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

(11) **EP 2 634 340 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
14.01.2015 Bulletin 2015/03

(51) Int Cl.:
E05D 15/10 *(2006.01)*

(21) Application number: **13156308.2**

(22) Date of filing: **22.02.2013**

(54) **A device for support and handling of sliding panels for doors**

Vorrichtung zum Tragen und Handhaben von Schiebeflügeln für Türen

Dispositif de support et de manipulation de panneaux coulissants de portes

(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

(30) Priority: **02.03.2012 IT AN20120016**

(43) Date of publication of application:
04.09.2013 Bulletin 2013/36

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Description

[0001] The present invention relates to a device for support and handling of sliding panels for doors.

[0002] Two types of sliding doors are currently known, the first one being simpler and cheaper, in which the panel slides from opening position to closing position while remaining on the same vertical plane that coincides with the plane where the panel lies.

[0003] In such first type of doors, the panel is hung to simple rectilinear tracks fixed in external position on the wall above the door lintel, in such manner that said tracks inevitably remain visible, unless they are concealed under masking elements.

[0004] Said first type of doors also include the so-called sliding doors in which the panel is concealed inside a suitable space provided on the wall where the door obtained, in such manner that, when opening, the panel can be laterally inserted inside said space and disappear when it reaches its maximum opening position.

[0005] Obviously, in this case, also the rectilinear tracks that support and make the panel slide, are housed and concealed inside said space.

[0006] According to a second type of doors with sliding panels, the panel abuts against the jambs of the frame, as in traditional revolving doors supported by pivoting hinges. This second type of doors can be technically defined as "doors with sliding abutting panel".

[0007] According to the second type of doors, the panel slides by moving along two different, parallel close vertical planes, of which one plane lying inside the door, and one lying in external position to the door close to the vertical wall where the door is obtained. Evidently, the second type of doors with sliding abutting panel requires the use of complicated and expensive devices to support and make the panel slide.

[0008] Some models of "doors with sliding abutting panel" are provided with support and sliding devices for the panel that are aesthetically impaired by the fact that they remain permanently visible on the wall on the side of the door where the panel slides during opening.

[0009] Other models of "doors with sliding abutting panel" are provided with support and sliding devices of the panel that are remain hidden on the back of the panel when the door is closed. In any case, also this second type of support and sliding devices of the panel is not completely satisfactory from the aesthetic viewpoint, given the fact that they are designed in such manner to remain visible after opening the door.

[0010] EP 1 559 861,DE 20 2011 022 810 U1, DE 36 10 775 and DE 33 43 366 disclose devices used to handle sliding panels. Nevertheless, in order to make the panel slide from right to left and vice versa, said devices must be mounted as a pair in suitable frames above and under the panel. Consequently, the device mounted under the panel remains visible, when the panel is open, with a very negative aesthetic and functional impact because it creates an obstacle for users when passing through the door. Moreover, special works are required in the door frame in order to house the two handling devices. It must be also noted that a single device is not self-standing, meaning that it is not capable of supporting the panel.

[0011] The purpose of the present invention is to remedy the aforementioned drawbacks with reference to the known types of support and sliding devices of panels of "doors with sliding abutting panel", which comprises sliding tracks that are not visible on the masonry wall when the door is opened or closed.

[0012] An additional purpose of the present invention is to disclose a device for sliding panels that can be mounted both on new doors and on existing doors without requiring any masonry works to embed or conceal support and guide tracks of the sliding panel.

[0013] A further purpose of the present invention is to disclose a device for sliding panels that can be used both on sliding doors with right-side opening and sliding doors with left-side opening, in such manner to avoid the manufacturing costs of two specific versions of the same device, one for left-opening doors and one for right-opening doors.

[0014] These purposes are achieved by the present invention, the main characteristics of which are listed in the attached first claim, whereas the dependent claims describe preferred embodiments of the invention.

[0015] The device comprises a first fixed frame adapted to be housed into a door opening and fixed under the door lintel, a second mobile frame disposed under the first fixed frame and connected to it with means that allow it to assume a retracted position, in which the panel is housed inside the door opening and abuts against the jambs of the door frame, without sliding laterally, and an extracted position, in which the door is not housed inside the door opening and does not abut against the jambs of the door frame, thus being free slide laterally.

[0016] Moreover, the device comprises a telescopic guide with two or more tracks, used to support and handle the sliding panel, the upper edge of which must be coupled to the last translating track of the telescopic guide, whereas the first track of the telescopic guide must be coupled with said mobile frame of the device.

[0017] The device further comprises:

- at least one rotating wheel with vertical axis disposed in said first fixed frame,
- a return rod with vertical axis connected to said rotatable wheel,
- a horizontal arm connected to the return rod and provided with a roll (or runner) with vertical axis, slidingly inserted into a longitudinal groove along the lower edge of the panel,
- synchronization means to synchronize the movement of said mobile connection means with the rotation of said rotating wheel, so as to allow a synchronized movement of the upper edge and lower edge of the door panel.

[0018] Because of the provision of synchronization means, the movement of the upper edge and of the lower edge of the door panel can be synchronized, avoiding the use of a second support and handling device disposed under the lower edge of the panel, thus completely overcoming the drawbacks of the prior art, which provides for two support and synchronization devices disposed on the upper edge of the panel and under the lower edge of the panel.

[0019] For explanatory reasons, the description of the device according to the present invention continues with reference to attached drawings, which only have illustrative, not limiting value, wherein:

- Figs. 1A to 1D are diagrammatic views of a door provided with the device, the sliding panel of which is illustrated in a series of different positions and seen from different angles;
- Fig. 2 is an axonometric top view of the first and second frame of the device;
- Fig. 3 is an axonometric bottom view of the first and second frame of Fig. 2;
- Fig. 4 is a front view of the first and second frame of Figs. 2 and 3;
- Fig. 5A is a sectional view with a vertical plane of the first and second frame and of the telescopic guide applied onto the second frame, wherein the panel is separated from the jambs of the door frame;
  Fig. 5B is the same view as Fig. 5A, where the panel abuts against the jambs of the door frame;
- Fig. 6 shows an alternative embodiment of a component of the first frame;
- Fig. 7A is an axonometric view of a second embodiment of the device, wherein the second mobile frame is moved back inside the door opening;
- Fig. 7A' is an enlarged view of a detail of Fig. 7A;
  Fig. 7B is the same view as Fig. 7A, wherein the second mobile frame is moved forward outside the door opening;
- Fig. 8 is a perspective view of the first frame of a third embodiment of the device,
- Fig. 9 is a perspective view of the second frame of the device of the third embodiment,
  Fig. 9A is an enlarged view of a detail of Fig. 9, showing an eccentric mechanism;
  Fig. 10 is the same view as Fig. 9, wherein the eccentric mechanism is moved with respect to Fig. 9,
- Fig. 11 is an exploded perspective view of the various parts of the eccentric mechanism of Fig. 9; and
  Fig. 12 is a longitudinal sectional view of the device according to the third embodiment.

[0020] Figs. 1A to 1D are diagrammatic views of the device, generally indicated with reference numeral (1), applied on a "door with sliding panel abut against jambs", which comprises only one panel (A). An opening is obtained in a masonry wall (M), generating a door opening (V) wherein a frame of the door comprising two uprights (MO) is mounted. Jambs (S) are mounted on the uprights (MO).

[0021] The panel (A) can have the following three positions:

- a first retracted position, in which the panel (A) is housed inside the door opening (V) and abuts against the jambs (S) of the door frame, without sliding laterally; such a first position is shown in Figs. 1A and 1D and practically corresponds to the closed door condition;
- a second extracted position, in which the panel (A) is not housed inside the door opening (V) and is separated from the jambs (S) of the door frame, in spite of being still able to obstruct the passage through the door opening (V); however, the panel is in the condition to slide laterally outside the masonry wall (M), where the door is obtained; such a second position is shown in Fig. 1B and corresponds to the condition that precedes the lateral sliding phase of the panel (A);
- a third position, in which the panel (A) does not obstruct the passage through the door opening (V) and remains in external position close to the masonry wall (M); such a position is shown in Fig. 1C and corresponds to the completely open door position.

[0022] Especially referring to Figs. 2 and 3, the device (1) comprises a first fixed frame (10) adapted to be fixed to the door frame. The first fixed frame (10) consists in a box-shaped cross-piece with parallelepiped shape, having suitable length to be housed inside the door opening (V), resting on the uprights (MO) of the door frame.

[0023] The first fixed frame (10) is removably connected to a second frame (20), likewise composed of a cross-piece. Referring to Fig. 4, the second frame (20) has length (L2) lower than length (L1) of the first frame (10). The second frame (20) is positioned close to and under the first frame (10).

[0024] The second mobile frame (20) is connected to the first fixed frame (10) with connection means (M1) allowing said second frame (20) to be in retracted position, as shown in Fig. 5B, wherein the panel (A), supported by the device (1), is housed inside the door opening (V) and abut against jambs (S) of the door frame, and an extracted position, as shown in Fig. 5B, wherein the panel (A) is not housed inside the door opening (V) and is separated from the jambs (S) of the door frame.

[0025] According to a first embodiment, said connection means (M1) comprise a pair of identical rockers (2). Each rocker (2) comprises a first pin (2a) situated on the first frame (10), and a second pin (2b) situated on the second frame (20). In view of the above, the first frame (10), the second frame (20) and the pair of rockers (2) form an articulated quadrilateral that allows the second frame (20) to roto-translate with respect to the first frame, while always remaining parallel to the first fixed frame.

[0026] The roto-translations of the second frame (20)

are guided by guiding means comprising two identical curvilinear guide tracks (3) obtained on the first frame (10), in which second pins (2b) of the rockers (2) are inserted with freedom of sliding.

[0027] The device (1) further comprises means to provide perfect synchronism between the alternate oscillations of the rockers (2).

[0028] In view of the above, each first pin (2a) consists in a revolving shaft with vertical axis, provided with lower end wherein one of the two ends of the rocker (2) is splined, and provided with upper end wherein a toothed pulley (4) is splined, as shown in Fig. 2.

[0029] The two toothed pulleys (4) are housed inside the first frame (10), which also contains a toothed belt (5) engaged with both toothed pulleys (4), thus ensuring perfect synchronism between oscillations of the two rockers (2).

[0030] Said toothed belt (5) engages also with a third toothed pulley (6), which is also housed inside the first frame (10), confined at one end of the first frame (10). Said third pulley (6) is splined to an upper end of a vertical shaft (7), supported by the first frame (10). The vertical shaft (7) has an axial hole (7a) (refer to Fig. 3), with splined profile, with opening accessible from the bottom.

[0031] The shaft (7) is situated in correspondence of an ending section of the first frame (10), which protrudes from said second frame (20), in view of the fact that the first frame (10) is provided, as mentioned earlier, with length (L1) higher than length (L2) of the second frame (20).

[0032] The first frame (10) has length (L1) such to be housed inside the door opening (V), astride uprights (MO) of the door frame. Therefore, said shaft (7) surmounts one of the uprights (MO) of the door frame, as shown in Fig. 2.

[0033] The upper section of a vertical return rod (8) is inserted into the opening of the hole (7a) of said shaft (refer to Figs. 3 and 4) with prismatic profile. The return rod (8) is adapted to be disposed and concealed behind one of the uprights (MO) of the door frame.

[0034] As shown in Fig. 6, at the base of the return rod (8) a horizontal arm (9) is applied, ending with a roll (9a) with vertical axis, slidingly inserted into a central groove (SL) (refer to Fig. 1 D) longitudinally obtained along the lower edge (A1) of the panel (A).

[0035] Referring to Figs. 5A and 5B, the device (1) comprises a telescopic guide (30) with two or more tracks, for support and handling of the sliding panel (A). The last translating track of the telescopic guide (30) is joined with the upper edge (A2) of the panel.

[0036] According to a simpler embodiment, the second mobile frame (20) acts as support for the first non-translating track of the telescopic guide (30).

[0037] It is possible to realize for a special version of the second frame (20), wherein said second frame (20) acts as first non-translating track of the telescopic guide (30). Therefore, the second frame (20) is an integral part of the telescopic guide. In view of the above, said second frame (20) comprises a series of idle wheels (32) with horizontal axis, to which an intermediate track (33) is slidingly associated.

[0038] The intermediate track (33) supports a series of idle wheels (34) to which the last translating track (35) of the telescopic guide (30) is slidingly associated; the last track (35) is joined with the panel (A) near the upper edge (A2) of the door.

[0039] A telescopic guide that can be efficaciously used in the device (1) is disclosed in the Italian patent application RM2010A000594 under the name of the Applicant.

[0040] The device (1) also comprises actuator (T) (refer to Fig. 3) for decelerated automatic return of the panel (A) during the first opening phase or the last closing phase, i.e. in those two phases in which the panel does not slide parallel to the wall (M), but simply moves inside the door opening (V), respectively moving away from the jambs (S) or moving closer to the jambs (S)

[0041] According to the first embodiment, shown in Figs. 2, 3 and 4, said actuators (T) consist in a gas spring, composed of a jack with cylinder (40a) hinged under the first frame (10) and stem (40b) hinged above the second frame (20) .

[0042] As shown in Figs. 5A and 5B, the first frame (10) remains protected and concealed behind finish bands (F) of the door frame.

[0043] Fig. 6 shows an alternative embodiment of the first frame (10), in which the driving belt (5) is replaced by an opposite pair of racks (5a), meshing with two toothed pulleys (4) and the third toothed pulleys (6).

[0044] Figs. 7A, 7A' and 7B shows a second embodiment of the device (1), which uses mobile connection means (M2) between the first frame (10) and the second frame (20), which differ from the connection means (M1) of the first embodiment.

[0045] In particular, said connection means (M2) comprise a pair of identical slides (50) joined with the second frame (20), slidingly coupled within corresponding guide tracks (51) joined with the first frame (10).

[0046] The sliding axis (X) of said slides (50) is horizontal and orthogonal to the panel (A), which is fixed to the second frame (20), after interposition of the telescopic guide (30) (described in the first embodiment and not shown in Figs. 7A and 7B). The telescopic guide (30) allows the panel (A) to make rectilinear alternate travels on a vertical plane, orthogonal to the horizontal sliding axis (X) of the slides (50).

[0047] For the perfect synchronism of the alternate travels of said slides (50), the second frame (20) supports a shaft (52) with horizontal axis orthogonal to the sliding axis (X) of said slides (50). At the two ends of the shaft (52) two identical pinions (53) are splined, engaging with corresponding racks (54) joined with the first frame (10) and parallel to the sliding axis (X) of the slides (50).

[0048] Likewise, this embodiment provides for a return rod (8) with vertical axis, which starts rotating around its vertical axis every time the second mobile frame (20)

moves with respect to the first fixed frame (10). The return rod (8) is inserted into a revolving bush (55) with vertical axis housed into a suitable seat obtained in the first frame (10). The bush (55) has an external toothed ring (56) engaging with a rack (57) joined with the slide (50), so that every travel of the slide (50) corresponds to a simultaneous rotation of said revolving bush (55) around its axis, in clockwise direction or vice versa, according to the direction (forward or backward) of the travel of the slide (50).

[0049] As shown in Figs. 7A and 7B, the first frame (10) is provided at its ends with two identical bushes (55), wherein the return rod (8) is selectively inserted according to the opening direction (right or left) of the panel (A).

[0050] The return rod (8) is not provided with circular section, but with at least one facet allowing for insertion into the bush (55) or the shaft (7) of the first embodiment according to the opening direction (right or left) of the panel (A).

[0051] This second embodiment of the device (1), which is shown in Figs. 7A and 7B, is characterized by higher flexibility compared to the first one, in the realization of devices (1) with different lengths, compatible with the width of the door opening (V).

[0052] The above is due to the fact that connection means (M2) are mounted at the two ends of a simple mounting plate, which can have different length from time to time, without requiring any dimensional adjustment of said means (M2), which have therefore standardized shape and dimensions (V).

[0053] Each slide (50) is preferably provided with decelerated automatic return means, which also guarantee the stable stop of the slide in its two opposite stop positions. Said means can be gas springs or other equivalent means, of known type and therefore not illustrated herein.

[0054] Figs. 8 to 11 show a third embodiment of the device (1), which uses mobile connection means (M3) between the first frame (10) and the second frame (20), which differ from the connection means (M1 and M2) of the first two embodiments.

[0055] In particular, said mobile connection means (M3) comprise a pair of roto-translating plates (60) fixed on the side of the second frame (20) facing towards the door opening (V) and connected to the first fixed frame (10) by means of an eccentric mechanism (E).

[0056] In order to show said eccentric mechanism (E), the first fixed frame (10) is not shown in Figs. 9 and 10, whereas Fig. 11 is an exploded view of all parts of said eccentric mechanism (E).

[0057] Fig. 12 shows said eccentric mechanism (E) cut with a vertical plane passing through its axis of rotation.

[0058] Referring to Fig. 11, said eccentric mechanism (E) comprises:

- a disk (61) provided with an off-centered shaft (62) with vertical axis, provided with base end (62a) and top end (62b);
- a radial bearing (63) circumscribing the disk (61);
- a circular housing (64) that houses said radial bearing (63).

[0059] Said circular housing (64) consists in a through hole obtained on each plate (60), the lower and upper openings of which are circumscribed by two annular cavities (65) where axial push bearings (66) are housed.

[0060] Said eccentric mechanism (E) and the relevant plate (60) are housed in a compartment (67) obtained in the first fixed frame (10) and provided with front opening for the mobile plate (60) that makes roto-translation motions inside said compartment (67).

[0061] Said compartment (67) is obtained by fixing a sort of frontally open drawer (68) under the first frame (10).

[0062] Said base and top ends (62a and 62b) of the off-centered shaft (62) are inserted into corresponding housings (69a and 69b), respectively obtained on a bottom wall (70) of said drawer (68) and in said first fixed frame (10), as shown in Fig. 11.

[0063] Said axial push bearings (66) are interposed between the roto-translating plate (60) and the first frame (10), on one side, and between the roto-translating plate (60) and the bottom wall (70) of the drawer (68), on the other side.

[0064] Likewise, this embodiment provides for a return rod (8) with vertical axis, which starts rotating around its vertical axis every time the second mobile frame (20) moves with respect to the first fixed frame (10).

[0065] The kinematic mechanism used to drive said return rod (8) into rotation every time the second mobile frame (20) moves with respect to the first fixed frame (10) comprises:

- a first pinion (71) fixed on the top end (62b) of the shaft (62);
- a second pinion (72) fixed on the top end of a bush (74) revolvingly contained into a housing obtained in the first frame (10);
- a rack (73) engaging with both pinions (70 and 71).

[0066] The rod (8) is inserted from below into said bush (74), as shown in Fig. 12.

[0067] Also in this embodiment, exactly as in the preceding one, the panel (A) is fixed to the second frame (20) with the interposition of a telescopic guide that allows the panel (A) to make alternate rectilinear travels over a vertical plane.

[0068] Although the operation of said eccentric mechanism (E) is evident, this description continues by illustrating the operating mode when the panel (A) is grabbed and pulled to extract it from the door opening (V), when the door is closed.

[0069] Fig. 9 shows the position of the eccentric mechanism (E) when the door is closed.

[0070] . In such a circumstance, being the panel (A) fixed to the second mobile frame (20) and being the plates (60) supported by said second frame (20), the disk (61)

is induced and forced to rotate together with the shaft (62), which is constrained to the first fixed frame (10).

[0071] The rotation of the disk (61) causes the movement of the plate (60) that makes a roto-translation with center of rotation on the shaft (62), consequently extracting said second mobile frame (20) from the door opening (V), as shown in Fig. 10 , which also shows the different position of the eccentric mechanism (E) compared to Fig. 9.

[0072] Such a roto-translating motion of the plate (60) corresponds to a simultaneous synchronized rotation of the return rod (8), given the fact that the pinion (71), revolving jointly with the shaft (62), drives into rotation, by means of the rack (73), the pinion (72) mounted on the bush (74) coupled at the top end of the return rod (8).

[0073] This third embodiment can be motorized easily and inexpensively, by associating the shaft (62) to an electric motor with two directions of rotation, mounted on the first frame (10).

[0074] It must be noted that the device (1) illustrated in the three embodiments shown in the figures comprises two independent parts, which can be separately ordered by the final user and combined together (being possibly already available in the warehouse):

a. the first independent part is the part comprising the two frames (20 and 10) and connection means (M1 of M2 of M3) and allowing for outward motion of the panel (A). Such a part is integrated with the synchronized return rod (8) concealed in the upright (MO) of the door. Said rod (8) is not direction-bound, meaning that it can be mounted on the right or left, in front or rear position with respect to the door passage.

b. The second independent part is the guide (30) that allows the panel to slide outwards/beyond the empty space of the door passage. Said guide (30) is not direction-bound, meaning that the door can be opened by moving the panel (A) rightwards or leftwards (by simply rotating the guide (30) by 180°).

[0075] In view of the above, customers who have purchased, used and stocked the guide (30), at any time, should they decide to use the device (1), can fix said guide (30) in the device (1), without having to consider the opening direction of the panel (A).

[0076] It must be noted that, in the prior documents, the handling movements and the relevant guides have a predefined direction. This means that different devices are provided for doors with right-side opening and doors with left-side opening. Moreover, the guide is constrained to the handling device.

Claims

1. A device (1) for support and handling of sliding panels for doors, comprising:

- a first fixed frame (10) housed inside a door opening (V) defined by door frame and astride uprights (MO) of the door frame;
- a second mobile frame (20) under the first fixed frame (10);
- a telescopic guide (30) with two or more tracks, positioned between second mobile frame (20) and panel (A) of the door, in correspondence with the upper edge (A2) of the panel, so that the panel (A) can slide with respect to the second mobile frame (20) and the panel can be supported by the device (1),
- mobile connection means (M1, M2, M3) between the first frame (10) and second frame (20) allowing said second frame (20) to move from a first position wherein the sliding panel (A) is housed inside the door opening (V) and abut against jambs (S) of the door frame, to a second position wherein the sliding panel (A) is not housed inside the door opening (V) and is separated from the jambs (S) of the door frame,
- at least a rotating wheel (6; 55, 56; 72) with vertical axis, disposed in said first fixed frame (10),
- a return rod (8) with vertical axis connected to said rotatable wheel (6; 55, 72),
- a horizontal arm (9) connected to the return rod (8) and provided with a roll or runner (9a) with vertical axis, slidingly inserted into a longitudinal groove (SL) along the lower edge (A1) of the sliding panel (A),
- synchronization means (5; 5a; 57; 73) to synchronize the movement of said mobile connection means (M1, M2, M3) with the rotation of said rotating wheel (6; 55, 72) so as to allow a synchronized movement of the upper edge (A2) and lower edge (A1) of the door panel.

2. A device according to claim 1, **characterized in that** the second frame (20) acts as first non-translating track of the telescopic guide (30).

3. A device according to one of the preceding claims, **characterized in that** said mobile connection means (M1) comprise:

- a pair of identical rockers (2) with a first pin (2a) situated on the first frame (10), and a second pin (2b) situated on the second frame (20); and
- two identical curvilinear guide tracks (3) on the first frame (10), in which said second pins (2b) of the rockers (2) are inserted with freedom of sliding.

4. A device according to the preceding claim, **characterized in that** it comprises:

- two toothed pulleys (4) housed inside the first

frame (10) and connected to the respective first pins (2a) of the rockers, and
- a toothed belt (5) engaged with both toothed pulleys (4), thus providing perfect synchronism between oscillations of the two rockers (2).

5. A device according to the preceding claim, **characterized in that** said at least one rotating wheel (6) connected to the return rod (8) is a third toothed pulley (6) housed at one end of the first frame (10), and said synchronization means (5) are said toothed belt (5) meshing with said third toothed pulley (6).

6. A device according to claim 1 or 2, **characterized in that** said mobile connection means (M2) comprise a pair of identical slides (50) joined with the second frame (20), slidingly coupled within corresponding guide tracks (51) joined with the first frame (10).

7. A device according to the preceding claim, **characterized in that** it comprises:

- a horizontal shaft (52) supported by the second frame (20) and having axis (Y) orthogonal to the horizontal sliding axis (X) of said slides (50);
- two racks (54) joined to the first frame (10) and parallel to the sliding axis (X) of the slides (50), and
- two pinions (53) fitted at the two ends of said shaft (52) and engaging with said racks (54).

8. A device according to the preceding claim, **characterized in that** said rotating wheel (55) is a bush (55) with a toothed external ring (56) and said synchronization means (57) are a rack (57) joined with the slide (50).

9. A device according to claims 1 or 2, **characterized in that** said mobile connection means (M3) comprise a pair of identical roto-translating plates (60) fixed on the side of the second frame (20) facing towards the door opening (V) and connected to the first fixed frame (10) by means of an eccentric mechanism (E), which comprises:

- a disk (61) provided with an off-centered shaft (62) with vertical axis, provided with base end (62a) and top end (62b);
- a radial bearing (63) circumscribing the disk (61);
- a circular housing (64) housing said radial bearing (63) and consisting in a through hole obtained on each plate (60),
- two axial push bearings (66) housed in respective annular cavities (65) of the circular housing (64).

10. A device according to the preceding claim, **characterized in that** each eccentric device (E) and the plate (60) are housed in a compartment (67) obtained in the first fixed frame (10) and provided with front opening for the mobile plate (60) that makes roto-translation motions inside said compartment (67).

11. A device according to the preceding claim, **characterized in that** under said first frame (10) a drawer (68) is fixed, frontally open, defining said compartment (67) and **in that** said base and top ends (62a, 62b) of the off-centered shaft (62) are inserted into corresponding housings (69a, 69b), respectively obtained on a bottom wall (70) of said drawer (68) and in said first fixed frame (10).

12. A device according to the preceding claim, **characterized in that** it comprises a first pinion (71) fixed on the top end (62b) of the off-centered shaft (62); wherein said rotating wheel (72) is a second pinion (72) fixed on the top end of a bush (74) revolvingly contained into a housing obtained in the first frame (10); and said synchronization means (73) are a rack (73) engaging with the first pinion (70) and second pinion (71).

13. A device according to any one of claims 9 to 12, **characterized in that** it comprises an electrical motor with two directions of rotation mounted on the first frame (10) and connected to said off-centered shaft (62).

14. A device according to anyone of claims 2 to 13, **characterized in that** said second frame (20) supports a series of idle wheels (32) with horizontal axis, to which an intermediate track (33) is slidingly associated, which supports a series of idle wheels (34) to which the last translating track (35) of the telescopic guide (30) fixed to the upper edge (A2) of the panel (A) is slidingly associated.

15. A device according to anyone of the preceding claims, **characterized in that** said rotating wheel (6; 55; 72) with vertical axis has comprises a hole (7a) having a splined profile and said return rod (8) comprises at least one end part with prismatic profile coupling into said hole (7a) having a splined profile.

Patentansprüche

1. Vorrichtung (1) zum Halten und Bewegen von verschiebbaren Türblättern, umfassend:

- einen ersten festen Rahmen (10), der in einer Türöffnung (V) untergebracht ist, die durch einen Türrahmen rittlings auf Pfosten (MO) des Türrahmens definiert ist;

- einen zweiten beweglichen Rahmen (20) unterhalb des ersten festen Rahmens (10);
- eine telekopische Führung (30) mit zwei oder mehr Schienen, die zwischen dem zweiten beweglichen Rahmen (20) und dem Türblatt (A) am oberen Rand (A2) des Türblattes so positioniert ist, dass das Türblatt (A) bezogen auf den zweiten beweglichen Rahmen (20) gleiten kann und von der Vorrichtung (1) gehalten wird,
- Mittel zur beweglichen Verbindung (M1, M2, M3) zwischen dem ersten Rahmen (10) und dem zweiten Rahmen (20), derart, dass der zweite Rahmen (20) sich in eine erste Stellung bewegen kann, in der das verschiebbare Türblatt (A) im Innern der Türöffnung (V) untergebracht ist und gegen die Pfosten (S) des Türrahmens in Anschlag geht, und in eine zweite Stellung, in der das verschiebbare Türblatt (A) nicht im Innern der Türöffnung (V) untergebracht ist und von den Pfosten (S) des Türrahmens abgerückt ist
- mindestens ein Drehrad (6; 55; 56; 72) mit vertikaler Achse, das im ersten festen Rahmens (10) untergebracht ist,
- eine Rückführstange (8) mit vertikaler Achse, die mit dem Drehrad (6; 55; 72) verbunden ist,
- einen horizontalen Arm (9), der mit der Rückführstange verbunden und mit einer Rolle (9a) oder einem drehbaren Läufer mit vertikaler Achse versehen ist, der in einer Rille (SL) eingesetzt und längs des unteren Randes (A1) des Türblattes (A) entlangläuft,
Synchronisierungsmittel (5; 5a; 57; 73), die die Bewegung der beweglichen Verbindungsmittel (M1; M2; M3) mit der Drehung des Drehrads (6; 55; 72) derart synchronisieren, dass eine synchrone Bewegung des oberen Randes (A2) und des unteren Randes (A1) des Türblattes ermöglicht wird.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der zweite Rahmen (20) als erste nicht verschiebbare Schiene der telekopischen Führung (30) dient.

3. Vorrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die beweglichen Verbindungsmittel (M1) Folgendes umfassen:

- ein Paar identische Kipphebel (2) mit einem ersten Stift (2a), der an dem ersten Rahmen (10) angebracht ist, und einem zweiten Stift (2b), der am zweiten Rahmen (20) angebracht ist; und
- zwei identische, krummlinige Führungsbahnen (3), die aus dem Rahmen (10) herausgearbeitet sind, in den die zweiten Stifte (2b) der Hebel (2) freibeweglich eingesetzt sind.

4. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** sie Folgendes umfasst:

- zwei gezahnte Riemenscheiben (4), die im Innern des ersten Rahmens (10) untergebracht und mit den entsprechenden ersten Stiften (2a) der Kipphebel verbunden sind, und
- einen Zahnriemen (5), der beide Riemenscheiben (4) in Eingriff nimmt und dadurch einen perfekten Sychronismus der Schwingungen der beiden Hebel (2) gewährleistet.

5. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** mindestens ein mit der Rückführstange (8) verbundenes Drehrad (6) ein drittes Zahnrad ist, das an einem Ende des ersten Rahmens (10) angeordnet ist, und dass die Synchronisierungsmittel (5) der Zahnriemen (5) sind, der das dritte Zahnrad (6) in Eingriff nimmt.

6. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die beweglichen Verbindungsmittel (M2) ein Paar identische Schlitten (50) umfassen, die mit dem zweiten Rahmen (20) fest verbunden und in entsprechenden Führungsschienen (51) beweglich gekoppelt sind, die fest mit dem ersten Rahmen (10) verbunden sind.

7. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** sie Folgendes umfasst:

- eine horizontale Welle (52), die vom zweiten Rahmen (20) getragen wird und eine Y-Achse aufweist, die orthogonal zur horizontalen Gleitachse (X) der Schlitten (50) steht;
- zwei Zahnstangen (54), die fest mit dem ersten Rahmen (10) verbunden sind und parallel zur Gleitachse (X) der Schlitten (50) stehen; und
- zwei Ritzel (53), die auf die beiden Enden der Welle (52) aufgezogen sind und die Zahnstangen (54) in Eingriff nehmen.

8. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** das Drehrad (55) eine Buchse mit einem gezahnten Außenring (56) ist und die Synchronisierungsmittel (57) eine fest mit dem Schlitten (50) verbundene Zahnstange sind.

9. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die beweglichen Verbindungsmittel (M3) ein Paar identische, drehverschiebbare Platten (60) umfassen, die auf der Seite des zweiten Rahmens (20) befestigt, zur Türöffnung (V) gerichtet und mit dem ersten festen Rahmen (10) mittels eines Exzentermechanismus (E) verbunden sind, umfassend:

- eine Scheibe (61), die eine außerzentrische Welle (62) mit vertikaler Achse aufweist, die ein Basisende (62a) und ein Kopfende (62b) besitzt;
- ein Radiallager (63), das die Scheibe (61) umschreibt;
- ein rundes Gehäuse (64), welches das Radiallager (63) aufnimmt und aus einer durchgehenden Bohrung in jeder Platte (60) besteht,
- zwei axiale Schublager (66), die jeweils in ringförmigen Hohlräumen (65) des runden Gehäuses (64) untergebracht sind.

10. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** jede Exzentervorrichtung (E) und die dazu gehörige Platte (60) in einer aus dem ersten festen Rahmen (10) herausgearbeiteten Öffnung (67) untergebracht sind und eine frontale Öffnung zur Durchführung der beweglichen Platte (60) aufweisen, die Dreh-Verschiebebewegungen im Innern der Öffnung (67) ausführt.

11. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** unterhalb des ersten festen Rahmens (10) eine Schublade (68) befestigt wird, die vorn offen ist und die Öffnung (67) begrenzt, sowie dadurch, dass das Basis- und das Kopfende (62a und 62b) der außerzentrischen Welle (62) in jeweilige Sitze (69a und 69b) eingesteckt sind, die jeweils aus einer Bodenwand (70) der Schublade (68) und aus dem festen Rahmen (10) herausgearbeitet sind.

12. Vorrichtung nach dem vorstehenden Anspruch, **dadurch gekennzeichnet, dass** sie ein erstes Ritzel (71) umfasst, das am Kopfende (62b) der exzentrischen Welle (62) befestigt ist; wobei das Drehrad (72) ein zweites Ritzel ist, das am Kopfende einer Buchse (74) befestigt ist, die drehbar in einem entsprechenden Sitz untergebracht ist, der im ersten Rahmen (10) herausgearbeitet ist; und wobei die Synchronisierungsmittel eine Zahnstange (73) sind, die das erste Ritzel (71) und das zweite Ritzel in Eingriff nimmt.

13. Vorrichtung nach einem beliebigen Anspruch von 9 bis 12, **dadurch gekennzeichnet, dass** sie einen Elektromotor mit zwei Drehrichtungen umfasst, der auf dem ersten Rahmen (10) montiert und mit der außerzentrischen Welle (62) verbunden ist.

14. Vorrichtung nach einem beliebigen Anspruch von 2 bis 13, **dadurch gekennzeichnet, dass** der zweite Rahmen (20) eine Reihe von horizontalachsigen Losrollen (32) trägt, die beweglich an eine Zwischenschiene (33) gekoppelt sind, die eine Reihe von Losrollen (34) trägt, die beweglich an die letzte verschiebbare Schiene (35) der teleskopischen Führung (30) gekoppelt sind, die an dem verschiebbaren Türblatt (A) am oberen Rand (A2) des Blattes befestigt sind.

15. Vorrichtung nach einem beliebigen der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das vertikalachsige Drehrad (6; 55; 72) eine Bohrung (7a) mit gerilltem Profil umfasst und dass die Rückführstange (8) mindestens einen Endabschnitt mit prismatischem Profil umfasst, der in die Bohrung (7a) mit gerilltem Profil eingekoppelt wird.

Revendications

1. Dispositif (1) pour le support et le déplacement de panneaux coulissants pour portes comprenant :

- un premier châssis fixe (10) logé dans un ouverture-porte (V) définie par un châssis de la porte et à cheval de montants (MO) du châssis de la porte ;
- un second châssis mobile (20) sous-jacent au premier châssis fixe (10) ;
- une coulisse télescopique (30), à deux ou plusieurs rails, interposée entre le second châssis mobile (20) et le panneau (A) de la porte, en correspondance du bord supérieur (A2) du panneau, de manière que le panneau (A) puisse glisser par rapport au second châssis mobile (20) et être supporté par le dispositif (1),
- des moyens de liaison mobile (M1, M2, M3) entre le premier châssis (10) et le second châssis (20), de manière que le second châssis (20) puisse se déplacer d'une première position, où le panneau coulissant (A) est logé à l'intérieur de l'ouverture-porte (V) et va en battement contre les intrados (S) du châssis de la porte, et une seconde position, où le panneau coulissant (A) n'est pas logé dans l'ouverture-porte (V) et il est distancié des intrados (S) du châssis de la porte,
- au moins une roue pivotante (6; 55 56; 72) à axe vertical, disposée dans ledit premier châssis fixe (10),
- une tige de renvoi (8), ayant axe vertical, reliée à ladite roue pivotante (6; 55; 72),
- un bras horizontal (9) relié à la tige de renvoi (8) et doté d'un roulement ou d'un patin de coulissement (9a) pivotant à axe vertical, enfilé et coulissant dans une rainure longitudinale (SL) le long du bord inférieur (A1) du panneau (A),
- des moyens de synchronisation (5; 5a; 57; 73) qui synchronisent le mouvement des dits moyens de liaison mobile (M1; M2; M3) avec la rotation de ladite roue pivotante (6; 55; 72), de manière à consentir le mouvement synchronisé du bord supérieur (A2) et du bord inférieur (A1) du panneau de la porte.

2. Dispositif selon la revendication 1, **caractérisé en ce que** le second châssis (20) fonctionne en tant que premier rail, non de translation, de la coulisse télescopique (30).

3. Dispositif selon l'une des revendications précédentes, **caractérisé en ce que** lesdits moyens de liaison mobile (M1) comprennent :

- une paire de culbuteurs identiques (2) ayant un premier pivot (2a) positionné sur le premier châssis (10) et un second pivot (2b) positionné sur le second châssis (20) ; et
- deux guides identiques curvilignes de coulissement (3), réalisées sur le premier châssis (10), dans lesquelles sont enfilés avec liberté de coulissement lesdits seconds pivots (2b) des culbuteurs (2).

4. Dispositif selon la revendication précédente, **caractérisé en ce qu'**il comprend :

- deux poulies dentées (4) logées à l'intérieur du premier châssis (10) et reliées à leurs respectifs premiers pivots (2a) des culbuteurs et
- une courroie dentée (5) qui s'engage avec les deux poulies dentées (4), en assurant ainsi un synchronisme parfait entre les oscillations des deux culbuteurs (2).

5. Dispositif selon la revendication précédente, **caractérisé en ce que** ladite au moins une roue pivotante (6) reliée à la tige de renvoi (8) est une troisième poulie dentée (6) disposée à une extrémité du premier châssis (10) et lesdits moyens de synchronisation (5) sont ladite courroie dentée (5) qui s'embraye avec ladite troisième poulie dentée (6).

6. Dispositif selon les revendication 1 ou 2, **caractérisé en ce que** lesdits moyens de liaison mobile (M2) comprennent une paire identique de traineaux (50) solidaires au second châssis (20), accrochés de manière coulissante dans des respectifs rails de coulissement (51) solidaires au premier châssis (10).

7. Dispositif selon la revendication précédente, **caractérisé en ce qu'**il comprend :

- un arbre horizontal (52) supporté par le second châssis (20) ayant un axe (Y) orthogonal à l'axe horizontal de coulissement (X) desdits traineaux (50) ;
- deux crémaillères (54) solidaires au premier châssis (10) et parallèles à l'axe de coulissement (X) des traineaux (50) ; et
- deux pignons (53) caletés aux deux extrémités du dit arbre (52) et embrayés avec lesdites crémaillères (54).

8. Dispositif, selon la revendication précédente, **caractérisé en ce que** ladite roue pivotante (55) est une douille (55) ayant une bague externe dentée (56) et lesdits moyens de synchronisation (57) sont une crémaillère (57) solidaire avec le traineau (50).

9. Dispositif, selon les revendications 1 ou 2, **caractérisé en ce que** lesdits moyens de liaison mobile (M3) comprennent une paire identique de plaques à translation rotative (60) fixées sur le côté du second châssis (20) tourné vers l'ouverture-porte (V) et reliées au premier châssis fixe (10) moyennant un mécanisme à excentrique (E) comprenant :

- un disque (61) qui supporte un arbre hors centre (62), ayant axe vertical, qui présente une extrémité de base (62a) et une extrémité de tête (62b) ;
- un roulement radial (63) qui circonscrit le disque (61) ;
- un siège circulaire (64) qui accueille ledit roulement radial (63) et qui consiste en un trou passant réalisé sur chaque plaque (60),
- deux roulements axiaux de poussée (66) logés dans des respectives cavités annulaires (65) du siège circulaire (64).

10. Dispositif, selon la revendication précédente, **caractérisé en ce que** chaque dispositif à excentrique (E) et la plaque correspondante (60) sont logés dans un espacement (67) réalisé dans le premier châssis fixe (10) et ayant une ouverture frontale de passage pour la plaque mobile (60), qui accomplit des mouvements de translation rotative à l'intérieur de cet espacement (67).

11. Dispositif, selon la revendication précédente, **caractérisé en ce que** en-dessous du premier châssis fixe (10) on installe un tiroir (68), ouvert frontalement et qui délimite cet espacement (67) et **en ce que** lesdites extrémités de base et de tête (62a et 62b) de l'arbre hors centre (62) sont enfilées dans des sièges correspondants (69a et 69b), réalisés respectivement sur une paroi de fond (70) du dit tiroir (68) et sur le premier châssis fixe (10).

12. Dispositif, selon la revendication précédente, **caractérisé en ce qu'**il comprend un premier pignon (71) fixé sur l'extrémité de tête (62b) de l'arbre excentrique (62) ; où ladite roue pivotante (72) est un deuxième pignon (72), fixé sur l'extrémité de tête d'une douille (74) logée et pivotante dans un siège prévu à cet effet réalisé sur le premier châssis (10) ; et lesdits moyens de synchronisation (73) sont une crémaillère (73) qui s'embraye avec lesdits premier pignon (70) et second pignon (71).

13. Dispositif selon l'une quelconque des revendications

de 9 à 12, **caractérisé en ce qu'**il comprend un moteur électrique à deux directions de rotation, monté sur le premier châssis (10) et relié au dit arbre hors centre (62).

14. Dispositif selon l'une quelconque des revendications de 2 à 13, **caractérisé en ce que** ledit second châssis (20) supporte une série de roues folles (32), ayant axe horizontal, auxquelles est associé de manière coulissante un rail intermédiaire (33) qui supporte une série de petites roues folles (34), auxquelles est associé le dernier rail coulissant (35) de la coulisse télescopique (30), fixé au panneau coulissant (A) en proximité du bord supérieur (A2) du panneau.

15. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite roue pivotante (6; 55; 72) à axe vertical comprend un trou (7a) ayant profil rainure et ladite tige de renvoi (8) comprend au moins un segment d'extrémité ayant profil prismatique qui se couple dans ledit trou (7a) ayant profil rainuré.

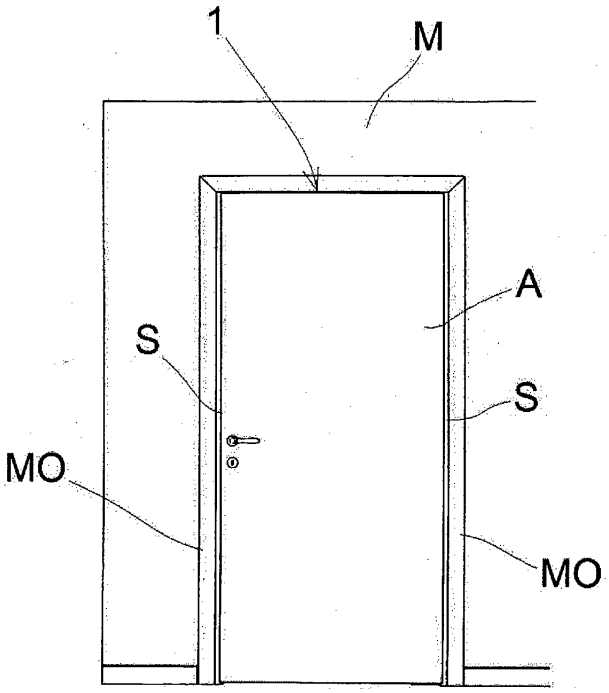


FIG. 1A

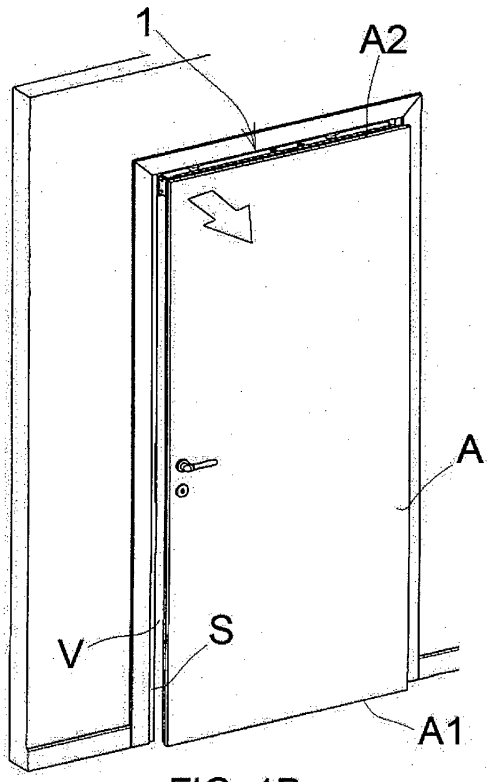


FIG. 1B

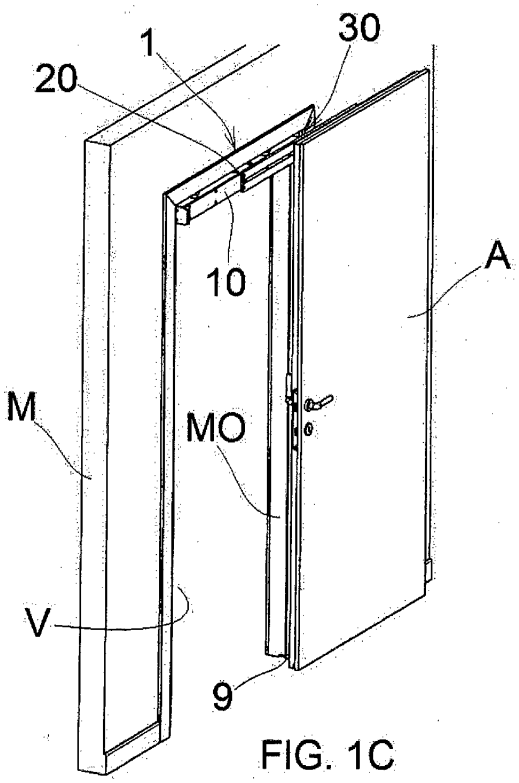


FIG. 1C

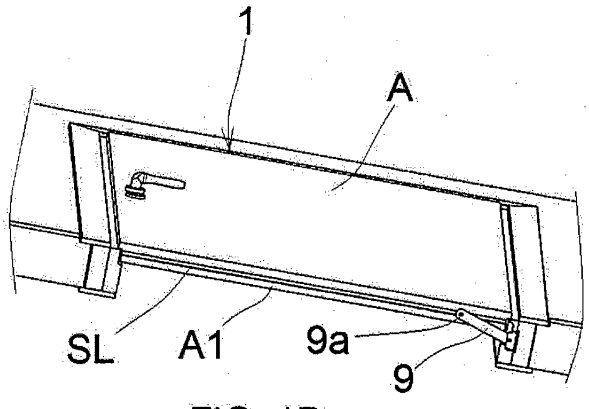


FIG. 1D

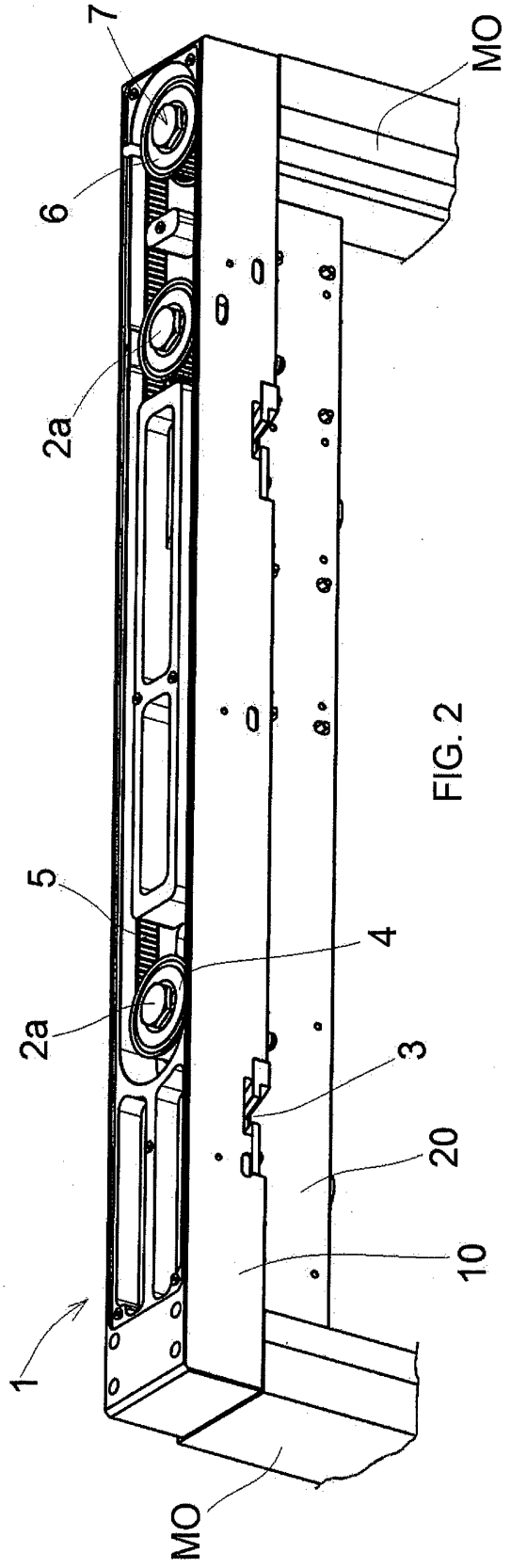

7
MO
6
2a
5
4
2a
3
20
10
1
MO

FIG. 2

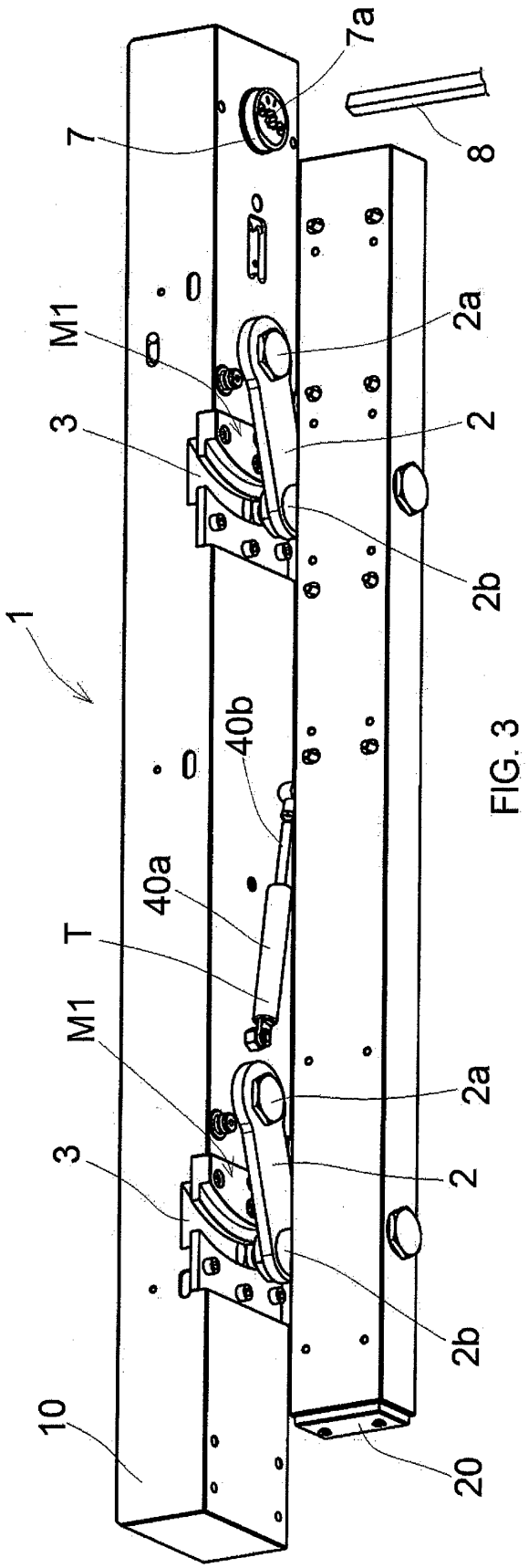

7a
8
7
M1
2a
3
2
2b
1
40b
40a
T
M1
2a
3
2
2b
10
20

FIG. 3

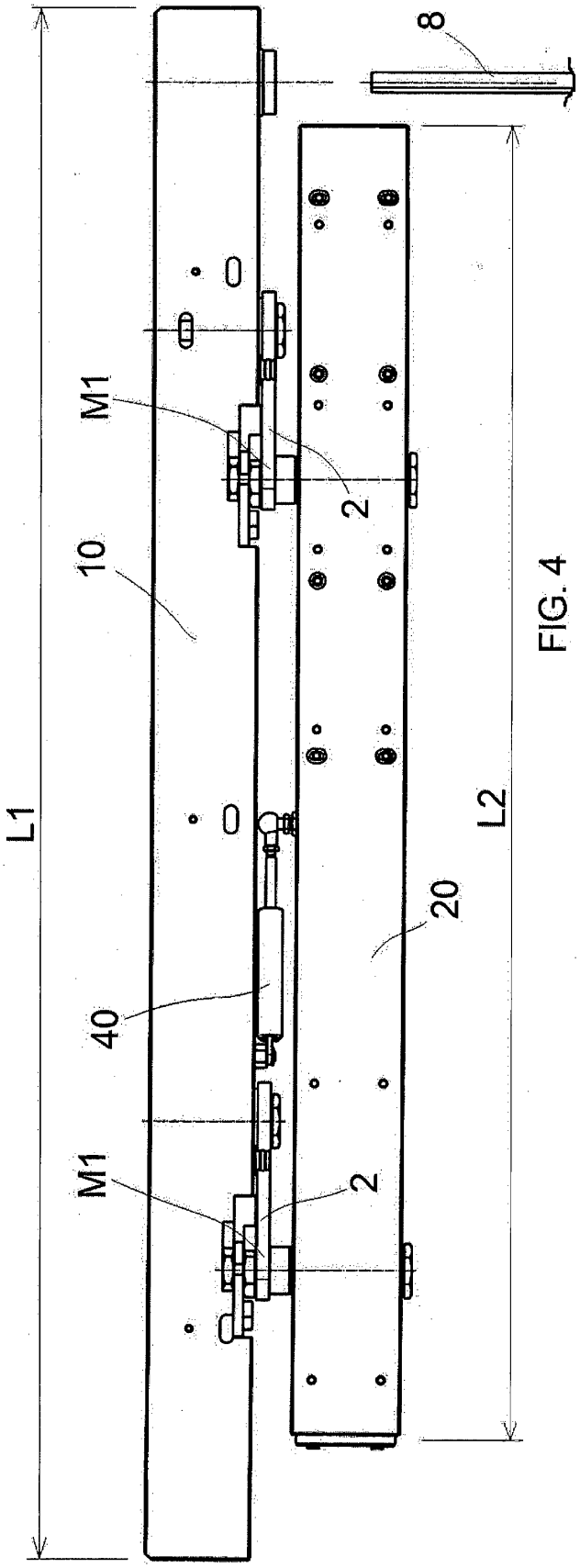


FIG. 4

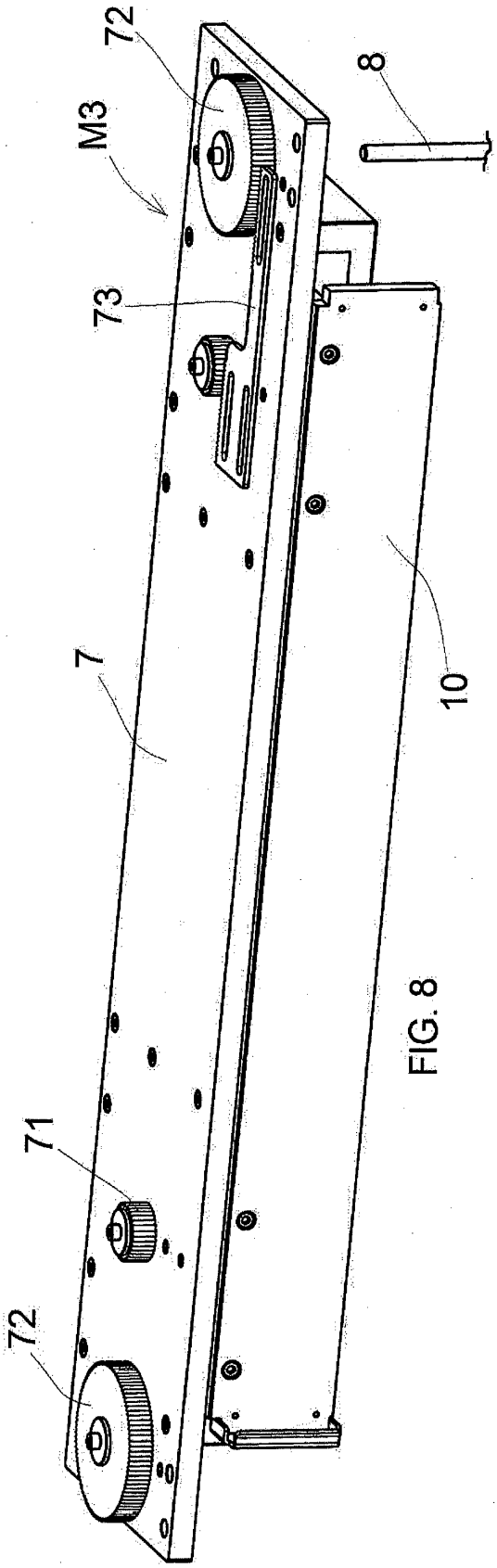


FIG. 8

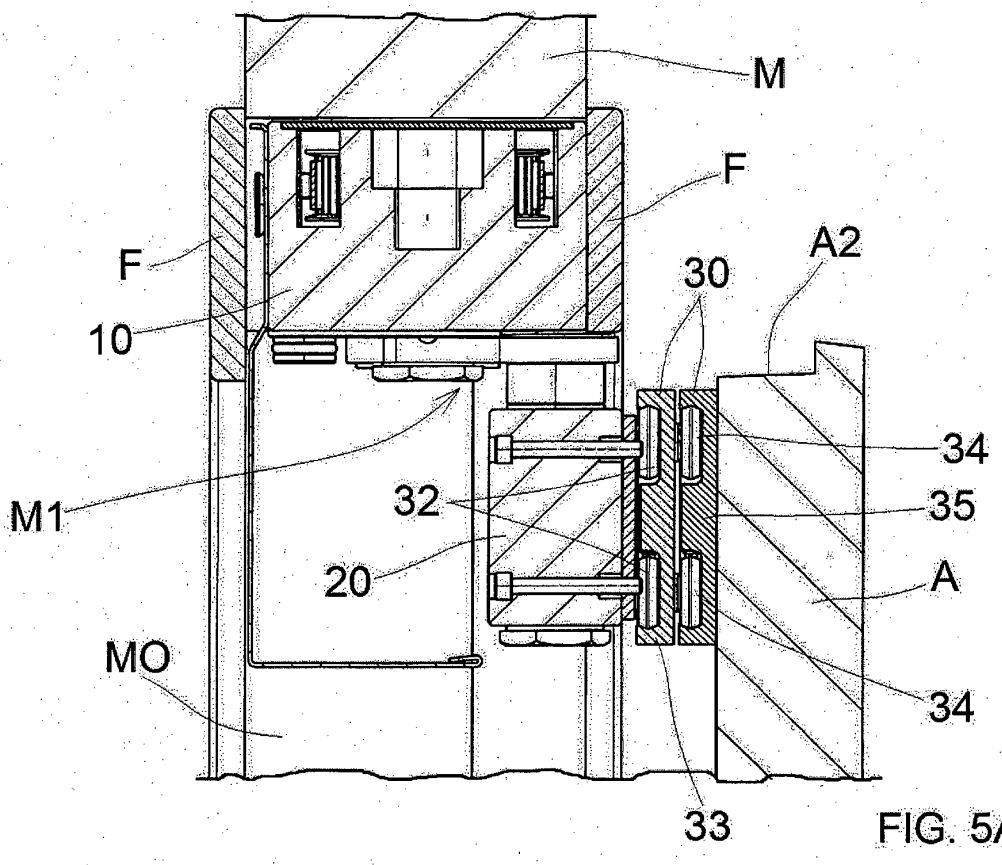


FIG. 5A

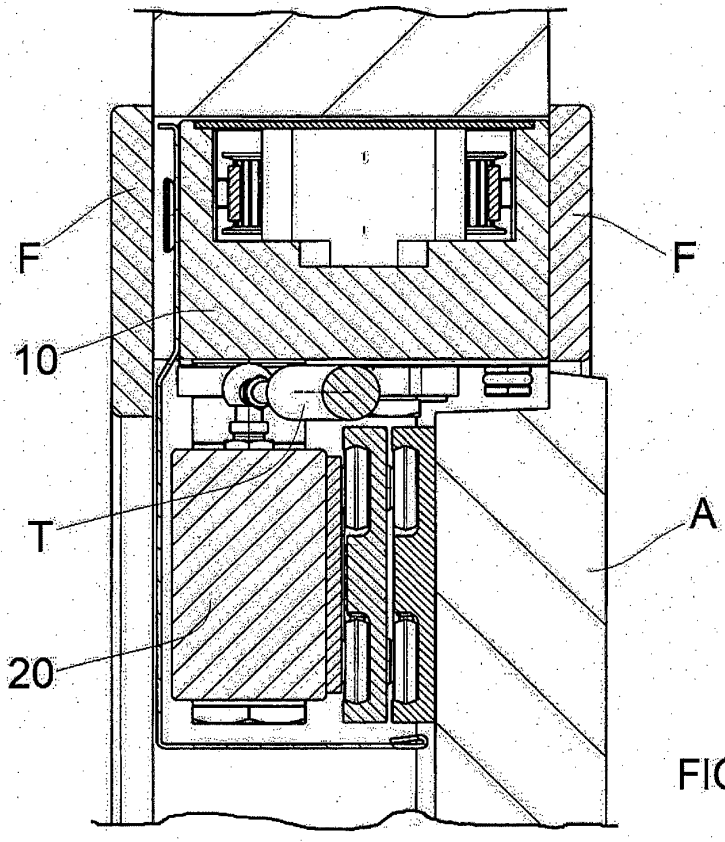


FIG. 5B

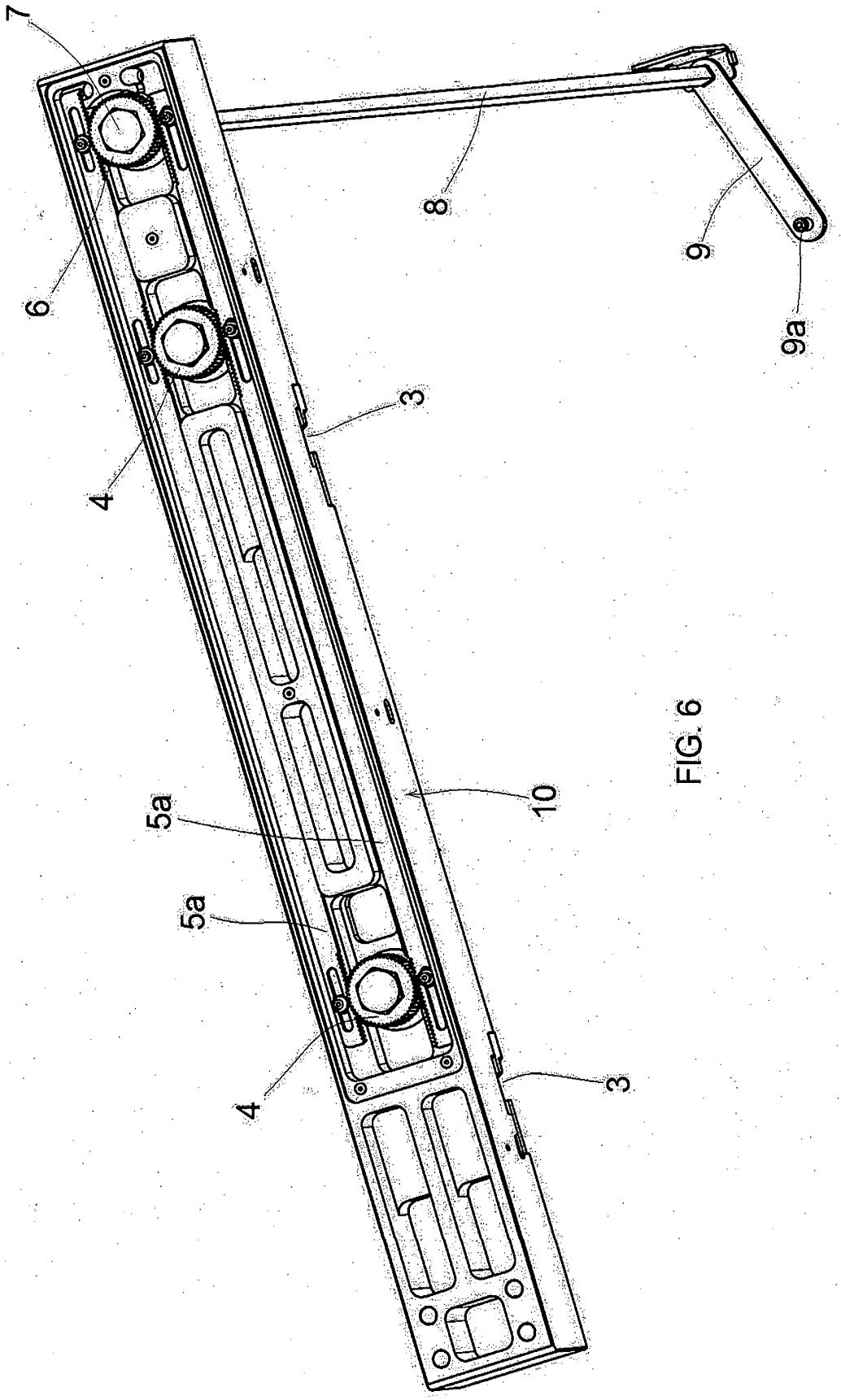
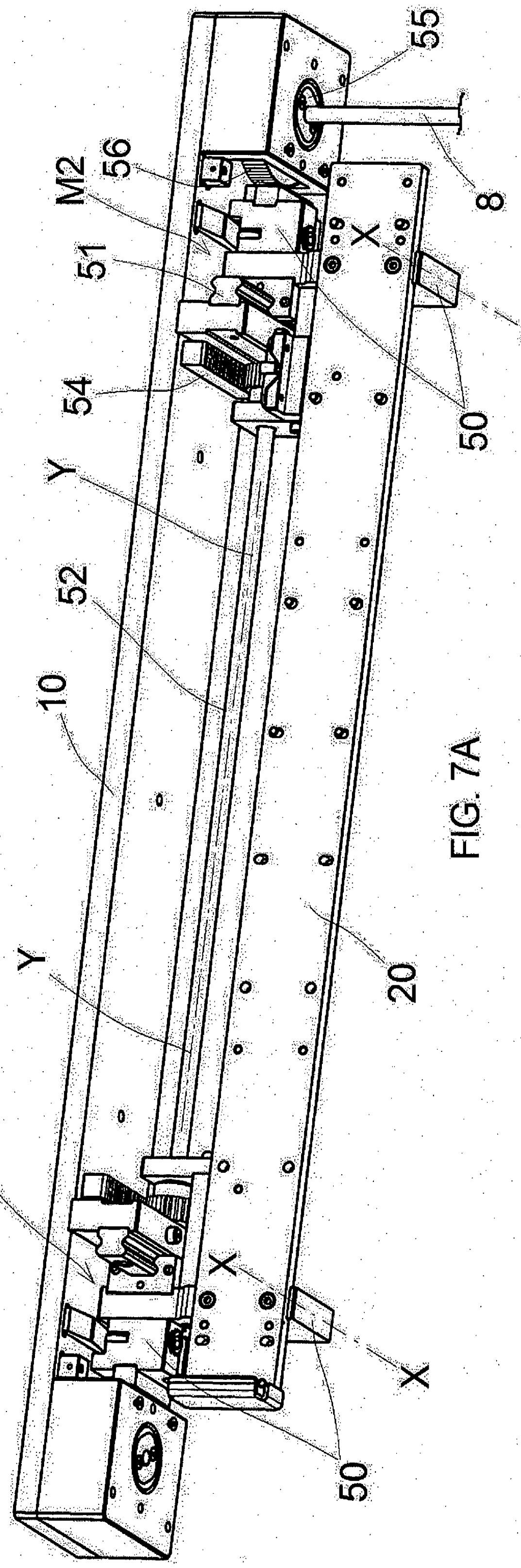
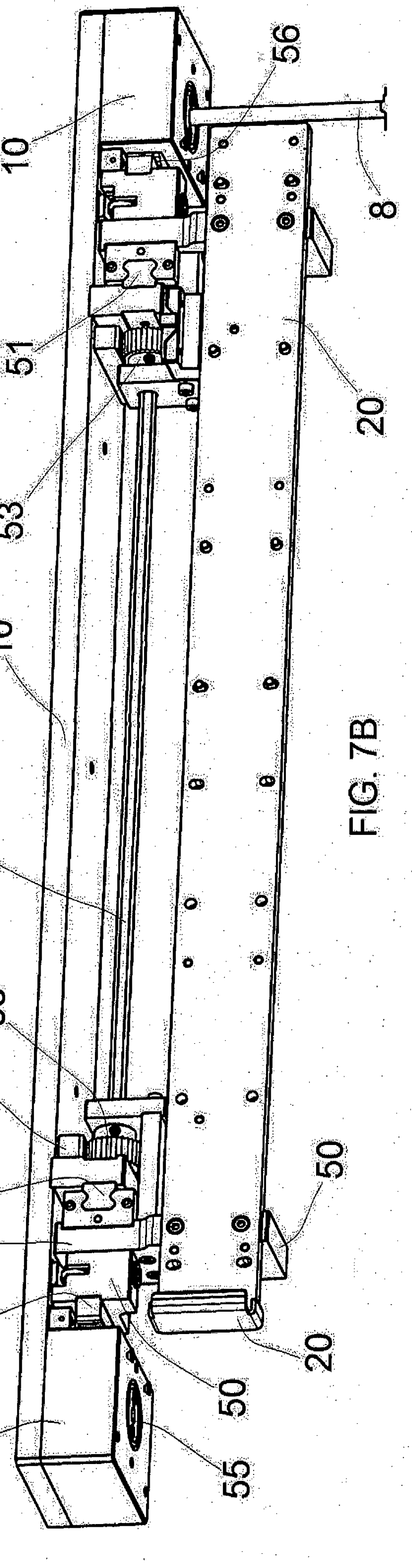


FIG. 6


55
56
M2
51
54
Y
52
10
Y
M2
X
X
50
20
8
X
X
50
50
FIG. 7A


56
10
8
51
53
20
10
52
53
54
51
50
57
10
50
55
20
50
FIG. 7B

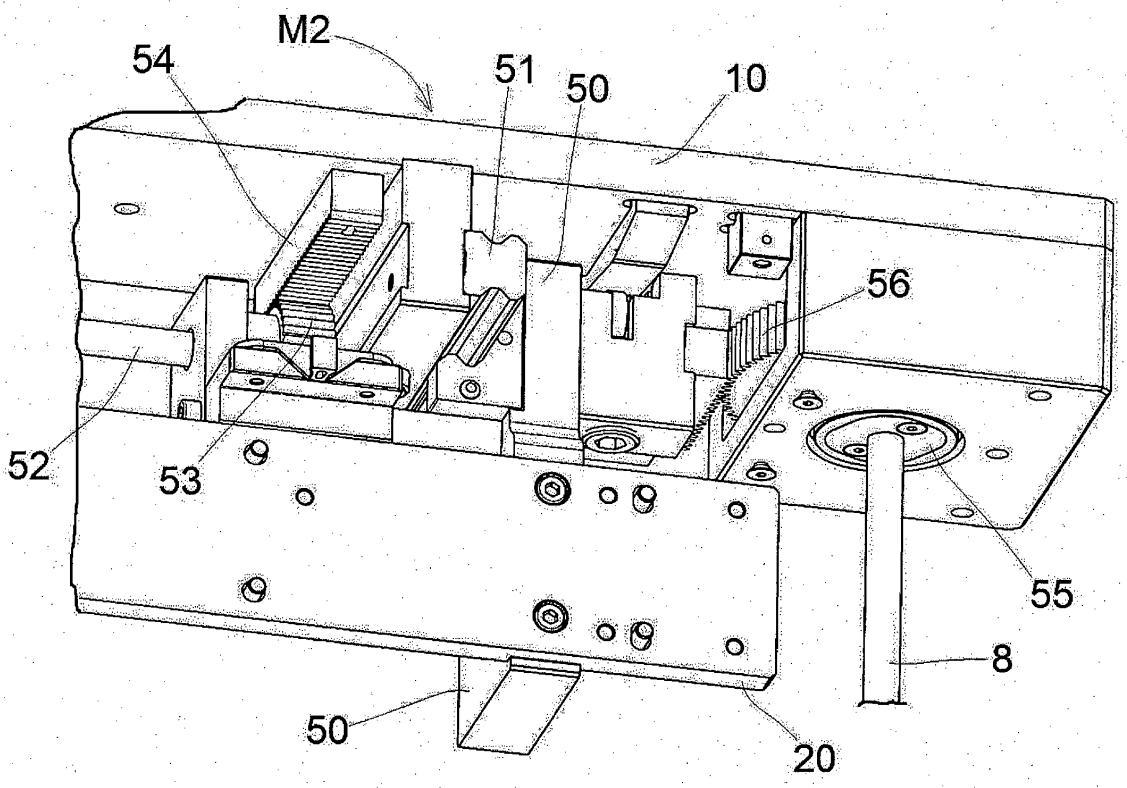


FIG. 7A'

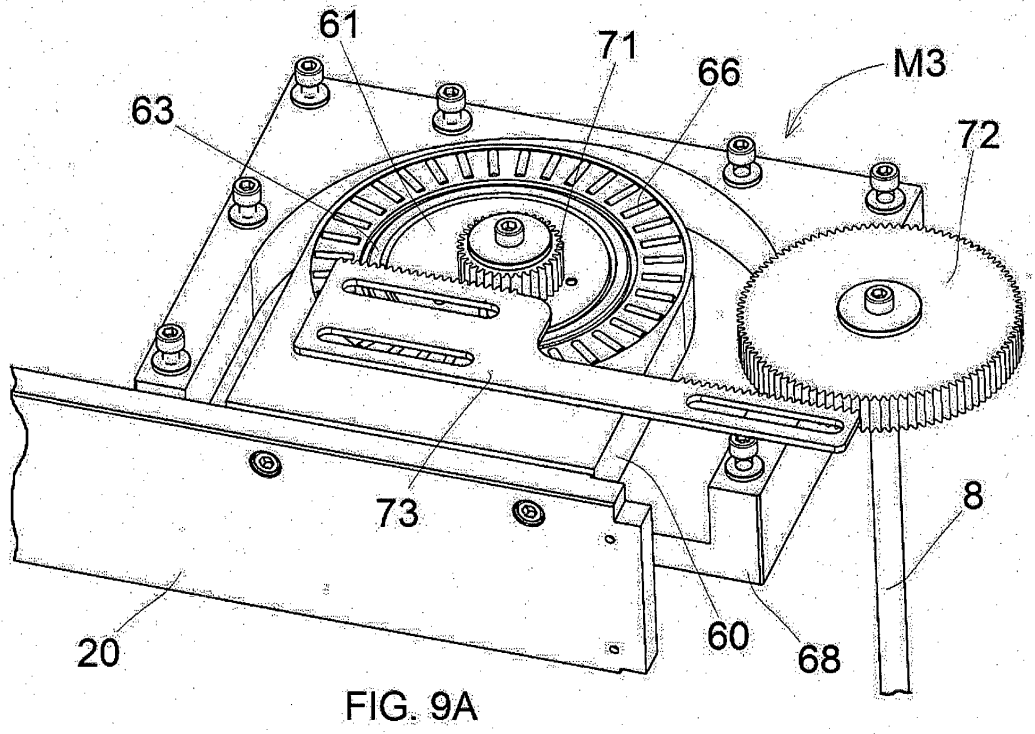


FIG. 9A

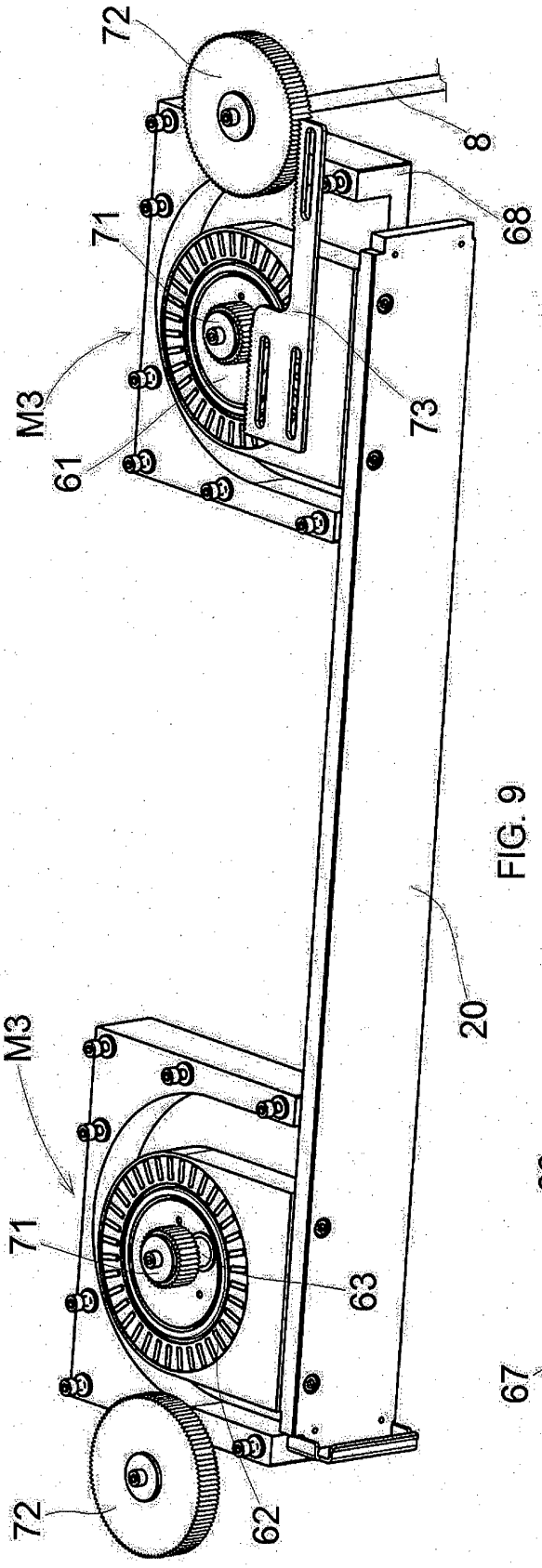

72
8
68
71
M3
73
61
20
M3
71
63
72
62

FIG. 9

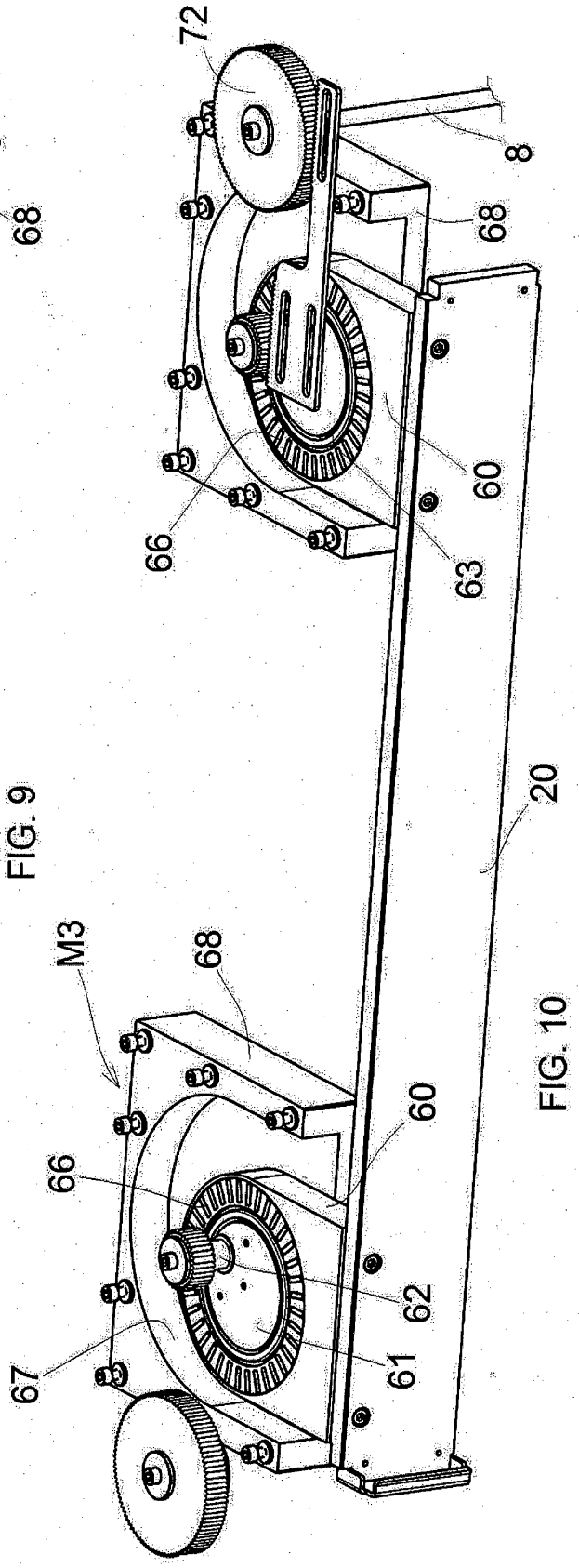

72
8
68
60
66
63
20
M3
68
66
60
62
67
61

FIG. 10

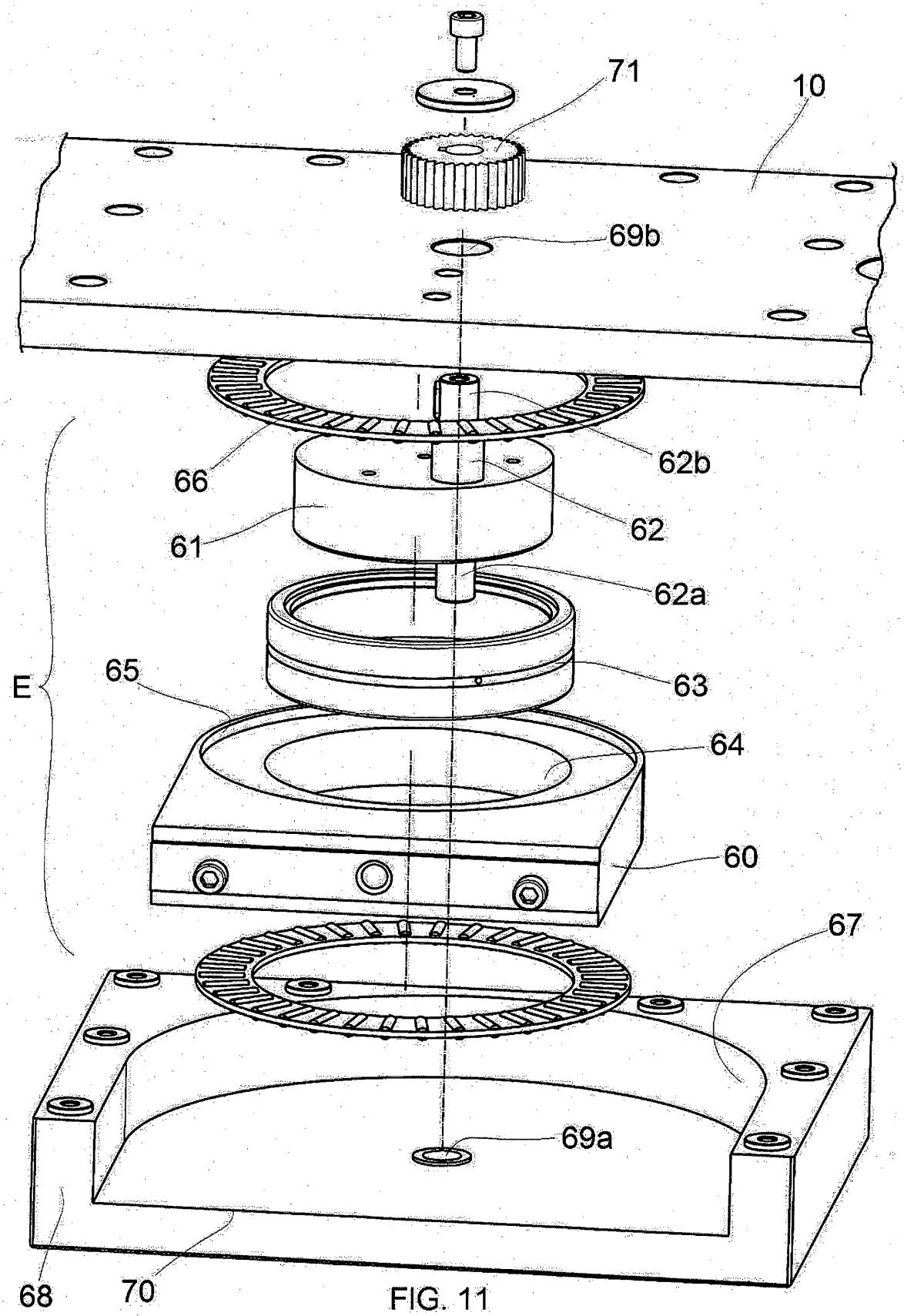


FIG. 11

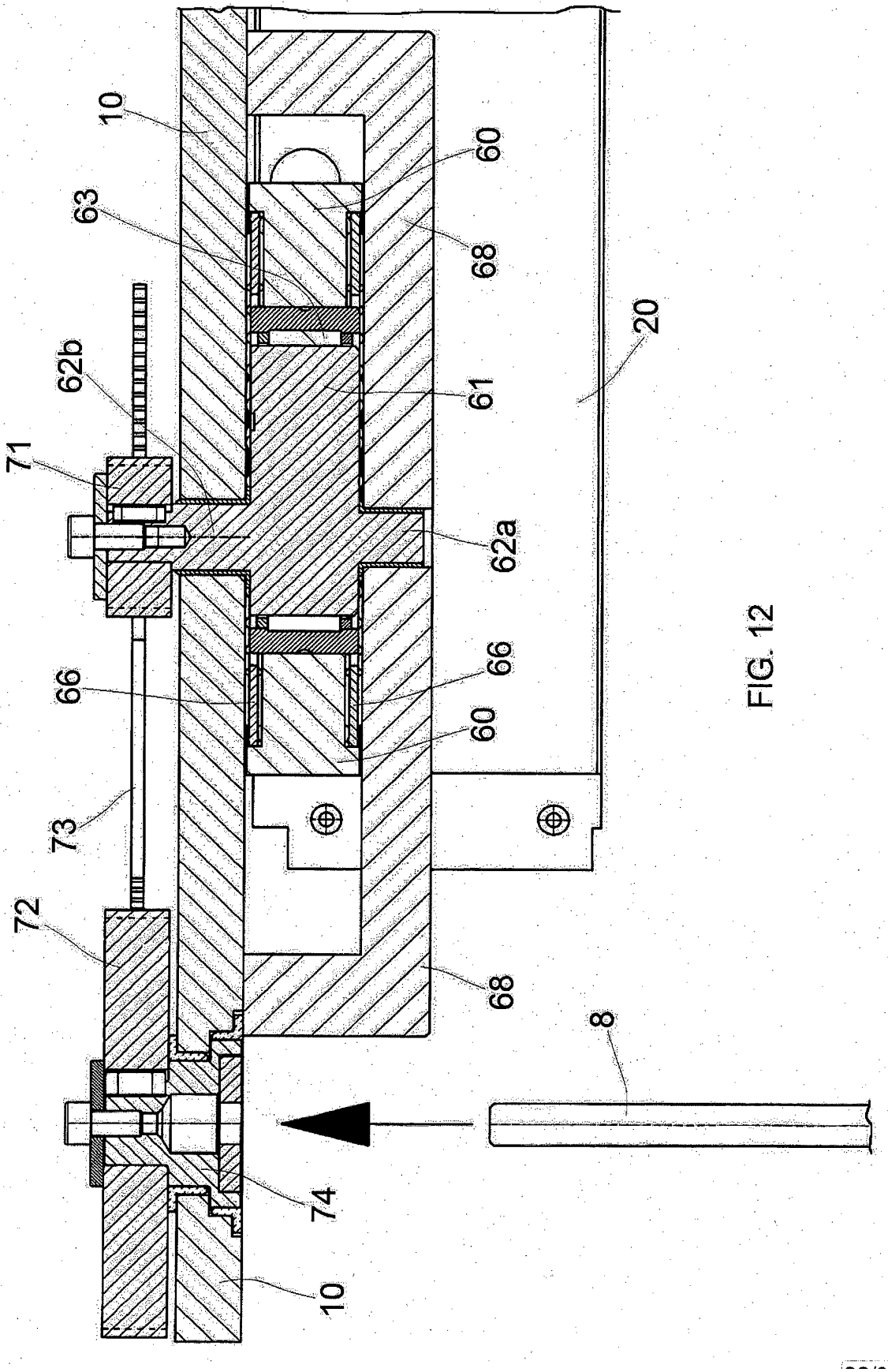


FIG. 12

REFERENCES CITED IN THE DESCRIPTION

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