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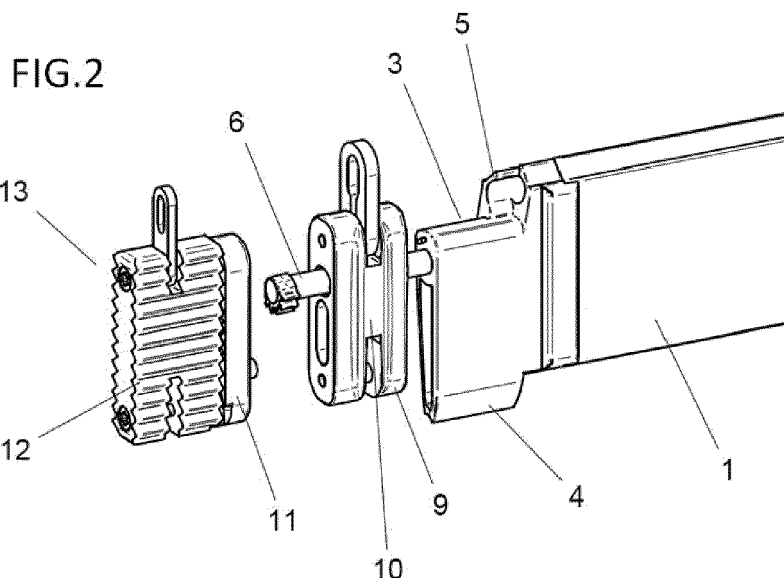
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(54) **IMPROVED SHUTTER**

(57) The invention relates to an improved shutter comprising slats that can be oriented by rotation characterised in that the rotation of the slats is caused due to the slats incorporating a shaft ending in a cogwheel that engages a rack, such that the relative movement of the slat with respect to the rack causes the rotation thereof,

and wherein the slat has an offset and a stop and is associated to a hub that is wider than the slat, the shaft of the slat being geared to a rack part that is joined to a catch the path of which can be blocked by the action of pivoting tabs.



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Description

[0001] The proposed invention relates to an improved shutter comprising rotating slats characterised in that the rotation of the slats occurs as a result of the incorporation therein of a shaft provided with gear components, such as a cogwheel that engages with a rack, in such a manner that the relative movement of the slat with regard to the rack makes the slat rotate.

[0002] During the operations of raising or lowering the shutter, the body of the slat and the rack move together; however, the action of a series of tabs located on the path of the parts incorporating the rack may block the descent of these parts that incorporate the rack. Once the descent of the parts incorporating the rack has been blocked, the slat continues its descent enough as for the engagement or friction between the shaft of the slat and the rack to cause the rotation of the body of the slat.

[0003] The degree of inclination of the slats can be adjusted by the controlled ascent or descent thereof.

[0004] The slat comprises an offset on the sides and tabs or protrusions that function as stops.

[0005] The slat shaft moves freely along a groove that is attached to the rack and acts as a guide for said shaft.

BACKGROUND OF THE INVENTION

[0006] Louvered shutters with orientable slats are very common; these are fixed, rigid shutters that can be oriented in order to allow more or less light through.

[0007] Several solutions have been developed to enable this possibility of orienting the slats in rolling shutters, although none offer the technical solution disclosed herein.

Already in 1964 patent ES296295 disclosed a rocking device for rolling shutters with pivoting and adjustable slats wherein such slats were joined in a pivoting manner at the ends by side chains that allowed the pivoting of said slats and were also attached to front chains that transmitted the pivoting movement from driving slats to the rest of the driven slats, the slats being permanently attached to the front chains that transmitted the pivoting movement between them.

[0008] More recently utility model 1038677 also suggests the pivoting of the slats of a shutter based on a series of tensing components that link them together. Patent ES2043131 also discloses a rolling shutter with pivoting slats wherein the slats are linked to one another by a driving chain and a pivoting chain.

[0009] This system of slats that are linked to one another both by driving elements and pivoting elements is present, among others, in patents ES2162571, ES2153463, ES2196936, although each patent provides specific solutions that overcome certain problems or provide advantages with respect to the prior art.

In some patents, such as ES2241458, means are incorporated to automate the guiding of the slats in their opening, essentially consisting in additional components that

when raising or lowering the shutter gather a series of extensions of the driving slats and guide them, thus changing the orientation of the rest. However, these systems allow orienting the slats only when the height of the driving slat coincides with such additional guiding elements.

[0010] The closest patent in the state of the art is Spanish patent ES2397012, also by the applicant, regarding a shutter system with orientable slats that shares with this application that the slats comprise a shaft that engages a rack in which, at a certain time of the lowering of the shutter, the part comprising the rack, and which also comprises ratchets, stops due to the action of certain tabs, whereas the slat continues to descend such that the slat rotates by engagement or friction of the shaft on the rack. The aforementioned Spanish patent does not however solve certain problems such as how to make the ends of the slats, the stops for aligning the slats, the arrangement and configuration of the ratchets and tabs, the grooves in the rack with respect to the cogwheel axis in order to produce the rotation, certain problems regarding pressure when rolling up the shutter or light passing through the areas that allow rotation, among others.

DESCRIPTION OF THE INVENTION

[0011] In order to solve these problems we propose an orientable slat system the pivoting movement of which is generated by the relative movement between the slat and a part comprising a rack which this part engages.

[0012] To do this, the slat comprises a shaft, preferably eccentric and preferably arranged at a point that is higher than the longitudinal centre of gravity of the slat, which protrudes from the slat body at the ends and that comprises, at least on one of such ends although preferably on both, a suitable cogwheel to engage a part that comprises a rack such that the slat rotates when both parts are engaged and the slat moves upwards or downwards with respect to the part that comprises the rack.

[0013] To return the slat to its vertical position it shall suffice, for example, to perform the reverse operation, i. e. to raise the slats until they are in a vertical position, and once in said position to unblock the parts incorporating the rack.

[0014] In a theoretical implementation, the release of the parts incorporating the rack would result in them falling by gravity and the resulting verticality of the slats, although this embodiment is not recommended, amongst other things due to the abruptness of the drop, the need for greater force for unblocking the parts incorporating the rack, and electronics that would allow such alternative.

[0015] Each slat is thus independent from the others, allowing to alternate in a same shutter slats that rotate and slats that do not rotate.

[0016] In order to facilitate the controlled rotation and other operational aspects of the shutter, the improved shutter comprises:

1. At least one slat that rotates upon a particular shaft and comprising:

a. The body of the slat itself which in turn comprises:

- i. A main elongated laminar body with a height between 20 and 100 mm.
- ii. An offset on the top of the ends of this laminar body, such offset having a maximum of 50% of the height of the slat, preferably between 10% and 40% of its height and preferably between 20% and 30% of its height.
- iii. A lower extension at the ends vertically coinciding with the offset, this extension preferably having a height equal to or less than that of the offset.
- iv. At least one stop at one of the ends, this stop being preferably arranged in the offset area.
- v. A shaft on which the body of the slat rotates as a whole and which incorporates gear or friction elements that we shall call the cogwheel, said shaft being eccentric and preferably located at a point above the centre of gravity of the slat.

b. A first chain the links of which comprise a hub that is crossed by the shaft that moves upward and downward together with the main body of the slat, this hub preferably having a longitudinal groove on the front and a longitudinal protrusion on the back.

c. A second chain the links of which comprise a part that has an inner rack and which holds the end of the shaft of the slat and a linear catch on the outside faces, wherein:

- i. The allowance between the cogwheel and the rack is preferably between 3% and 8% of the width of the guiding groove, understanding the width of the guiding groove as the total width of the housing of the rack part over which the cogwheel runs.
- ii. The catch exhibits, on at least one of its sides, a series of teeth the angles of which with respect to the horizontal plane of the flank on which the linear catch rests is at most of 60°, preferably between 30° and 50°. In the event that the teeth have an isosceles triangle section, with the two non-vertical sides being equal, the horizontal plane of the flank on which the linear catch rests would coincide with the bisection of this triangle.

2. A braking system for the link of the second chain,

comprising:

- a. A U-shaped rail
- b. Elements that immobilise or release the link of the second chain.
- c. Means for varying the position of such elements.

[0017] In a system thus configured the body of the slat shall rotate by the action of the cogwheel on the rack when there is a relative movement of the shaft on the rack.

[0018] During the operations of raising and lowering the shutter the body of the slat, the link from the first chain and the link from the second chain move upward or downward together with the shutter.

[0019] Located on the path of the link of the second chain, coinciding with the catch, are a series of tabs suitable for blocking the descent of the parts incorporating the catches.

[0020] These tabs shall have a complementary geometry to the peaks of the catch.

[0021] Once the descent of said pieces is blocked, the body of the slat can still descend slightly with the shaft guided by the groove present in the link of the second chain.

[0022] This descent of the body of the slat and its shaft with respect to the link of the second chain causes the body of the slat to rotate due to the action of the cogwheel on the rack.

[0023] The cogwheel has on its perimeter a toothed area and one or several other areas with geometry complementary to the ends of the guiding groove, these areas being preferably flat.

[0024] For the body of the slat to return to its position perpendicular to the surface of the Earth, the body must be raised slightly such that the action of the cogwheel on the rack once again causes the body of the slat to rotate, this time in the opposite sense.

[0025] Once the body of the slat is perpendicular to the surface of the Earth, the tabs, by the action of a flat bar, vary their position and release the catch thus allowing the upward or downward movement of the body of the slat together with the first and second links.

[0026] On the other hand, the cogwheel that is at the ends of the shaft of the slat has on its perimeter a toothed area and other flat areas. These flat areas have a geometry complementary to the ends of the guiding groove and collaborate to keep the cogwheel fixed at the ends of said guiding groove.

[0027] The aforementioned stop prevents the slat from rotating in the opposite sense, for example by the action of an external force, and also prevents the passage of light in certain positions of the slat.

[0028] This stop also favours the rolling and unrolling operations of the shutter on its upper shaft since it contributes to maintaining the slats in position when rolling upon themselves.

[0029] The front longitudinal groove and the rear lon-

itudinal protrusion of the hub contribute to the coupling of the tongue and grooved hubs to one another during rolling operations.

[0030] Thus, since said hub is wider than the slat, when the shutter rolls around the upper roller all the pressure of the rolling falls on the hub, thus preventing the slats from wear.

[0031] In addition, the tongue and grooving contributes to the rolling being orderly, preventing sideways shifts that may cause tension in the structure of the shutter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

Figure 1 shows in detail the end of the body of one of the slats with the main body of the slat (1), the longitudinal centre of gravity of the slat (2), the offset (3), the lower extension (4), the stop (5), the shaft of the slat (6) and the rotation shaft of the slat (7) and the cogwheel (8).

Figure 2 shows a detail of the end of a slat with the main body of the slat (1), the offset (3), the lower extension (4), the stop (5) the hub (9) crossed by the shaft of the slat (6) and with a groove on the front (10), also showing the cogwheel (8) that can be inserted in a rack part (11) and which is integrally joined to a catch (12) such that the ensemble of the catch (12) and the rack part (11) will be called the link of the second chain (13).

Figure 3 shows, in two different drawings, the side of the rack part (11), the first drawing (22) showing the cogwheel (8) engaged at the top end of the guiding groove, whereas in the other drawing (23) the cogwheel is engaged at the bottom of the guiding groove and is rotated with respect to the drawing (22). The cogwheel can be seen to comprise in its perimeter a toothed area (20) and two areas (21) complementary to the geometry of the ends of the guiding groove, which in this case are flat.

Figure 4 shows in detail a series of slats connected to one another.

Figure 5 shows in a first drawing (24) a hub (9) in plan view showing the groove (10) on the front and the protrusion on the back (14) and in a second drawing (25) two hubs one above the other showing their tongue and groove joining.

Figure 6 shows the catch piece (12) at two different times, with its teeth (18) shown from the side and one of the tabs (15) blocking it and pivoting around a shaft (19), representing in a first drawing (16) the tab set apart and therefore the catch (12) moving freely whereas the second representation (17) shows a catch (12) on which tabs (15) act on both sides, where the tabs (15) are blocking the movement of the catch.

Figure 7 shows the shutter rolled around the top roller having eliminated the catches from this view in order

to show how the hubs (9) that are joined by a tongue and groove assembly form a compact disk when rolled around one another and taking on the pressure from the rolling.

Figure 8 shows a section of the rail (27) in which the shutter moves up and down, showing a catch (12), a hub (9), a rotated slat (26) with a suitable offset (3) to bridge the extension of the rail (28) when the slat rotates.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0033] The invention proposed can be embodied in many different ways, and here we have chosen one on which tests have been performed, without this rejecting other embodiments that may share the technical solutions claimed herein.

[0034] The invention proposed relates to an improved shutter comprising:

1. A plurality of slats wherein each slat rotates on a particular shaft and wherein each slat comprises:

a. The body of the slat itself which in turn comprises:

- i. An elongated, laminar main body (1) with a height of 40 mm.
- ii. An offset (3) on the top of the ends, which offset measures 10 mm.
- iii. A lower extension (4) on the ends vertically coinciding with the offset, this extension measuring 10 mm.
- iv. A stop (5) at each end, this stop being arranged in the area of the offset (3).
- v. A shaft (6) on which the body of the slat rotates as a whole unit and which incorporates gear or friction elements that we shall call a cogwheel (8), such shaft being located at a point above the longitudinal centre of gravity of the slat, the cogwheel having in its perimeter a toothed area (20) and two areas with a geometry complementary to the ends of the guiding groove (21) which in this case are flat.

b. A hub (9) crossed by the shaft (6) the upward and downward movement of which is integral with that of the main body of the slat, said hub having a longitudinal groove (10) on the front and a longitudinal protrusion (14) on the back which have a complementary geometry. The assembly formed by the hub and the couplings with the higher and/or lower hubs shall be called the link of the first chain.

c. The end of the shaft and the cogwheel (8) house a rack part (11) that is suitable for engag-

ing with the cogwheel (8), said piece being joined to a catch (12), the assembly formed by both being the link of the second chain (13), wherein:

- i. The allowance between the cogwheel and the rack is 5% of the width of the guiding groove.
- ii. The catch (12) has on its two faces a series of teeth with a section in the shape of an isosceles triangle the two equal sides of which are the ones that protrude and the angle of which with the bisection is of 40°.

2. A braking system for the link of the second chain, comprising:

- a. Tabs (15) that rotate about a shaft (19) and which when changing position immobilise or release the link of the second chain wherein these tabs reproduce at least the reverse geometry of a peak in the catch.

[0035] The connection of several slats forms a shutter that shall roll or unroll around the top roller when it is raised or lowered.

[0036] In the position or raising or lowering, the slats that are not rolled around the top roller are aligned on the same plane and preferably perpendicular to the surface of the Earth as shown in figure 4, the slats and the links from the first and second chain all moving upwards and downwards together, since the pull of the shutter is borne by the hub whereas the links of the second chain rest on the shaft in that position.

[0037] During the raising or lowering operations the slats, in particular the links of the second chain, run free through the rails (27) of the shutter since the tabs (15) are out of their path.

[0038] In order to rotate the slats, the tabs (15) change their position pivoting around their shaft (19) from which they receive their movement, said shaft being associated to a driving force such as an electromagnet.

[0039] According to its position, which is determined by the shaft (19), the tabs (15) can invade the path of the catch, thus blocking it, or remain out of the path of the catch leaving it free.

[0040] Due to this variation in the position of the tabs, the catches remain stationary, and so do the rack parts.

[0041] Despite the immobilisation of the links of the second chain, both the shafts of the slats (6) and the hubs (9) and the slats continue their descent thus running along the rack.

[0042] Since the rack is engaged with the cogwheel (8) the downward movement of the shaft of the slat (6) on the fixed rack causes the shaft to rotate, and therefore the body of the slat (1) also rotates.

[0043] To return the slats to their initial position, i.e. perpendicular to the surface of the Earth, they are raised,

causing the reverse rotation due to the engagement of the cogwheel.

[0044] Once the shaft reaches the top of the groove incorporated in the links of the second chain, the tabs change position, for example by the action of a flat bar that may run up and down along the rail by the action of an electromagnet, thus enabling the shutter to be raised or lowered.

[0045] To prevent the first and second chain from becoming unstable in the rolling of the shutter around the top roller, a groove has been provided on the front of the hubs as well as a protrusion on the back such that when they roll over one another, they configure a disk-shaped structure by socketing that keeps the rolled shutter in position and also the hubs (9), by being wider than the slats, take on the pressure when rolling the shutter, thus preventing the action of undesirable forces on the slats.

Claims

1. Improved shutter of the type comprising a plurality of slats of which at least one has a rotation shaft associated to a part on which it engages or drags such that the relative movement of the shaft on said part causes its rotation, **characterised in that** it comprises

1. a plurality of slats of which at least one rotates over a particular longitudinal shaft and wherein said slat comprises:

a. The body of the slat itself which in turn comprises an elongated laminar main body (1) of a height of between 20 and 100 mm and on its ends an offset (3) in which is housed a stop (5) and a lower extension (4) that coincides vertically with the offset, this extension being preferably of a height equal to or less than that of the offset.

b. A shaft of the slat (6) that rotates together with the body of the slat and which incorporates gear or friction elements that we shall call a cogwheel (8).

c. A first chain the links of which comprise a hub (9) that has a longitudinal groove (10) on one side and a longitudinal protrusion (14) on the opposite side.

d. A second chain the links of which comprise an element having an inner rack and which houses the cogwheel (8) wherein the allowance between the cogwheel and the rack is preferably between 3% and 8% of the width of the guiding groove, and another element comprising a linear catch (12).

2. A braking system for the link of the second chain, comprising:

- a. A rail through which the catch (12) runs.
 - b. A plurality of mobile tabs (15).
 - c. Means for varying the position of the tabs comprising a shaft (19) around which the tabs pivot and a driving element associated to the shaft.
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- 2. Improved shutter according to claim 1 **characterised in that** the shaft of the slat (6) is eccentric and preferably located above the longitudinal centre of gravity (2) of the slat.
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- 3. Improved shutter according to claim 1 **characterised in that** the offset (3) is at most 50% of the height of the slat, preferably between 10% and 40% of its height and preferably between 20% and 30% of its height.
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- 4. Improved shutter according to claim 1 **characterised in that** the hub (9) is wider than the slat.
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- 5. Improved shutter according to claim 1 **characterised in that** the longitudinal groove (10) is on the front face of the hub (9) and the longitudinal protrusion (14) is on the back, both having a complementary geometry.
- 25
- 6. Improved shutter according to claim 1 **characterised in that** the teeth of the catch have an angle with respect to the horizontal plane of the flank on which the linear catch rests of a maximum of 60°, preferably between 30° and 50°.
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- 7. Improved shutter according to claim 1 **characterised in that** the tabs (15) each pivot about a shaft (19) which provides their movement.
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- 8. Improved shutter according to claim 1 **characterised in that** the cogwheel (8) has on its perimeter a toothed area (20) and at least one area with a complementary geometry to the ends of the guiding groove.
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- 9. Improved shutter according to the previous claim **characterised in that** the areas with a complementary geometry to the ends of the guiding groove are flat.
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FIG.1

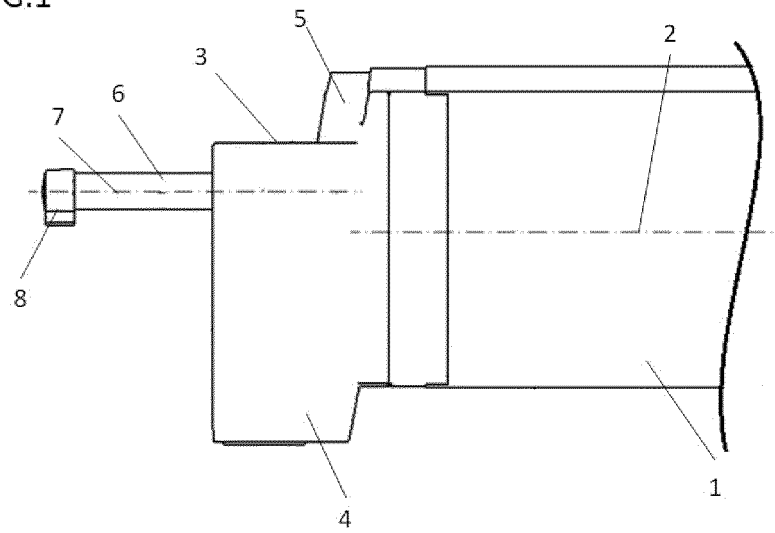
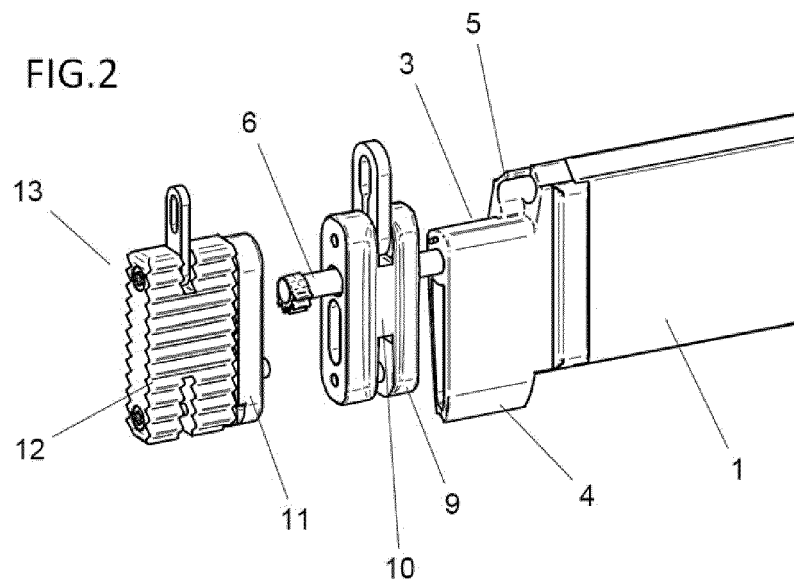


FIG.2



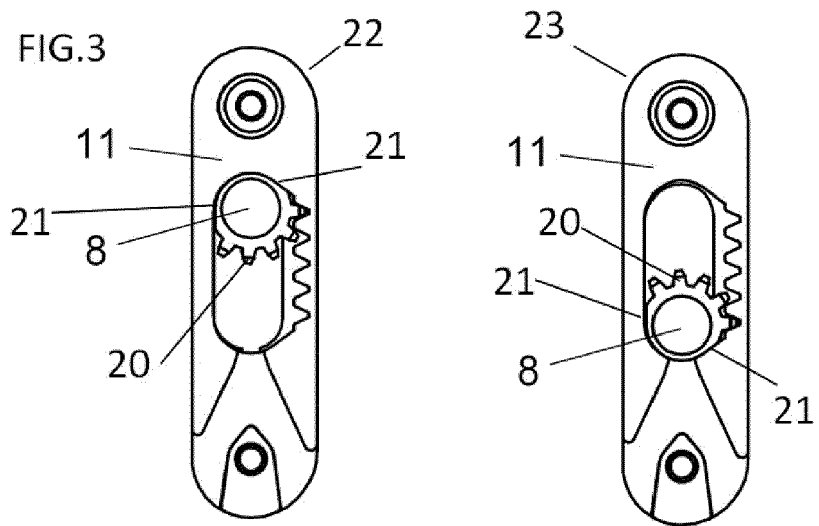


FIG.4

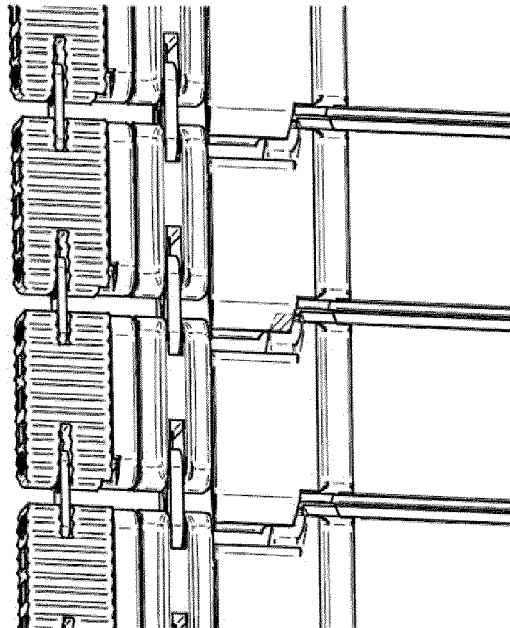


FIG.5

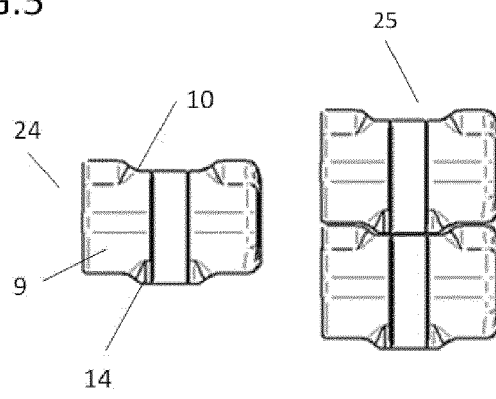


FIG.6

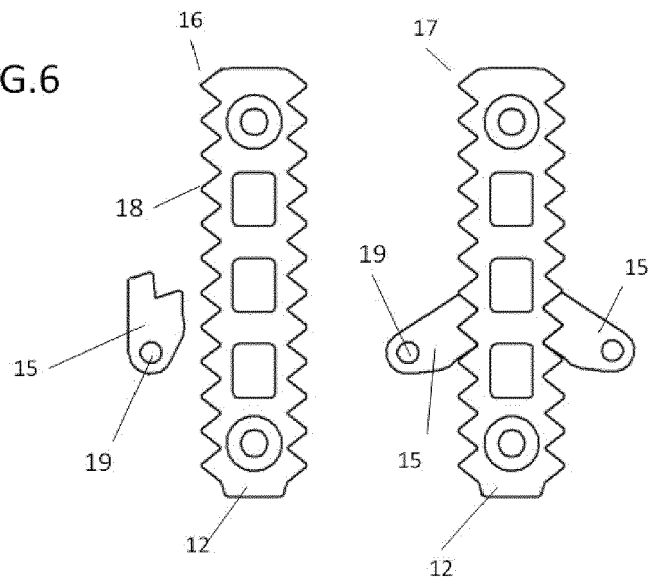


FIG.7

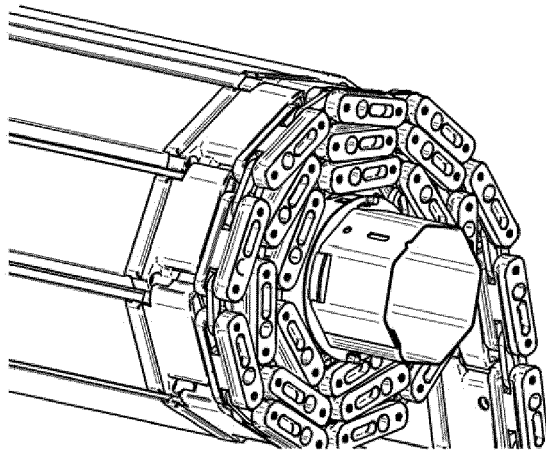
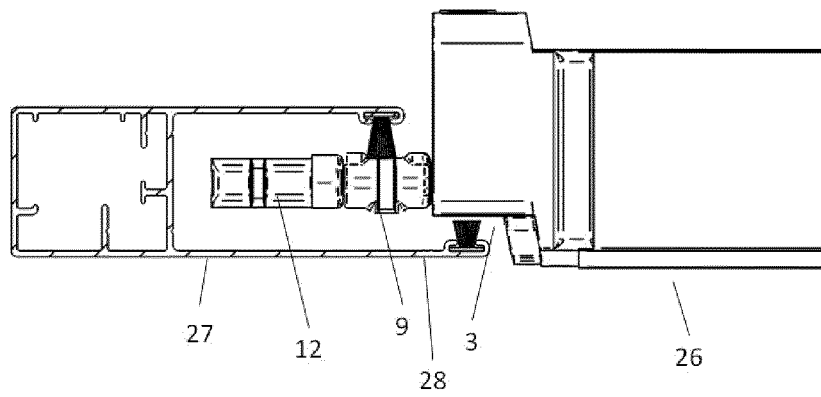


FIG.8





EUROPEAN SEARCH REPORT

Application Number
EP 17 15 2744

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 September 2017	Examiner Peschel, Gerhard
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			

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REFERENCES CITED IN THE DESCRIPTION

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