(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 508 681 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.07.2019 Bulletin 2019/28

(51) Int Cl.:
E06B 9/34 *(2006.01)* ***E06B 9/15*** *(2006.01)*

(21) Application number: **18199007.8**

(22) Date of filing: **05.10.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **06.10.2017 IT 201700112700**

(71) Applicant: **Centro Avvolgibili G. Costanzo & C. s.n.c.**
88040 Pianopoli CZ (IT)

(72) Inventors:
- **Giallanza, Antonio**
  98071 Capo d'Orlando (IT)
- **Marannano, Giuseppe Vincenzo**
  90144 Palermo (IT)
- **Porretto, Mario**
  90020 Palermo (IT)
- **Pardeo, Francesca**
  88040 Gizzeria (IT)
- **Strangis, Antonio**
  88046 Lamezia Terme (IT)
- **Muraca, Emanuel**
  88046 Lamezia Terme (IT)

(74) Representative: **Perrotta, Aldo**
Ing. Aldo Perrotta
Corso Umberto 81
88068 Soverato (IT)

(54) ROLLER SHUTTER WITH A DESMODROMIC SYSTEM

(57) Desmodromic-system roller shutter consisting of parallel slats (1) and kinematic chains, which slides in the lateral guides (13) secured to the wall, characterized in that a right rotating guide (6) at the right end and a left rotating guide (14) at the left end are secured to each slat, each rotary guide (6, 14) has in its upper part an arc-shaped slot (18), each kinematic chain is formed of sliders (11, 17) and rotating guides (6, 14), each slider (11, 17) has two pins (2, 3), the first pin (2) being arranged in the lower part of each slider (11, 17) and the second pin (3) in the upper part of each slider (11, 17), the first pivoting pin (2) in the lower part of each slider (11, 17) fits into the slot (18) and the second pivoting pin (3) in the upper part of each slider (11, 17) pivotally fits into a hole present on each rotating guide (6, 14) of the immediately upper slat (1).

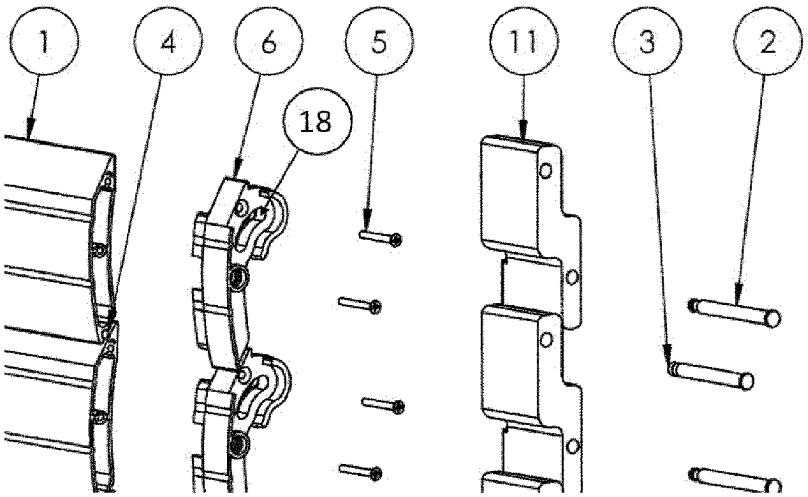


Fig. 2

EP 3 508 681 A1

Description

Technical Field of the Invention

[0001] The present invention relates to a roller shutter with a desmodromic-system. The shutter of the present invention is provided with a mechanism allowing the slats to be opened by exploiting the weight of the blind itself. The opening of the slats is carried out thanks to the particular geometry of the mechanism and by using the interaction between the guides and the sliding parts of the shutter. Its geometry is able to determine the opening or closing of the slats.

Background Art

[0002] Several solutions intended for the production of the so-called "roller shutter" are available on the market. The "roller shutter with adjustable slats" represents one of the latest innovations in the field of doors and windows, the latter, indeed, combining the advantages of the so-called "rolling gates" with those of "blinds with adjustable doors" allowing to adjust the amount of light and thermal energy coming into the houses.

[0003] The multiple solutions of shutter with adjustable slats in the technical literature can be classified into two main categories:

1) Solutions allowing the opening of the slats by exploiting the weight of the shutter itself.
2) Solutions provided with a secondary mechanism specifically intended for moving the slats.

[0004] The solution presented in the patent application IT-102013902182150 of NICOLA BENEDETTO belongs to the first category; this solution can be adapted to existing rail guides, and the opening of each slat is ensured by the weight of the upper slats. The opening of slats occurs sequentially from the bottom up. The solution described above, however, has some considerable disadvantages, one of which lies in the conformation of the slats, which are composed of two parts, a fixed one acting as a frame and a movable one that is rotated until a full opening is achieved (in any case limited to a quantity lower than 90°). For this reason, the area intended for the passage of light is greatly limited by the presence of the frame of each single slat, resulting in a solution that is not very efficient and aesthetically unpleasant.

[0005] As far as the solutions belonging to the second category are concerned, it is possible to mention the Italian Patent Application IT-MO97A000208, which discloses an opening mechanism that closely resembles the functioning principle of Venetian blinds. The main drawback of this solution is due to the fact that the whole movement mechanism of the slats is in view, leading to an unpleasant appearance. Furthermore, the presence of several components limits the reliability of the mechanism.

[0006] The solution proposed herein has a low number of components, resulting in low production cost and high reliability values. Moreover, the absence of external mechanisms makes it possible to produce an aesthetically simple and pleasant shutter.

[0007] Another solution belonging to category 2) is the one presented in the Patent Application IT-VR2014A000288. A shutter in which the opening is carried out thanks to an external chain. The latter allows the translation of two parts, one being integral with the slats and the other being integral with the chain; the translation movement is then converted into rotation of the shutters by means of two rail guides obtained on the same elements.

Summary of the Invention

[0008] The present invention proposes an innovative solution of roller shutter with adjustable slats which offers many advantages compared to those already available on the market. In particular:

- The mechanism that enables the opening of the slats makes the shutter very easy to build and therefore affordable, as it is composed of a few constructively simple elements.
- The opening of the slats occurs without the use of external drives, but by gravity alone.
- The shutter can be used in existing frames without the need of replacing the vertical guides, the box and the winding roller of old window fixtures.
- The low weight also enables the manual handling if avoiding the insertion of the electric winding/unwinding motors is desired.

[0009] The solution proposed by the present invention, although belonging to the same category 1), allows to overcome the aforementioned problems while keeping the adaptability to the already existing guides. In particular, both the support and the opening of the slats are performed by means of a desmodromic system made between the rotating guides and the sliders near the fixed guides in the wall. The area intended for the passage of light is thus maximized by eliminating the presence of fixed frames. The solution provided herein also proves to be easier to build, with the additional possibility of reaching the highest degrees of opening, even close to 135°. This possibility is ensured using only the modification of the slotted groove (Fig. 6) obtained from the rotating guide.

[0010] The solution provided in the present invention, which belongs to category 1), allows the transformation of the relative translation movement between the sliders and the rotating guides in rotation movement of the slats by exploiting only the two aforementioned components

and, therefore, without the use of an external chain. In particular, the sliders are connected to each other and to the rotating guides so that only one component can perform two functions. This new technical improvement allows to eliminate a component present in the aforementioned solution, making the shutter proposed herein more reliable, as it is made with fewer components.

[0011] Moreover, the rotating guides and the sliders are designed in such a way that they can be made by moulding and without the need for further processing for removing shavings. This condition ensures a considerable reduction in production costs and times. In addition, the low number and low complexity of the components also ensures a reduction in assembly times and costs.

[0012] These objects are achieved by producing a roller shutter with a desmodromic-system consisting of parallel slats and kinematic chains, which slide within the lateral guides fixed to the wall, characterized in that a right-hand rotating guide is fixed to each right end and a left-hand rotating guide to each left end, that each rotating guide has in its upper part an arc-shaped slot, that each kinematic chain is made up of sliders and rotating guides, that each slider has two pins the first pin being arranged in the lower part of each slider and the second pin in the upper part of each slider, that the first pin is rotatable in the lower part of each slider is inserted in the slot and that the second pin rotating in the upper part of each slider rotates in a hole on each rotating guide of the slat immediately superior.

[0013] Another feature lies in the fact that on the rear face of the left and right rotating guide there is a raised edge which is inserted inside the slat.

[0014] Another feature lies in the fact that said right and left rotating guides are furthermore secured to the ends of each individual slat by means of two screws.

[0015] Another feature lies in the fact that the lower end of the roller shutter is constituted of a primary slat.

[0016] Another feature lies in the fact that a primary right-end cap and a primary left-end cap are fixed to the primary slat by means of screws, which are connected to the rest of the chain of sliders by means of pins and they also slide inside the lateral guides.

[0017] Another feature lies in the fact that the primary slat does not directly touch the flooring, that there is a last component lower than the primary slat rod which is inserted inside the primary slat.

[0018] Another feature lies in the fact that the rotating guides and the slots have grooves and raised edges on the respective interface faces, which enable with closed roller shutter and therefore closed slats, a perfect integration and closure of fixed and moving parts in contact.

[0019] Other features and advantages will be evident from Figures 1-6 given by way of non-limiting example.

Brief Description of the Figures

[0020]

Fig. 1 depicts an exploded view of the roller shutter object of the present invention.

Fig. 2 depicts a detail of the slot (18) on the rotating guide (6) of the roller shutter object of the present invention.

Fig. 3 depicts an assembly detail which shows how the pins (2-3) are engaged with the right rotating guide (6) and therefore with the slat (1) of the roller shutter object of the present invention.

Fig. 4 depicts the opening steps of the slats of the roller shutter according object of the present invention.

Fig. 5 depicts the kinematic chain consisting of a rotating guide and sliders of the rolling shutter object of the present invention.

Fig. 6 depicts a see-through side view of an embodiment of the kinematic chain, used in the present invention.

Detailed Description of an Embodiment of the Invention

[0021] This disclosure is aimed at describing all the components and the operation of the mechanism as a whole.

[0022] In Fig. 1 below, an exploded view of the shutter, together with the indication of all the components thereof, is shown.

[0023] The slats (1) are preferably made of an aluminium alloy by an extrusion process, the preferably curved shape facilitates its winding and the presence of the central rib allows to use the shutter even in case of a very large window in width by stiffening the slat. The slat (1), in addition to the first central rib, preferably has a second rib, both of which have a hole extending along the whole length of the slat (1) and are obtained during the extrusion step thereof; these two holes allow to secure of the right and left rotating guides (6,14) by means of two screws to the slat (1). The rotating guides (6,14) are preferably made by moulding in plastic material.

[0024] On the back side of the right and left rotating guides (6, 14) there is a raised edge which fits into the slat (1), said right and left rotating guides are then secured to the ends of each single slat (1) by means of two screws (5). In this way, the rotating guides (6,14) and the slat (1) are thus perfectly fitted, thereby the rotating guides (6,14) are able to transmit the rotation movement to the slat (1) to allow its opening/closing.

[0025] In the rotating guide (6,14), see also Fig. 2 and 3, there is a slot (18) acting as a guide for the pin (2) which is locked in the sliders (11, 17) and therefore allows to guide the rotation movement of the slat (1) during opening or closing. The rotation movement is transferred to

the slats (1) through the pin (3) which connects and secures the slats (1) to the sliders (11, 17) by means of the rotating guides (6-14).

[0026] A "kinematic chain" is thus created, so that each slider (11, 17) is engaged with the rotating guides (6, 14), on one side by means of a hinge constraint, on the other by a carriage constraint. In the preferred embodiment, the sliders (11, 17) have a "Z"-like shape, with two parts offset parallel to the lateral guides (13) connected by a transverse part, although the embodiment is not limited to that represented and may be any shape able to slide in the lateral guides (13) provided that each slider (11, 17) has two pins (2, 3) the first pin (2) being arranged in the lower part of each slider (11, 17) and the second pin (3) in the upper part of each slider (11, 17), respectively. The lower end of the shutter preferably consists of the so-called primary slat (7), in Fig. 1, which has a more regular shape, as it does not wind itself on the roller. To the primary slat (7), at both ends, a right primary slat stopper (8) and a left primary slat stopper (15) are secured by means of screws (5), being connected to the rest of the slider chain by means of pins (3) and sliding within the lateral guides (13), too. In this way, primary slat (7), primary slat stopper (8.15), and primary slider (12-16) are rigidly connected to each other; this means that the primary slat is able only to translate, being not allowed to rotate. The primary slat does not directly touch the floor, since preferably there is a last lower component referred to as primary slat rod (9) which is inserted inside the primary slat (7). This component, being engaged with the latter using two spring rod stoppers (10), allows a full contact between the gate and the floor covering along the entire length of the slat.

[0027] Moreover, the rotating guides (6.14) and the sliders (11.17) have grooves and raised edges on the respective interface sides, which allow the perfect integration and closing of the fixed and movable parts in contact, when the roller shutter and, therefore, the slats are closed, allowing to obtain a closing of the adjustable roller with total absence of passage of light from the outside and aesthetically pleasing to the eye.

[0028] The roller shutter, as a whole, is made up by repeating a kinematic chain including two sliders, upper (right-left) and lower (right-left) (11up-11low/ 17up-17low) and a slat (1).

[0029] Each slider (11) has two pins (2, 3), the first pin (2) being arranged in the lower part of each slider (11) and the second pin (3) in the upper part of each slider (11), the first pivoting pin (2) in the lower part of each slider (11) fits into the slot (18) and the second pivoting pin (3) in the upper part of each slider (11) fits into a hole present on each rotating guide (6,14) of the immediately upper slat (1).

[0030] In Fig. 4, a sequence of images showing the movement of the components during the unwinding step is proposed; in particular from the instant I in which the primary slat (7) and the primary right and left sliders (12, 16) touch the ground to the instant V in which the first slat completes its opening and the next one begins to open, instant VI, and finally also the latter fully opens, instant VII.

[0031] At instant I, all the weight of the shutter is supported by the roller (member present in the box wherein the shutter is wound), therefore all the slats (1) and the sliders (11, 17) are suspended and subjected to gravity. At instant II, the roller has made a rotation in the direction of unwinding and the primary sliders (12, 16) have come into contact with the ground. At this point, the further rotation of the roller causes the upper slider (11, 17) to translate with respect to the primary lower one (12-16), the latter therefore being fixed as it is in contact with the ground and with the guides (13). Such movement of relative translation between the sliders is transformed in rotation movement, by the pin (2)-rotating guide (6-14) system, around the pin (3). The movement goes on until the instant VI, wherein the utmost opening with respect to the initial position has been reached. Still at instant VII, the two upper and lower sliders (11.17) come into contact and the overlying kinematic chain starts the opening movement. The sequence repeats until the unwinding is completed and all the slats are thus open.

[0032] The single kinematic chain can be schematized as in Fig. 5. As mentioned above, during the unwinding of the shutter, the relative distance between each slider (11, 17) and the one preceding it reduces to zero. Referring to Fig. 5, the lower slider (11, 17) can be schematized with a hinge-type constraint (a), since the translation in the y negative direction is prevented by the presence of the underlying slider, the translation along x is prevented by the presence of the pins (2, 3) locked in their seat and of the guide (13). Between the upper slider (11, 17) and the slat (1) there is, instead, a carriage-type constraint (b), since the two parts can translate relatively along one direction (in this case, a circumferential arc) and rotate. The upper slider (11, 17) is able only to translate along the y axis until it comes in contact with the lower slider (11, 17). For this reason, it is possible to assign a skate-type constraint (c) to the latter. By performing the calculation, it turns out that the kinematic chain has a certain freedom.

[0033] The invention, as it is well understood, is not limited to the representation given by the tables, but can be subjected to improvements and modifications from the skilled person without parting from the scope of the patent.

[0034] The present invention provides many advantages and allows to overcome issues which could not be overcome with the systems currently available on the market.

Claims

1. Desmodromic-system roller shutter consisting of parallel slats (1) and kinematic chains, which slides in the lateral guides (13) secured to the wall, **char-**

acterized in that a right rotating guide (6) at the right end and a left rotating guide (14) at the left end are secured to each slat, each rotary guide (6, 14) has in its upper part an arc-shaped slot (18), each kinematic chain is formed of sliders (11, 17) and rotating guides (6, 14), each slider (11, 17) has two pins (2, 3), the first pin (2) being arranged in the lower part of each slider (11, 17) and the second pin (3) in the upper part of each slider (11, 17), the first pivoting pin (2) in the lower part of each slider (11, 17) fits into the slot (18) and the second pivoting pin (3) in the upper part of each slider (11, 17) pivotally fits into a hole present on each rotating guide (6, 14) of the immediately upper slat (1).

2. Desmodromic-system roller shutter according to claim 1, **characterized in that** on the back side of the right and left rotating guides (6-14) there is a raised edge which fits into the slat (1).

3. Desmodromic-system roller shutter according to claim 2, **characterized in that** said right and left rotating guides are then secured to the ends of each single slat (1) by means of two screws (5).

4. Desmodromic-system roller shutter according to claim 1, **characterized in that** the lower end of the shutter consists of a primary slat (7).

5. Desmodromic-system roller shutter according to claim 4, **characterized in that** to the primary slat (7), at both ends, the right primary slat stopper (8) and the left primary slat stopper (15) are secured by means of screws (5), being connected to the rest of the slider chain by means of pins (3) and sliding within the lateral guides (13), too.

6. Desmodromic-system roller shutter according to claim 5, **characterized in that** the primary slat does not directly touch the floor, that there is a last lower component, the primary slat rod (9), which is inserted inside the primary slat (7).

7. Desmodromic-system roller shutter according to claim 1, **characterized in that** the rotating guides (6,14) and the sliders (11,17) have grooves and raised edges on the respective interface sides, which allow the perfect integration and closure of the fixed and moving parts in contact when the roller and, therefore, the slats are closed.

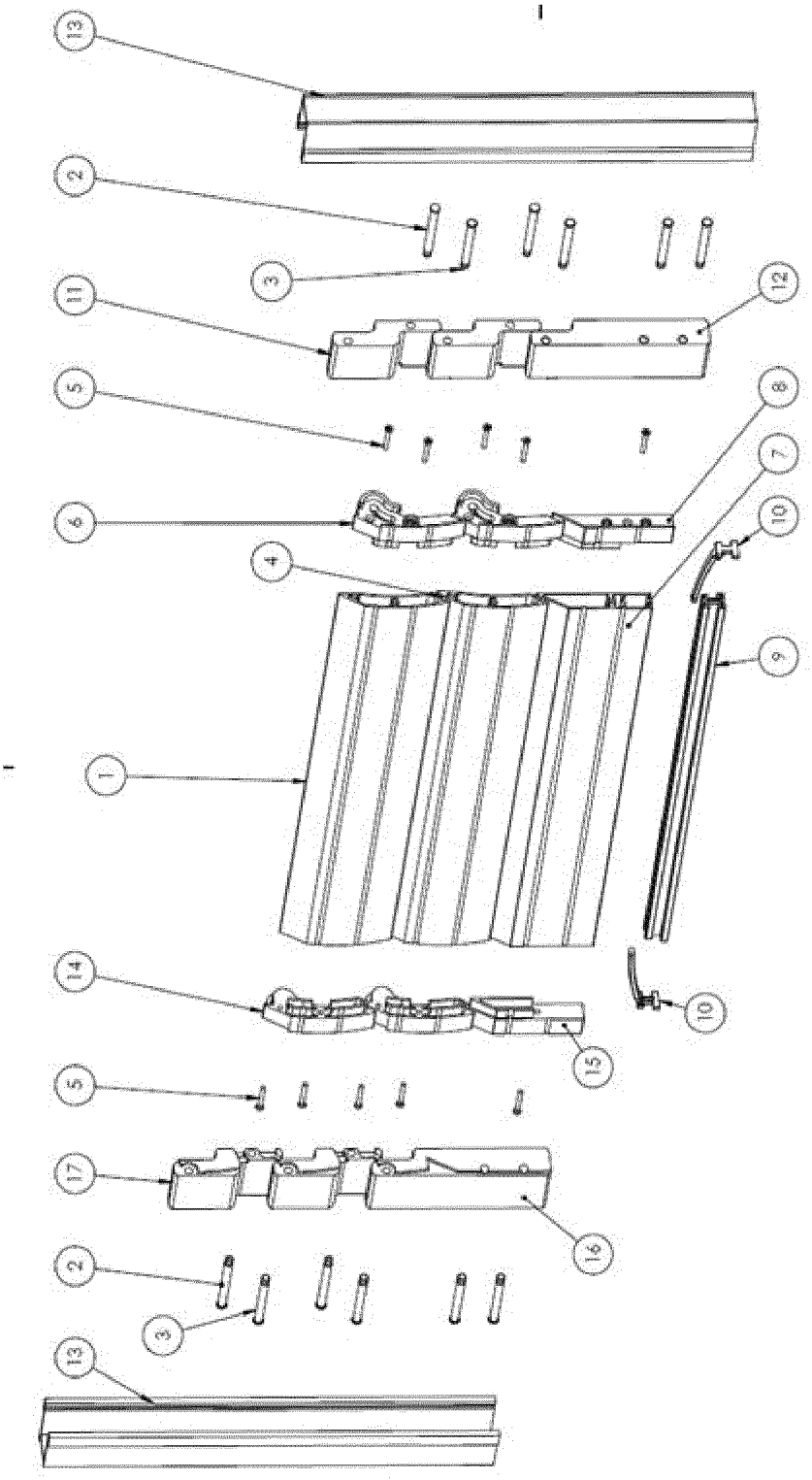


Fig. 1

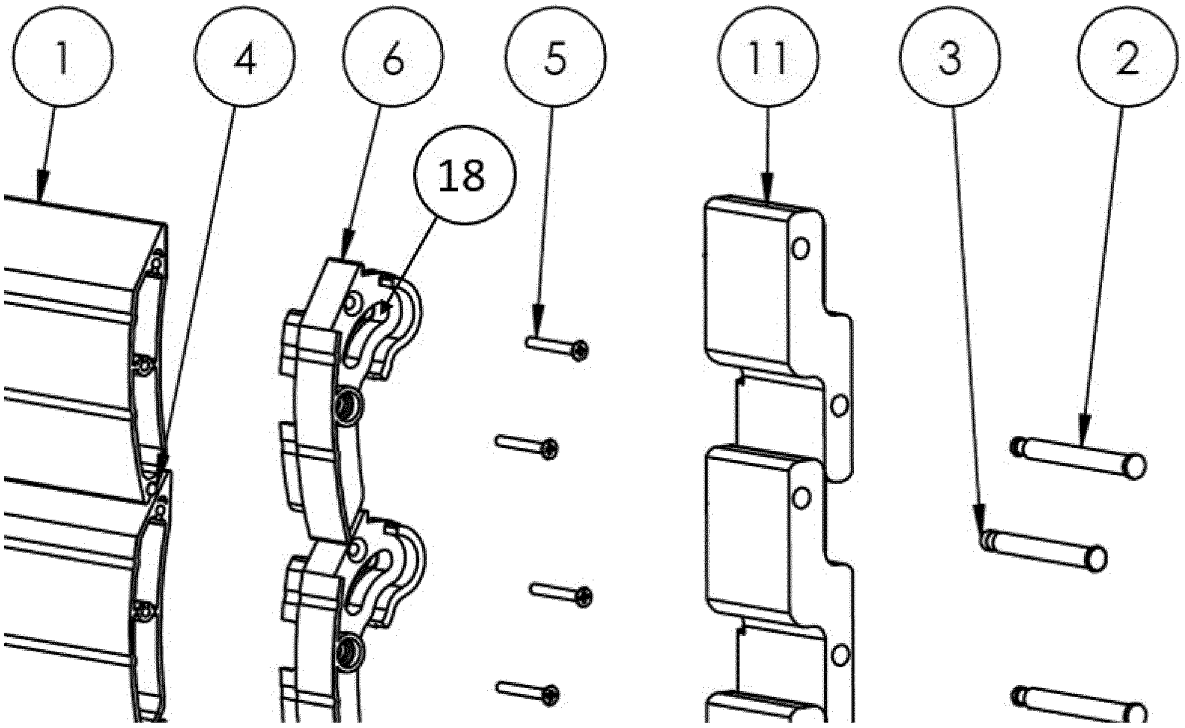


Fig. 2

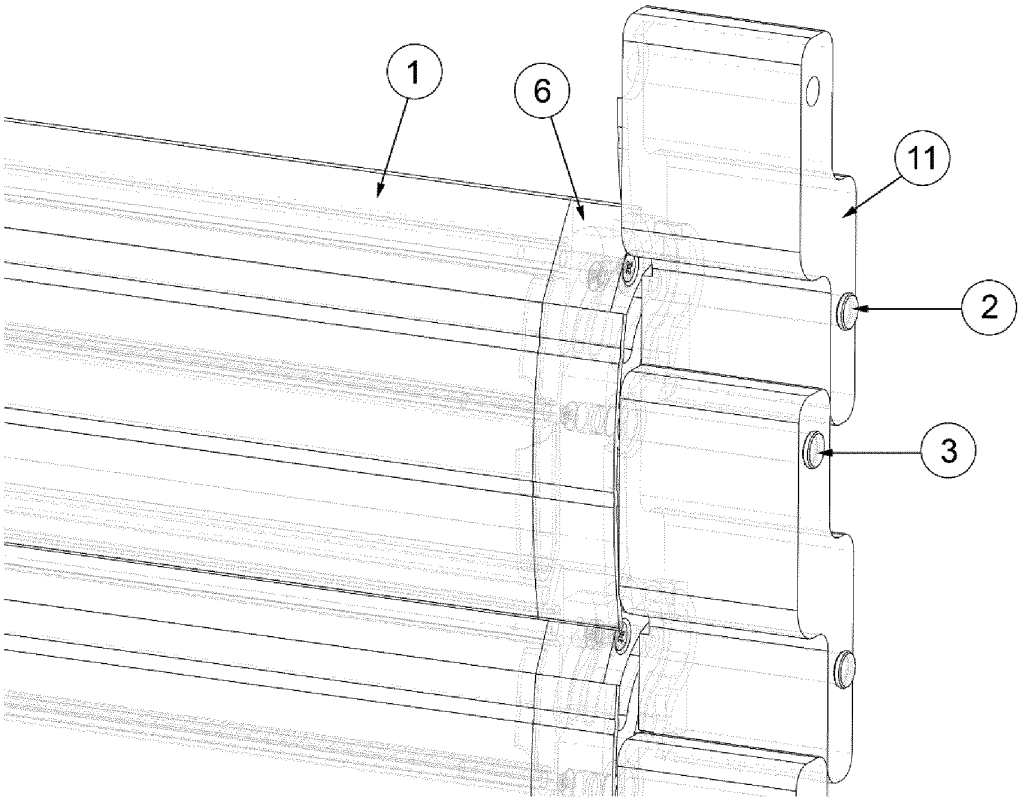


Fig. 3

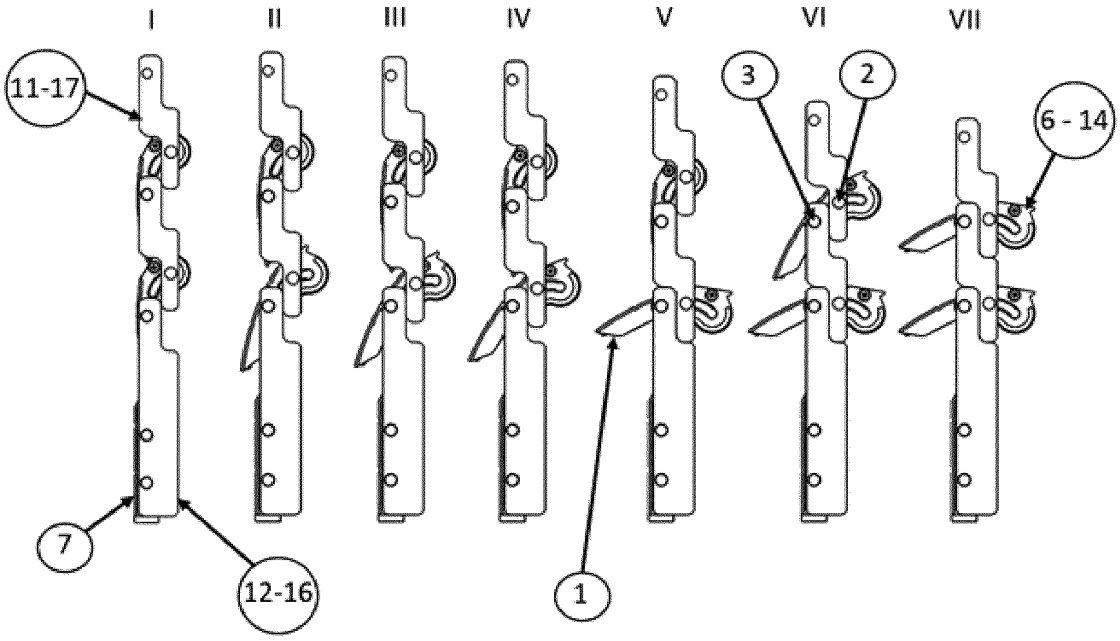


Fig. 4

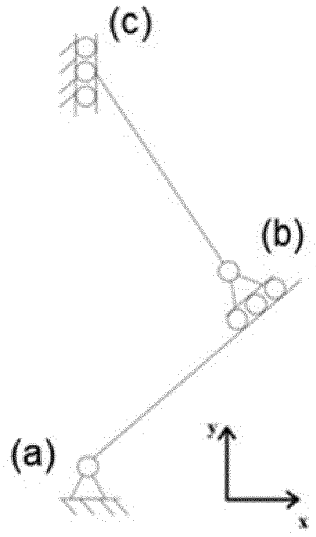
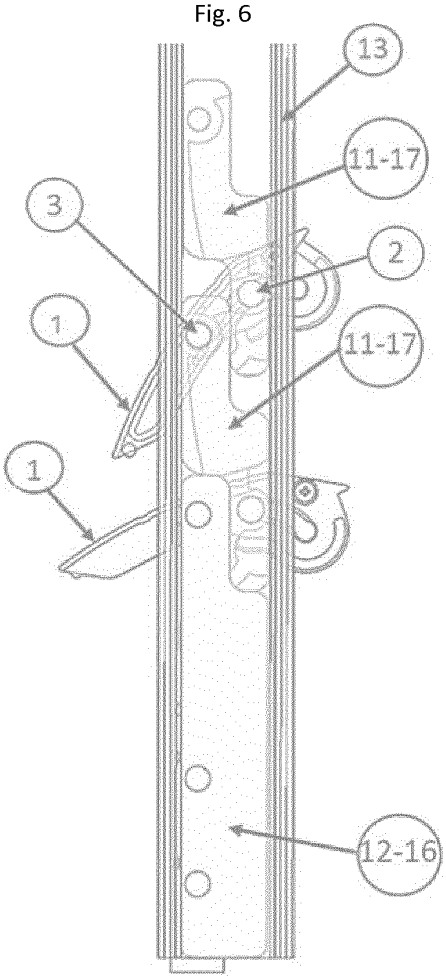


Fig. 5

Fig. 6



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 19 9007

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2016/078850 A1 (TEKNALSYSTEM S R L [IT]) 26 May 2016 (2016-05-26) * figures 1-18,21,22 *	1-7	INV. E06B9/34 E06B9/15
A	EP 3 205 809 A1 (CENTRONE LUIGI [IT]) 16 August 2017 (2017-08-16) * figures 2,3,11-16 *	1-7	
A	EP 2 985 405 A1 (BRACCHITTA GIUSEPPE [IT]; BRACCHITTA MAURIZIO [IT]) 17 February 2016 (2016-02-17) * figures 1-11 *	1-7	

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 February 2019	Merz, Wolfgang

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 19 9007

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-02-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016078850 A1	26-05-2016	EP 3221544 A1	27-09-2017
		ES 2688082 T3	30-10-2018
		WO 2016078850 A1	26-05-2016
EP 3205809 A1	16-08-2017	NONE	
EP 2985405 A1	17-02-2016	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 102013902182150, NICOLA BENEDETTO **[0004]**
- IT MO970208 A **[0005]**
- IT VR20140288 A **[0007]**