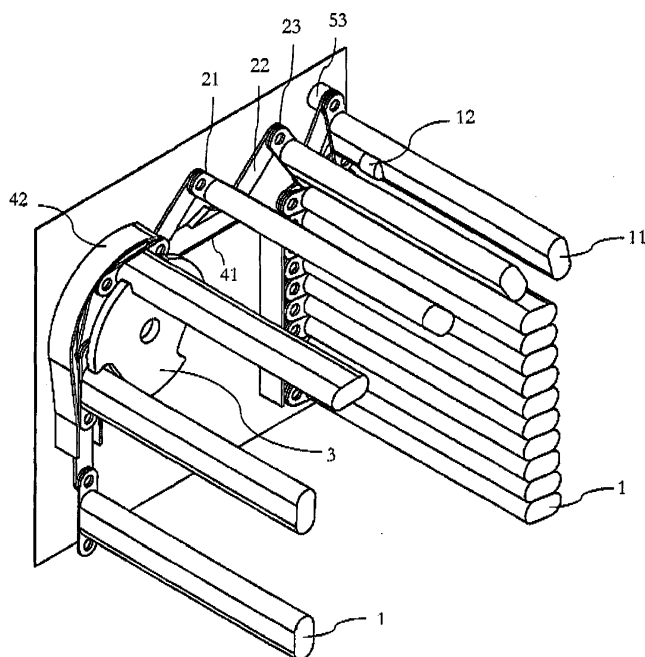


Fig. 1

Description

[0001] The present invention relates to a retractable security grate provided with a bar winding and packing system, which allows a dimension reduction of the casing needed to house the grate when it is completely lifted.

BACKGROUND OF THE INVENTION

[0002] At the state of the art, there are known various embodiments of retractable security grates to be applied to windows, French doors and main doors, made up of a series of bars constrained with respect to each other and connected to lifting systems which allow the bars to be arranged inside a casing when the grate is completely lifted.

[0003] An example of such systems is described in the Patent US2032461 in which it is described a retractable security grate comprising a series of bars constrained with respect to each other by means of a chain, configured so that they can be lifted by means of a shaped wheel and "folded" packed on guides arranged horizontally or vertically. At the state of the art there are known many other examples, as the Italian application BA2009U000052 or the Italian Patents n° 1327560, n° 1388391 and n° 1394469.

[0004] Another example of such system is the Italian Patent application BA2009A000034 filed by the inventors of the present Patent application, in which there was described a retractable security grate comprising a series of parallel bars transversal with respect to each other articulated by means of rectangular little plates, comprising a winding system for said bars by means of shaped discs.

[0005] Other documents are the international Patent application WO2012/120483 and the US Patent application US4013113.

[0006] All the cited documents and many others known at the state of the art describe packing systems for the bars of retractable security grates.

[0007] However, none of the documents known at the state of the art describes winding systems for the bars of retractable security grates which allow the simple structure to be optimized and, above all, the space taken by the bars when these ones are completely packed to be optimized.

[0008] This last aspect is particularly important since when the grate is completely up, the packed bars are contained inside a casing positioned in the outer walls of the building. In many cases, the casing has to contain also a rolling gate. Moreover, to the space taken by the packed bars, in many cases it is to be added the space taken by a suitable heat insulating layer, intended to correct the heat bridge provided by the casing.

[0009] It is to be highlighted also that the retractable security grates are installed in case of renewal of yet existing buildings. In these cases, the maximum thickness of the casing is limited to the existing structure of

the building, and a very large casing could cause the technical impossibility to install the retractable security grate.

[0010] Therefore, it is clear that in all the cited situations, it is needed a packing system for retractable security grates which allows to reduce at minimum the space taken by the bars when these are packed inside the casing.

[0011] Therefore, aim of the present invention is to provide a retractable security grate provided with a system of guides installed in the casing and with a lifting system which allow to reduce at minimum the space taken by the bars as a whole. It is to be precised that it will be used indifferently the words security grate or grate.

[0012] The object of the present invention reaches the prefixed aims since it is a retractable security grate provided with a bar winding and packing system which allows to optimize the dimensions of the casing needed to house the grate bars when the same is completely lifted.

[0013] Conveniently the winding system of the grate object of the present invention allows to pack the bars by exploiting also the horizontal dimension of the casing in addition to the space available in vertical direction. So, it is clear that it is possible to pack the same number of bars of equal thickness in a casing of smaller dimension with respect to what needed in the devices known at the state of the art, or, alternately, it is possible to pack a greater number of bars (which allow to provide grates for casing of greater height) in casings of equal dimensions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Six views of a preferred embodiment of the object are appended to the present invention.

Figure 1 shows a panoramic view of the assembled system;

Figure 2 shows a side view of the system;

Figure 3 shows a perspective view of the sole guides of the system;

Figure 4 shows a perspective view of the guides and of the shaped wheel;

Figures 5 and 6 show the front view and the side view of the guides of the packing system according to the invention, respectively;

Figure 7 shows a side view of the guides;

Figure 8 shows an embodiment of the pins which constrain the various elements of the system.

DETAILED DESCRIPTION OF THE INVENTION

[0015] With reference to figure 1, a preferred embodiment of the grate, object of the present invention, comprises a plurality of bars (1), each one integral to a respective little plate (21). The bars are constrained with respect to each other by means of connecting rods (22). Each connecting rod is in fact hinged to two little plates (21) corresponding to a couple of consecutive bars (1).

[0016] The constraints between the bars and the little plates can be carried out according to modes known at the state of the art, all comprised in the aims of the present invention.

[0017] According to a preferred embodiment there can be used washers (23) in Teflon or other self-lubricating material interposed in the couplings between the little plates and the connecting rods, so that the need to use lubricants is avoided.

[0018] In addition, the pins used to constrain the little plates and the connecting rods are alternately of different thickness (51, 52) so that they project outwardly at different depth, as it is shown in figure 8, where the casing and the guides are not shown for clarity.

[0019] The security grate comprises also vertical guides (not shown in the drawings) of type known at the state of the art, inside which the little plates (21) and the connecting rods (22) slide when the grate is lowered or lifted.

[0020] The lifting and lowering of the bars (1) is controlled by a shaped wheel (3) and by a couple of guides (41, 42). As it is shown in figure 4, the shaped wheel (3) is configured so that it is provided peripherally with a series of grooves (31, 32, 33) of such shape that they can house the bars (1). The grooves are at suitable distance the one with respect to the other so that they can engage, by rotating, following bars of the grate.

[0021] The number and the shape of the grooves shown in figure 4 are to be intended example of a preferred embodiment of the invention and not limiting the aim of the same. Wheels with three, four or more grooves can be used without departing from the aims of the present invention. The wheel (3) is constrained to the side wall of the casing (5) so that it can rotate. On the rotation axis of the wheel an electric motor can be conveniently installed (not shown in figure) for the actuation of the grate. Even if in the figures it is shown, for simplicity, only a side of the grate, it is clear that a similar wheel can be arranged at the opposed end of the casing, preferably keyed on the same rotation axis and moved by means of the same electric motor. As it is shown in the figures 4 and 7, the two guides (41, 42) define an obliged path for the bars and the connecting rods. The shape of the two guides is such that these define a first portion of substantially vertical path, installed in continuity with the vertical guides (not shown) in which the little plates and the connecting rods slide when the grate is lowered, and a second portion which defines a portion of substantially circular path. This portion will be of greater width than the width defined by the vertical portion so that it is possible the correct passage of the little plates and connecting rods. The system is configured so that the wheel (3), in whose groove (31) a bar (1) is engaged, forces, by rotating, such bar to follow the section of path defined by the guides (41, 42) and engages the next bar with the next groove (32).

[0022] Conveniently, the outer guide (42) ends almost at the upper end of the circumference defined by the

same, so that it is allowed the movement of the little plates and connecting rods shown in figures and explained in detail in the following.

[0023] The inner guide (41) comprises instead, after the vertical section (411) a second horizontal section (412) and a last vertical section (413), the three sections being jointed with suitable bending radii.

[0024] The system comprises also a third guide (43), arranged in diagonal and jointed to the vertical section (413) almost at the connection with the horizontal section, as it is shown in figure 6.

[0025] The side view of figure 6 allows to observe that the thickness of the guide (43), measured by the wall of the casing, is lower than the thickness of the guide (41). In this way, the inclined guide (43) is engaged only by the pins (52) projecting mainly outwards, thus allowing an ordered folded packing following a vertical arrangement, as it is shown in the images. The presence of the inclined guide is useful in fact to guide the end of each little plate which has to be positioned outwards, thus avoiding sticking of the system.

[0026] Moreover, advantageously the inner guide is provided on the horizontal section (41) with a relief (44) of lower thickness than the thickness of the inclined guide (43). In this way, the relief cannot be engaged by the pins (51, 52) which constrain the adjacent little plates.

[0027] A sole little plate is provided with a pin (53) of such dimensions that it engages the relief (44). This little plate is the little plate which constrains the first bar (11) whose dimensions would exceed the vertical height available for packing. By engaging the relief (44) the pin (53) lifts the end of the bar. In addition, conveniently the first bar (11) which has to be packed in vertical position is provided with a relief (12) arranged on the surface which will be packed on the adjacent bar (14). The relief (12) can be welded to the bar, screwed or constrained by other suitable means, and it has such a thickness that the bar (11) is prevented from being positioned in horizontal position. The angle formed by the bar (11) with respect to the horizontal when the relief rests on the previous bar is such that, when the wheel (3) is lifting the grate, the force exerted by the connecting rod constrained to the next bar is directed in the direction of lifting the bar (11). The next bars (15, 16) continue to be packed in horizontal direction, as it is shown in figure.

[0028] In this way, in addition to the space available in vertical direction, it is possible to exploit the horizontal dimension of the casing to pack the bars.

[0029] Therefore it is clear that it is possible to pack the same number of bars of equal thickness in a casing of smaller dimensions with respect to what needed in the devices known at the state of the art, or, in the same way, it is possible to pack a greater number of bars (which allow to realize grate for casings of greater height) in casings of equal dimensions.

Claims**1.** Retractable security grate, comprising:

- a plurality of bars (1), each one rigidly joined to a small plate (21), each small plate (21) being hinged to two connecting rods (22) by means of pins (51,52) having alternately different thickness, said small plates being configured to slide into guides;
- an internal guide (41) and an external guide (42) integral with a side wall of a casing defining an obligatory path for the connecting rods (22);
- a shaped wheel (3) configured to move said bars (1);

characterized in that

said security grate comprises a further guide (43) integral with the side wall of the casing having a thickness such as to be engaged exclusively by the pins (52) with a greater thickness, said guide (43) being arranged so as to allow an ordered accordion packing of the bars (1) according a vertical arrangement and in that

the first bar (11) whose size would exceed available vertical packaging height is provided with a protrusion (12) to prevent said first bar (11) from leaning on the preceding bar (14), said protrusion (12) being configured so that the minimum angle allowed between said first bar (11) and the horizontal line, is such that direction of the force exerted by the next connecting rod (13) is directed to raise said bar (11), allowing successive bars (15, 16) to pack in the horizontal direction.

2. Retractable security grate according to claim 1 wherein said internal guide (41) comprises a relief (44), whose thickness is such that it can not be engaged by pins (52) of greater thickness, and in that at least one of the small plates (21), is bounded to the adjacent connecting rod (22) by means of a pin (53) having a thickness suitable to engage said relief (44).**3.** Retractable security grate according to claim 1 or 2, wherein the shaped wheel (3) comprises, at its edge, a plurality of grooves (31, 32, 33) whose shape is configured to accommodate bars (1), said grooves being arranged at a suitable distance from each other such as to engage, when shaped-wheel is turning, successive bars.**4.** Retractable security grate according to claim 3 wherein said shaped wheel (3), engaging a bar (17) in a groove (31), is configured to force said bar (17) to follow the path defined by the guides (41, 42) and to engage with the adjacent groove (32) the next bar (18).**5.** Retractable security grate according to one of the preceding claims, wherein the shaped wheel (3) is rotatably constrained to the lateral wall of the casing (5).**6.** Retractable security grate according to one of claims 1 and 3, wherein said guides (41, 42) define a first and a second path part, said first part being vertical and said second part being circular and wherein the width of the circular part is greater than the width of the vertical part.**7.** Retractable security grate according to one of the preceding claims, wherein into coupling between said small plates and said connecting rods are interposed Teflon, or other self-lubricating material, washers (23).**8.** Retractable security grate according to one of the preceding claims, further comprising lateral vertical guides within which said plates (21) and said connecting rods (22) slide when the security grate is moved down or raised.

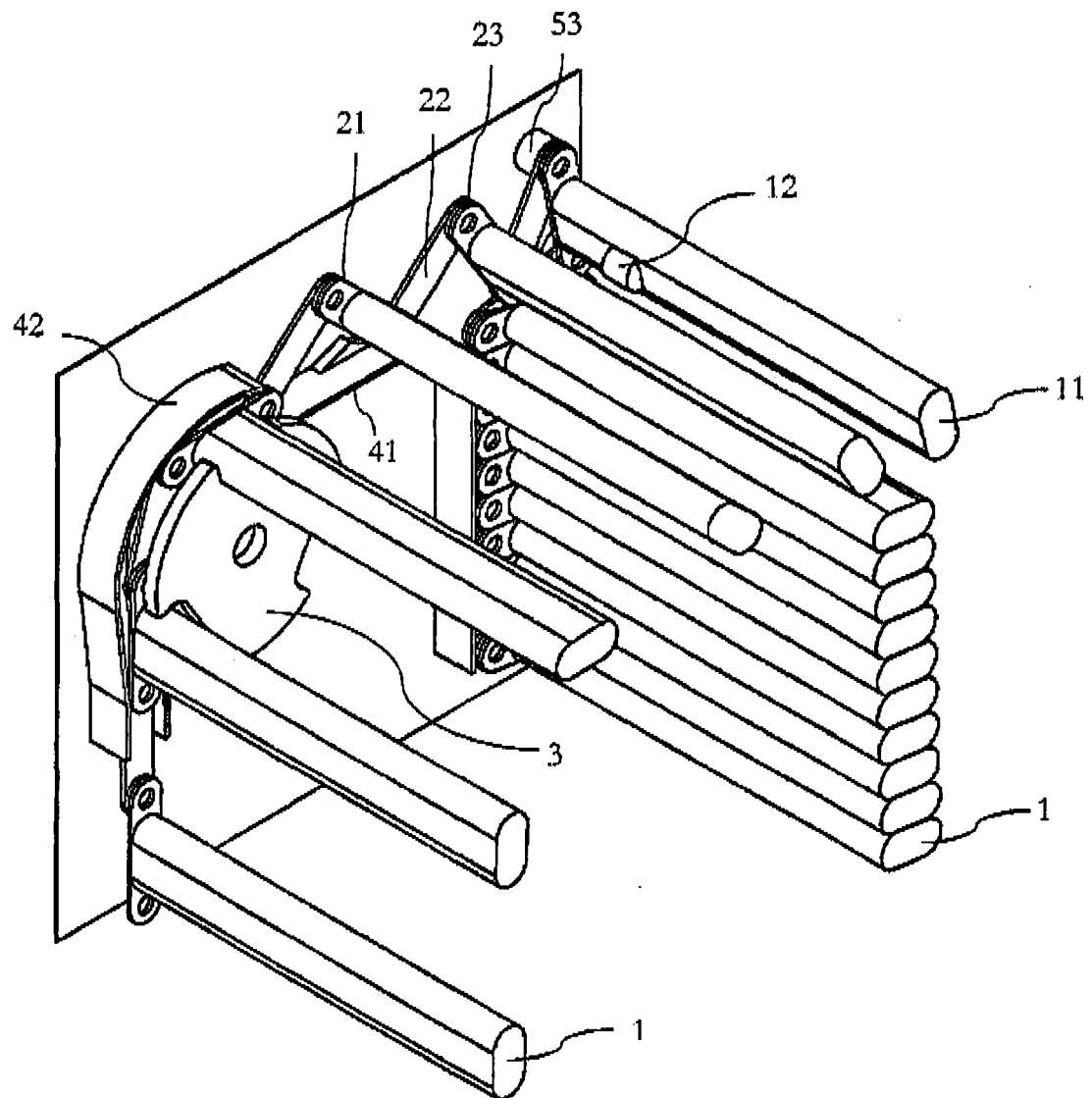


Fig. 1

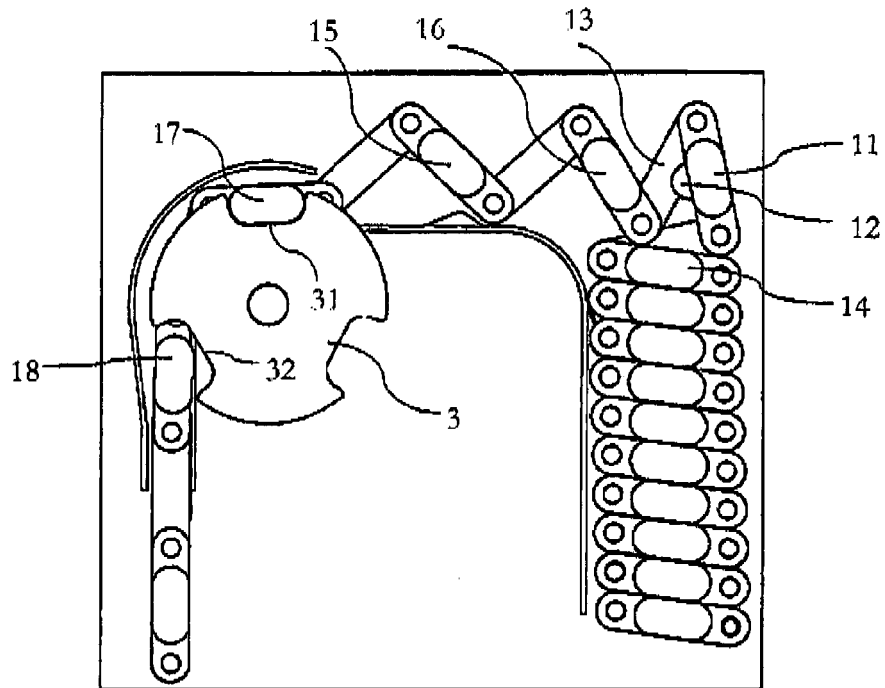


Fig. 2

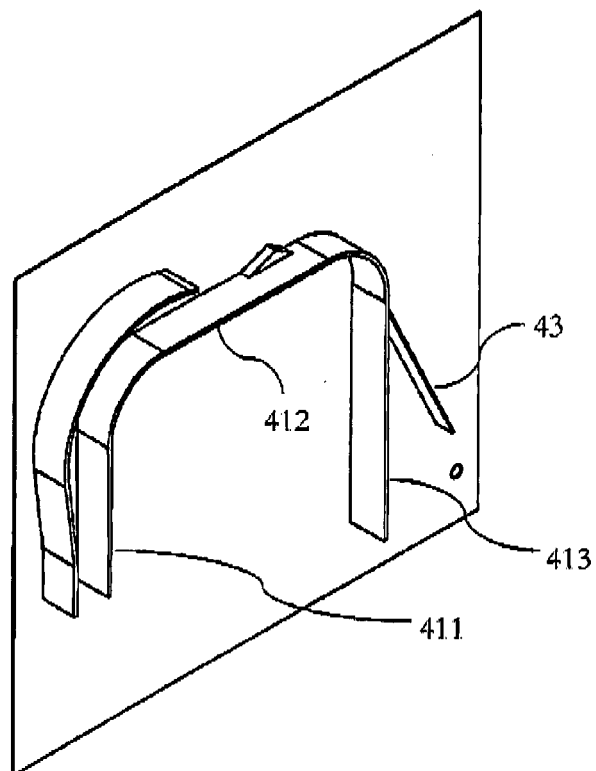


Fig. 3

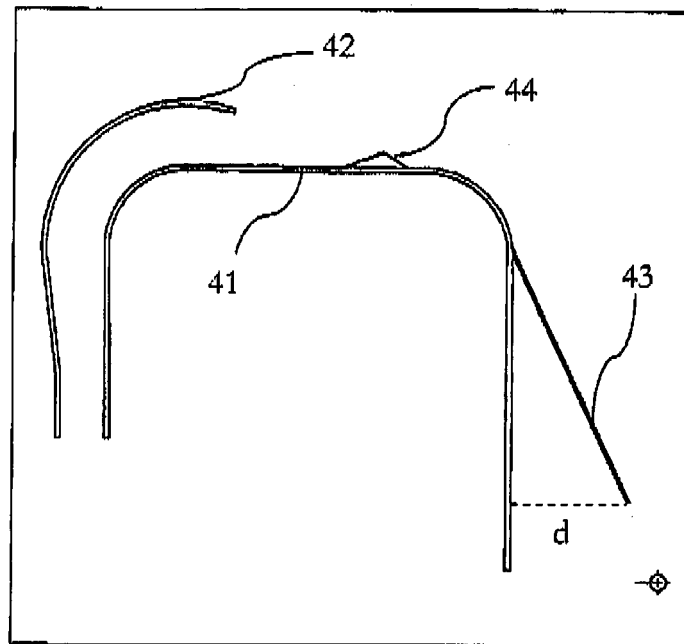


Fig. 5

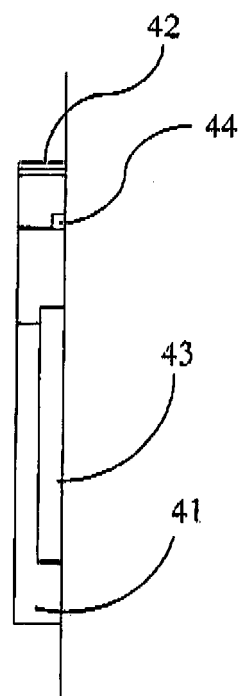


Fig. 6

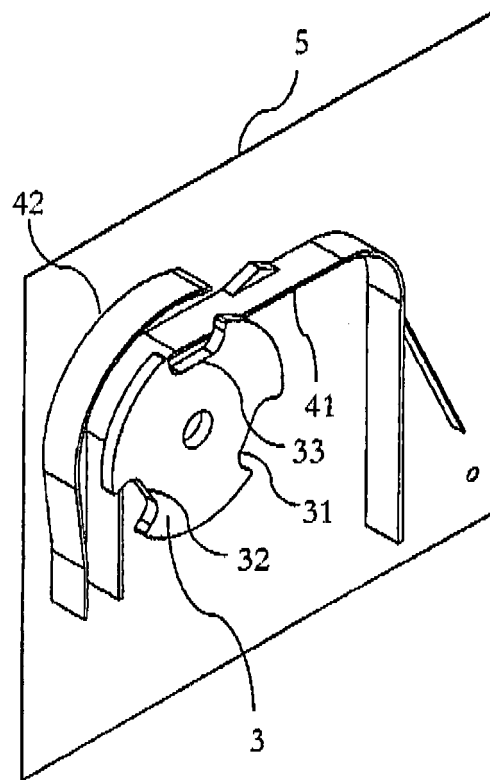


Fig. 4

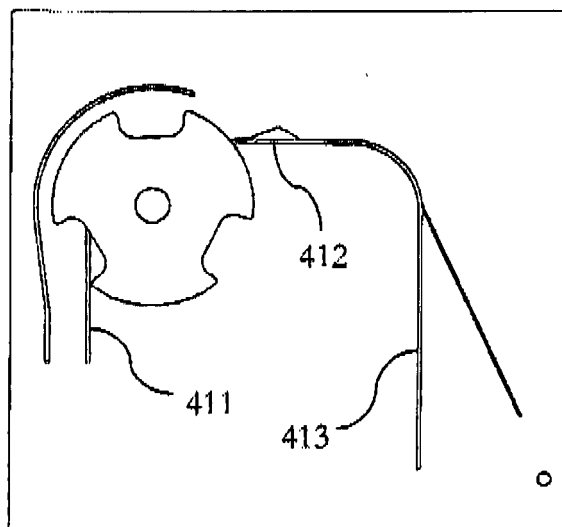


Fig. 7

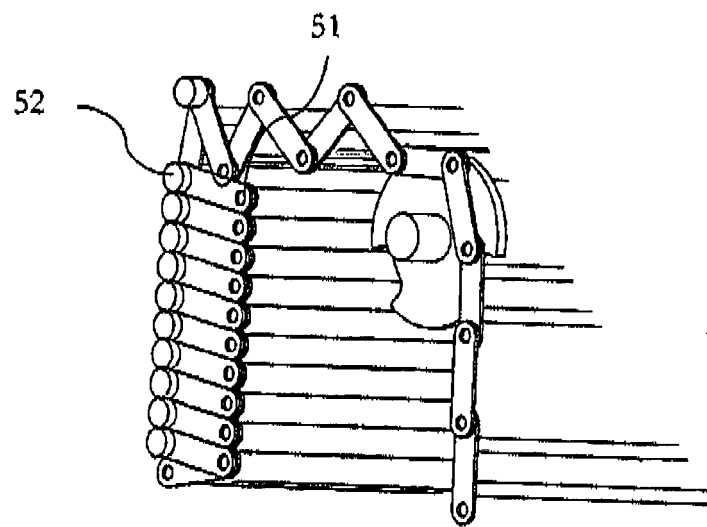


Fig. 8



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 00 0596

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
Place of search		Date of completion of the search	Examiner
Munich		29 July 2015	Weißbach, Mark
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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