



(11)

EP 3 241 975 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.11.2017 Bulletin 2017/45

(51) Int Cl.:
E06B 9/86 (2006.01) **E06B 9/165 (2006.01)**
E06B 9/80 (2006.01) **E06B 9/17 (2006.01)**
E06B 9/15 (2006.01)

(21) Application number: **16382197.8**

(22) Date of filing: **05.05.2016**

(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:
MA MD

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(54) **MOTORIZED ROLLING SHUTTER**

(57) First aspect: It comprises: panel of slats (1, 2, 43); and locking device of the panel when the lower slat (2) reaches the lower position, and comprising a tilting retaining element (24) with: cam portion (45), to contact the lower slat (2) and tilt the retaining element (24) to a lower position; and ratchet portion (46), to hook the lower slat (2) in locked position locking the panel. Retaining element (24) tilts between locked position, and released position where the ratchet portion (46) does not hook the lower slat (2). It allows automatic locking of the panel. Second aspect: It comprises connection elements (8), connecting adjacent slats (1, 2, 43), and comprising: upper and lower members articulated to one another and connected to the slats (1, 2, 43); and torsion spring (15) to force upper and lower members to pivot to approximate slats (1, 2, 43). It allows selective visibility, lighting and ventilation.

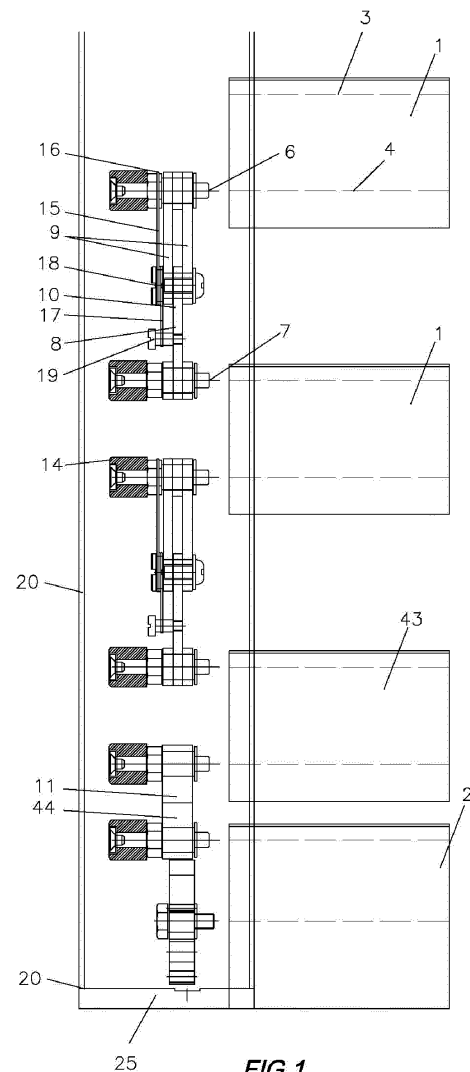


FIG. 1

Description

OBJECT OF THE INVENTION

[0001] The present invention can be included within the field of motorized roller shutters. In particular, the object of the invention relates to a motorized roller shutter, applicable to closure of windows, doors and other wall openings.

BACKGROUND OF THE INVENTION

[0002] The state of the art discloses numerous roller shutter constructions (also called shutters or closures) of motorized type, to close doors, windows and other closures of walls, where said shutters include horizontal parallel slats which define a panel of slats, where the slats are selectively maintained together or separated to respectively prevent or allow the entry of air and light through the shutter.

[0003] Most of the solutions contemplated in the state of the art include slats with elongated connection extensions provided on their sides or with connection elements incorporated between the slats.

[0004] US2921628 discloses a shutter provided with elongated connection extensions for the slats with size limitations in the light and air openings.

[0005] For its part, FR1508003 shows another type of roller shutter of cheaper production, whose slats, with open and weak structure, are connected to one another by connection elements threaded in openings made in the slats, which gives rise to frequent breakages.

[0006] ES0225708U shows a roller shutter on a roller, with horizontal bars connected together by tie-rods articulated as connection elements, the bars of which may be approximated or separated with the assistance of a cable or wound on a roller and guided between rails disposed opposite in side jambs connected to one another by a lower profile. The shutter bars can only be separated from or brought closer to one another to be wound up or down.

[0007] In more recent constructions, e.g. that disclosed in US6371189, the slats are connected by means of connection elements, external to the slats, which are flexible elements, such as cables or fibres, inserted in perforated arms which protrude from the ends of the slats, so that their breakage is easy.

[0008] Another construction of recent appearance on the market uses connection elements, external to the slats, with rotatory joints trimmed with rubber wheels to allow the silent sliding in the side jambs between which the shutter runs for its winding or unwinding. However, said rotatory and sliding movements of solid surfaces with respect one another increase the noise and possibility of interfering in the operation of the closure, and cause an increase in friction between the relatively mobile parts, and therefore, their wear, and also require low friction materials to reduce friction and wear to a mini-

mum. Furthermore, and despite the components of the rotatory joints being mounted with a precise angle favouring rotation, interferences may occur in the operation of the roller shutter. These roller shutters are also relatively expensive to produce and assemble-dismantle for the repair or replacement of the slats.

[0009] Generally, the panel of slats which include this type of devices can be wound and unwound by motor, e.g. on the motor casing or on a roller disposed behind the lintel of the opening to close.

DESCRIPTION OF THE INVENTION

[0010] The present invention discloses a motorized roller shutter to close openings which, according to a first aspect, provides an automatic locking element, and according to a second aspect, provides the selective option of allowing visual access to inside the opening, and lighting and ventilation of the opening.

[0011] According to the first aspect, the roller shutter comprises a panel of parallel slats to close an opening, where the slats incorporate a lower slat located lowermost the remaining slats. The shutter additionally comprises an actuation motor to make the panel go up and down, and a locking device to lock the raising of the panel, once the lower slat has reached a closed position, furthest down in its path, wherein the panel generally completely occupies the opening.

[0012] Advantageously, the locking device comprises: a first support, and a lock shaft fixed on the first support, and at least one retaining element, mounted tilting on its corresponding lock shaft. The retaining element, in turn, comprises a cam portion, configured to contact with the lower slat and make the retaining element tilt until the lower slat reaches the closed position. The retaining element also incorporates a ratchet portion, configured to hook the lower slat, defining, in the closed position, a locking situation wherein raising of the panel is prevented.

[0013] Each retaining element is operable to selectively tilt with respect to the lock shaft between the locked position and a released position, wherein the ratchet portion does not hook the lower slat and therefore it allows raising of the panel.

[0014] According to the second aspect, the shutter comprises a panel of slats to close an opening, and also comprises connection elements to connect consecutive pairs of slats, one of the slats of each pair located above and the other below.

[0015] Advantageously, the connection elements comprise first connection elements, to connect the slats of a pair. The first connection elements in turn comprise an upper member pivotably connected to a lower part of the slat located above, and a lower member pivotably connected to an upper part of the slat located below.

[0016] Likewise, the first connection elements also comprise a connection shaft located at an intermediate point between the two slats of the pair, and whereby the

upper member and the lower member are pivotably articulated to one another, and the first connection elements further comprise a torsion spring attached to the upper member and with the lower member to exercise on the upper and lower members a recovery force which tends to relatively pivot the upper and lower members with respect to the connection shaft to approximate the slats of each pair.

[0017] The motorized roller shutter comprising the locking device is compatible both with the first connection elements, articulated, and alternatively, third connection elements which are rigid.

DESCRIPTION OF THE DRAWINGS

[0018] To complement the description being made and in order to aid towards a better understanding of the characteristics of the invention, according to a preferred example of practical embodiment thereof, a set of drawings is attached as an integral part of said description wherein, with illustrative and non-limiting character, the following has been represented:

Figure 1.- Shows an elevational view of a side end of a motorized roller shutter according to the present invention, which illustrates the layout of one end of the slats, which are inserted in one of its jambs and, opposite the slats, in position before their incorporation in them, it also illustrates the connection elements.

Figure 2.- Shows a top view, in greater scale, of the side of the shutter shown in figure 1, with the connection elements already mounted.

Figure 3.- Shows a profile view of the side of the shutter, according to figure 1, with its components mounted and illustrating a working position coinciding with the end of the lowering of the shutter wherein the retaining element is being biased by the lowering of the lower slat.

Figure 4.- Shows a view according to figure 3 although showing the shutter locked by the retaining element, in correspondence with a locked position with the slats separated and equidistant.

Figure 5.- Shows a profile view of the side of the shutter, according to figure 4, illustrating a locked position, with the slats in contact, wherein the first connection elements are retracted, the slats are superimposed and the shutter fixed in that position by the retaining element.

Figure 6.- Shows a profile view of the side of the shutter, in correspondence with figure 5, illustrating a working position coinciding with the start of winding of the shutter from the position shown in figure 5 upon the retaining element having been released after actuation of the actuator.

Figure 7.- Shows a vista frontal of an example of the actuation mechanism based on an electromagnet.

Figure 8.- Shows an alternative embodiment to that

illustrated by figure 1, including rigid third connection elements instead of the first and the second connection elements.

Figure 9.- Shows an alternative embodiment to that illustrated by figure 5, including rigid third connection elements instead of the first and the second connection elements.

PREFERRED EMBODIMENT OF THE INVENTION

[0019] Below, a detailed description is offered with the aid of the aforementioned figures 1-9 of an example of preferred embodiment of a motorized roller shutter according to the present invention. The shutter is designed for closing a defined opening in a wall, wherein a door, a window, etc. is installed; for example, although not exclusively, in commercial premises.

[0020] The shutter comprises a panel composed of a plurality of horizontal, consecutive and parallel slats (1, 2, 43) comprising upper slats (1, 43) and a lower slat (2). The upper slats (1, 43) are preferably equal and comprise in turn a plurality of first upper slats (1) and a second upper slat (43) located below to the first upper slats (1). For its part, the lower slat (2) is placed below the second upper slat (43), in the lower part of the panel.

[0021] The slats (1, 2, 43) are guided, preferably at their ends, as shall be explained below, between two opposite guide rails (21) disposed in two side jambs (20), which can be interconnected by a lower profile (not represented) or even with the vertical sides forming part of a frame (not shown) the lintel of which may include a box (not represented) for the winding of the shutter.

[0022] The shutter additionally incorporates connection elements (8, 44, 49), where each connection element (8, 44, 49) interconnects a pair of adjacent slats (1, 2, 43), one of which occupies a lower position and another an upper position. The connection elements (8, 44, 49) are preferably located on both sides of the slats (1, 2, 43). The connection elements (8, 44, 49) comprise first connection elements (8) which are preferably articulated. In the example represented in the figures, a first connection element (8) comprises an upper member and a lower member, where the upper member is connected to the lower part of the slat (1, 2, 43) located above, whilst the lower member is connected to the uppermost of the slat (1, 2, 43) located below. The upper member and the lower member are articulated to one another by means of a connection shaft (18) located at an intermediate point between the two slats (1, 2, 43).

[0023] The figures show first pivots (6) and second pivots (7), with the first pivots (6) to rotatably attach the upper member of the first connection element (8) to the lower part of a slat (1, 2, 43), and with the second pivots (7) to rotatably attach the lower member of the first connection element (8) to the upper part of a slat (1, 2, 43).

[0024] The pivots (6, 7) may be materialized in various forms. According to the embodiment shown in the figures, the slats (1, 2, 43) comprise first housings (4) and second

housings (3), where the first pivots (6) are housed in the first housings (4), and the second pivots (7) are housed in the second housings (3). According to a particular example shown in the figures, the housings (3, 4) pass through the slats (1, 2, 43), so that the pivots (6, 7) can be formed by bars housed in the housings (3, 4) and which protrude from said housings (3, 4) by their ends. Alternatively, not represented in the figures, the housings (3, 4) may be blind, so that the pivots (6, 7) are connected to the housings (3, 4), externally protruding.

[0025] To assist a joint between the upper member and the lower member, and therefore cause approximation and separation of two adjacent slats (1, 2, 43) from one another, the first connection element (8) additionally comprises a torsion spring (15), which is preferably mounted coaxially with the connection shaft (18). The torsion spring (15) incorporates a first branch (16) coupled to the upper member, and a second branch (17) coupled to the lower member, so that the branches (16, 17) exercise on the respective upper and lower members a recovery force which tends to bring each pair of two adjacent slats (1, 2, 43) closer to one another.

[0026] According to a preferred embodiment shown in the figures, the upper and lower members are formed by first plates (9, 10). In particular, the figures illustrate that the upper member comprises two first upper plates (9) opposite one another and articulated to the first pivot (6), and the lower member comprises a first lower plate (10) articulated to the second pivot (7), wherein the first upper plates (9) are articulated to the first lower plate (10) by means of said connection shaft (18). The incorporation of first plates (9, 10) in the members of the first connection element (8) has an anti-intrusion effect, to avoid unauthorized access or vandalism.

[0027] It is shown in the figures that preferably the first lower plate (10), or alternatively any of the first upper plates (9), incorporate a protuberance (19) whereon the second branch (17), or alternatively the first branch (16), rests to favour the joint between the two adjacent slats (1, 2, 43).

[0028] According to the represented preferred embodiment, the lower slat (2) and the second upper slat (43) are not connected by a first connection element (8), but by a second connection element (44), which is not articulated, so that it does not allow significant separation and approximation between the lower slat (2) and the second upper slat (43). This avoids the existence of sufficient space between said lower slat (2) and second upper slat (43), and therefore that acts of intrusion and vandalism are committed against the shutter and its mechanisms. The second connection element (44) may be configured in various ways, many of them already known in the state of the art. It is preferred that there are two second connection elements (44), one on each side of the slats (1, 2, 43).

[0029] In particular, according to the example represented in the figures, the second connection element (44) comprises a second plate (11) to be articulately connect-

ed, for example, by screws (13) to said second upper slat (43) and lower slat (2), for example, in particular, to the housings (3, 4). This allows a certain relative displacement between the second upper slat (43) and the lower slat (2), to be able to articulate the necessary movement of the shutter panel, but without allowing a sufficient space to be defined to facilitate unauthorised access. A preferred example is represented in the figures wherein the second plate (11) comprises an elongated grommet (12), also called elongated hole, in the upper part, to connect to the second upper slat (43), whilst with the lower slat (2) the connection occurs by means of direct fitting in its respective joint shaft.

[0030] Bushings (14), for example of nylon, are mounted on the pivots (6, 7), in particular at free ends, opposite the connections with the slats (1, 2, 43). The jambs (20), which are situated at the sides of the panel of slats (1, 2, 43), are longitudinally covered by guide rails (21) wherein the bushings (14) slide.

[0031] An actuation motor (not shown), for example of reversible type, controlled by a remote control, is connected to the panel of slats (1, 2, 43) to achieve its winding or unwinding, depending on whether it is actuated in one direction or another, so that the panel displaces along the guide rails (21).

[0032] The shutter of the present invention advantageously comprises a locking device which makes it possible to lock the raising of the panel, once it has reached a closed position wherein the panel completely occupies the opening. When the locking device is activated, an actuation by the actuation motor in the direction of raising the shutter, causes separation of the slats (1, 2, 43), creating a cavity to allow vision from the outside and the passage of air, light, etc.

[0033] To decrease the noise generated by impact of the slats (1, 2, 43), the slats (1, 2, 43) may incorporate in their upper part, or in their lower part, dampers (5, 42), such as of *silent block-type* for example, of rubber, which in the figures have been represented in the lower part, and which dampen the contact between consecutive slats (1, 2, 43) or between the lower slat (2) and the ground. According to a preferred example, as shown in detail in figure 3, the dampers (5, 42) comprise first dampers (5), which have a forked shape, and are inserted on their corresponding slat (1, 2, 43). Also preferably, the dampers (5, 42) may comprise second dampers (42), which have circular shape, e.g. hemispherical, and which are housed in different channels made on their corresponding slat (1, 2, 43). It is preferred that the first dampers (5) are mounted on the upper slats (1, 43), whilst one of the second dampers (42) is mounted on the lower slat (2).

[0034] The locking device comprises at least one retaining element (24), mounted on a corresponding first support (22) rotatably with respect to a corresponding lock shaft (23) fixed to the first support (22). Preferably, there are two retaining elements (24), one on each side of the slats (1, 2, 43), and each one mounted on its re-

spective first support (22) rotatably around its lock shaft (23).

[0035] The retaining element (24) or, as has just been explained, each retaining element (24), comprises a cam portion (45) and a ratchet portion (46). The cam portion (45) is configured to contact by means of interference with the lower part of the lower slat (2), and cause rotation of the retaining element (24). The ratchet portion (46) is configured to hook the lower slat (2) and cause locking of the panel, preventing the raising of the panel when the panel has reached the aforementioned closed position. The retaining element (24) is operated to tilt between a locked position, wherein there is interference between the ratchet portion (46) with the lower slat (2) and therefore it prevents the raising of the panel, and a released position, wherein said interference no longer exists and therefore it allows raising of the panel.

[0036] In the example represented in the figures, each first support (22) rests on a corresponding base (25) of each one of the jambs (20). Preferably, the first supports (22) are separated by a distance greater than the length of the slats (1, 2, 43), and opposite, in closed position, the lower slat (2), although preferably positioned retracted in relation to the lower slat (2) in order to facilitate the opening or closing in the tilting of the retaining element (24).

[0037] Preferably, as observed in the figures, the ratchet portion (46) hooks the second slat (2) in the corresponding bushing (14) of said second slat (2).

[0038] According to a preferred embodiment, as illustrated in the figures, to actuate the tilting of the retaining element (24), it uses a lever (34) articulated on a lever shaft (33) and equipped with two arms (35, 36), which are defined as a first arm (36) and a second arm (35). The first arm (36) is connected to the retaining element (24) and the second arm (35) is connected to an actuation mechanism (47), so that, in locked position, when the actuation mechanism (47) acts on the second arm (36) of the lever (34), the first arm (36) in turn moves the retaining element (24) to release the interference with the lower slat (2) and allow the raising of the shutter panel.

[0039] It contemplates various ways to connect the first arm (36) to the retaining element (24). According to a preferred embodiment shown in the figures, first tie-rods (40) are used, for example in the form of flat metal plates.

[0040] Preferably, the actuation mechanism (47) comprises a displaceable element (31), which is longitudinally displaceable, the displaceable element (31) being connected to the second arm (35) of the lever (34), so that a displacement of the displaceable element (31) actuates the second arm (35), causing a tilting of the lever (34), so that the first arm (36) acts on the retaining element (24).

[0041] It is preferred that the actuation mechanism (47) comprises an electromagnet, as described below.

[0042] The electromagnet comprises a casing (30) and a frame, where the frame coincides with the displaceable element (31). When the electromagnet is actuated, the

displaceable element (31), i.e. the frame of the electromagnet, is longitudinally displaced. The displaceable element (31) is connected to the second arm (35) of the lever (34), so that when the displaceable element (31) is displaced, it acts on the lever (34) and therefore on the retaining element (24), as previously explained.

[0043] Similar to that explained previously for connection of the first arm (35) to the retaining element (24), various ways are contemplated to connect the second arm (35) with the displaceable element (31). According to a preferred embodiment shown in the figures, it is preferred to use second tie-rods (39), in the form of flat metal plates.

[0044] The figures show an example where the lever (34) is positioned below the actuation mechanism (47), in particular the electromagnet, so that a rising movement of the displaceable element (31) causes an upward movement of the second strap (39). The length of the arms (35, 36) can be determined at one's convenience depending on requirements, in particular of space, of each specific case. For example, it is preferred that the first arm (36) is substantially longer than the second arm (35), to optimize displacement of the retaining element (24).

[0045] In the preferred example represented in the figures, the electromagnet is mounted using at least one second support (26), preferably two vertically disposed second supports (26), which are separated from their corresponding first support (22), and fixed (preferably screwed) to its corresponding base (25) of the jambs (20). Preferably, the second support (26) incorporates in one of its faces a vertical extension (29) wherein is fixed, at working height, the casing (30) of the electromagnet, from which the displaceable element (31) emerges in the upper part. The lock shaft (23) wherein the lever (34) tilts is fixed on an opposite face of the second support (26).

[0046] On the other hand, preferably, it is possible to incorporate actuation means, such as an end-of-stroke (48), in correspondence with the displaceable element (31), for example, opposite a head of the displaceable element (31), so that, when the displaceable element (31) reaches the end-of-stroke (48), the actuation motor can raise the shutter, since there is no longer danger of interference between the ratchet portion (46) of the retaining element (24) and the lower slat (2). For security reasons, in the preferred case of there being two retaining elements (24), located one on each side of the slats (1, 2, 43), it is preferred that the ends-of-stroke (48) are synchronized to allow the actuation motor to actuate the raising of the shutter only when the two ends-of-stroke (48) have been activated.

[0047] The locking device may additionally incorporate force means (27) to push the retaining element (24) towards the locked position, helping that the retaining element (24), during the closed position, recovers the locked position, where the force means (27) push the retaining element (24) towards the locked position. In particular, by way of example, this occurs when actuation by the

first arm (36) of the lever (34) stops. In the figures, an example is represented wherein the force means (27) comprise a spring, for example, of helicoid type, which is connected, for example, by screws (28), at one end to the retaining element (24) and at the other to a fixed point (25) of the jamb (20), such as the second support (26).

[0048] To be able to actuate the shutter by means of the aforementioned actuation motor, it is possible to have an electric control (not represented), which may be fixed or displaceable, which orders the rotation of the actuation motor in one direction or another. In particular, the following movements and situations can be defined:

- a) A completely open position, wherein the opening is completely open, so that the panel of slats (1, 2, 43) is rolled up, preferably rolled on a roll (not shown) disposed external to the opening.
- b) An intermediate position, wherein the panel of slats (1, 2, 43) is partially rolled up or rolled down.
- c) A closed position, as previously described, wherein the panel completely occupies the opening.
- d) A locked position, which automatically occurs when it moves from an intermediate position to a closed position, since the retaining element (24) acts automatically. In the locked position, if the actuation motor does not act, the slats (1, 2, 43) fall and come together, whilst if in the locked position the actuation motor acts to try to raise the shutter, the first connection elements (8) tilt and cause separation of the slats (1, 2, 43).
- e) A released position wherein, starting from the locked position, the actuation mechanism releases the retaining element (24), allowing the panel to be raised.

[0049] The electronic control therefore allows the actuation motor to act to: wind or unwind the panel of slats (1, 2, 43) when the retaining element (24) is not in locked position; and provide approximation or separation between the slats (1, 2, 43) in locked position; or for the actuation mechanism to act to release the retaining element (24).

[0050] Once locked position is reached, the separation between the pairs of adjacent slats (1, 2, 43) of the panel occurs by means of rotation of the actuation motor in the winding direction and once the separation is executed, there is an obligatory stop of the actuation motor due to the blocking maintained by the retaining element (24) on the lower slat (2).

[0051] In short, maintaining the locked position, the passage from a situation wherein the panel of slats (1, 2, 43) is completely unwound and completely occupying the opening and the slats (1, 2, 43) are kept together in contact with one another, to a situation wherein the panel of slats (1, 2, 43) continues to completely occupy the opening and the slats (1, 2, 43) are kept separated from one another equidistant to one another, is given by a slight rotation of the actuation motor, whilst reversal of

the direction of the actuation motor in the same path, shall return the panel of slats (1, 2, 43) to the previous situation, assisted by the action of the springs (15) and of gravity, always keeping the locked position.

[0052] The unlocking order biases displacement of the displaceable element (31) of the electromagnet which, through the second tie-rod (39), displaces the second arm (35) of the lever (34), whilst the lower first arm (36) actuates the retaining element (24) through the first tie-rod (40) and it forces it to rotate, to be separated from its locked position, allowing the winding of the panel of slats (1, 2, 43). The displacement of the displaceable element (31) of the electromagnet guarantees its contact with the actuation means of the actuation motor, in particular with the end-of-stroke (48), whereby it orders the rotation of the actuation motor in order to cause displacement of the displaceable element (31) until the position required by the user or, where applicable, the complete winding of the panel of slats (1, 2, 43).

[0053] In first locked position, when the slats (1, 2, 43) are joined in contact or appreciably close together and no light and air spaces have been created between them, the first articulate connection elements (8) are folded, and the branches (16, 17) of the torsion springs (15) do not exercise any tension on them, the panel of slats (1, 2, 43) completely seals the opening, the electromagnet is at rest as is the actuation motor, and the lever (34), the retaining element (24) and the spring (27) are also at rest. Following with the locked position, but in the situation wherein the panel of slats (1, 2, 43) occupies the opening and the slats (1, 2, 43) are kept separate from one another and equidistant to one another creating spaces of light and air between them, the branches (16, 17) of the torsion springs (15) offer slight pressure outward to maintain the separation of the first connection elements (8), so that one end of the spring (15) hits on its corresponding screw (13) in the lower plate (10), whilst the opposite end rests on the lower end of the slat (1, 2, 43) above each pair of neighbouring slats (1, 2, 43).

[0054] By means of the described invention, it achieves a motorized safety shutter, with anti-intrusion effect, which is mounted forming a shutter, and allowing a great view of the inside, and a locking of the shutter.

[0055] The previous paragraphs have described a motorized shutter equipped with a locking device, and a roller shutter comprising first connection elements (8), which are articulated, and second connection elements (44), which are not articulated, where in particular an embodiment has been described wherein the shutter comprises the locking device in combination with the first (8) and the second connection elements (44).

[0056] As illustrated in figures 8 and 9, the presence of the locking device is also compatible with third non-articulated connection elements (49), in replacement of the first connection elements (8) and optionally also of the second connection elements (44).

[0057] The incorporation of the third non-articulated connection elements (49) provides the technical effects

mentioned below, and which are based on the length of the third connection elements (49) is less than that of the first connection elements (8):

- reduction of the size of the box to wind the shutter; 5
- adapt the installation of a shutter with locking device to an old construction wherein the shutter winding box already has a pre-established size;
- reduce the cost and complexity of a shutter with locking device. 10

[0058] In particular, each third connection element (49) comprises a rigid connection body (50), and which can be connected to the slats (1, 2, 43), for example, incorporating an upper hole (51) and a lower hole (52), to connect two adjacent slats (1, 2, 43). It is preferred that at least one of the holes (51, 52) has elongated form, where in the figures it has been represented that the upper hole (51) has elongated shape. The effect of incorporating at least one hole (51, 52) is twofold: on the one side, the assembly is simplified, and on the other hand, it allows that the third connection elements (49), which are rigid, be displaceable, as are the first connection elements (8), between a position wherein they make contact and do not allow ventilation or lighting, and a position wherein certain lighting and ventilation are allowed, but leaving a reduced spaced to avoid acts of vandalism. 15 20 25

[0059] Likewise, the connection bodies (50) are preferably configured by way of flat tie-rods, as illustrated in figure 8. 30

[0060] In figure 8 it is observed that, preferably, the connection body (50) corresponding to the joint of the lower slat (2) with the second upper slat (43) has a shorter length than the connection bodies (50) corresponding to the other slats (1, 43), to further reduce the acts of vandalism. 35

Claims

1. Motorized roller shutter, comprising:

- a panel of parallel slats (1, 2, 43) consecutively connected to close an opening, the slats (1, 2, 43) comprising a lower slat (2) located lowermost; 45
- an actuation motor to actuate raising and lowering of the panel; and
- a locking device to lock the raising of the panel, once the lower slat (2) has reached a closed position wherein the panel completely occupies the opening; 50

characterized in that the locking device comprises:

- a first support (22); 55
- a lock shaft (23) fixed on the first support (22); and

- at least one retaining element (24), mounted tilting on its corresponding lock shaft (23), and comprising:

- cam portion (45), configured to contact with the lower slat (2) and make the retaining element (24) tilt until the lower slat (2) reaches the closed position; and
- ratchet portion (46), configured to hook the lower slat (2), defining, in the closed position, a locking situation wherein raising of the panel is prevented; each retaining element (24) being operable to selectively tilt with respect to the lock shaft (23) between the locked position and a released position, wherein the ratchet portion (46) does not hook the lower slat (2) and therefore it allows raising of the panel.

2. Motorized roller shutter, according to claim 1, wherein the locking device additionally comprises force means (27), such as a spring, connected to the retaining element (24) and to the second support (22), to push the retaining element (24) towards the locked position. 25

3. Motorized roller shutter, according to claim 1, wherein the locking device additionally comprises a lever (34) articulated on a lever shaft (33) and comprising: 30

- a first arm (36) connected to the retaining element (24); and
- a second arm (35), connected to an actuation mechanism (47), to actuate the tilting of the retaining element (24), so that, in locked position, when the actuation mechanism (47) acts on the second arm (35) of the lever (34), the first arm (36) in turn displaces the retaining element (24) to unhook from one another the ratchet portion (46) and the lower slat (2) and allow the raising of the shutter panel. 35 40

4. Motorized roller shutter, according to claim 3, wherein the actuation mechanism (47) comprises a displaceable element (31), which is longitudinally displaceable, the displaceable element (31) being connected to the second arm (35) of the lever (34), so that a displacement of the displaceable element (31) actuates the second arm (35), causing a tilting of the lever (34), so that the first arm (36) acts on the retaining element (24). 45

5. Motorized roller shutter, according to claim 4, wherein the lever (34) is positioned below the actuation mechanism (47), so that an upward movement of the displaceable element (31) causes a tilting of the lever (34). 50

6. Motorized roller shutter, according to any of claims 3-5, wherein the actuation mechanism (47) comprises an electromagnet comprising a casing (30) and a frame, where the frame coincides with the displaceable element (31), where the displaceable element (31) is longitudinally displaceable by actuation by the electromagnet to act on the second arm (35) of the lever (34) and in consequence, on the retaining element (24).

7. Motorized roller shutter, according to claim 1, wherein there are two retaining elements (24), one on each side of the slats (1, 2, 43), and each one mounted on its respective first support (22) rotatably around its lock shaft (23).

8. Motorized roller shutter, according to claim 1, wherein it additionally incorporates at least one actuation means, in correspondence with its corresponding displaceable element (31), each actuation means being activated by the displacement of its displaceable element (31) to command the actuation motor to raise the shutter.

9. Motorized roller shutter, according to claim 8, wherein the actuation means comprises an end-of-stroke (48).

10. Motorized roller shutter, comprising:

- a panel of parallel slats (1, 2, 43) consecutively connected to close an opening; and
- connection elements (8, 44, 49) to connect pairs of consecutive slats (1, 2, 43), one of the slats (1, 2, 43) of each pair being located above and the other below;

wherein the connection elements (8, 44, 49) comprise first connection elements (8), to connect the slats (1, 2, 43) of a pair, and where the first connection elements (8) in turn comprise:

- an upper member pivotably connected to a lower part of the slat (1, 2, 43) located above;
- a lower member pivotably connected to an upper part of the slat (1, 2, 43) located below;
- a connection shaft (18) located at an intermediate point between the two slats (1, 2, 43) of the pair, and whereby the upper member and the lower member are pivotably articulated to one another; and
- a torsion spring (15) attached to the upper member and the lower member, to exercise on the upper and lower members a recovery force which tends to relatively pivot the upper and lower members with respect to the connection shaft (18) to approximate the slats (1, 2, 43) of each pair.

11. Motorized roller shutter, according to claim 10, additionally comprising:

- first pivots (6) to rotatably attach the upper member of the first connection element (8) to the lower part of its slat (1, 2, 43), and
- second pivots (7), to rotatably attach the lower member of the first connection element (8) to the upper part of its slat (1, 2, 43).

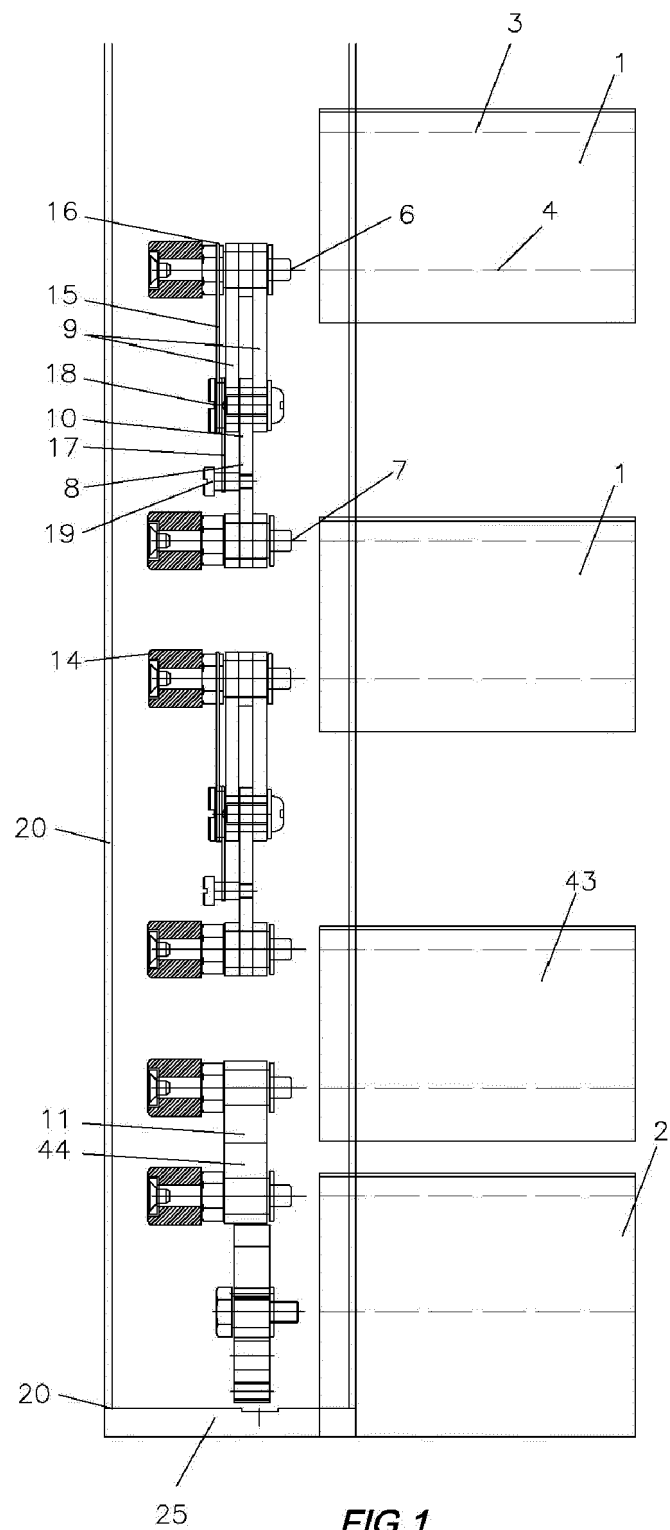
12. Motorized roller shutter, according to claim 10, wherein the upper member comprises two first upper plates (9) opposite one another and articulated to the first pivot (6), and the lower member comprises a first lower plate (10) articulated to the second pivot (7), where the first upper plates (9) are articulated to the first lower plate (10) by means of the connection shaft (18).

13. Motorized roller shutter, according to claim 10, wherein the slats (1, 2, 43) comprise first housings (4) located below and second housings (3) located above, where the first pivots (6) are housed in the first housings (4), and the second pivots (7) are housed in the second housings (3), where preferably the housings (3, 4) pass through the slats (1, 2, 43), so that the pivots (6, 7) comprise bars housed in the housings (3, 4) and protruding from said housings (3, 4) by their ends.

14. Motorized roller shutter, according to any of the preceding claims, wherein the slats (1, 2, 43) incorporate dampers (5, 42) to dampen the noise generated by impacts between the slats (1, 2, 43) or between the slats (1, 2, 43) and the ground, where preferably the dampers (5, 42) comprise at least one of a list consisting of:

- first dampers (5), which have a forked shape, and are inserted in their corresponding slat (1, 2, 43); and
- second dampers (42), which have a circular shape, and which are housed in different channels made on their corresponding slat (1, 2, 43).

15. Motorized roller shutter, according to any of claims 1-9, additionally comprising third non-articulated connection elements (49), to connect adjacent pairs of slats (1, 2, 43), wherein the third connection elements (49) comprise a connection body (50) which is rigid and which can be connected to the adjacent pair of slats (1, 2, 43), wherein the connection body (50) additionally comprises an upper hole (51) and a lower hole (52), to connect two adjacent slats (1, 2, 43), where at least one of the holes (51, 52) is elongated, and the connection bodies (50) are configured by way of flat tie-rods.



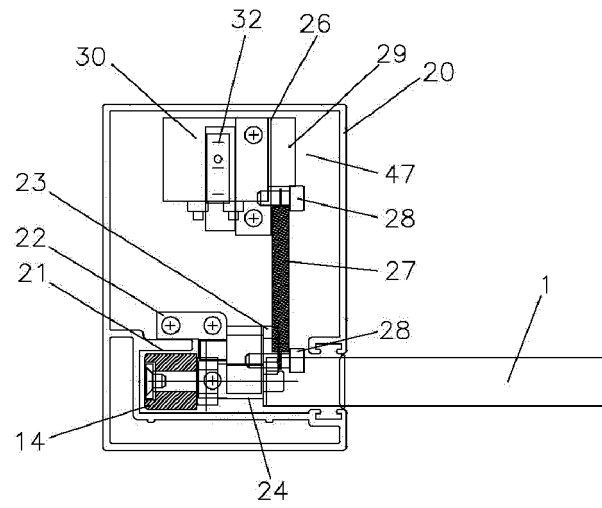


FIG.2

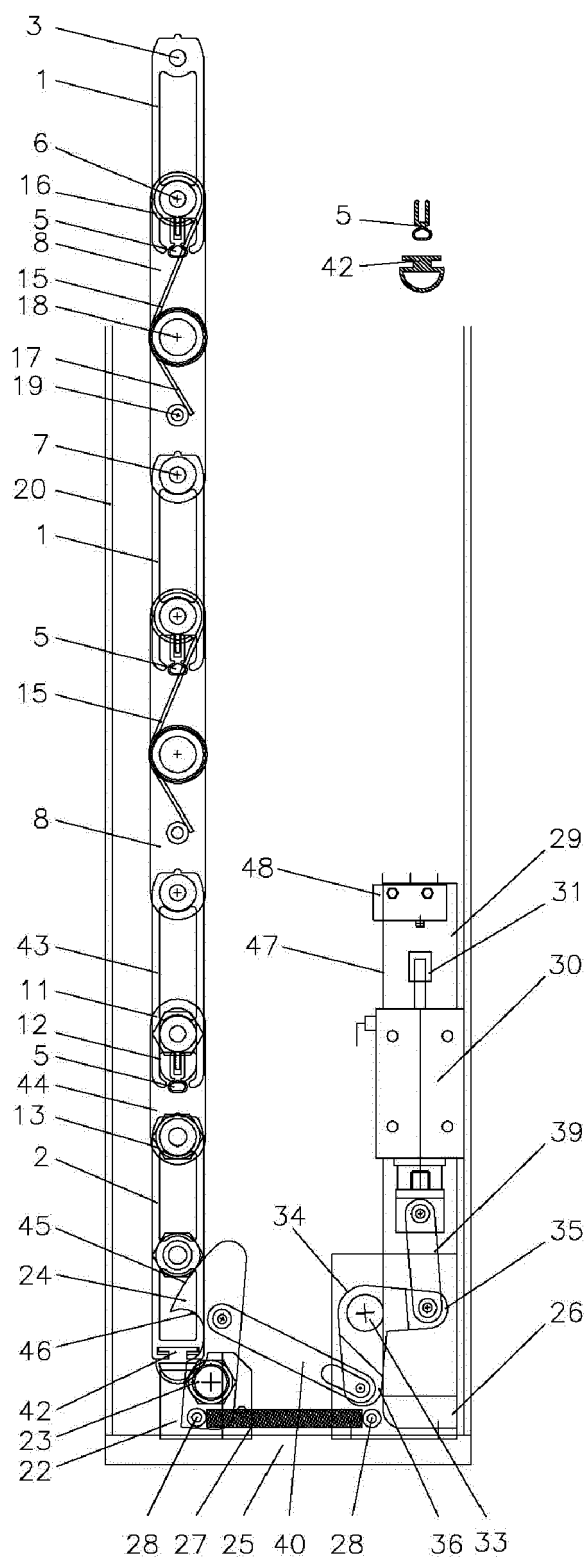


FIG.3

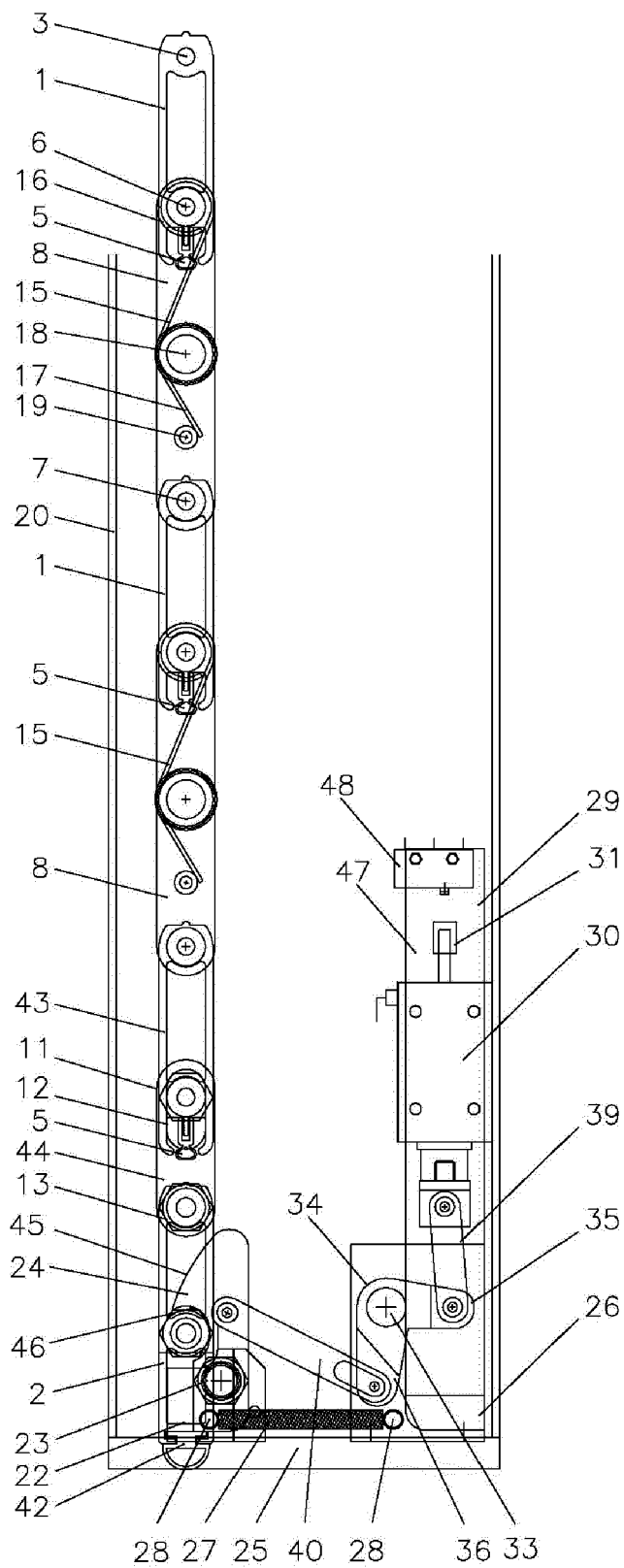


FIG.4

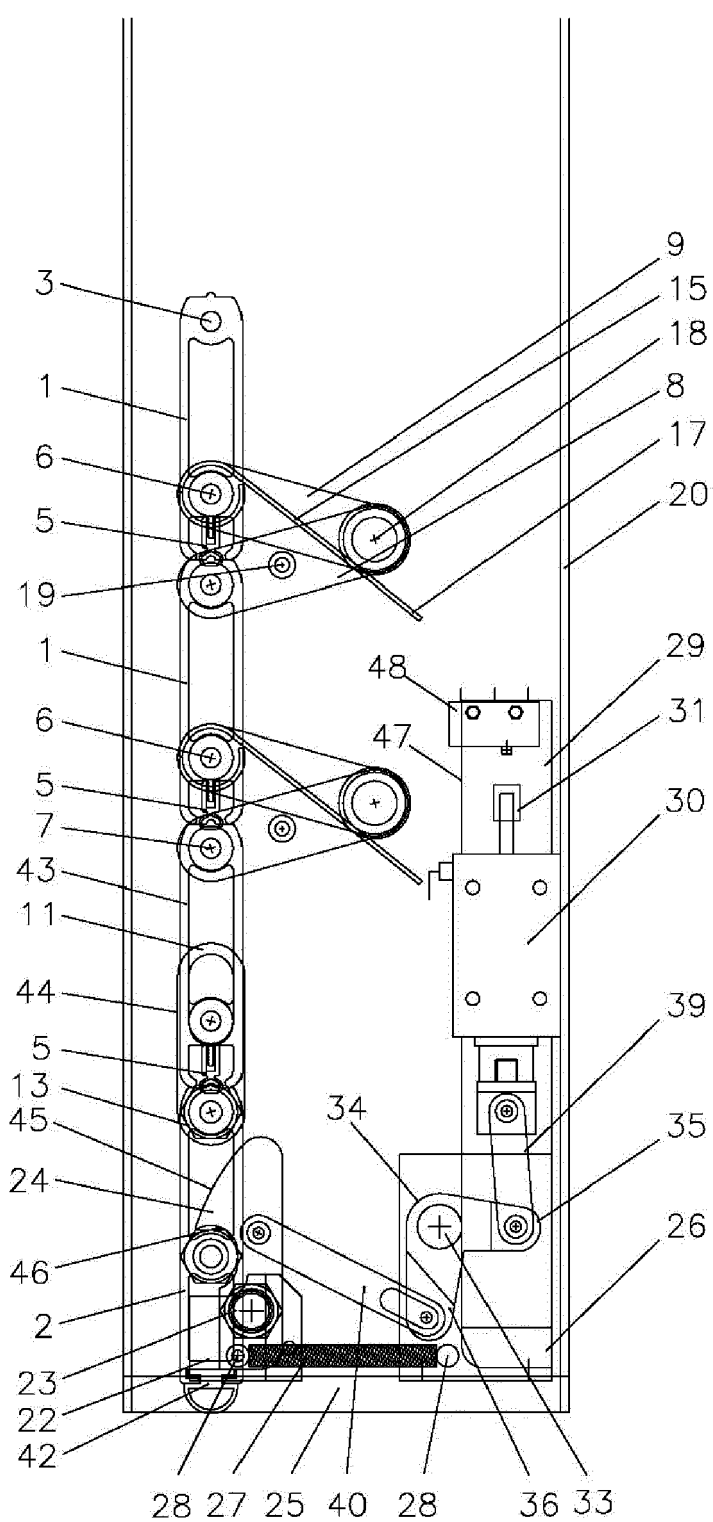


FIG.5

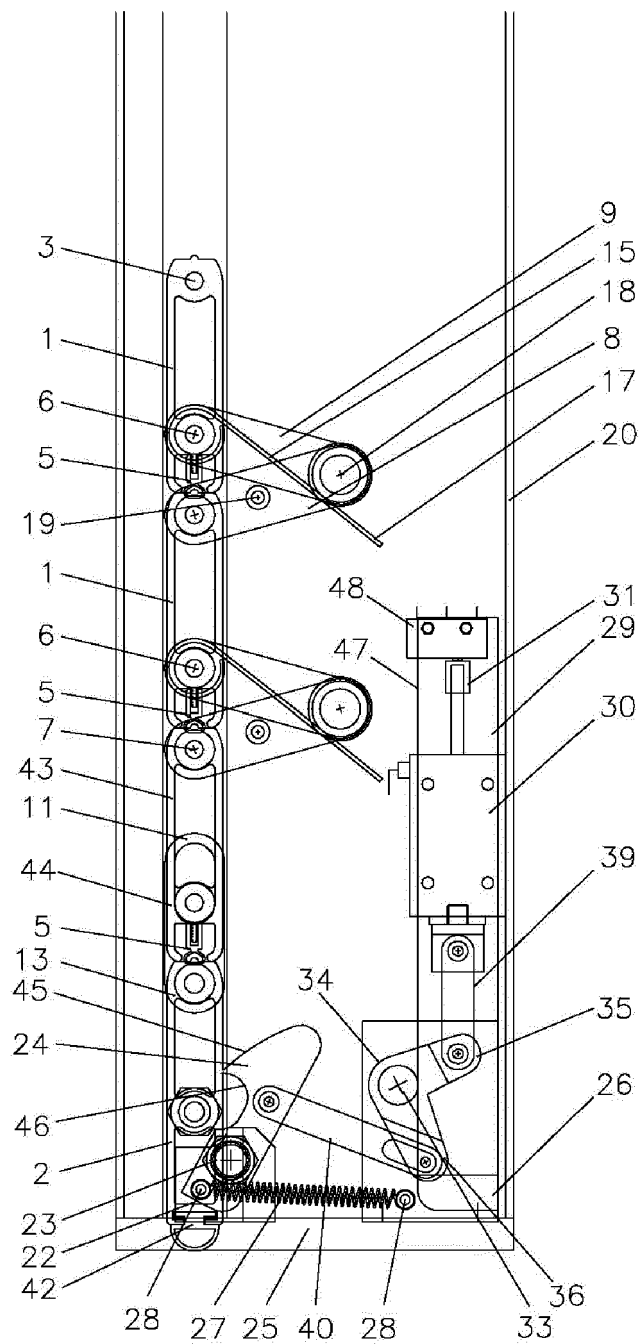


FIG.6

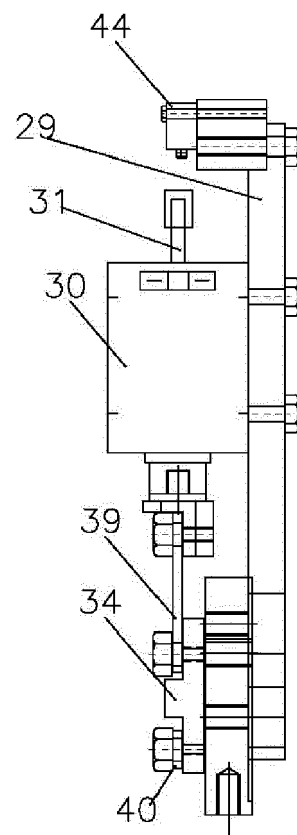
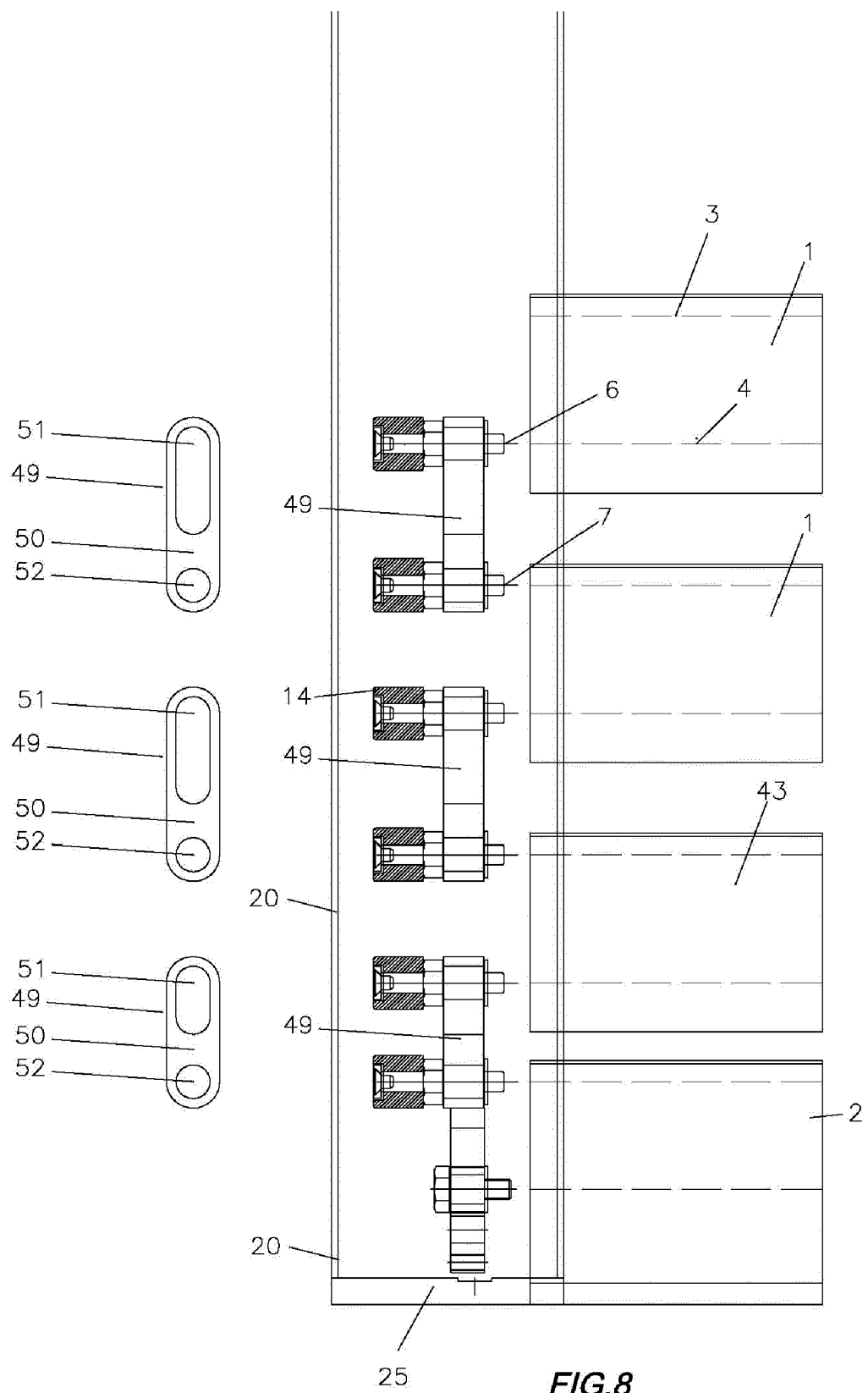


FIG.7



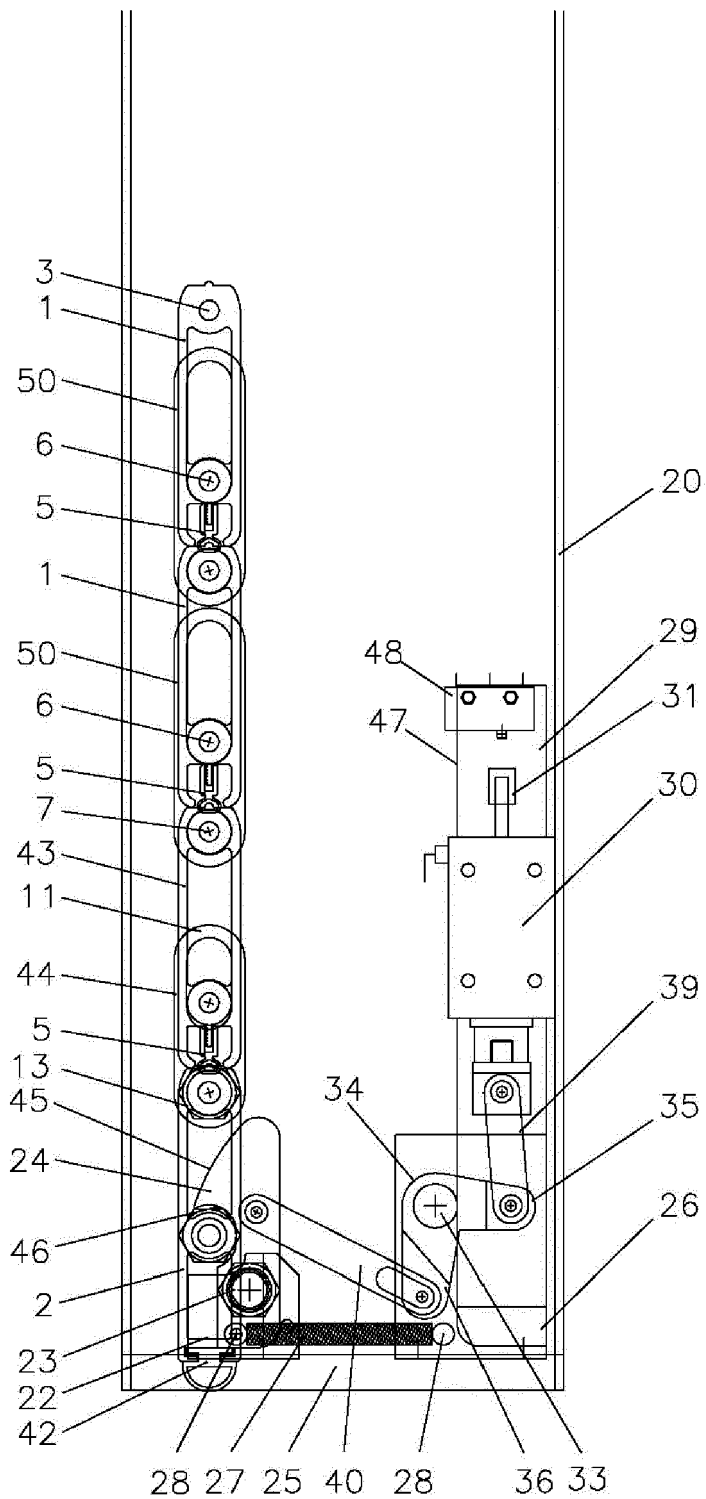


FIG.9



EUROPEAN SEARCH REPORT

Application Number
EP 16 38 2197

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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)
A,D	US 6 371 189 B1 (AZOULAI HAIM [IL]) 16 April 2002 (2002-04-16) * figures 1,3 * * column 1, line 5 - line 8 * * column 2, line 15 - line 22 * -----	10-14	INV. E06B9/86 E06B9/165 ADD. E06B9/80 E06B9/17 E06B9/15
A	DE 199 48 817 A1 (WIRAL ROLLADENFERTIGUNGS UND V [DE]) 12 April 2001 (2001-04-12) * figures 1-3 * * column 1, line 3 - line 25 * * column 1, line 60 - line 64 * * column 1, line 68 - column 2, line 1 * -----	10-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
1 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 November 2016	Examiner Tänzler, Ansgar
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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Application Number

EP 16 38 2197

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

10-14

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 16 38 2197

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 10-14

Motorized roller shutter with connection elements

2. claims: 1-9, 15

Motorized roller shutter with a locking device

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 38 2197

5 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
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25-11-2016

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 6371189	B1	16-04-2002	NONE

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

REFERENCES CITED IN THE DESCRIPTION

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- FR 1508003 [0005]
- ES 0225708 U [0006]
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