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(54) **ROLLER BLIND WITH SWIVELING SLATS AND RELATED MOVING SYSTEM**

(57) Roller shutter for screening solar radiation incoming from casings of buildings, comprising: side guides integrally installed to the sides of the casing to be screened; a plurality of laths, at least one of said laths being of swinging type, said laths being constrained to respective not swinging end elements which slide inside said side guides, and being wound up around an axis positioned inside a box positioned on the casing, characterized in that said shutter further comprises at least a rack installed inside at least one of said side guides, and in that said at least one swinging lath is constrained to at least a pinion installed so that it meshes with said rack and so that it makes said at least one lath rotate after a vertical movement of said rack.

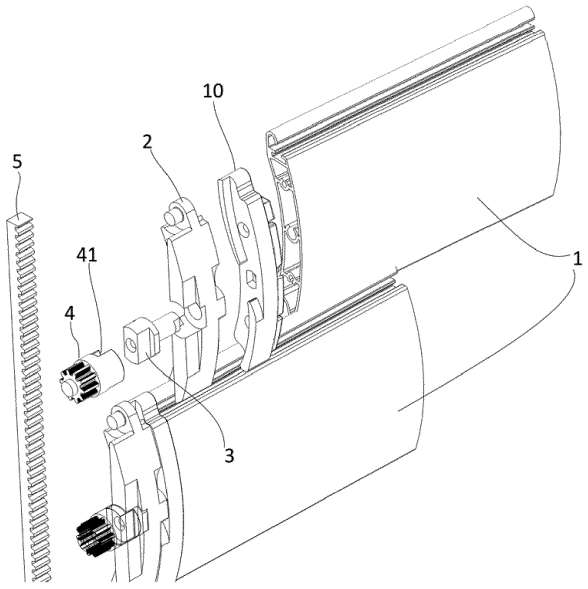

Fig.2

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Description

[0001] The present invention relates to a shutter with swinging laths and its respective moving system of laths.

[0002] In particular, the invention allows to increase the maximum rotation angle of the laths of shutters, to install shutters with swinging laths also in case of redevelopment in place of traditional existing shutters, and possibly to realize shutters in which only a part of the laths is able to swing.

TECHNICAL FIELD

[0003] Roller shutters are commonly installed outside casings to screen solar radiation. They are generally shutters made up of a plurality of laths constrained so that they can be wound up around a roller, possibly a motorized roller. Laths are also known with the name lamellae, which is intended as equivalent of laths in the present document. In the upper portion of the casing it is provided a box which allows to house the shutter when it is wound up around the roller.

[0004] Traditional shutters have no swinging laths, and so they allow neither to change the solar screening extent nor to modify the openings orientation so that direct solar radiation incoming is screened even if natural illumination of ambients is allowed.

[0005] At the state of the art there are known also shutters with swinging laths, as for example the one described in the Italian Patent application BA2013A000082, in which it is described a shutter with swinging laths which can be packed as an "accordion" when closed in the box, instead of being wound up around a roller. Other embodiments are known at the state of the art, as those described in the applications VR2009A000006, VR2011A000078, MI2012A000528, PD2009A000017, BA2013A000061. Other examples are described in documents EP1056921 and DE3511246. According to the today inventors knowledge, there are not known roller shutters with swinging laths which can be automatized, and so configured to bring again automatically the shutters laths in the vertical position before the shutter is lifted, and in particular it is not known the use of a system with pinions and rack for moving lamellae.

AIM OF THE INVENTION

[0006] Therefore, aim of the present invention is to provide a roller shutter with swinging laths. According to another aim, the present invention provides a roller shutter with swinging laths, configured so that the laths are brought again automatically in the vertical position before the shutter is lifted. According to another aim the present invention provides a system for moving the laths of a shutter, which allows to change the orientation angle of at least a portion of said laths, thus allowing to realize roller shutters in which not all the laths are able to swing.

[0007] The invention realizes the prefixed aims since it is a roller shutter for screening solar radiation incoming from casings of buildings, comprising: side guides integrally installed to the sides of the casing to be screened; a plurality of laths, at least one of said laths being of swinging type, said laths being constrained to respective not swinging end elements which slide inside said side guides, and being wound up around an axis positioned inside a box positioned on the casing, characterized in that said shutter comprises further at least a rack installed inside at least one of said side guides and in that said at least one swinging lath is constrained to at least a pinion installed so that it meshes with said rack and so that it makes said at least one lath rotate after a vertical movement of said rack.

FIGURES

[0008] In figure 1 it is shown an assembled view of an embodiment of the system for moving the laths according to the invention, shown in an exploded view in figure 2. In figure 3 the system is shown with laths inclined with respect to the vertical position, in figure 4 it is shown a view of the system with shown (in phantom lines) sliding side guide. In figure 5 (a, b, c) there are shown a front, side and section view of the shutter and its respective moving system, respectively. In figure 6 it is shown a detail, in exploded view, of the constraint system of laths; in fig. 7 it is shown a preferred embodiments of the control system of the laths angle, whose functioning is described in figures 9 to 13.

[0009] It is to be précised that, only for graphical clarity, only few laths are shown in figures, and the moving system is shown with reference to only one side of the shutter. It is clear that the shutter according to the invention comprises a plurality of laths sufficient to cover the whole opening of the casing and that, as a function of the width of the casing to be covered, the shutter can be realized with the moving system installed on only one o or both sides.

DETAILED DESCRIPTION

[0010] With reference to figure 1, the shutter according to the present invention comprises a plurality of swinging laths (1), each one constrained at both the ends to a not swinging end element (2) which slides inside a suitable side guide (6). The constraint of the lath (1) to the end element (2) is clear from figure 6. A key (3) passes through a hole (21) inside the end element (2), and engages with its own shaped end (31) in a respective shaped hole (101) provided in the closing plug (10) of the lath (1). It is to be précised that the one shown in figure is a preferred embodiment of the constraint between end element and lath, other embodiments being however used provided that the realized constraint is such that it allows only the relative rotation between end element (2) and lath (1) around an axis parallel to the profile of the lath. With reference to figure 6 it is also

observed that the end element (2) is provided with constraint means (22, 23) at upper and lower ends. In the shown embodiment they are a pin (22) and a respective hole (23), which allow a plurality of end elements (2) to be constrained to each other so that between the same it is allowed only the relative rotation around the axis of the pin (22). Also in this case, it will be possible to use a different constraint manner provided that the constraint between end elements is such that the same are allowed to slide inside the side guide (6) and to be wound up together with the laths (1) around the axis (11), as it occurs also in the traditional shutters. As it is visible in figure 6, the key (3) is provided with a shaped end (32) also in the side opposite to the one directed towards the lath (1). This shaped end (31) is configured to engage slidingly in a respective shaped constraint means (41) provided on the pinion (4). The pinion (4), well visible in figure 2, is in fact realized so that it has a toothed end and the other one with a cylindrical outer surface, with a recess (41) configured to engage slidingly in the shaped end (32) of the key (3). Once the key has engaged in the pinion (4), the same rotate integrally, and the constraint therebetween can be removed only when the constraint means are in vertical position and the key, dragged by the respective end element (2), is lifted.

[0011] As it is clear in figure 4, each pinion engages in the rack (5) which is vertically sliding inside the side guide (6). The constraint of rack (5) and pinions (4) relating to each lath (1) is such that, when the rack is moved upwards or downwards, the pinions (4) rotate of an angle imposed by the extent of the vertical movement of the rack. In its own rotation, each pinion (4) imposes the rotation also to the respective lath (1) by means of the key (3). On the contrary, the end element (2) does not rotate. It is to be noted that the end element (2) has such a width that it projects with respect to the side guide (6). In this way, the laths (1) can rotate without interference with the guide (6). Hence, as it is visible in comparison to figures 3 and 4, the laths (1) can take a plurality of angular positions, thus realizing the aim of providing a swinging laths shutter.

[0012] In order to wind up the shutter it is clearly needed that pinions (4) and respective keys (3) have respective constraint means (41, 32) oriented in vertical direction, and that laths (1) are in the closed position shown in figure 4. In the following it will be described the manner in which this occurs automatically. Once the laths are in the position in figure 4, the shutter can be wound up around the roller (11), as it occurs for traditional shutters. When the roller (11) (which can be of motorized or manual control type) winds up the shutter, the key (3) relative to each lath (1) slides with respect to its own pinion (4) and moves upwards, integrally with the shutter. Since all pinions (4) are oriented in the same manner, each key (3) in its movement upwards can pass easily to the following pinions without encountering interferences. Without departing from the aims of the present invention, it will be possible to use all the measures known at the state of the art concerning working tolerances, couplings clearance and geometrical couplings to be realized on key (3) and pinion (4) in order that the functioning system is not subjected to jamming.

[0013] It is also to be précised that it is possible to vary number and position of swinging laths, without departing from the aims of the present invention. Each lath (1) can be realized in fact in fixed manner (not swinging) by simply not installing for the same the key (3) and the pinion (4) and constraining it integrally to the respective end element (2). Hence, there can be realized shutters in which all the laths (1) are provided with the described movement mechanism, or only a portion, without any limit about number and position of the swinging laths.

[0014] Before describing an embodiment of the automatic positioning system of laths it is to be observed that, once each key (3) has engaged in the respective pinion (4) there exists a direct correspondence between the vertical position of the rack (5) and the angular position of the laths (1). In other words, the vertical position of the rack can oscillate between two limiting positions, corresponding to the closed position of the laths and to the maximum angular opening of the same. Preferably, the shutter according to the present invention comprises further an automatic positioning system of laths (1) in closed position before lifting the same shutter.

[0015] According to a first embodiment, not shown in figures, the vertical position of the rack can be controlled by an electric motor positioned inside the box and provided with a suitable pinion engaging in the rack. Said electric motor can be configured to be controlled by means of the same control, typically a button, which actuates the electric motor controlling the axis (11) on which the shutter is wound up. Conveniently, a limit stop contact can be installed on the rack (5), configured to allow the electric motor controlling the axis (11) to be started to wind up the shutter only when the rack (5) is in the correct position to allow the winding up. Similarly the control motor of the rack can be managed, which is instead excluded from the functioning when the rack is in the correct position to allow lifting. In this way, by using only a control and with only one action by the user, by using as well components yet available on the market, it is possible to bring again the laths in the correct position, and after, to lift the shutter. A second limit stop contact can be installed so that the functioning of the control motor for orienting laths in the opening direction is allowed only when the shutter is completely lowered.

[0016] Clearly this embodiment is easily realizable with shutters for which it is yet provided a motorized control.

[0017] Another embodiment of the automatic positioning system of laths (1) is shown in the appended figures 7 to 13. It is an embodiment usable both with shutters provided with electric control and shutters provided with manual control. With reference to figure 7, inside the box (12) of the casing it is provided a transmission box (8) provided with a pulley (9). A belt (not shown in figure) connects the pulley (9) of the transmission box (8) to the

driving pulley (11) integral to the winding axis (11) of the shutter. Since the movement arrives to the transmission box directly from the axis (11), what described in the following can be used both with electric controlled shutters and manually controlled shutters.

[0018] In figure 8, there are shown inner components of the transmission box (8), shown in exploded view in figure 9. For graphical clarity the box is not drawn in this one and other figures.

[0019] The pulley (9) moves, in a cascade manner, the pinion (81) and the toothed wheel (82), Therefore, these two elements always rotate when the axis (11) rotates.

[0020] As it is visible in figure 10, the toothed wheel (82) is provided, in the rear portion, with a pin (821) arranged eccentrically with respect to the rotation axis of the wheel (82). An idle wheel (83) is configured to rotate, controlled by the toothed wheel (82), only when said pin (821) engages in one of the slots (831) provided on the idle wheel (83). The idle wheel (83) is in fact provided with slots (831), open at ends, and is positioned so that, during its rotation, the pin (821) can engage in one of said slots, thus making the idle wheel rotate of an angle equal to the angle between two following slots (831). Preferably, as it is shown in figures, the slots are 5 in number and the angle between the two following slots is 72°.

[0021] The idle wheel (83) is so always still unless the pin (821) engages in one the slots (831). In this case, it rotates integrally with the toothed wheel (82), but only until the pin (821), continuing its rotation, goes out from the slot. Therefore a mechanism is realized in which an intermittent rotation of the idle wheel (83) corresponds to a continuous rotation of the axis of the shutter. According to what described in figure the idle wheel (83) remains still for four-fifth of a revolution of the toothed wheel (82), and it moves then for the remaining portion of the revolution.

[0022] The idle wheel (83) is provided in turn with an eccentric pin (832), configured to engage in a slot (841) provided on the partial toothed wheel (84). With a mechanism similar to the just described one for the idle wheel (83), the partial wheel (84) will rotate only when the pin (832) engages in the slot (841). In all the other times and for all the other positions of the idle wheel (83) the partial toothed wheel (84) does not move. It is to be précised that in the present context for partial toothed wheel (84) it is intended a wheel provided with teeth only on a circular sector and not on the whole circumference. According to what shown in figures, the partial wheel (84) moves of 90° every complete revolution of the idle wheel (83) and so, every 5 revolutions of the toothed wheel (82). Obviously such values can change, without departing from the aims of the invention, as a function of the dimensioning of the system.

[0023] When it moves, by rotating around its own axis (842) the partial wheel (84) engages in a pinion (85) which by means of a cam (851) lifts or lowers the terminal (86), integral to the rack (5). Therefore the rack (5) moves controlled by the movement of the axis (11) of the shutter, but it can move only when the idle wheel (83) transmits the movement thereto.

[0024] It is in fact to be précised that what shown is only an embodiment of the mechanism, and that other embodiments can be used provided that it is a mechanism configured to transform a continuous rotating movement (the one provided by axis of the shutter) in a movement of the rack alternating the rest status and the reciprocating movement, the rest status of the rack corresponding to the rotations of the axis needed to unwind (or wind up) the shutter, and the reciprocating movement of the rack being possible to be carried out only when the shutter is in its completely lowered position. Once installed, the functioning of the system is as follows:

> It is to be assumed that the shutter is completely lowered and that it has the laths open in order that light is filtered. Therefore the rack (5) is in its lowest position. The configuration of the just described gears inside the transmission box is such that in this position the pin (832) of the idle wheel (83) engages in the respective slot (841) on the partial wheel (84).

[0025] When the axis (11) begins to rotate, the shutter is not lifted firstly, since it is constrained to the axis with springs or flexible belts, according to what occurs commonly also at the state of the art. As long as the flexible belts are not completely wound up on the axis (11), the shutter is not lifted.

[0026] The driven pulley (9) instead rotates immediately integrally to the axis (11), and by means of the just described mechanism, the idle wheel (83) makes the partial wheel (84) rotate, which, in turn lifts the rack (5). The dimensioning of the system is such that when the toothed wheel has carried out its rotation, the laths of the shutter are in their closed position.

[0027] Even if the axis (11) continues to rotate, according to what just described, the partial wheel (84) remains still and so the shutter can begin to be lifted and to be wound up around the roller without the rack (5) changes position, and so, without the pinions (4) act as interferences for the keys (3). On the contrary, by lowering the shutter, the partial toothed wheel (84) will not move until it is engaged again by the pin (832) of the idle wheel (83). Clearly before this occurs the system has to carry out, in opposite direction, the same number of revolutions carried out in lifting step and so, the laths (1) of the shutter can rotate, controlled by the rack (5), only when the shutter is completely lowered and the keys (3) are at respective pinions (4). Also the opening of the laths occurs easily by means of the rotation of the axis (11) and without needing other control by the user.

[0028] Hence, a transmission box (8) has been described, configured so that a continuous rotating movement in inlet - provided by the pulley (9) - is accepted, and a discontinuous vertical movement - for controlling the rack (5) - is produced, said vertical movement being able to occur only when the shutter is completely lowered.

Claims

1. Roller shutter for screening solar radiation incoming from casings of buildings, comprising:

   - side guides (6) integrally installed to the sides of the casing to be screened;
   - a plurality of laths (1), at least one of said laths being of swinging type, said laths (1) being constrained to respective not swinging end elements (2) which slide inside said side guides (6), and being wound up around an axis (11) positioned inside a box positioned on the casing,
   - at least a rack (5) installed inside at least one of said side guides (6),

   said at least one swinging lath (1) being constrained to at least a pinion (4) installed so that it meshes with said rack and so that it makes said at least one lath (1) rotate after a vertical movement of said rack, **characterized in that**
   said at least one pinion (4) is constrained to said lath (1) by means of a shaped key (3), said key being installed integrally to said lath (1) and being provided with a shaped end (32) in the side opposite to the one directed towards the lath (1), said shaped end (31) being configured to engage slidingly in a respective shaped constraint means (41) provided on said at least one pinion (4) so that once said key (3) has engaged in the pinion (4), the same rotate integrally and in such a way that the constraint between the same can be removed slidingly by means of vertical movement of said key (3).

2. Roller shutter for screening solar radiation incoming from casings of buildings according to claim 1, comprising a couple of racks (5), each one installed in one of said side guides (6).

3. Roller shutter for screening solar radiation incoming from casings of buildings according to any one of the preceding claims, **characterized in that** all the laths are of swinging type.

4. Roller shutter for screening solar radiation incoming from casings of buildings according to any one of the preceding claims, further comprising an automatic positioning system of said swinging laths (1) in closed position before the same shutter is lifted.

5. Roller shutter for screening solar radiation incoming from casings of buildings according to claim 4, **characterized in that** said axis is of motorized type, and comprising further at least an electric motor positioned inside the box of the casing and provided with a suitable pinion engaging in said at least one rack.

6. Roller shutter for screening solar radiation incoming from casings of buildings according to claim 5, **characterized in that** said electric motor is configured to be controlled by means of the same control actuating the electric motor controlling said axis (11), and comprising further a limit stop contact installed on said rack (5), configured to allow the electric motor controlling the axis (11) to be started to wind up the shutter only when the rack (5) is in the correct position to allow the winding up.

7. Roller shutter for screening solar radiation incoming from casings of buildings according to any one of claims 4 to 6, **characterized in that** said automatic positioning system of laths comprises a transmission box (8) configured so that a continuous rotating movement in inlet, provided by the movement of said axis (11), is accepted, and a discontinuous vertical movement for controlling said rack (5) is produced, said discontinuous vertical movement being able to occur only when the shutter is completely lowered.

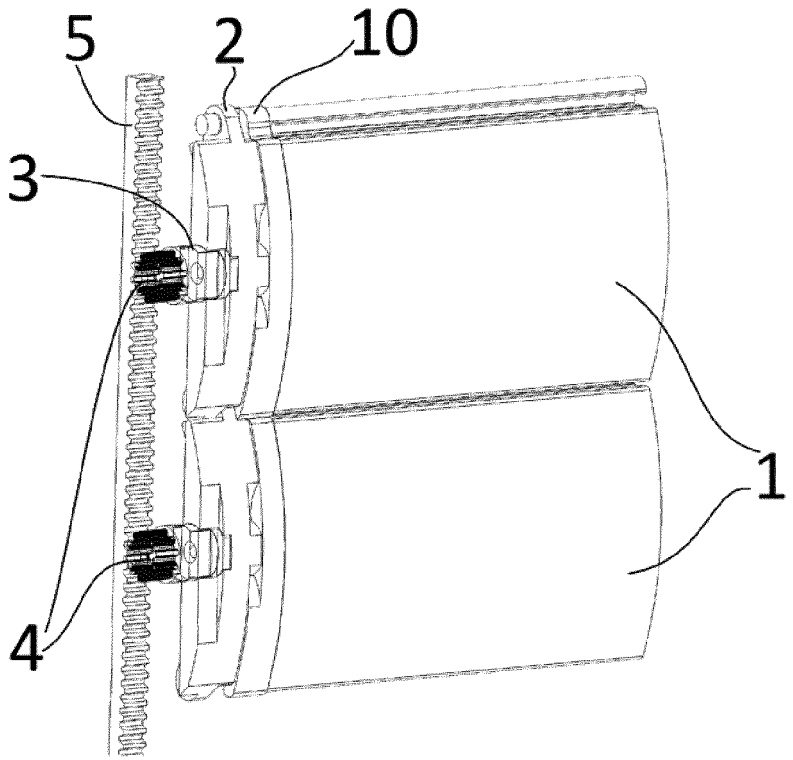

Fig.1

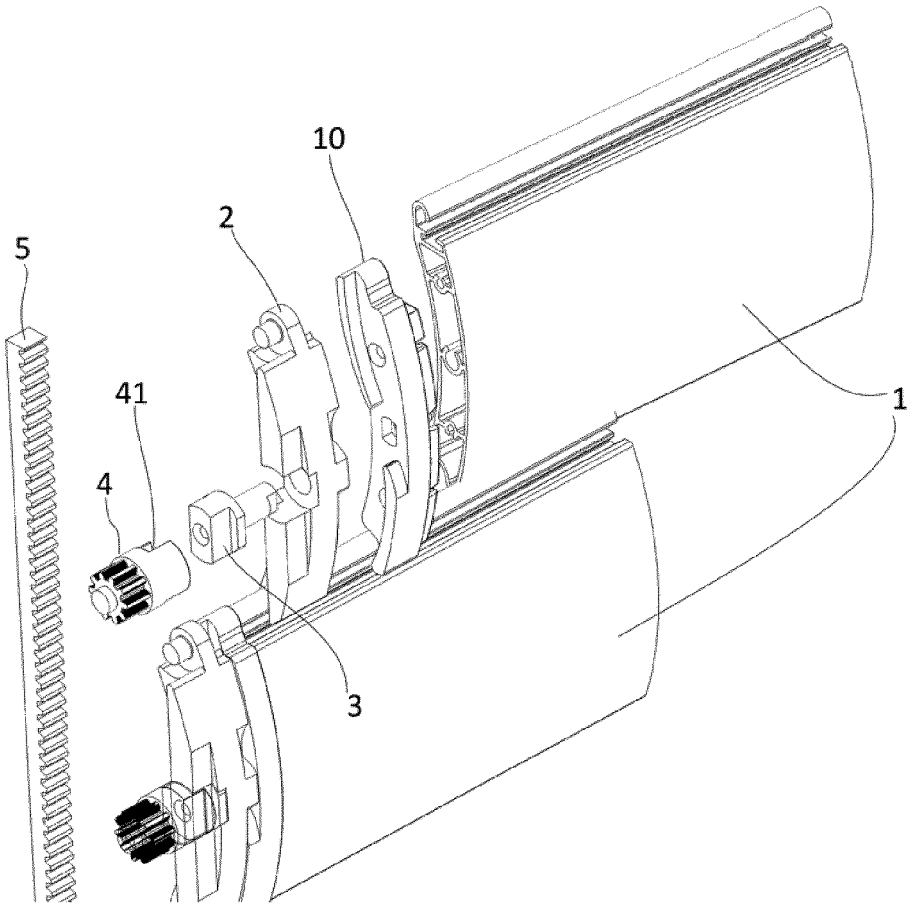

Fig.2

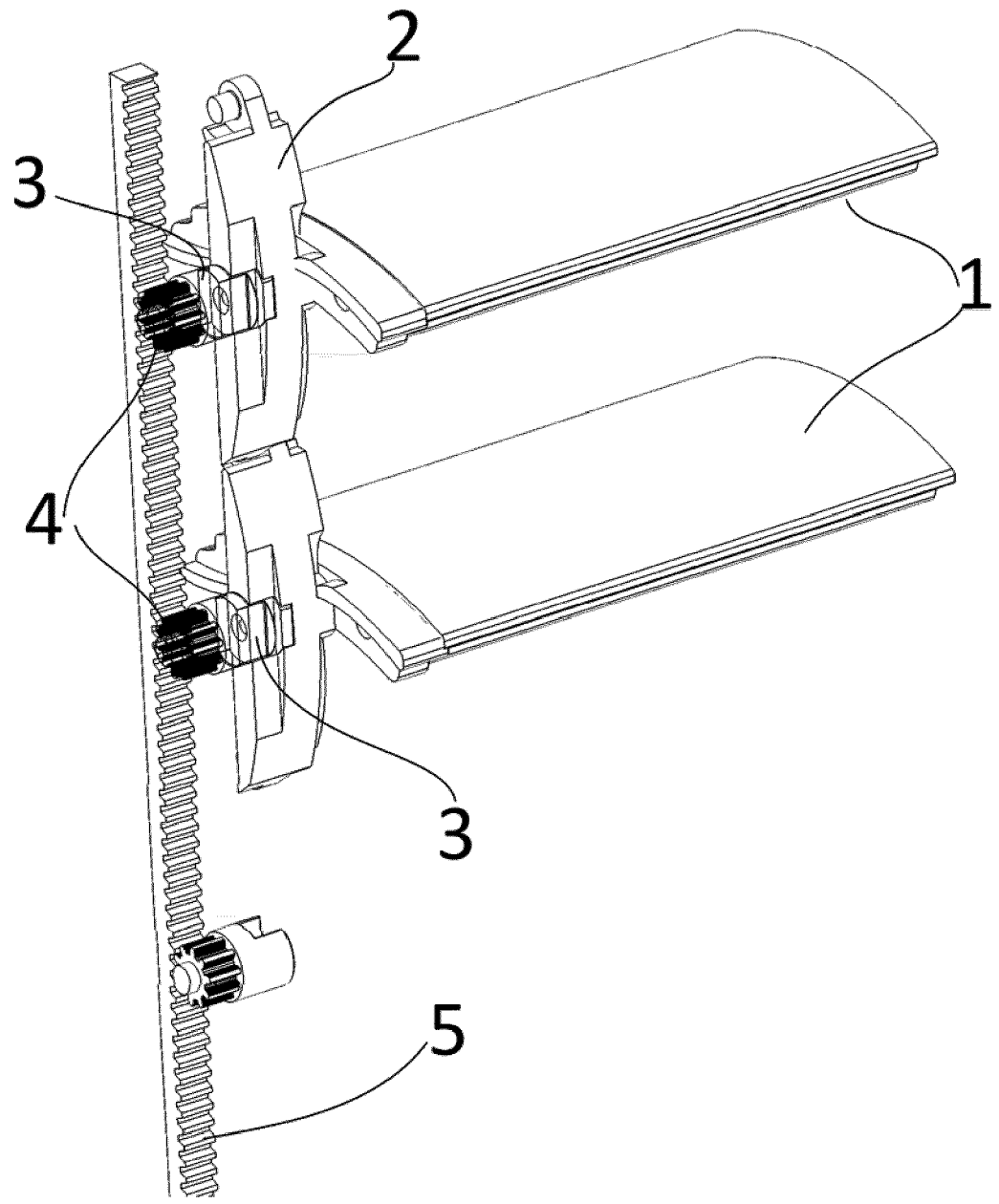

Fig.3

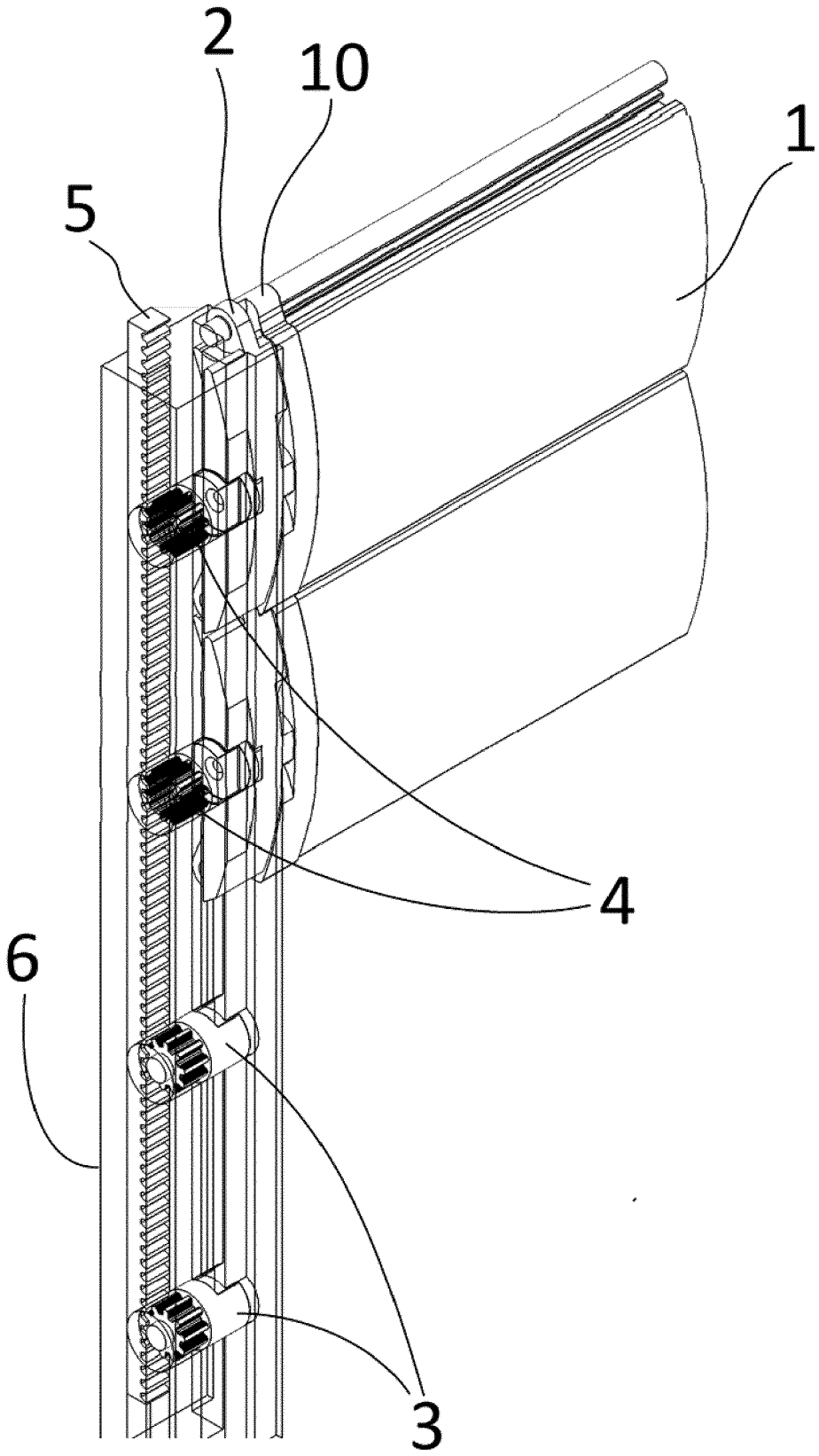

Fig.4

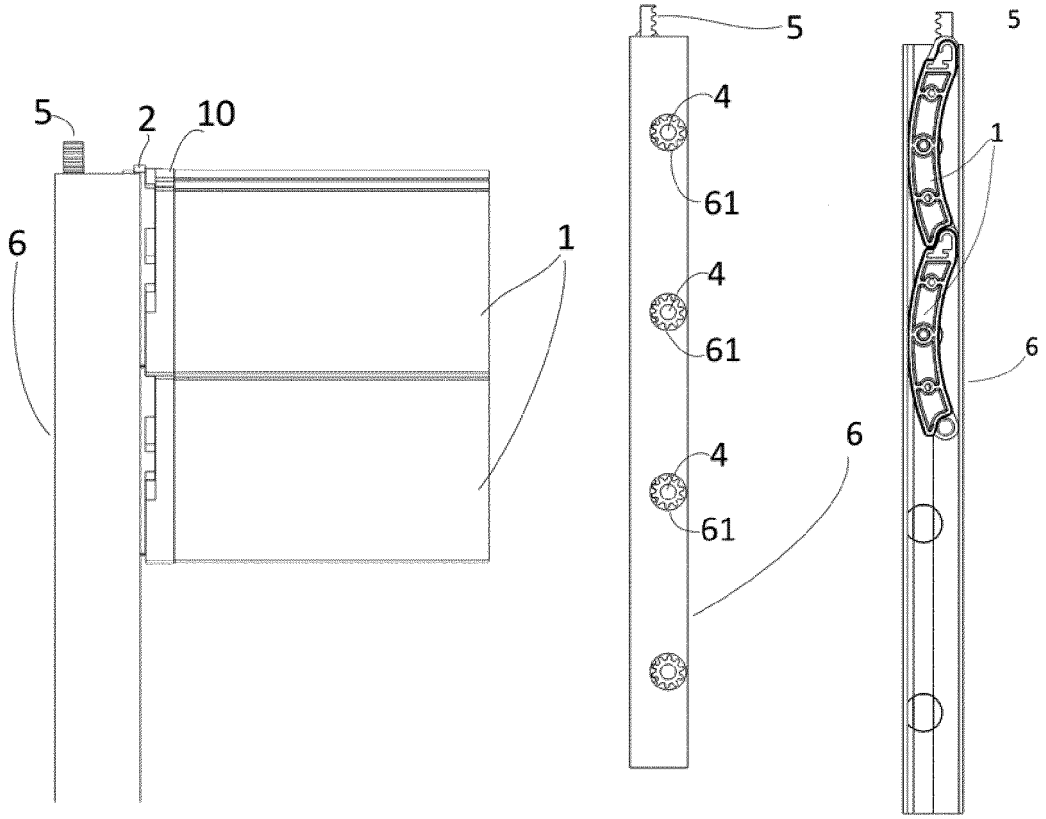

Fig.5 (a –b – c)

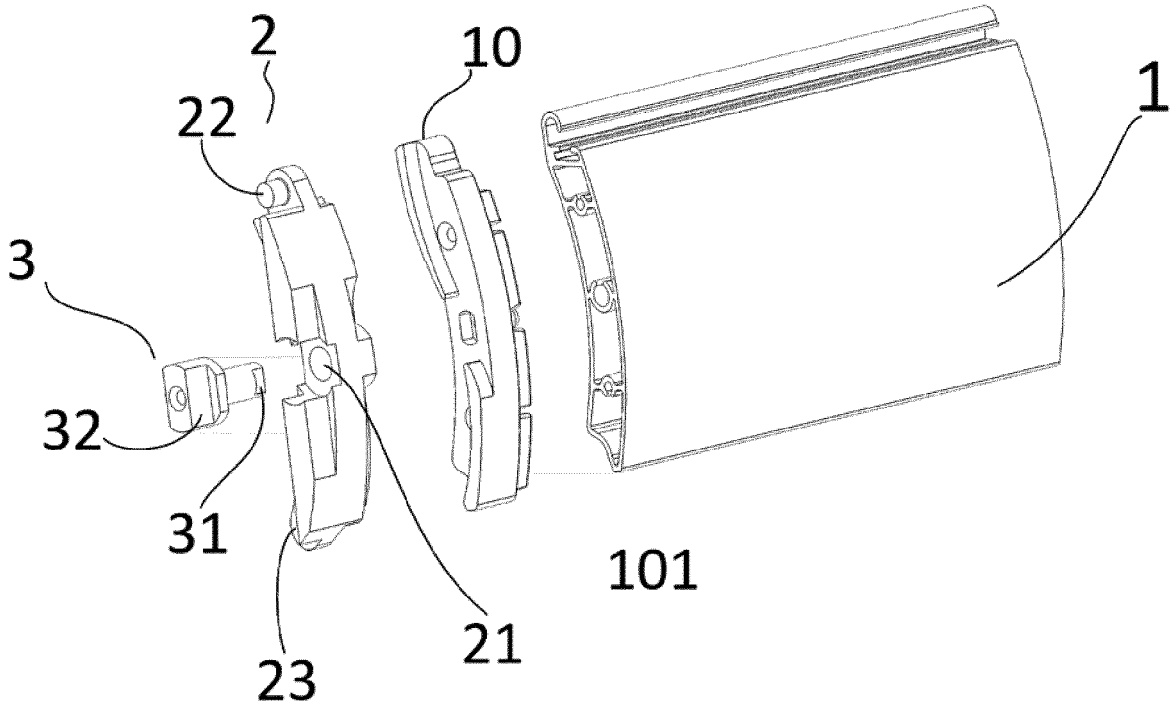

Fig.6

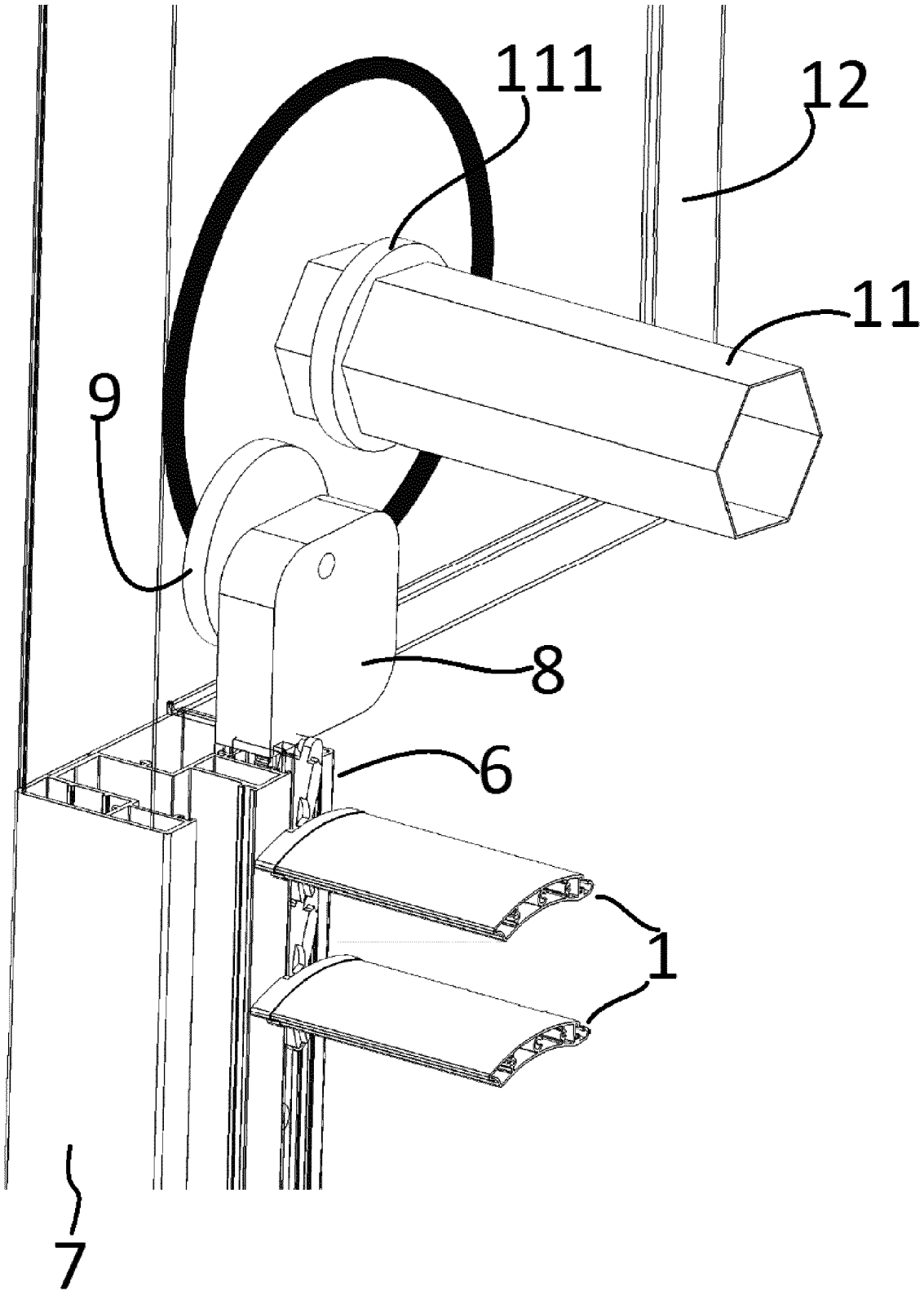

Fig.7

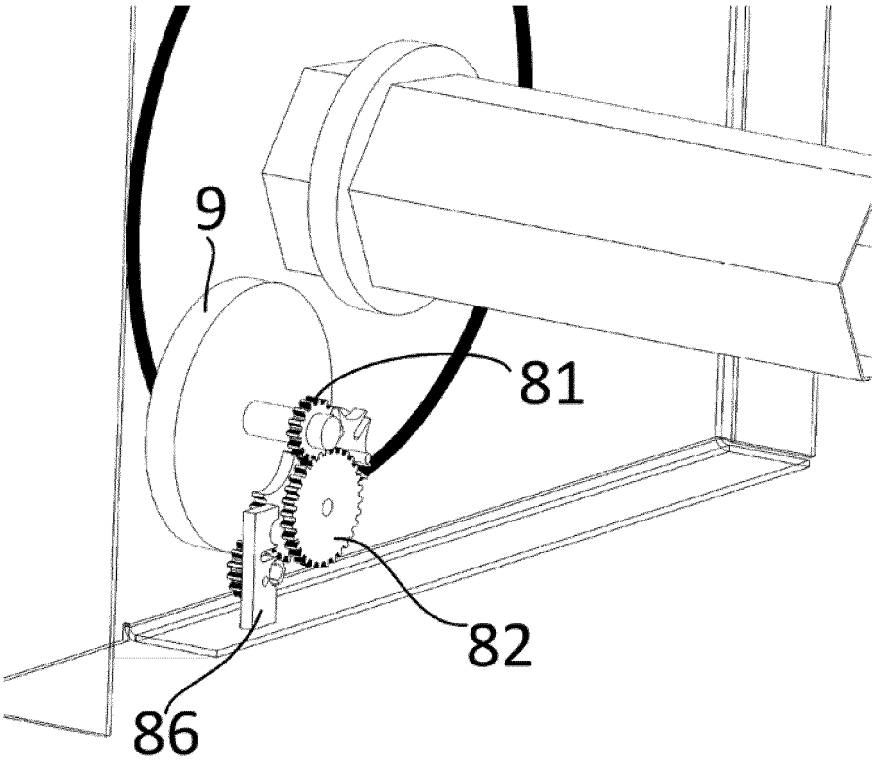

Fig.8

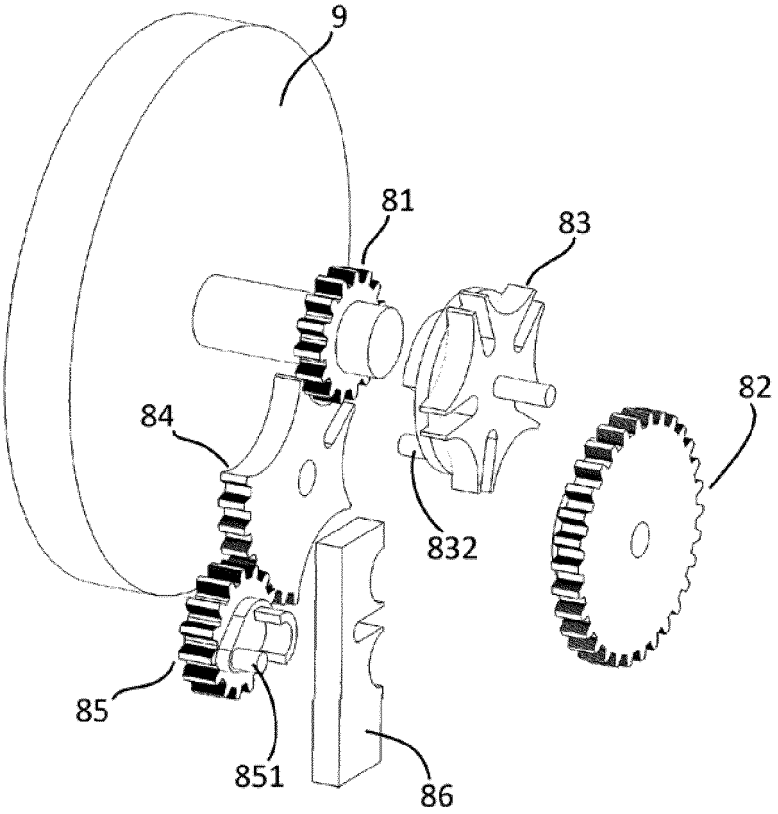

Fig.9

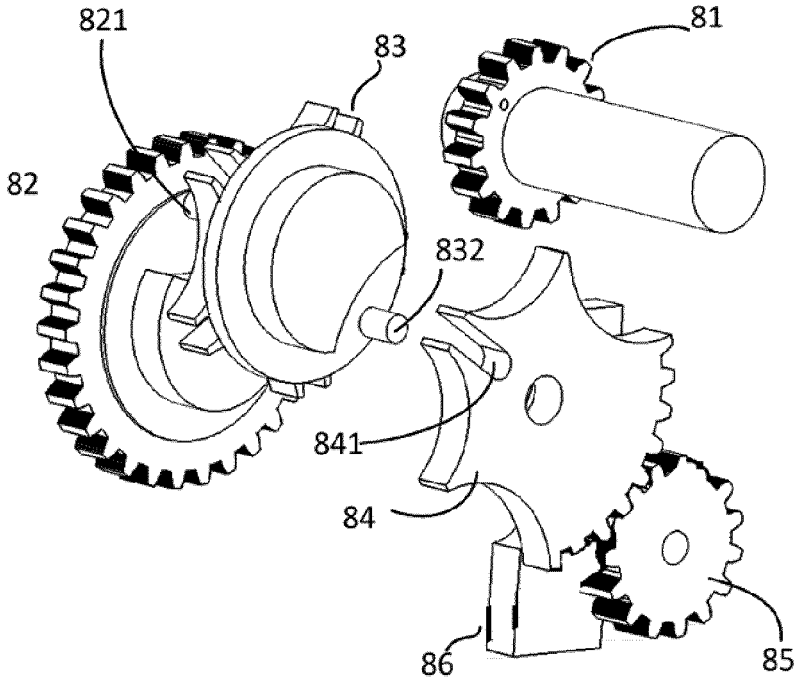

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Fig.10

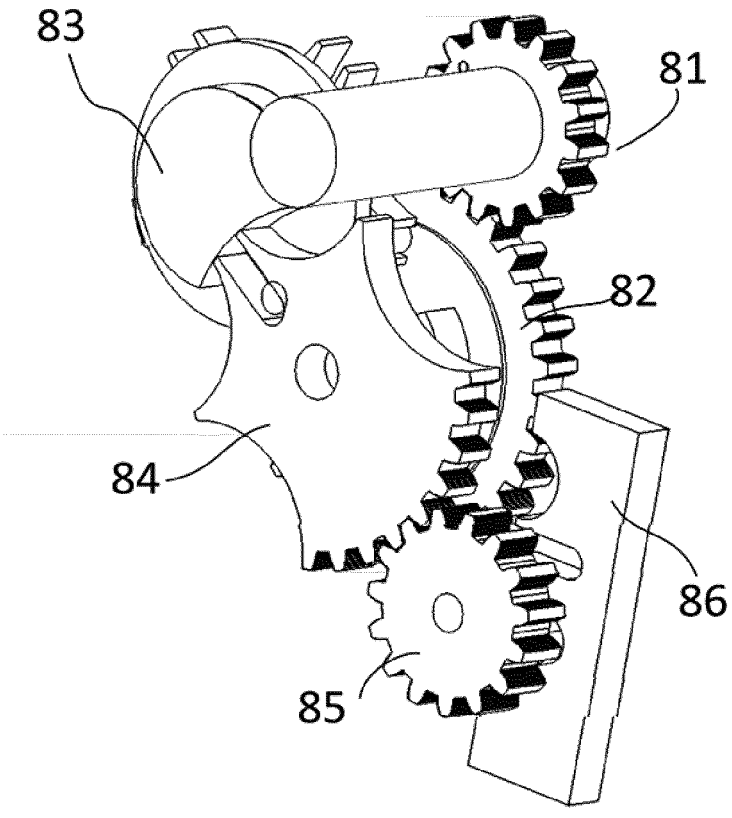

Fig.11

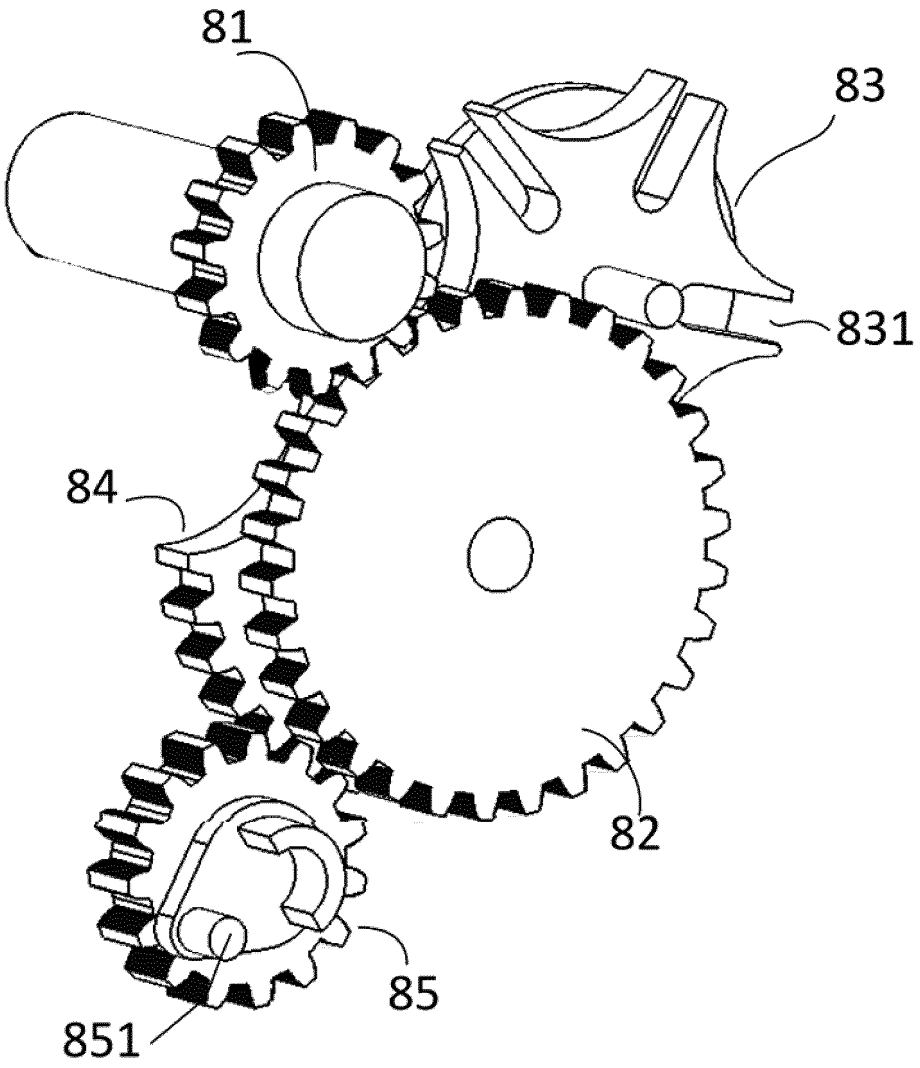

Fig.12

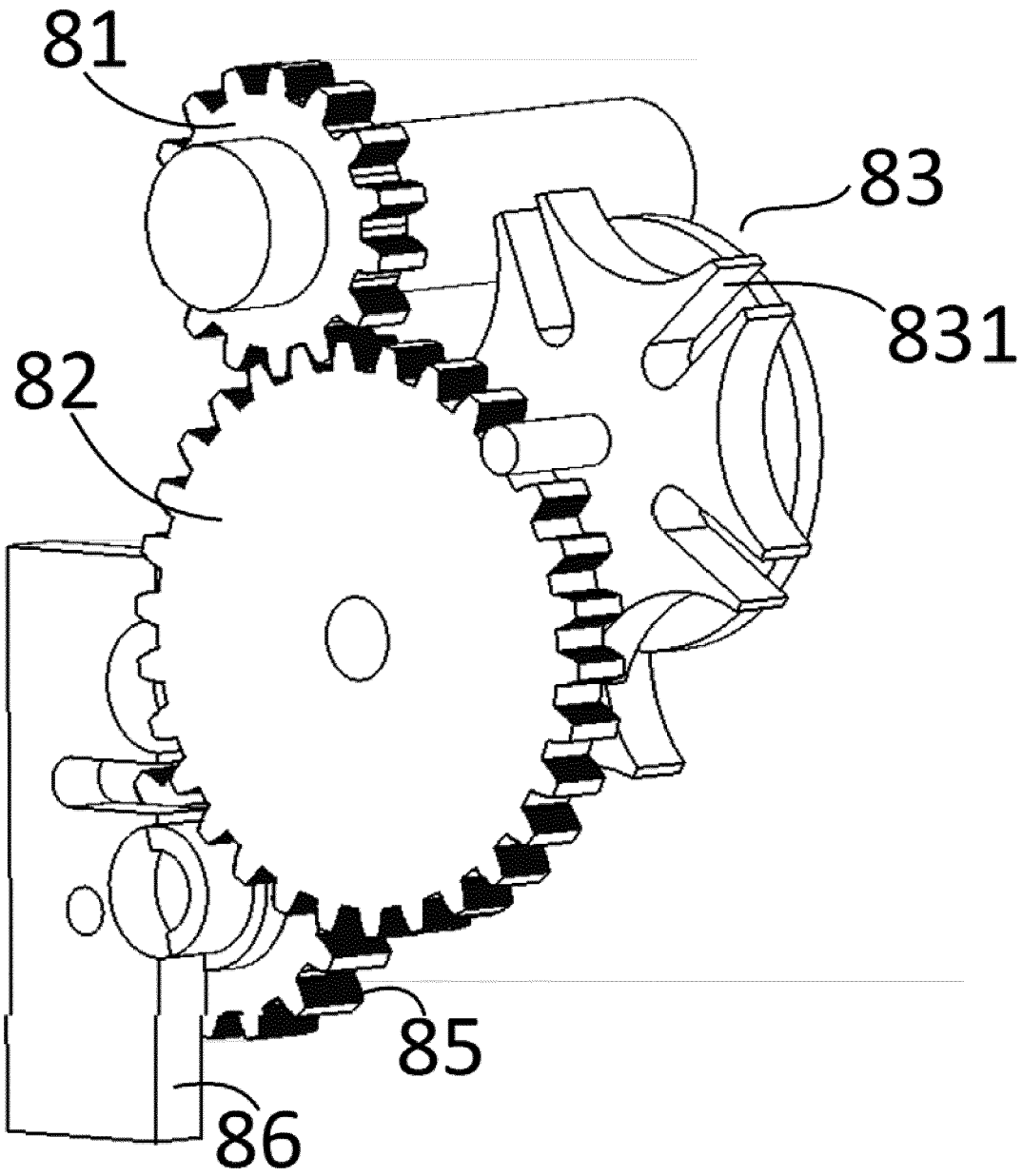

Fig.13

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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 7705

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	EP 1 056 921 A2 (TRISTEK LTD [IL]) 6 December 2000 (2000-12-06) * paragraph [0029] - paragraph [0032]; figures 7-11 *	1-7	INV. E04F10/10 E06B9/34
A	DE 35 11 246 A1 (PFEFFER THEOPHIL DIPL ING) 2 October 1986 (1986-10-02) * page 17, paragraph 1 - page 19, paragraph 2 * * page 21, paragraph 2; figures 1, 2, 6 *	1-7	
A	EP 2 307 654 A1 (VKR HOLDING AS [DK]) 13 April 2011 (2011-04-13) * paragraphs [0018], [0033], [0036], [0037], [0041], [0042]; figures 13-17 *	1-7	
A	WO 2012/016982 A1 (BEUZEBOC VINCENT [FR]) 9 February 2012 (2012-02-09) * abstract; figures 1A-4 *	1-7	
A	AU 2003 204 589 B2 (TRISTECK LTD) 28 July 2005 (2005-07-28) * abstract; figures 1-9 *	1-7	TECHNICAL FIELDS SEARCHED (IPC) E04F E06B
A	EP 2 985 405 A1 (BRACCHITTA GIUSEPPE [IT]; BRACCHITTA MAURIZIO [IT]) 17 February 2016 (2016-02-17) * abstract; figures 5, 6 *	1-7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 August 2017	Weißbach, Mark

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
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EPO FORM 1503 03.82 (P04C01)

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25-08-2017

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