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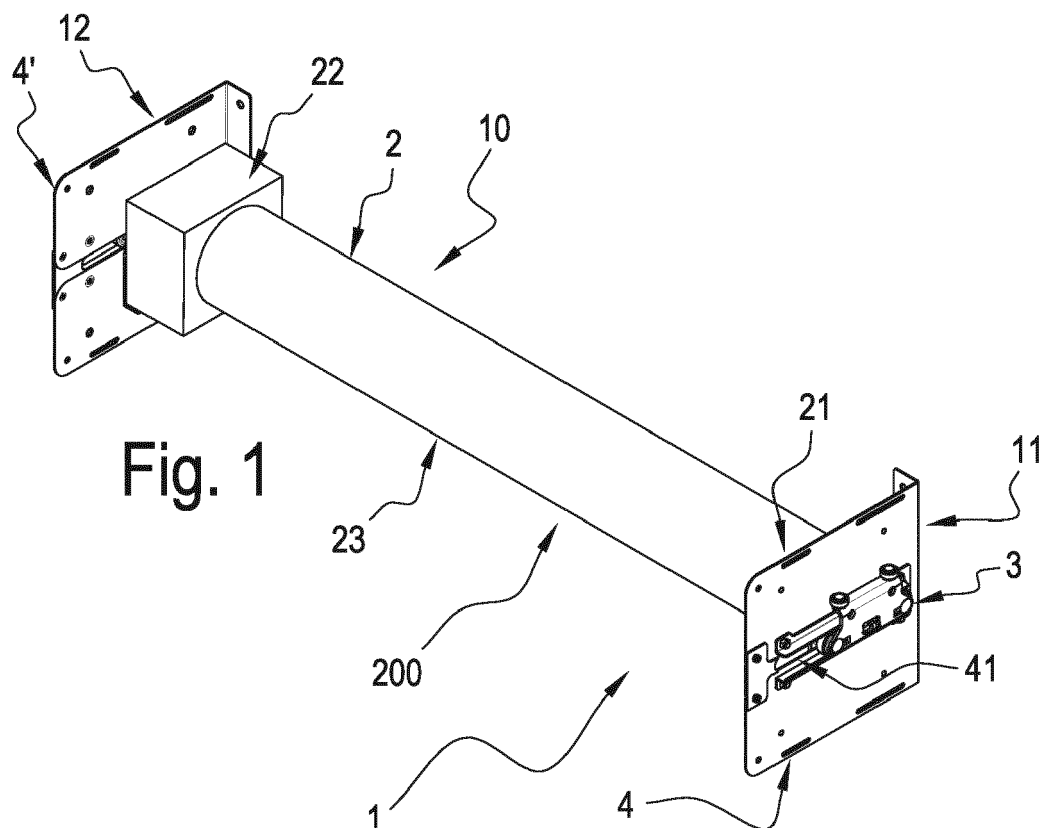
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(54) **SLIDING BEARING FOR A ROLLER SHUTTER MOTOR**

(57) Described is a sliding device (11) for a movement system (10) for winding a movable wall, in an apparatus for closing an access section to a room, config-

ured to facilitate the method for assembly of the apparatus if the movement system (10) comprises a motor (2).



Description

[0001] This invention relates to a sliding device for a movement system for winding a movable wall, in an apparatus for closing an access section to a room, configured to facilitate the method for assembly of the apparatus if the movement system comprises a motor.

[0002] According to the prior art apparatuses for closing a section for access to a room, a movement system is frequently used which is configured to move a wall designed to be positioned on a closing plane of the access section, in order to close that section. The movement system is configured to cause a movement of the wall between the closed condition and the open condition of the access section, by means of a winding/unwinding motion of the movable wall about a winding axis defined by the movement system. This type of movement system may be defined as a movement system for winding the movable wall.

[0003] During the winding motion, when opening, the wall is wound progressively around the winding axis, increasing the diameter of a "roller" which is defined by the portion of the wall wound around the winding shaft.

[0004] In the open condition, all or most of the wall is wound around the winding shaft, and the diameter of the "roller" defined by the wall is the maximum. During the unwinding motion, when closing, the wall is unwound progressively from the winding axis. The unwinding of the wall from the winding axis causes the reduction in the diameter of the "roller".

[0005] The use is known of a device for sliding the winding axis. The sliding device is configured for guiding a sliding movement of the winding axis in a direction transversal to the winding axis.

[0006] In fact, due to the presence of the structural elements which delimit the access section, the distance between the closing plane and the winding axis, in a direction transversal to the closing plane and winding axis, must allow the positioning of the roller in the fully open shutter condition.

[0007] If the distance between the closing plane and the winding axis were constant, the wall would be positioned, in a condition of not complete opening, starting from the axis, in such a way as to define a bending angle relative to the closing plane. This angle is to be considered defined on a plane transversal to the winding axis and to the closing plane, and therefore in a plane which in conditions of normal use is parallel to the force of gravity.

[0008] In other words, the distance between the winding axis and the closing plane, in a direction transversal both to the closing plane and the winding axis, results in, when the shutter is in the at least partially closed or completely closed condition, to a "bending" of the wall, since a first part (lower) of the wall is positioned on the closing plane of the room and at least a second part (upper) of the wall is positioned between the axis or the winding shaft and the closing plane.

[0009] The bending is formed at the second (upper) part of the wall.

[0010] The bending of the second (upper) part of the wall can allow the passage of insects or other flying creatures, and may increase the wear of the movable wall and/or the supporting system of the movable wall.

[0011] The closing apparatuses which comprise the sliding device are configured so that the sliding movement accompanies the variation of the diameter of the roller corresponding to the movement of the wall between the open condition and the closed condition, so as to prevent the bending of the movable wall which could be caused by the greater distance between the winding axis and the closing plane.

[0012] One type of sliding device comprises two sliding units operating at opposite ends of the winding axis. Each sliding unit contributes to allowing and guiding the sliding movement by means of a respective carriage translating along a respective guide in turn mounted on a respective plate. Each carriage is constrained to the respective end of the winding axis in such a way that the sliding movement of the winding axis of the wall can be performed by the translation of the carriage along the guide.

[0013] One drawback of prior art systems of this type is due to the fact that the motor, winding shaft and the movable wall must be fixed to the sliding unit after installation of the latter.

[0014] The installation height (normally located at a few metres from the ground or in any case higher than that of a person), and the weight of these motor elements, winding shaft and movable wall, means that the installation of these prior art systems is particularly inconvenient, lengthy and difficult. Moreover, there is the problem of the electrical cables, which must be fastened in these systems only after all the mechanical elements have been assembled, with considerable inconvenience in working at height above the ground, in uncomfortable positions.

[0015] An aim of the invention is therefore to provide a method of mounting and a sliding device of a movement system for winding a movable wall configured to close a section for access to a room for a motor, which overcome the above-mentioned drawbacks.

[0016] An assembly method according to the invention or according to any one of the appended claims of the method lends itself to the assembly of a movement system for winding a movable wall in a closing apparatus for closing a section for access to a room, in particular, but without limiting the scope of the invention, if the movement system comprises a tubular motor and the aim is to allow a sliding movement of the winding axis defined by the tubular motor during the winding motions for opening and unwinding motions for closing the movable wall.

[0017] A sliding device according to the invention or according to any one of the appended claims of the device is configured to allow an assembly method according to the invention to be performed or according to any one of the appended claims of the method.

[0018] A movement system according to this description or according to any one of the appended claims of the system comprises a sliding device according to the description or according to any one of the appended claims of the device.

[0019] A closing apparatus according to this description or according to any one of the appended claims of the apparatus comprises a movement system according to the description or according to any one of the appended claims of the system.

[0020] The features of a method, a device, a system and an apparatus according to the invention will become clearer from the following detailed description of respective possible example embodiments of that method, device, system and apparatus according to the invention.

[0021] The following detailed description refers to the accompanying drawings, in which:

- Figure 1 shows a perspective view from the right and from above of a possible example embodiment of a movement system according to the invention, in a condition of assembly of the embodiment of the system in a possible example embodiment of a closing apparatus according to the invention;
- Figure 2 is a perspective view from the left and from above of the embodiment of the system;
- Figure 3 is a perspective view of a tubular motor schematically illustrated and belonging to this embodiment of the system;
- Figure 4 is a perspective view from the left of a first sliding unit belonging to a possible example embodiment of a device according to the invention, the embodiment of the device belonging to the above-mentioned embodiment of the system;
- Figure 5 is a perspective view from the right of the first sliding unit;
- Figure 6 is a perspective view from the left and from above of a fixing condition between a first end of the tubular motor and a fixing plate belonging to the first unit;
- Figure 7 is a perspective view from the right of a second sliding unit belonging to the embodiment of the device;
- Figure 8 is a perspective view from the right and from above of a condition of fixing between a second end of the tubular motor and a fixing plate belonging to the second unit;
- Figure 9 is a perspective view from the right and from below of the fixing condition between the second end of the tubular motor and the fixing plate belonging to the second unit;
- Figure 10 is a perspective view from the right of a supporting plate belonging to the first unit;
- Figure 11 is a perspective view from the left of the supporting plate of the first unit;
- Figure 12 shows this embodiment of the movement system in a situation wherein each carriage belonging to the first sliding unit and a second carriage be-

longing to the second sliding unit adopts a respective condition for fixing to a respective end of the tubular motor and is removed from the guide of the respective unit;

- 5 - Figures 13 and 14 show two respective views of a possible example embodiment of a movement system according to the invention according to a further embodiment;
- 10 - Figures 15 and 16 show two respective views of a possible example embodiment of a movement system according to the invention according to yet another embodiment.

[0022] The accompanying drawings refer to a possible example embodiment of a sliding device according to the invention.

[0023] The device is labelled 1 in Figures 1 and 2.

[0024] The accompanying drawings refer to a possible example embodiment of a movement system according to the invention.

[0025] The system is for moving a movable wall by winding. The movable wall is to be considered as any closing element configured for closing an access section to a room. The room could be any environment or zone. The movable wall could, for example, be a shutter or a blind or a gate. The shutter could be a shutter of a commercial enterprise or an industrial shutter. The closing of the access section means preventing the passing through of said access section or only obstructing the passing through.

[0026] The system is labelled 10 in Figures 1 and 2.

[0027] The system comprises the device 1. The system comprises a motor 2.

[0028] It should be noted, more generally speaking, that the motor 2 might be a central motor or a so-called tubular motor (the description below with reference to the system applied to the tubular motor should be considered applicable also to the central motor where technically possible, and vice versa).

[0029] In any case, the term motor 2 in this invention means any actuator designed to generate mechanical energy, coupled to a winding shaft 200 for rotating it.

[0030] The winding shaft 200 extends along a relative axis X. That axis X is indicated in figure 3.

[0031] The motor 2 and the winding shaft 200 are configured to adopt a condition of connection to the movable wall. In this connection condition, the axis X of the tubular motor defines the winding axis of said movable wall.

[0032] The winding shaft 200 has a first axial end 21. If the motor 2 is of the tubular type, the first end of the winding shaft 200 is a drive end of the tubular motor 2. The winding shaft 200 has a second axial end 22. The tubular motor comprises an operating sector 23 situated axially between the first end 21 and the second end 22. The movement system 10 is configured so that, in said connection condition, the unwinding of said wall closing said section and the winding of said wall opening said section occur around said operating sector 23.

[0033] If the motor 2 is of the tubular type, the second end 22 is a parachute end of said tubular motor 2. The movement system 10 or the tubular motor 2 is configured so that said drive end 21 causes the rotation of said operating sector 23 about said axis X and said parachute end 23 is driven by said rotation in such a way as to be able to automatically limit the speed of said rotation if a preset limit is exceeded.

[0034] The accompanying drawings refer to possible example embodiments of an apparatus for closing said access section.

[0035] The apparatus comprises the movement system 10. The apparatus comprises the movable wall. In the apparatus, the motor 2 adopts the connecting condition.

[0036] The device 1 is configured to allow and guide the sliding of the motor 2 transversely to the axis X of the shaft 200 during the winding of the wall when opening the section and the unwinding of the wall when closing the section. The device is configured so that this sliding occurs by the direct effect of the winding or unwinding.

[0037] The device comprises a first sliding unit 11. The device 1 comprises a second sliding unit 12. The first unit 11 is configured to operate on the first end 21. The second unit 12 is configured to operate on the second end 22. The device comprises a first carriage 3. The device 1 comprises a second carriage 3'. The first carriage 3 belongs to the first unit 11. The second carriage 3' belongs to the second unit 12.

[0038] The device 1 comprises a first fixing system 5. The first fixing system 5 belongs to the first unit 11. The first fixing system 5 is configured to define a condition for fixing between said first carriage 3 and the first axial end 21. The device 1 comprises a second fixing system 5'. The second fixing system 5' belongs to the second unit 12. The second fixing system 5' is configured to define a fixing condition between said second carriage 3' and the second axial end 22.

[0039] The device 1 comprises a first guide 41. The first guide 41 belongs to the first unit 11. The first carriage 3 is configured to adopt a condition of insertion in the first guide 41. The first guide 41 is configured for guiding a translating motion of said first carriage 3 whilst said first carriage 3 adopts the condition of insertion in the first guide 41.

[0040] The device 1 comprises a second guide 41'. The second guide 41' belongs to the second unit 12. The second carriage 3' is configured to adopt a condition of insertion in the second guide 41'. The second guide 41' is configured for guiding a translating motion of said second carriage 3' whilst said second carriage 3' adopts the condition of insertion in the second guide 41'.

[0041] In the apparatus the movement system 10 adopts a condition for assembly in the apparatus.

[0042] The assembly condition of the movement system 10 in the apparatus corresponds to the condition of fixing the first carriage 3 to the first end 21. The assembly condition of the movement system 10 in the apparatus

corresponds to the condition of insertion of the first carriage 3 in the first guide 41. The assembly condition of the movement system 10 in the apparatus corresponds to the condition of fixing the second carriage 3' to the second end 22. The assembly condition of the movement system 10 in the apparatus corresponds to the condition of insertion of the second carriage 3' in the second guide 42.

[0043] Figures 1, 8 and 9 refer to a situation wherein each of the first carriage 3 and second carriage 3' adopts the respective fixing condition and the respective insertion condition. Figure 12 refers to a situation in which each of the first carriage 3 and second carriage 3' adopts the respective fixing condition but not the respective insertion condition.

[0044] The movement system or the device 1 is configured so that, whilst each of the first carriage 3 and second carriage 3' adopts the respective fixing condition and the respective insertion condition, the translating motion of the first carriage 3 and the translating motion of the second carriage 3' correspond to a sliding movement of said tubular motor 2 along a direction transversal to its axis X.

[0045] The sliding device 1 is configured so that the first fixing system 5, in order to define the fixing condition of the first carriage 3 to the first end 21 of the tubular motor 2, acts at least mainly parallel to the said x of the winding shaft 200. That means that the first fixing system, in order to define the fixing condition of the first carriage 3, applies a fixing action directed at least mainly along a direction parallel to the axis X of the tubular motor 2. The first fixing system 5, in order to define the fixing condition of the first carriage 3, might act parallel to the axis X of the tubular motor 5, and in this case the fixing action is directed along the direction parallel to the axis X of the tubular motor 2.

[0046] The method comprises a step of fixing the first carriage 3. The step of fixing the first carriage 3 is performed in such a way as to obtain the fixing condition of the first carriage 3.

[0047] The method comprises a step of inserting the first carriage 3. The step of inserting the first carriage 3 is performed in such a way as to obtain the condition of insertion of the first carriage 3 in the first guide 41.

[0048] It should be noted that, according to the invention, the elements for fixing to the sliding device, including the motor 2 and the shaft 200, may be fixed to the respective carriage 3 before they are inserted in the guide 41 (and the electrical cables can be coupled to the motor during this step); in this way, advantageously, the assembly operations are facilitated since the carriage 3 can be inserted in the guide 41 with all the components already fixed to it and coupled to each other mechanically and/or electrically.

[0049] The guide 41 is then closed, in such a way as to prevent the carriage 3 from coming out, by a first block 6, as described in more detail below.

[0050] In that way, a sliding device is provided for a

movement system for winding a movable wall configured to simplify the method for assembling the movement system in the apparatus which comprises it.

[0051] It should be noted that Figures 4 and 5 show a situation in which the first carriage 3 adopts the respective insertion condition but not the respective fixing condition, to show some features which would not be visible with the first carriage 3 in the respective fixing condition.

[0052] The step of fixing the first carriage 3 is performed by acting at least mainly parallel to said axis X. The step of fixing the first carriage 3 might be performed by acting parallel to the axis X.

[0053] The method comprises a step of fixing the second carriage 3'. The step of fixing the second carriage 3' is performed in such a way as to obtain the fixing condition of the second carriage 3'.

[0054] The method comprises a step of inserting the second carriage 3'. The step of inserting the second carriage 3' is performed in such a way as to obtain the condition of insertion of the second carriage 3' in the second guide 41'.

[0055] The step of inserting the first carriage 3 and the step of inserting the second carriage 3' are performed, advantageously, simultaneously (with the shaft 200 and/or motor 2 components preferably already fixed to each other and/or fixed to the respective carriages 3, 3'). For this reason, the condition of fixing the second carriage 3' (to the relative shaft 200 and/or motor 2 components) is also preferably performed before the step of inserting the second carriage 3'. Nevertheless, in Figure 7, in order to show some features which would not be visible with the second carriage 3' in the fixing condition, Figure 7 shows a situation wherein the second carriage 3' adopts the respective insertion condition but not the respective fixing condition.

[0056] Figures 8 and 9 refer, on the other hand, to a situation wherein the second carriage 3' adopts the respective insertion condition and the respective fixing condition.

[0057] The arrows A of Figure 12 indicate the direction of insertion of each of the first carriage 3 and second carriage 3' in the respective guide 41 or 41'.

[0058] The sliding device 1 is configured so that the second fixing system 5', in order to define the condition of fixing the second carriage 3' to the second end 22 of the tubular motor 2, acts at least mainly transversely to a direction parallel to said axis X.

[0059] This means that the second fixing system 5', in order to define the fixing condition of the second carriage 3', applies a fixing action directed at least mainly along a direction transversal to direction parallel to the axis X of the tubular motor 2. The second fixing system 5', in order to define the fixing condition of the second carriage 3', might act along the transversal direction, and in that case the fixing action exerted by the second fixing system 5' is directed along the transversal direction.

[0060] The step of fixing the second carriage 3' is performed by acting at least mainly transversely to said axis

X. The step of fixing the first carriage 3 might be performed by acting along the transversal direction.

[0061] The device 1 comprises a first fixing plate 51. The first fixing plate belongs to the first unit 11. The device 1 comprises a second fixing plate 51'. The second fixing plate 51' belongs to the second unit 12.

[0062] The device 1 comprises a plurality of first holes 511. The plurality of first holes 511 is located on or through the first fixing plate 51. The plurality of first holes 511 belongs to the first fixing system 5.

[0063] The device 1 comprises a plurality of first fixing elements. The plurality of first fixing elements is not shown. The plurality of first fixing elements belongs to the first fixing system 5.

[0064] The first fixing system 5 is configured so that, in said fixing condition of the first carriage 3, each first fixing element acts between a respective one of the first holes 511 and a first outer face 211 of the tubular motor 2 in such a way as to contribute to keeping said first face 211 against said first fixing plate 51. For this purpose, the fixing system, in the fixing condition of the first carriage, keeps the tubular motor 2 pulled against the first fixing plate 51 along a direction parallel to the axis X of the tubular motor 2.

[0065] The first face 211 is an outer surface transversal to said axis X of the tubular motor 2 and situated on said first end 21.

[0066] Each of the fixing elements could comprise, for example, a head and a shank. In the fixing condition of the first carriage 3, each of the fixing elements is oriented at least mainly or completely along a direction parallel to the axis X of the tubular motor 2.

[0067] The effect of simplifying the method for assembling the movement system, which is achieved thanks to carrying out the step of fixing the first carriage 3 before the step of inserting the first carriage 3, is performed in particular in the case of use of a first fixing system 5 having these features, since with this type of first fixing system 5 it would otherwise be very difficult if it is not impossible to obtain the fixing condition of the first carriage 3 whilst the first carriage is already in the condition for inserting in the first guide 41.

[0068] Figure 4 shows the first fixing plate 51 without the tubular motor and with the holes 511. Figure 6 shows more closely the condition of fixing the first carriage to the first end 21 of the tubular motor 2 by means of the first fixing plate 51.

[0069] The device comprises a first structure 4. The first structure belongs to the first unit 11.

[0070] The first structure 4 is configured to be fixed to a structural element which delimits the access section. This structural element could be, for example, a wall.

[0071] The first structure defines the first guide 41. The device 1 comprises a first opening 41a. The first opening 41a is situated on or through the first structure 4. The first opening 41 is situated on an edge 4a of the first structure 4. The structure 4 is configured so that the first guide 41 opens by means of the first opening 41a, to

allow said step of inserting the first carriage 3 to be performed whilst said first carriage 3 adopts said fixing condition.

[0072] Figures 10 and 11 show the first isolated structure in order to highlight its features and in particular the slot 422, the opening 41a and the edge 4a.

[0073] The device 1 comprises a first supporting plate 42. The first supporting plate 42 belongs to the first structure 4. The device 1 comprises a first track 43. The first track belongs to the first structure 4. The first supporting plate 42 has a first face 421 and a second face 423. The second face 423 faces the opposite side of the first supporting plate 42 relative to the first face 421.

[0074] The first supporting plate 42 is such that the first structure 4 can be considered to be a first flag-like structure.

[0075] The first face 421 is visible and indicated in Figure 5. The second face 423 is visible and indicated in Figures 4 and 6.

[0076] The first track 43 is mounted on the side of a first face 421 of said first supporting plate 42, in such a way that said first guide 41 is defined between said first track 43 and said first supporting plate 42 and on the side of said first face 421.

[0077] The device 1 comprises a first slot 422. The first slot 422 is situated on or through the first supporting plate 42. The first slot 422 places said first guide 41 in communication with the second face 423 of the first supporting plate 42. The first end 21 of the tubular motor 2, whilst the first carriage 3 adopts the respective fixing condition and the respective inserted condition, is situated on the side of said second face 423.

[0078] The device 1 comprises a first connecting element 32. The first connecting element 32 belongs to the first carriage 3. The first connecting element structurally connects the first carriage 3 to said first fixing plate 51. The first structure 4 is configured so that the condition of insertion of the first carriage 3 corresponds to the passage of said first connecting element 32 through said slot 422. The first structure 4 is configured so that the translational motion of the first carriage 3 corresponds to the motion of the first connecting element 32 along the slot 422.

[0079] This configuration of the device on the side of the first unit 11 increases the stability of the sliding of the tubular motor 2 on the first end 21.

[0080] Thanks to the first opening 41a, a first sliding unit 11 may be used which has these features which increase the stability, as it is possible to perform the step of inserting the first carriage 3 after the step of fixing the first carriage 3, thereby facilitating the step of fixing the first carriage 3 as mentioned above and therefore obtaining the above-mentioned effects in terms of simplifying the assembly method and simultaneously obtaining an excellent stability in the sliding of the tubular motor 2 on the side of the first end 21.

[0081] As already mentioned, therefore, the elements of the movement system (winding shaft 200 and/or motor

2 and/or movable wall) may be fixed to the carriage 3 before its insertion in the guide 41.

[0082] The first opening 41a in fact allows the passage of the first connecting element 32, during the insertion of the first carriage 3, whilst the first carriage already adopts the fixing condition to the first end 21 of the winding shaft 200.

[0083] The device 1 comprises a first block 6. The first block 6 belongs to the first unit 11. The first unit 11 is configured so that the first block 6 can be locked on the first opening 41a in such a way as to prevent the passage of the first carriage 3 from the insertion condition to a condition of disengagement relative to the first guide 41. The first block 6 could be a flange which can be locked to the first supporting plate 42.

[0084] In other words, the first block 6 guarantees that the carriage 3 does not escape from the guide 41 once it has been inserted in the slot 41a.

[0085] The first block is an element which is coupled to the first or second structure (4, 4').

[0086] The device 1 comprises a second fixing plate 51'. The second fixing plate 51' belongs to the second unit 11. The device 1 comprises a second fixing plate 51'. The second fixing plate 51' belongs to the second unit 12. The second fixing plate 51' forms a bracket 511'.

[0087] The second fixing system is configured so that, in said fixing condition of the second carriage 3', the second end 22 is supported by the bracket 511'.

[0088] The device 1 comprises at least one second hole 512'. The at least one second hole 512' is situated on or through the bracket 511'. The at least one hole 512' belongs to the second fixing system 5'.

[0089] The second fixing system 5' comprises at least a second fixing element. The at least a second fixing element is not shown.

[0090] The second fixing system 5' is configured so that, in said fixing condition of the second carriage 3', said second fixing element acts between said second hole 512' and said second end 22 to keep said second end 22 pressed on said bracket 511'.

[0091] The second fixing system could comprise two second holes 512' situated on the bracket 511' and two respective second fixing elements.

[0092] The device 1 comprises a second structure 4'. The second structure 4' belongs to the second unit 12.

[0093] The second structure 4' is configured to be fixed to the above-mentioned structural element which delimits the access section. Operatively, the motor 2 and the winding shaft 200 are situated between the structures 4 and 4' and can slide between them, thanks to the sliding units 11 and 12, during the winding and unwinding of the movable wall around the operating sector 23 of the tubular motor 2.

[0094] The second structure 4' defines the second guide 41'. The device 1 comprises a second opening 41a'. The second opening 41a' is situated on or through the second structure 4'. The second opening 41a' is situated on an edge 4a' of the second structure 4'. The

second structure 4' is configured so that the second guide 41' opens by means of the second opening 41a'.

[0095] It should be noted that, apart from the possible differences which may derive from what is described above, between the second fixing system 5' and the first fixing system 5, the second unit 12 might have one or more or all of the features of the first unit 11. Apart from these possible differences, the second unit 12 could be equal to the first unit 11.

[0096] For this reason, the second opening 41a' allows the step of inserting the second carriage 3' to be performed whilst said second carriage 3' adopts said fixing condition at the second end 22.

[0097] The device 1 further comprises a rolling element 7. The rolling element belongs to the second unit 12. The second unit 12 is configured so that the rolling element 7 acts between the bracket 511' and the second structure 4' during the translating motion of the second carriage 3'. The rolling element 7, which is clearly shown in Figure 9, brings numerous advantages. Firstly, the element 7 makes it possible to oppose any bending forces acting on the fixing plate 51' due to the weight of the various elements acting on it (motor 2, movable wall, etc.), keeping the entire system perfectly aligned.

[0098] This also reduces, during use, any risk of scraping or risk of jamming of the fixing plate 51' on the second structure 4' due to bending of the fixing track 51' due to the weight acting on it.

[0099] Figures 13, 14 and 15-16 illustrate two further embodiments of the device 1.

[0100] According to these embodiments, there is a cradle 201 which houses and supports the winding shaft 200 (not illustrated in the drawings).

[0101] The cradle 201 is, in use, operatively fixed to the carriage 3, 3'.

[0102] The cradle 201, according to Figures 13 to 14, has a curvilinear shape (circular arc) and houses, that is, it supports an end of the winding shaft 200.

[0103] Preferably, as shown in Figures 15 and 16, the cradle 201 has a tapered bottom shape.

[0104] Preferably, according to the embodiments shown in Figures 13-16, the motor 2 is a central (non-tubular) motor, for example of the type described and illustrated in Figure 1 of the Italian patent (application No. 102016000094667) in the name of the same Applicant as this invention.

[0105] The central motor 2 is operatively coupled to the winding shaft 200.

Claims

1. A sliding device (1) for a motor (2) and a winding shaft (200) driven by said motor (2) of a movement system (10) for winding a movable wall, said movable wall being configured to close a section for access to a room,
wherein said sliding device (1) comprises a first slid-

ing unit (11) which is configured to operate on a first end (21) of the winding shaft (200) and which comprises:

- a first carriage (3);
- a first fixing system (5) configured to define a fixing condition between said first carriage (3) and a first axial end (21) of said winding shaft (200);
- a first guide (41) for guiding a translating movement of said first carriage (3) along a direction transversal to the axis (X) of extension of the winding shaft (200), whilst said first carriage (3) adopts a condition of insertion in the first guide (41), in such a way that, in said fixing condition and in said inserted condition of said first carriage (3), said translating movement corresponds to a sliding movement of said winding shaft (200) and motor (2) along the transversal direction;

said first fixing system acting, to define said fixing condition, at least mainly parallel to said axis (X) of extension of the winding shaft (200).

2. The device (1) according to claim 1, wherein said first fixing system (5) comprises:

- a first fixing plate (51) having a plurality of first holes (511);
- a plurality of first fixing elements, said first fixing system (5) being configured so that, in said fixing condition, each first fixing element acts between a respective of the first holes (511) and a first outer face (211) of the winding shaft (200), said first face (211) being transversal to said axis (X) and located on said first end (21), in such a way as to contribute to keeping said first face (211) against said first fixing plate (51).

3. The device (1) according to claim 2, wherein said first sliding unit (11) comprises a first structure (4) which defines said first guide (41) and which is configured so that said first guide (41) opens by means of an opening (41a) on an edge (4a) of said structure (4), to allow obtaining said condition of insertion of the first carriage (3) whilst said first carriage (3) adopts said fixing condition.

4. The device (1) according to claim 3, wherein:

- said first structure (4) comprises a first supporting plate (42) and a first track (43) mounted on the side of a first face (421) of said first supporting plate (42), in such a way that said first guide (41) is defined between said first track (43) and said first supporting plate (42) and on the side of said first face (421);

- said first supporting plate (42) has a slot (422) which places said first guide (41) in communication with a second face (423) of the first supporting plate (42), said second face (423) facing the opposite side of said first supporting plate (42) relative to said first face (421), in such a way that said first end (21) of the winding shaft (200), in said fixing and inserting condition of the carriage (3), is situated on the side of said second face (423);
- said first carriage (3) comprises a connecting element (31) which connects said first carriage (3) to said first fixing plate (51), said first guide (41) being configured so that said condition of insertion of the first carriage (3) corresponds to the passage of the connecting element (32) through said slot (422), in such a way that the translating motion of the first carriage (3) corresponds to the motion of the connecting element (32) along the slot (422).
5. The device (1) according to claim 3 or 4, comprising a second sliding unit (12) which is configured to operate on a second end (21) of said winding shaft (200), said second axial end (22) being opposite said first axial end (21), and which comprises:
- a second carriage (3');
 - a second fixing system (5') configured to define a fixing condition between said second carriage (3') and said second axial end (22) of said motor of the winding shaft (200);
 - a second guide (41') for guiding a translating motion of said second carriage (3') whilst said second carriage (3') adopts a condition of insertion in the second guide (41'), in such a way that, in said fixed condition and in said inserted condition of said second carriage (3'), said translating motion of the second carriage (3') corresponds to said sliding motion of said winding shaft (200);
- said second fixing system (5') acting, to define said fixing condition of the second carriage (3'), at least mainly transversely to a direction parallel to said axis (X);
- wherein said second sliding unit (12) comprises a second structure (4') which defines said second guide (41') and which is configured so that said second guide (41') opens by means of a second opening (41a') on an edge (4a') of said second structure (4'), to allow said insertion condition of the second carriage (3') to be obtained whilst said second carriage (3') adopts said fixing condition to said second axial end (22).
6. The device (1) according to claim 5, wherein said second fixing system (5') comprises:
- a second fixing plate (51'), said second fixing system (5') being configured so that, in said fixing condition of the second carriage (3'), said second end (22) is supported by a bracket (511') defined by said second fixing plate (51'); said second fixing plate (51') having at least a second hole situated through said bracket (511');
 - at least a second fixing element, said second fixing system (5') being configured so that, in said fixing condition of the second carriage (3'), said second fixing element acts between said second hole (512') and said second end (22) to keep said second end (22) pressed on said bracket (511').
7. A movement system (10) for winding a movable wall, said movable wall being configured to close a section for access to a room, comprising a device according to any one of the preceding claims and said winding shaft (200) and the motor (2), said winding shaft (200) and the motor (2) being configured to adopt a condition for connection to said movable wall in which said axis (X) of the winding shaft (200) defines the winding axis of said movable wall.
8. A movement system (10) according to claim 7, wherein;
- said device is according to claim 5 or 6;
 - said first end (21) is a drive end of the motor (2);
 - said motor (2) comprises an operating sector (23) axially situated between said first end and second end (23), said movement system (10) being configured so that, in said connection condition, the unwinding of said wall closing said section and the winding of said wall opening said section occur around said operating sector (23);
 - said second end (22) is a parachute end of said motor (2), said motor (2) being configured so that said drive end causes the rotation of said operating sector (23) about said axis (X) and said parachute end is driven by said rotation in such a way as to be able to automatically limit the speed of said rotation if a preset limit is exceeded.
9. A closing apparatus for closing a section for access to a room, comprising a movement system (10) according to claim 7 or 8 and said movable wall, wherein:
- said motor (2) adopts said condition of connection to said movable wall;
 - for each carriage (3; 3') of each unit (11; 12) of the device (1) belonging to the apparatus, the carriage (3; 3') adopts the respective fixing condition and the respective insertion condition;

- for each structure (4; 4') of each unit (11; 12) of the device (1) belonging to the apparatus, the structure (4, 4') is configured to be fixed to a structural element which delimits said access section.

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10. A method for assembling a movement system (10) for winding a movable wall in a closing apparatus (100) for closing an access section, said movable wall being configured for closing said access section, comprising:

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- a step of fixing a first carriage (3), said step of fixing the first carriage (3) being performed in such a way as to obtain a fixing condition between said first carriage (3) and a first axial end (21) of a winding shaft (200) having an axis (X) of extension;

- after said step of fixing said first carriage (3), an insertion step performed in such a way as to obtain a condition for inserting said first carriage (3) in a first guide (41), in such a way that, in said fixing condition and in said condition for inserting said first carriage (3), said translating motion corresponds to a sliding movement of said winding shaft (200) along a direction transversal to its axis (X) of extension;

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wherein said fixing step is performed by acting, to define said fixing condition, at least mainly parallel to said axis.

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11. The assembly method according to claim 10, comprising:

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- a step of fixing a second carriage (3'), said step of fixing the second carriage (3') being performed in such a way as to obtain a fixing condition between said second carriage (3') and a second axial end (22) of said winding shaft (200), said second axial end (22) being opposite said first axial end (21);

- after said step of fixing said second carriage (3'), a step of inserting said second carriage (3'), said step of inserting the second carriage (3') being performed in such a way as to obtain a condition for inserting said second carriage (3') in a second guide (41'), in such a way that, in said fixing condition and in said inserting condition of said second carriage (3'), a translating motion of said further carriage (3') along said further guide (41') corresponds to said sliding motion of said motor (2);

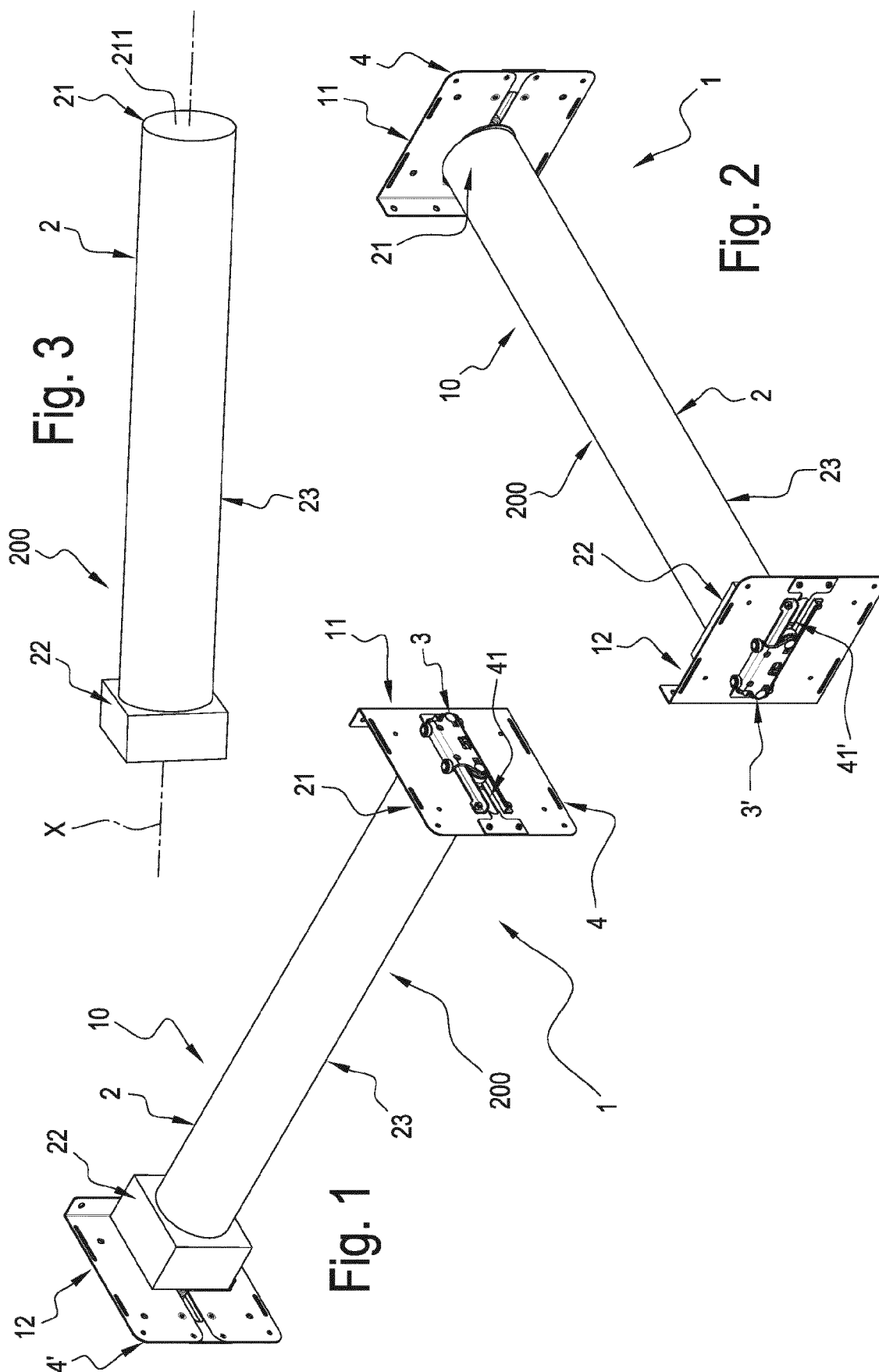
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wherein said step of inserting said first carriage (3) and said step of inserting said further carriage (3') are performed simultaneously.

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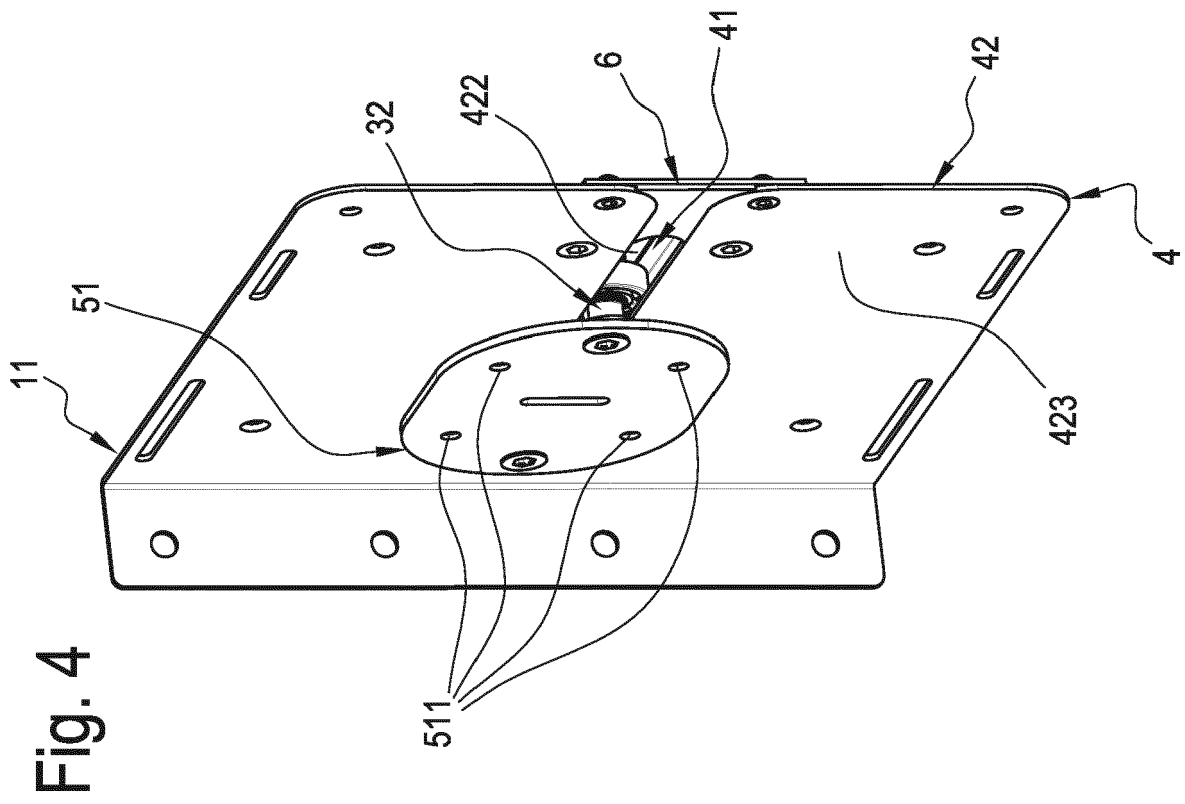
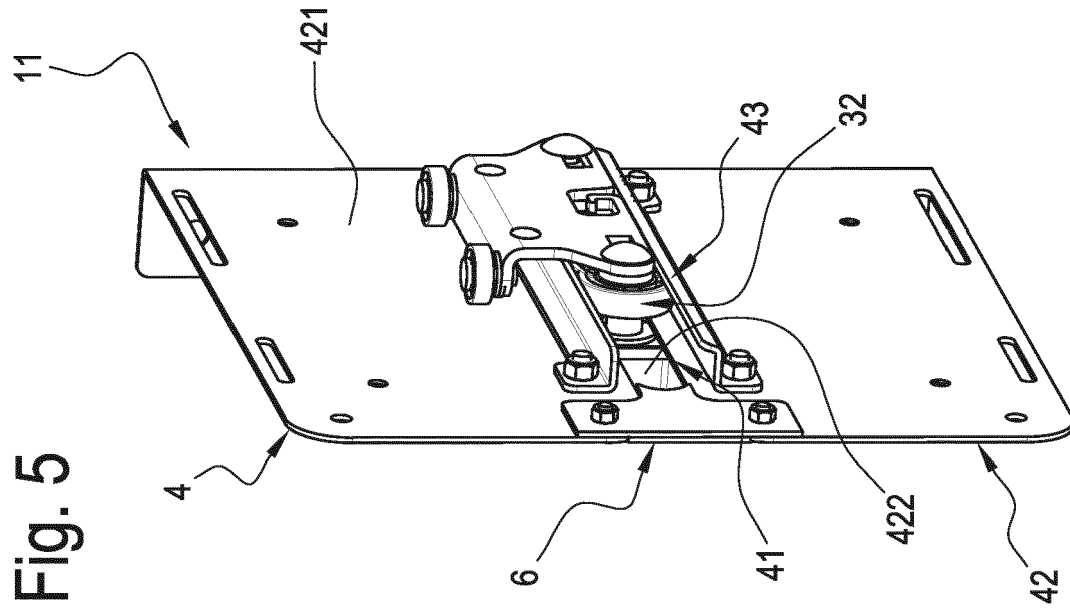


Fig. 6

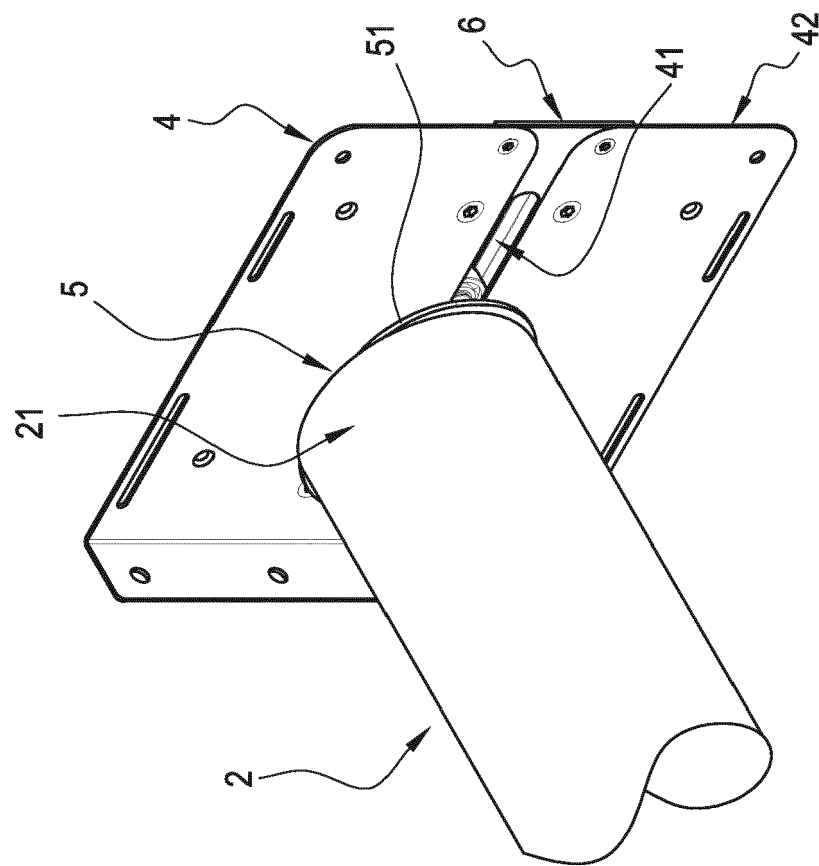


Fig. 7

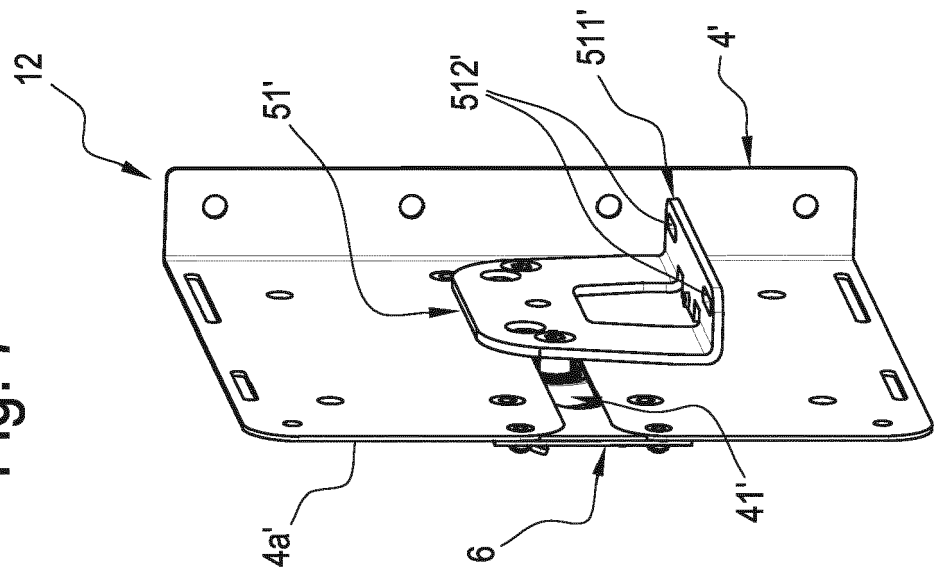


Fig. 9

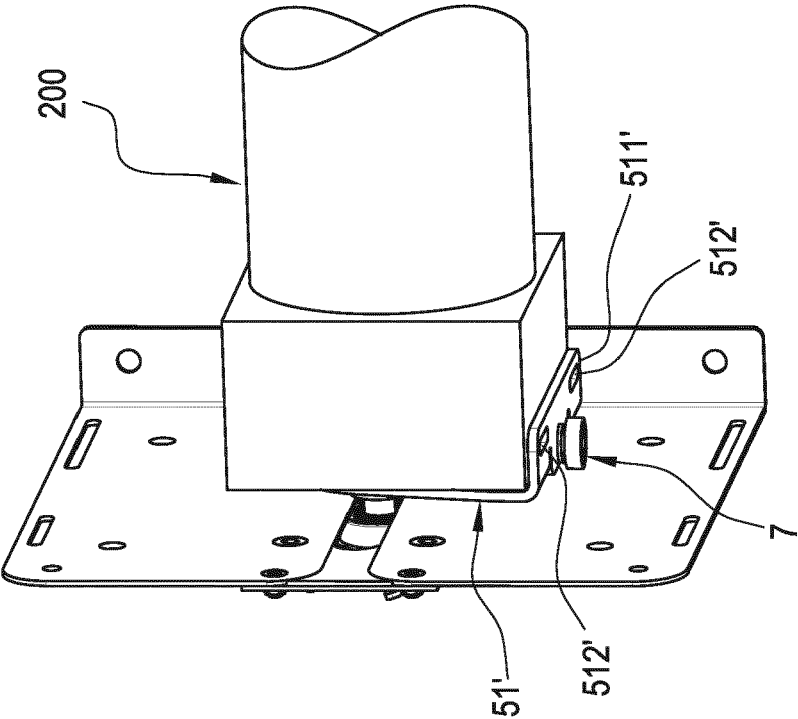


Fig. 8

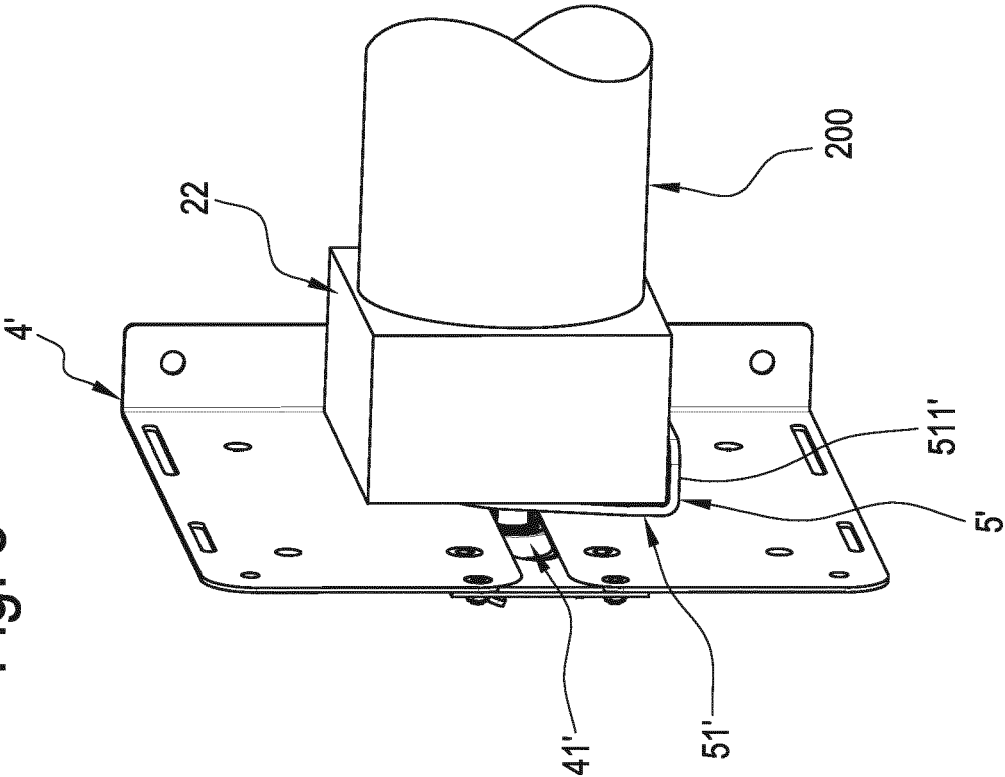


Fig. 11

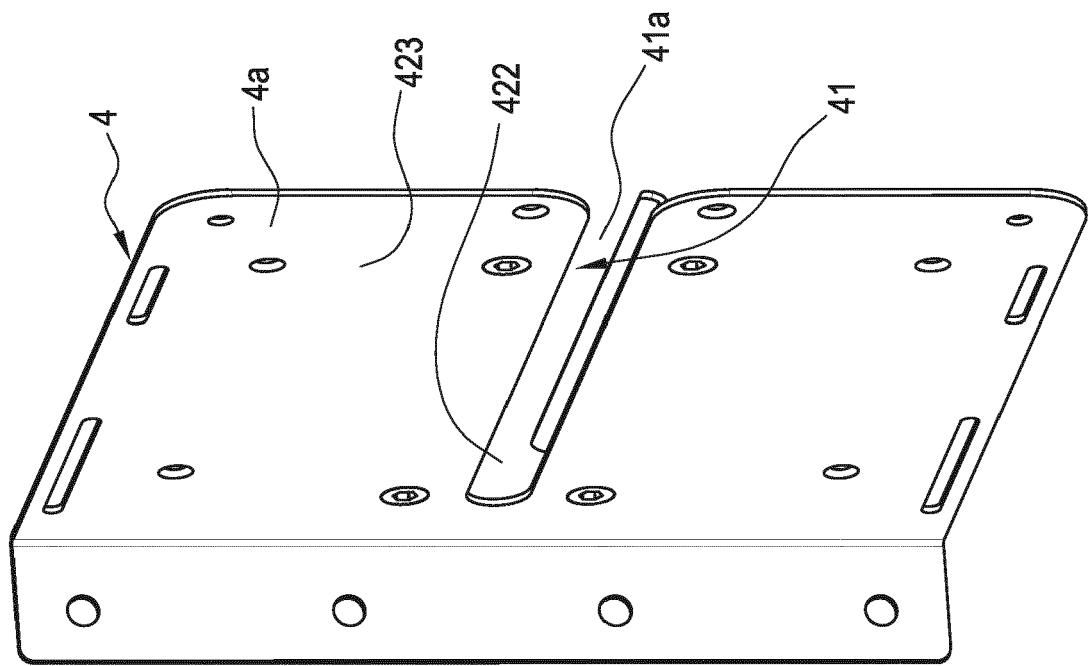
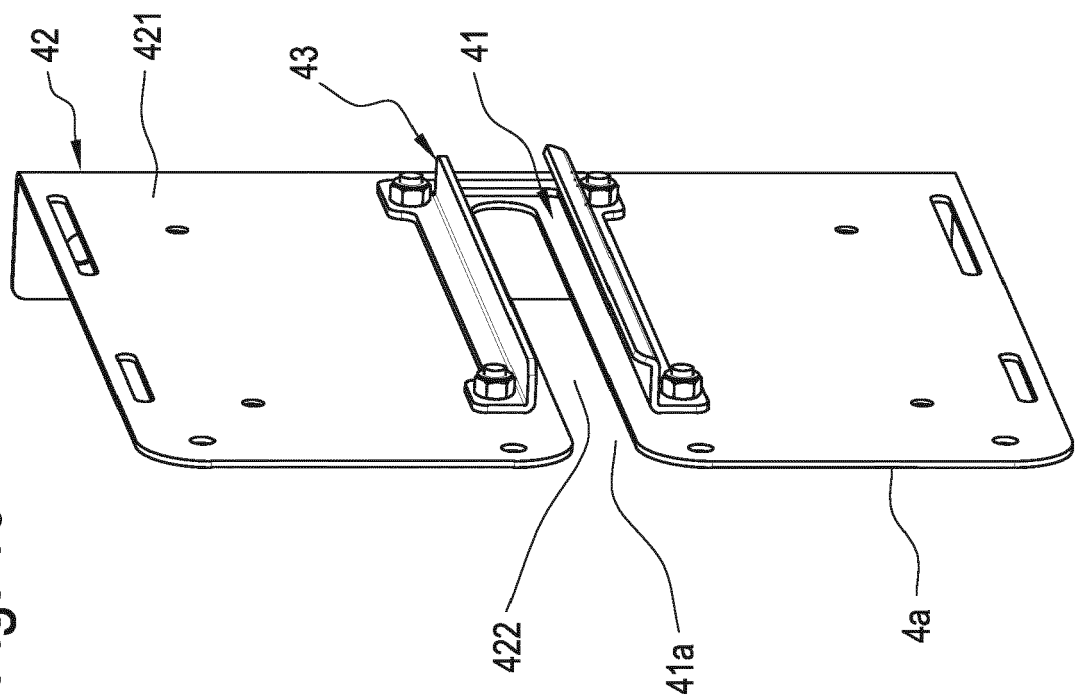


Fig. 10



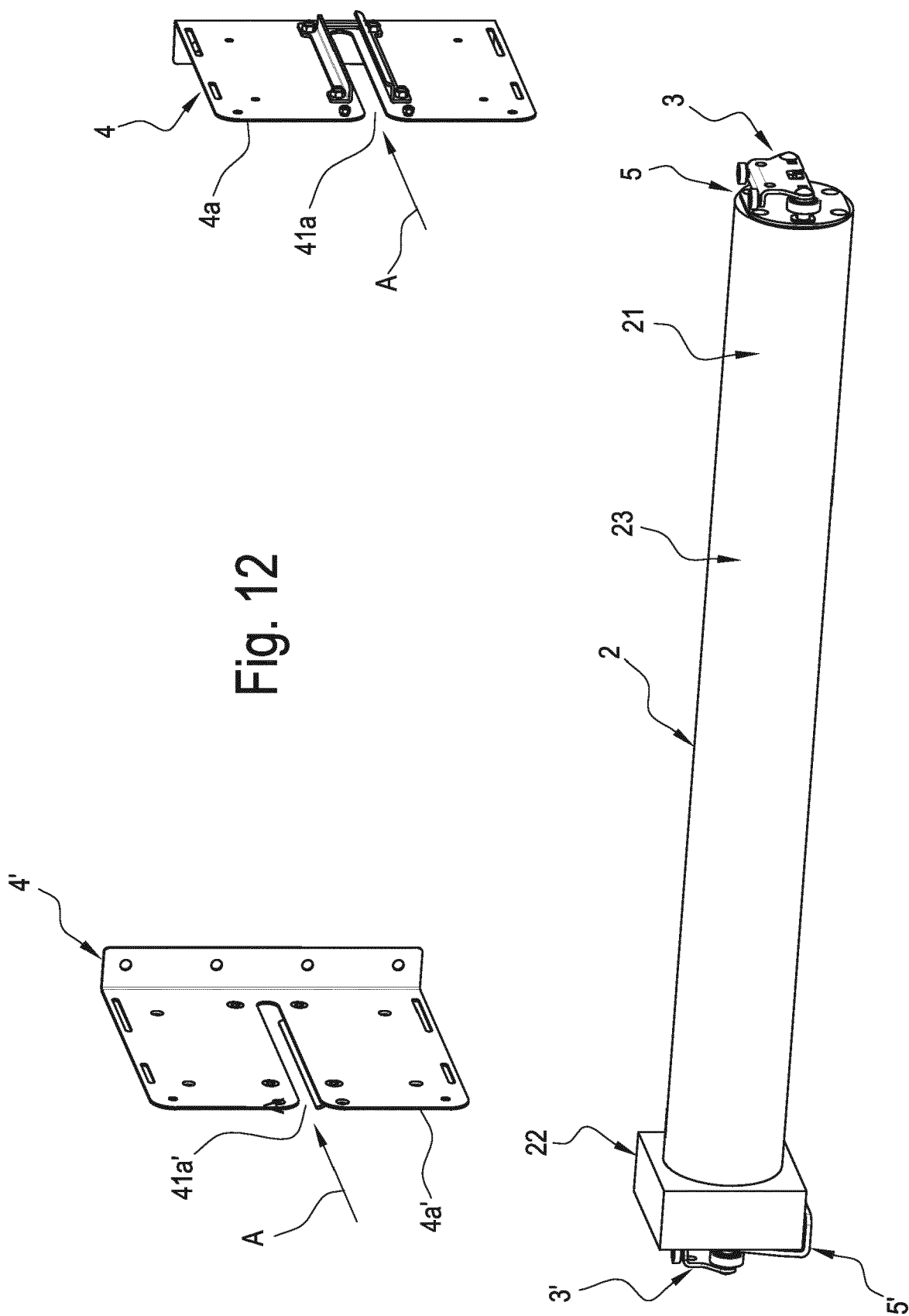


FIG. 14

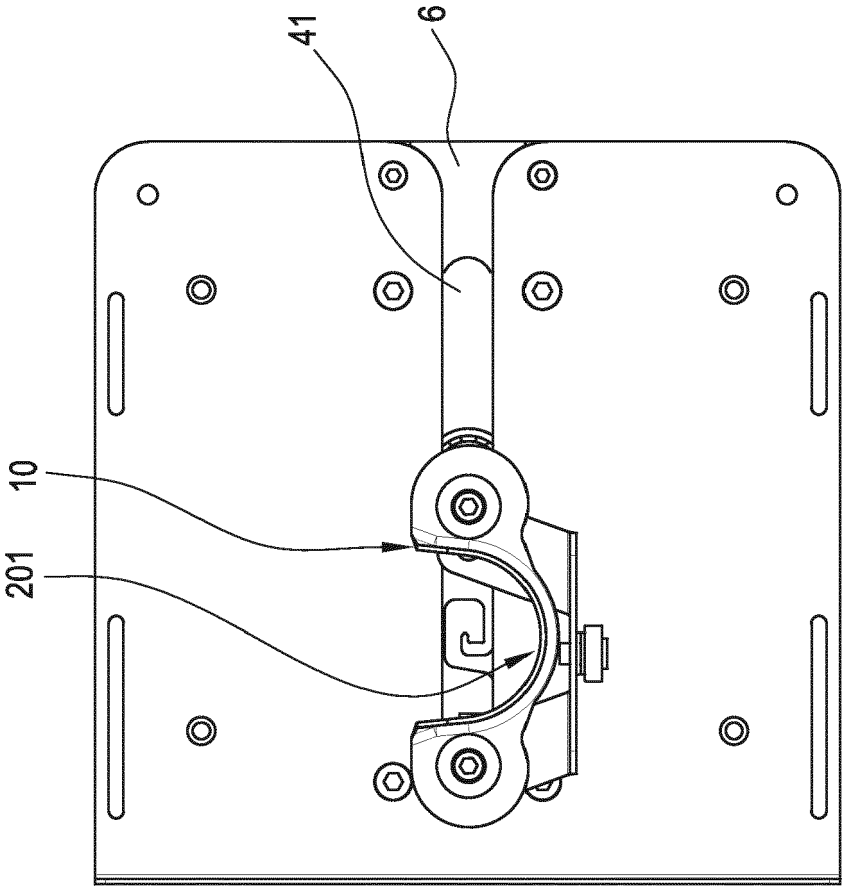


FIG. 13

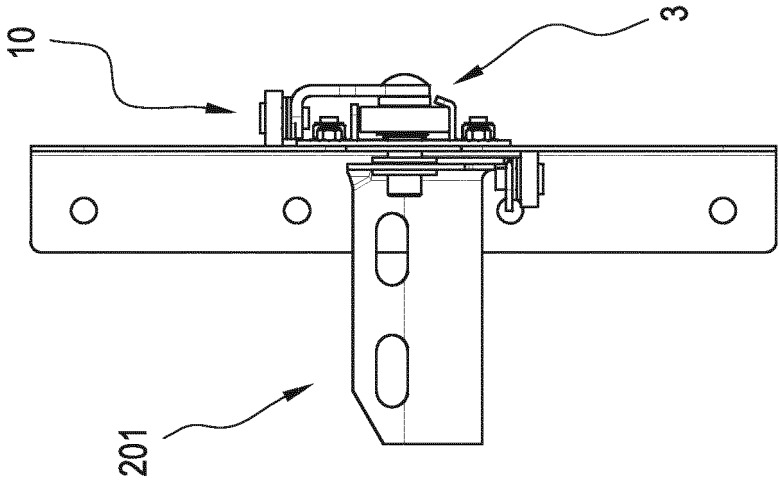


FIG. 16

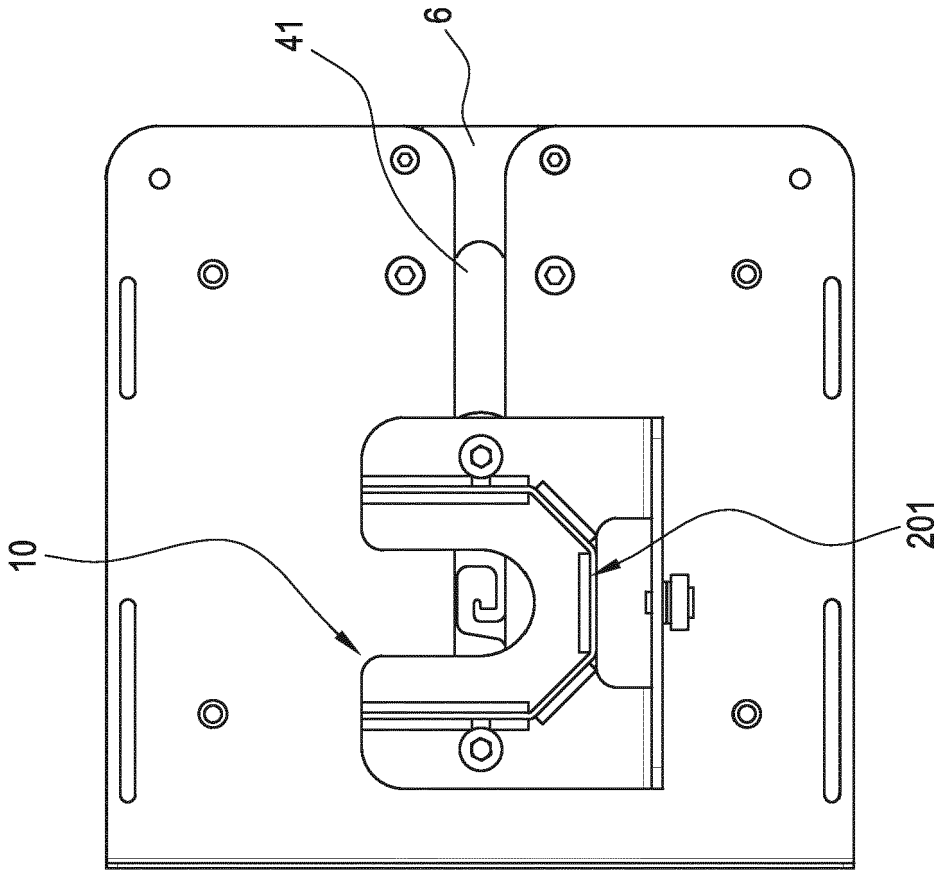
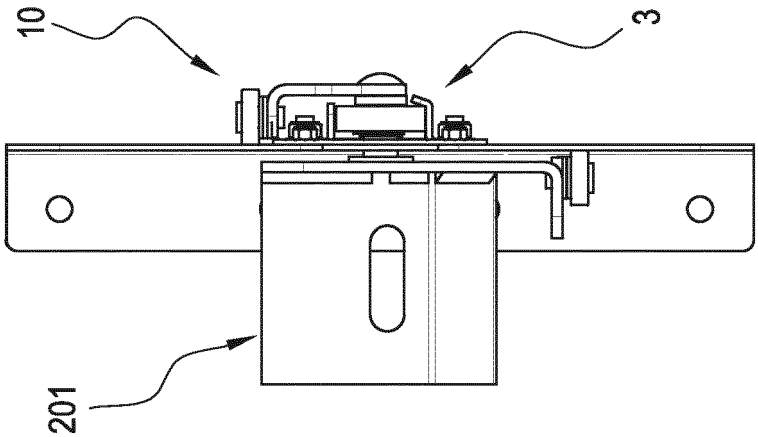


FIG. 15





EUROPEAN SEARCH REPORT

Application Number
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X	DE 35 19 726 A1 (MACHILL ROLF) 4 December 1986 (1986-12-04) * figures 4,5 * * page 5, line 1 - line 20 * * page 11, line 16 - line 32 * * page 13, line 20 - page 14, line 24 *	1	
			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 15 June 2021	Examiner Tänzler, Ansgar
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15-06-2021

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DE 3519726 A1	04-12-1986	NONE	

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