

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2017 Bulletin 2017/23

(51) Int Cl.:
E05D 15/06 (2006.01) **E05F 15/643** (2015.01)
E05F 15/73 (2015.01) **E05F 15/632** (2015.01)

(21) Application number: **16201355.1**

(22) Date of filing: **30.11.2016**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
 GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
 PL PT RO RS SE SI SK SM TR**
 Designated Extension States:
BA ME
 Designated Validation States:
MA MD

(72) Inventors:

- **CAVALCANTE, TONI**
36066 SANDRIGO (VI) (IT)
- **STEFANOU, Theodoros**
36066 SANDRIGO (VI) (IT)

(74) Representative: **De Giorgi, Michele et al**
Barzanò & Zanardo Roma S.p.A.
Via Piemonte, 26
00187 Rome (IT)

(30) Priority: 02.12.2015 IT UB20156093

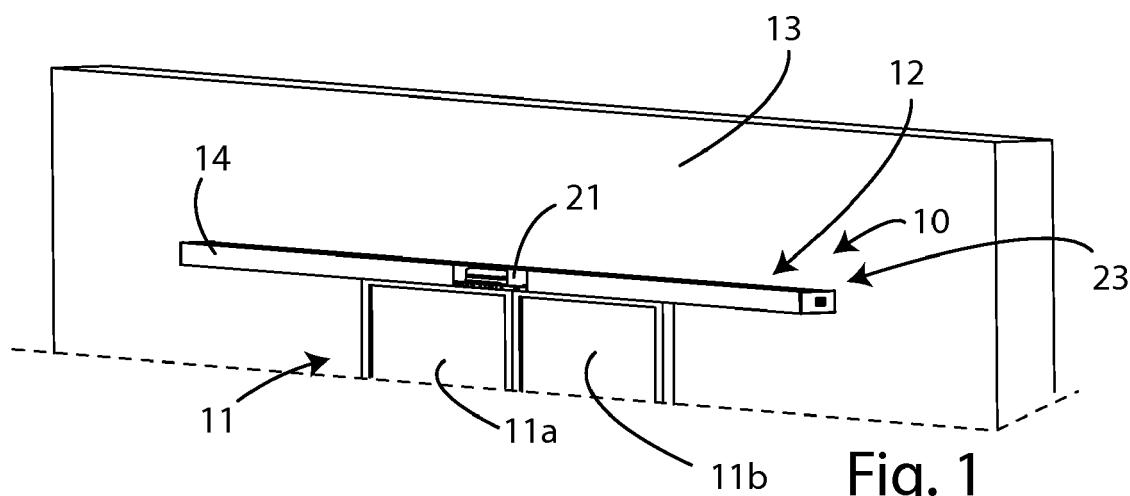
(71) Applicant: **Topp Srl a socio unico**
36066 Sandrigo (VI) (IT)

(54) **ACTUATING APPARATUS FOR SLIDING DOOR**

(57) An actuating apparatus for sliding door (11) characterized by comprising:

- a support beam (12), fixable to a wall (13);
- at least one casing element (14), complementary to said beam (12) and can be fixed to the latter in order to delimit with the latter a service compartment (A) and an operating compartment (B) in which, in use, track trolleys (15) roll supporting the door (11);
- a primary group (16) comprising drive motor (17) of the door (11), a sensing and safety device (18), electrical

power supply means (19) and a control device (20) connected to said means of power supply (19), to said sensing and safety device (18) and said motor (17) for controlling them; the primary group (16) is enclosed in a first box-like container (21) which is placed external to the sensing and safety device (18) and a first connector (22) of the electrical power supply means (19); the first box-like container (21) being shaped so as to stay in the operating compartment (A).



Description

[0001] The present invention relates to an actuating apparatus for a sliding door, its construction, management of components and simplified assembly.

[0002] In particular, the present invention relates to an actuating apparatus for a sliding door which is fixable to the architrave of an opening to support the leaf or leaves of a sliding door.

[0003] Nowadays, in the field of production and installation of sliding doors, manufacturers, once receive an order, produce an actuating apparatus based on the specifications in the order.

[0004] In detail, this conventional system comprises a beam to be fixed to the support onto which the door is mounted, which is made to specified length in order, to fit the opening to which the sliding door is mounted.

[0005] The beam is formed by means of a profiled metal with a section shaped in such a way to provide seats and supports for housing, in which the components of the door actuating device, the power supply device and that of the actuating control device is to be fixed.

[0006] In particular, the conventional apparatuses shows an electric motor fixed to one end of the beam, a geared motor connected to the electric motor and a return pulley fixed to the other end of the beam and kinematically connected to the gear motor by a belt.

[0007] Track trolleys, for supporting the leaf or leaves, are coupled by sliding on to a track component of the beam and hooked to the belt and with the aid of this, is pulled or dragged when the electric motor is actuated.

[0008] The power supply device is equipped with a transformer connectable to the electric motor, to supply it at a converted voltage with respect to that of the grid.

[0009] These conventional apparatuses have various problems with the construction, transporting and installation.

[0010] In fact, in the case of very large rooms, the beam will be of notable length, creating consequent difficulties when transporting it.

[0011] In addition, the installation of the electrical and mechanical components requires high expertise and, according to some national laws, it may legitimately be carried out only by qualified and authorized personnel.

[0012] The main problem of the present invention, is to simplify the structure of an actuating apparatus for sliding doors making it more simple to install.

[0013] The principal aim of the present invention is to make an actuating apparatus for sliding doors which gives solution to the problem, resolving the drawbacks of the opening apparatus for sliding doors, described above.

[0014] Within the same purview, its is the aim of the present invention proposing an actuating apparatus for a sliding door which allows a more simple logistics of warehousing and distribution of the product.

[0015] Another object of the present invention is to provide an actuating apparatus for a sliding door which does

not require a specialized personnel for its assembly.

[0016] A further object of the invention is to propose an actuating apparatus for a sliding door which is more compact when disassembled compared to the conventional apparatuses.

[0017] This aim, as well these and other goals which will become apparent hereinafter are achieved by an actuating apparatus for a sliding door according to claim 1 attached.

[0018] Detailed features of the apparatus for actuating a sliding door according to the invention are disclosed in the corresponding dependent claims.

[0019] Further characteristics and advantages of the invention will become apparent from the description of a preferred form of execution, but not exclusive of an actuating apparatus for a sliding door according to the invention, illustrating an indicative and non-limitative example in the accompanying drawings, in which:

- Figure 1 shows an actuating apparatus for a sliding door according to the present invention, in perspective view;
- Figures 2, 3 and 4 show a zoom-in detail, of the actuating apparatus of Figure 1, with some parts removed to better illustrate others, in a perspective view;
- Figures 5, 6 and 7 illustrate a zoom-in detail of the actuating apparatus of Figure 1 relative to the primary group in perspective view from the front and from behind;
- Figures 8, 9 and 10 illustrate the internal components to the primary group of Figures 5-7;
- Figures 11, 12, 13, 14 show details of the apparatus according to the present invention;
- The figures 15 and 16 show a detail of the electro-block and of the kinematic mechanism operated by it;
- Figure 17 illustrates a cross section view of the longitudinal direction of the beam of an actuating apparatus according to the present invention;
- Figure 18 illustrates a detail of the apparatus according to the present invention in perspective view.

[0020] With particular reference to the above figures, it is generally indicated with 10 an actuating apparatus for a sliding door 11 which, according to the present invention, has a peculiar characteristic in that it comprises:

- a support beam 12, preferably in metallic material and more preferably in aluminum, fixable to a wall 13;
- at least a casing element 14, preferably in plastic

material and more preferably in PVC, complementary to the beam 12 and fixable to the latter in order to delimit with this a service compartment A and an operative compartment B on which, in use, the support track trolleys 15 of the door 11 roll;

- a primary group 16 comprising a drive motor 17 of the door 11, a sensing and safety device 18, preferably comprising a radar to detect an individual who approaches the door, electrical power supply means 19, preferably comprising a battery 19a, and a control device 20, advantageously electronic, connected to electrical power supply means 19, to the sensing and safety device 18 and to the motor 17 to control them; the primary group 16 is enclosed in a first box-like container 21, outside of which they face the sensing and safety device 18 and a first connector 22 of the electrical power supply means 19; the first box-like container 21 is shaped in a way to be housed in the service compartment A.

[0021] The control device 20 is preferably configured to operate the door in function of a received signal, in use, by the sensing and safety device 18 to open the door in case of detecting a user that approaches it and to prevent the movement of the door if it detects the presence of a user within the acting zone.

[0022] Preferably, the sensing and safety device 18 will comprise a plurality of sensors to detect the possible presence of users throughout the area of action of the door leaves.

[0023] In other words, according to the present invention, the electronic control part and the door drive is enclosed in the first container 21 so as to form a component, the plug and play type, that is ready to be simply fixed to the beam 12, connected to an actuation mechanism of the door and connected to the electricity grid in order to be put into operation.

[0024] In a variant implementation of the present invention, not illustrated in the attached figures, the primary group 16 also comprises an electrical transformer equipped with a socket to connect to the electricity grid that faces the outside of the first container 21.

[0025] In a further embodiment, preferably, the actuating apparatus 10 also includes a secondary group 23 which in turn comprises an electric transformer 24, suitable to transform the power supply grid to power the control device 20 through the power supply means 19.

[0026] In this case, the transformer 24 is enclosed in a second box-like container 25 and electrically connectable to the electrical power supply means 19; the transformer 24 is also equipped with a second connector 26 adapted to be connected to the electricity grid; the second box-like container 25 is shaped in a way as to mate with a longitudinal end of the beam 12 in order to delimit at least one of the compartments A and / or B, according to a longitudinal direction C of the beam 12 development; in particular, preferably the second box-like container 25

is shaped to constitute a support structure for the casing element 14.

[0027] Thus, an apparatus according to the present invention does not require specific skills for installation, also, the high voltage electrical components is enclosed in the second container 25 therefore it does not expose the installer to risks and does not require the intervention of qualified operators.

[0028] The transformer 24 is advantageously connected to a socket / plug which defines the second connector 26 and is placed on the external of the second container 25 to be connected to the electricity grid and has also a low voltage electrical connection 25a, to connect to the primary group 16 to power it.

[0029] The first container 21 advantageously also houses an electro-block 27 operable to block the door 11.

[0030] In variants, not illustrated in the attached figures, to facilitate the installation of the apparatus 10, advantageously the first container 21 comprises of open channels configured to house the power cables and / or connection, not illustrated, in such a way that parts of the cable inserted in the channels are included in the total overall size of the first container 21.

[0031] In the exemplified embodiment, in the attached figures, the aforesaid channels are substantially defined by side openings 28a and by fins 28b suitable to drive projecting wire from a first face of the first container 21.

[0032] The first container 21 can then, preferably, comprises a first box-like body 21 a equipped with the aforesaid channels on one of its first face 29, and a second box-like body 21 b which house the sensing and safety device 18.

[0033] The first box-like body 21 a is advantageously fixed to the beam 12 in correspondence with its second face 30, which is parallel and opposite to the first face 29.

[0034] The box-like bodies 21 a and 21 b are complementary to each other, in such a way that when the second box-like body 21 b is coupled to the first box-like body 21 a covers the channels at least partially. To facilitate the adjustment and setting of actuating apparatus 10, the control device 20 advantageously comprises an interface 32, operated by the user to define operational settings of the device 10, which is placed on the external of the first container 21.

[0035] The interface 32 may advantageously include a control handle and / or signal lights of the selected settings.

[0036] The first container 21 advantageously comprises a hinged cover 21 c, preferably aluminum, can be opened, to which the detection and safety device 18 is fixed.

[0037] In particular, with reference to the embodiment illustrated in the attached figures, the aforesaid channels are covered by the hinged cover 21 c.

[0038] The motor 17 is preferably equipped with a geared motor 33 comprising at least one pulley 34 for driving a dragging element of the door 11, which preferably is at least, per se, a conventional belt and not illus-

trated.

[0039] The pulley 34 protrudes from a rear wall of the first container 21 in a way that, when the first container 21 is fixed to the beam 12, the pulley 34 protrudes in the operating compartment B.

[0040] The beam 12 is preferably configured to support the first container 21 in its own central portion with respect to its longitudinal direction C of development.

[0041] More particularly, the beam 12 advantageously comprises a base section 12a to be fixed to the wall 13 and a support 12b which can be fixed to the base section 12a and configured to mate with the first container 21.

[0042] Advantageously, the support 12b includes threaded pins 120 and the first container 21 comprises through holes 210 adapted to receive in insertion the threaded pins 120 to fix, by means of nuts screwed onto the threaded pins, the primary group 16 to the beam 12.

[0043] To avoid that an inexperienced or careless operator from damaging the primary group 16 by excessively tightening the nuts, advantageously inside of the through holes 210 are inserted cylindrical elements 211 having a length less than that of the hole and such that they limit the tightening of the nuts so to avoid clamping tension that may damage the first container 21.

[0044] The geared motor 33, when the door 11 is of two leaves 11 a and 11 b, preferably comprises two pulleys, mutually coaxial, or a single pulley adapted to be coupled to both sides of the dragging elements of a leaf 11 a or 11 b of the door 11.

[0045] The actuating apparatus 10 in this case preferably comprises a pair of timing pulleys for the dragging element, fixed to the beam 12 on opposite sides of first container 21.

[0046] In a traditional way per se, each of the doors 11 a and 11 b is fixed to a respective branch of the dragging elements to be dragged by the latter according to a specular movements with respect to the first container 21.

[0047] In particular, preferably the apparatus 10 comprises a clamping element 35 adapted to be fixed to a bar 36, which slides along the beam 12 and can be fixed to the door to sustain a leaf 11 a or 11 b.

[0048] The clamping element 35 preferably comprises a seat in which the two extremes of a dragging element is forced to close the ring and at the same time to connect it to the bar 36 so as to allow the dragging of the latter and the leaf.

[0049] When the door 11 is a leaf, the beam 12 is advantageously configured to support the first container 21 in a lateral portion, next to its first end, with respect to a longitudinal direction C of development.

[0050] In this case, the actuating apparatus comprises a single timing pulley for the dragging element, conventional per se and not illustrated, fixed to the beam 12 at the second end of the latter.

[0051] To facilitate the transportation and warehouse management of the components of the device 10, the beam 12, or more precisely the base section 12a, preferably consists in two pieces having the same profile and

connected in an aligned manner with respect to the respective longitudinal directions of development, which in figure 1 coincide and are illustrated as the development direction C.

[0052] For structural simplicity and in order to simplify the installation and the management of components in stock, the pieces preferably are mutually connectable by means of the first container 21 or by means of a bracket also adapted to support the first container 21.

[0053] Advantageously, to limit the noise of the apparatus 10, elastic supports are anticipated, connecting the motor 17 to the first container 21.

[0054] Furthermore, to obtain a high safety of the apparatus, a kinematic mechanism 37 which can act on the electro-block 27 to prevent rotation of the pulley 34 is envisaged.

[0055] Such kinematic mechanism 37 can also be operated manually to lock or unlock the rotation of the pulley 34 and consequently the opening / closing of the door 11.

[0056] The kinematic mechanism 37 particularly is provided with a pivoting arm 39 which, by tilting, is coupled with a ring gear 40 coaxial and integral or fixed to the pulley 34.

[0057] Functionally, the kinematic mechanism 37 may be:

- In a first configuration, exemplified in figure 16, in which the tilting arm 39 inserts between two teeth of the ring gear 40, preventing rotation of the pulley 34;
- In a second configuration, exemplified in figure 15, in which the rocker arm 39 disengages the ring gear 40 and thus liberates the pulley 34 to rotate freely.

[0058] The electro-block 27 is provided with a small piston 27a adapted to actuate the kinematic mechanism 37 to make it pass from the second to the first configuration.

[0059] Preferably, the apparatus 10 includes a button 41, preferably envisaged on an exposed face, in use, of the first container 21; the button 41 is connected to the kinematic mechanism 37 to be able to operate the transition from the first to the second configuration.

[0060] To facilitate installation, the base section 12a is preferably constituted by two portions 200a and 200b and by a connecting element 200c provided with a slotted hole 201.

[0061] This solution is preferable when it is useful to reduce the overall dimensions during transportation, providing the base section mountable, for union of the two portions 200a and 200b by means of the connecting element 200c.

[0062] The two portions 200a and 200b each have one end preferably shaped to not obstruct the slotted hole 201 when they are assembled with the connecting element so as to allow the insertion of a screw 202 through the hole.

[0063] On assembly, preferably, the base section is

mounted, assembled, pivoted to the wall by means of the screw 202, then it is leveled and, thus, fixed to the wall.

[0064] This construction is clearly very simple to implement.

[0065] In corresponding manner, the casing element 14 can constitute two longitudinal portions 141 and 142 corresponding to the two portions 200a and 200b, preferably in PVC.

[0066] Advantageously, the two longitudinal portions 141 and 142 are substantially C-shaped to be fixed to the pieces 200a and 200b so as to form tubular elements, opened below, on which the track trolleys 15 roll.

[0067] To avoid deformation of the longitudinal portions 141 and 142, advantageously the apparatus 10 comprises support elements 201 and 202, a first 201 of which is preferably fixed to or integral with the primary group 16, a second support 202 being fixed to a corresponding portion 200a or 200b in an intermediate position along the development of the latter.

[0068] The supports 201 and 202 are preferably shaped so as to maintain the form and the desired position of each longitudinal portion 141 or 142, in particular preventing twist, so as to reduce the material used to construct the latter with the advantage of lightness and simplicity of production of the device 10.

[0069] It is then observed how the present invention achieves the intended aim and purposes.

[0070] In particular, the actuating apparatus according to the present invention is easier to install, being sufficient to fix the beam to the wall and thus, fix the primary group and eventually the secondary group, electrically connecting this / these to the electricity grid, and eventually between them, and kinematically connects the leaves, and finally the assembly plans to close the beam with the casing element 14.

[0071] All this without having to assemble the electrical and electronic components directly on the beam as it happens for the traditional apparatuses.

[0072] Then, the actuating apparatus according to the present invention allows for a simple logistics of warehousing and distribution of the product and does not require specialized personnel for its assembly.

[0073] It is also more compact, in particular by envisaging for the beam to be assembled by the pieces.

[0074] The invention thus conceived is susceptible to numerous modifications and variants, all falling within the protective scope of the appended claims.

[0075] Moreover, all the details may be replaced with other technically equivalent elements.

[0076] In practice, the materials employed, as well as the forms and the dimensions, may be varied depending on the contingent requirements and state of the art.

[0077] Where the constructional characteristics and techniques mentioned in the following claims are followed by reference signs or numbers, such signs and reference numbers have been applied with the sole purpose of increasing the intelligibility of the claims and consequently, they do not constitute in any way limiting the

interpretation of each element identified, purely by way of example, by such signs and reference numbers.

5 Claims

1. An actuating apparatus for sliding door (11) **characterized by** comprising:

- a support beam (12), fixable to a wall (13);
- at least one casing element (14), complementary to said beam (12) and can be fixed to the latter in order to delimit with the latter a service compartment (A) and an operating compartment (B) in which, in use, track trolleys (15) roll supporting the door (11);
- a primary group (16) comprising drive motor (17) of the door (11), a sensing and safety device (18), electrical power supply means (19) and a control device (20) connected to said power supply means (19), to said sensing and safety device (18) and said motor (17) for controlling them; the primary group (16) is enclosed in a first box-like container (21) which is placed external to the sensing and safety device (18) and a first connector (22) of the electrical power supply means (19); the first box-like container (21) being shaped so as to stay in the operating compartment (A).

2. An actuating apparatus according to claim 1 **characterized in that** it comprises a secondary group (23) comprising an electric transformer (24) enclosed in a second box-like container (25) and connectable electrically to said electrical power supply means (19); said transformer (24) being equipped with a second connector (26) adapted to be connected to the electricity grid; said second box-like container (25) made in a way to mate with a longitudinal end of said beam (12) and of said casing element (14) to delimit at least one of said compartment (A, B), in a longitudinal direction (C) of development of said beam (12).

3. Actuating apparatus according to one of the preceding claims, **characterized in that** said first container (21) houses a electro-block (27) operable to lock said door (11).

4. Actuating apparatus according to one of the preceding claims, **characterized in that** said first container (21) comprises of open channels configured to house power cables and / or connection in such a way that parts of said cables, inserted in said channels, are included in the overall space of said first container (21).

5. Apparatus according to claim 4 **characterized in**

that said first container (21) comprises a first box-like body (21 a) provided with said channels on a first face (29), and a second box-like body (21 b) housing said Sensing and safety device (18); said box-like bodies (21 a, 21 b) are complementary to each other, coupled in such a way that said second box-like body (21 b), when mated to said first box-like body (21 a), covers at least, partially said channels preferably by means of a hinged cover.

5

sists of two pieces having the same profile and connected in aligned manner with respect to the respective longitudinal directions of development; said pieces being mutually connectable through said first container (21) or by means of a bracket also adapted to support said first container (21).

10

6. Actuating apparatus **characterized in that** said control device (20) comprises an interface (32) operable by the user to define operational settings of said device; said interface (32) being placed external to the said first container (21).

15

7. Actuating apparatus according to one of the preceding claims, **characterized in that** said first container (21) comprises a hinged cover which is fixed to the said Sensing and safety device (18).

20

8. Actuating apparatus according to one of the preceding claims, **characterized in that** said motor (17) is equipped with a geared motor (33) comprising at least one pulley (34) for actuating a dragging element of the door (11), said at least one pulley (34) protrudes from a rear wall of said first container (21) so that, when said first container (21) is fixed to said beam (12), said pulley (34) protrudes into said operating compartment (B).

25

30

9. Actuating apparatus according to claim 8 **characterized in that** said beam (12) is configured to support said first container (21) in its own central portion with respect to a direction of longitudinal development; said geared motor (33) comprising two coaxial pulleys adapted to be coupled each to a dragging element of a leaf of the said door (11); said actuating apparatus comprising a pair of timing pulleys for said dragging elements, fixed to said beam (12) on opposite sides of said first container (21), each of said leaves is fixed to a respective branch of said dragging elements to be dragged by the latter according to specular movements with respect to said first container (21).

35

40

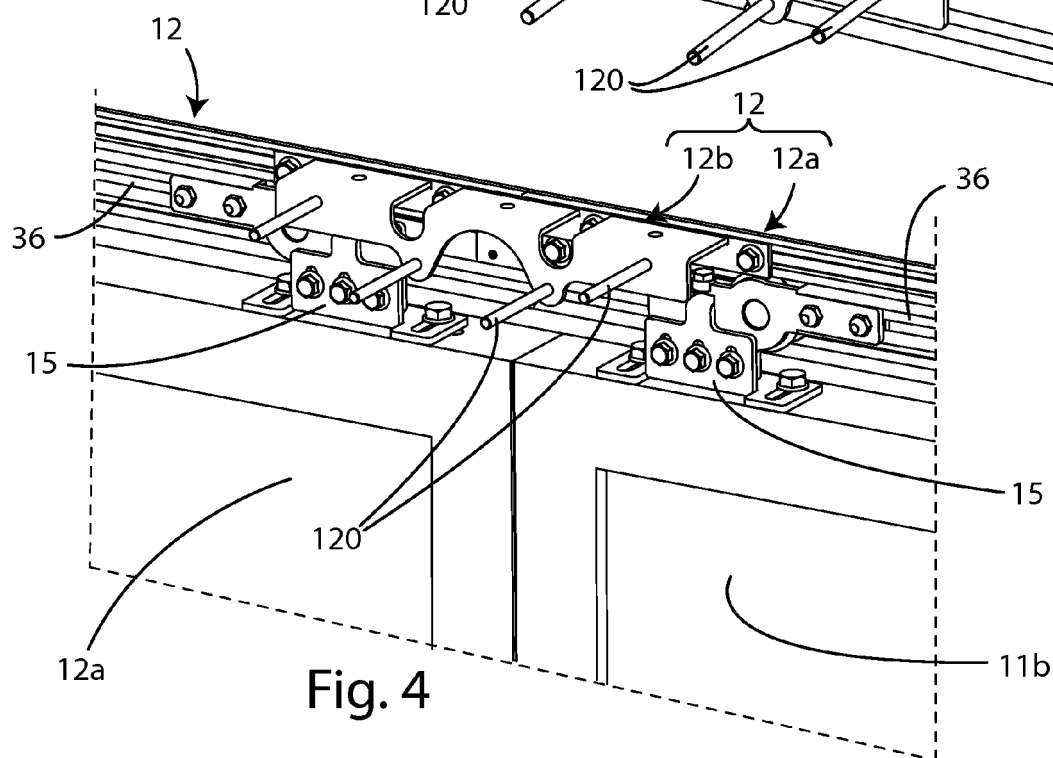
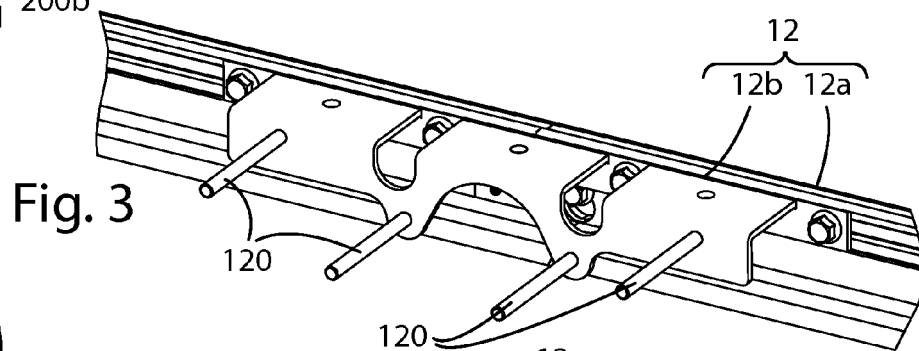
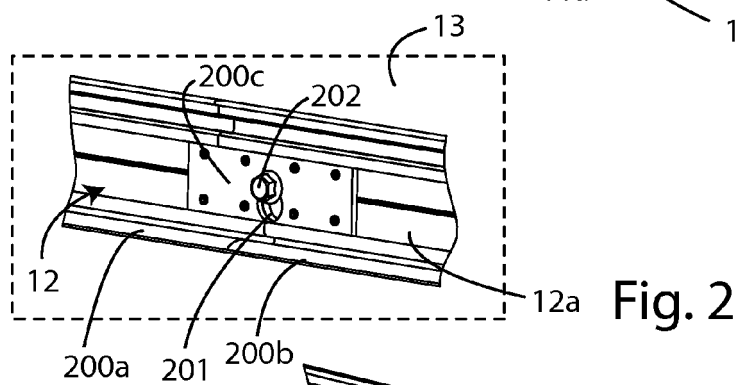
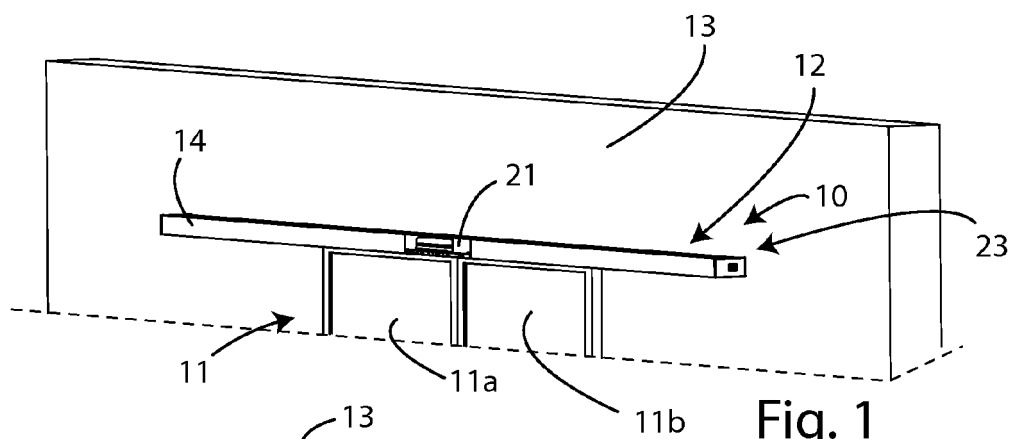
45

10. Apparatus according to claim 8 **characterized in that** said beam (12) is configured to support said first container (21) in a lateral portion, next to its first end, with respect to a direction of longitudinal development; said geared motor (33) comprising a single pulley (34); said apparatus further comprising timing pulley for said dragging element, fixed to said beam (12) in correspondence to the second end of the latter.

50

55

11. Actuating apparatus according to one of the preceding claims **characterized in that** said beam (12) con-



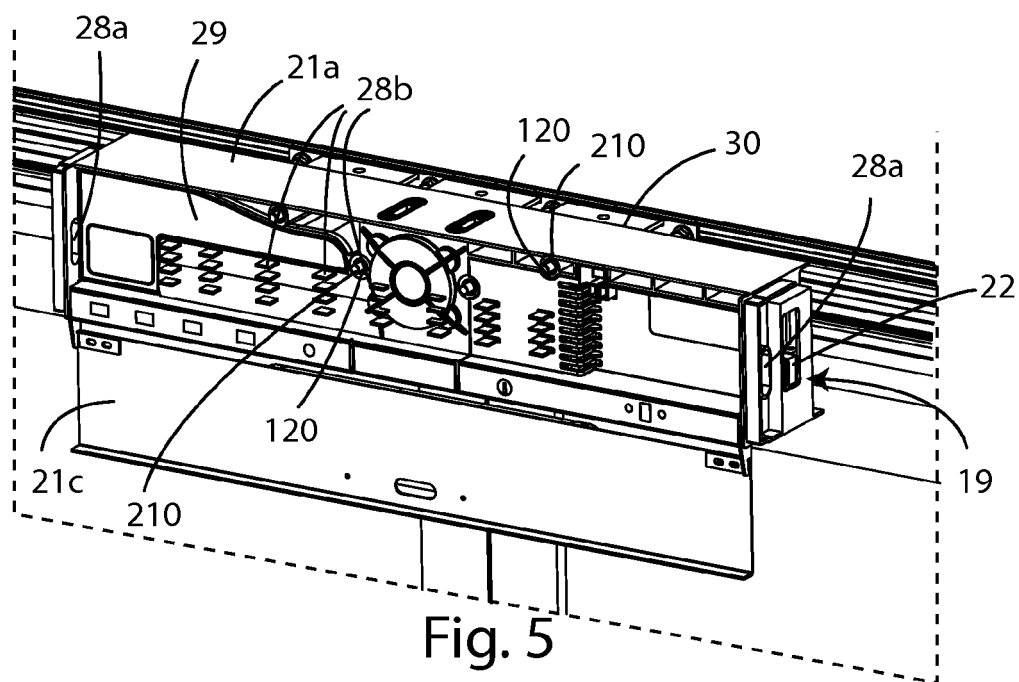


Fig. 5

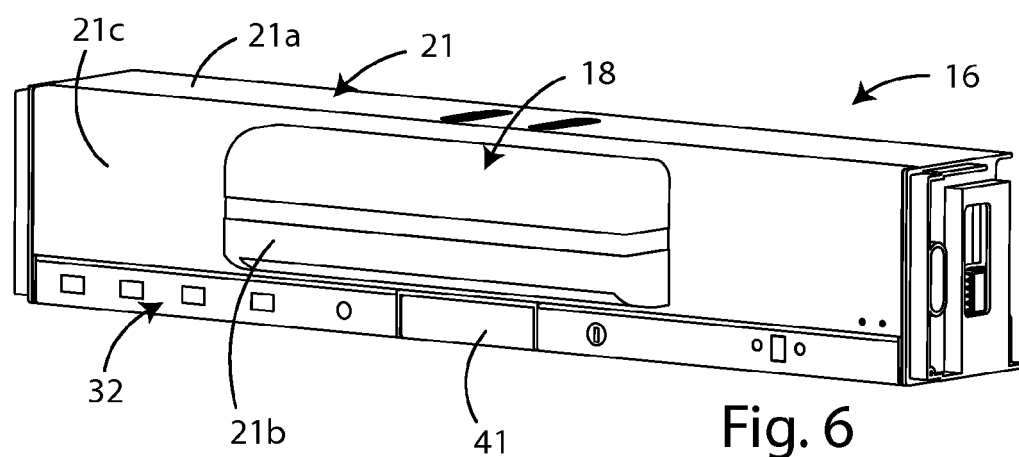


Fig. 6

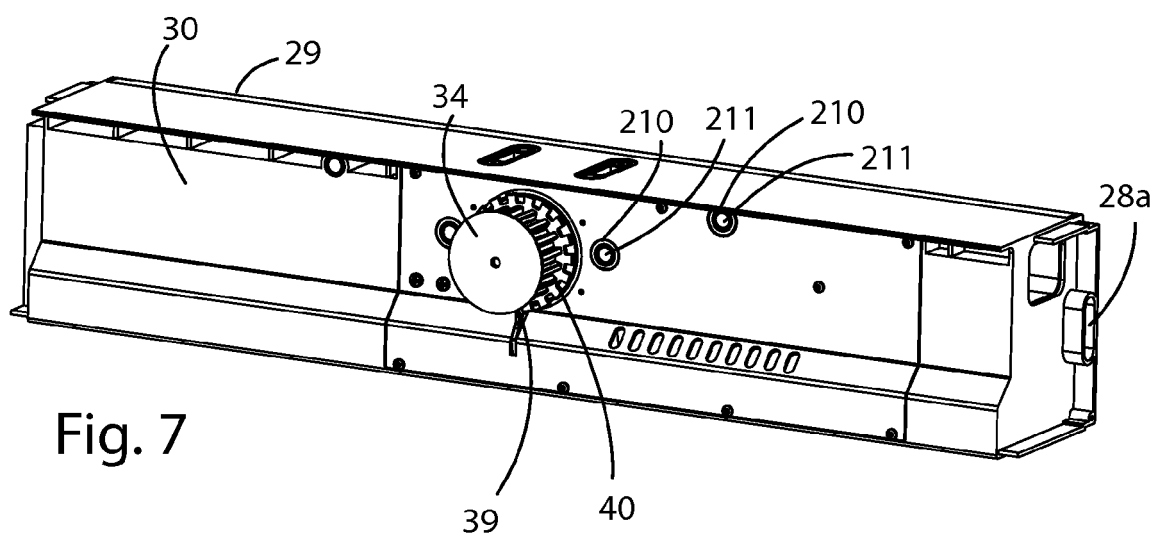
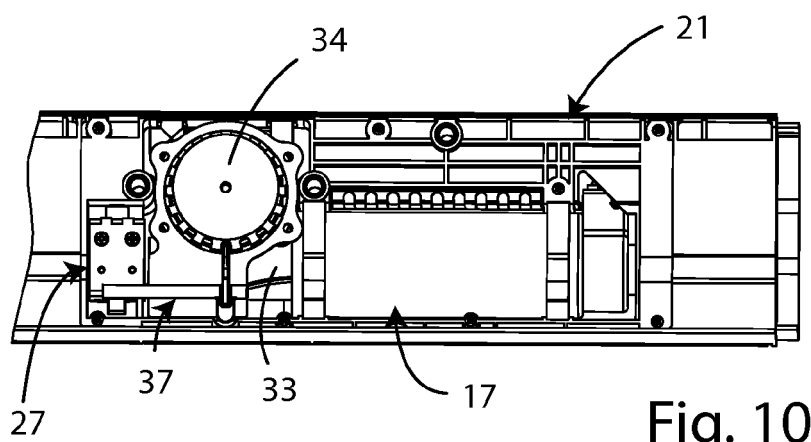
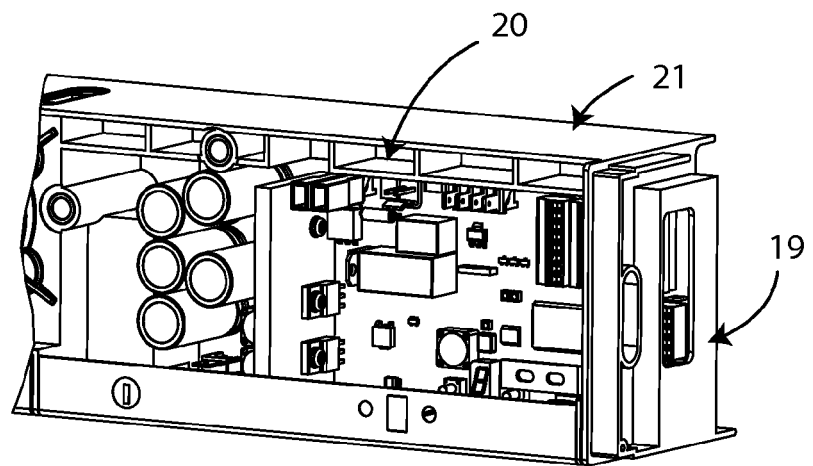
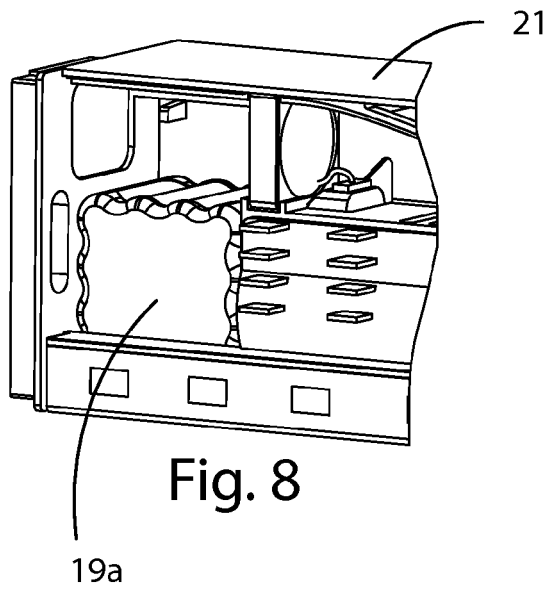


Fig. 7



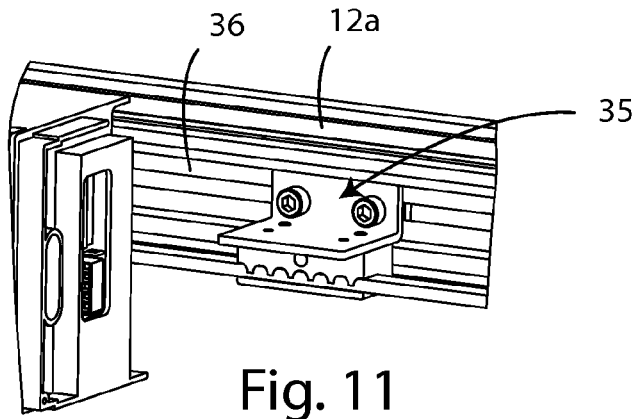


Fig. 11

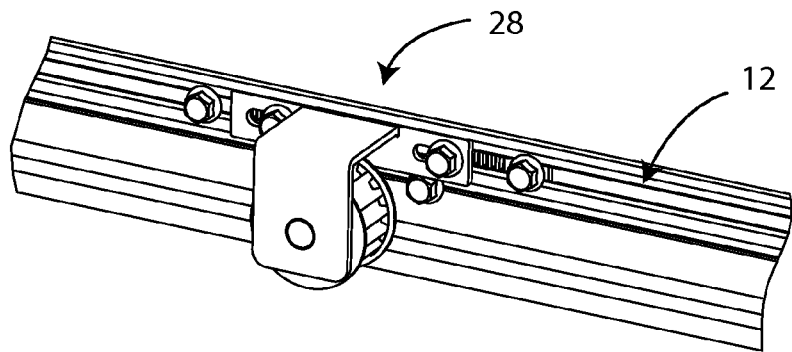


Fig. 12

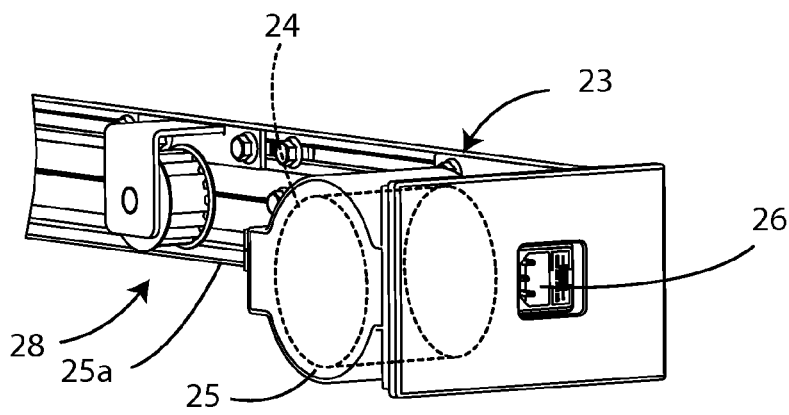


Fig. 13

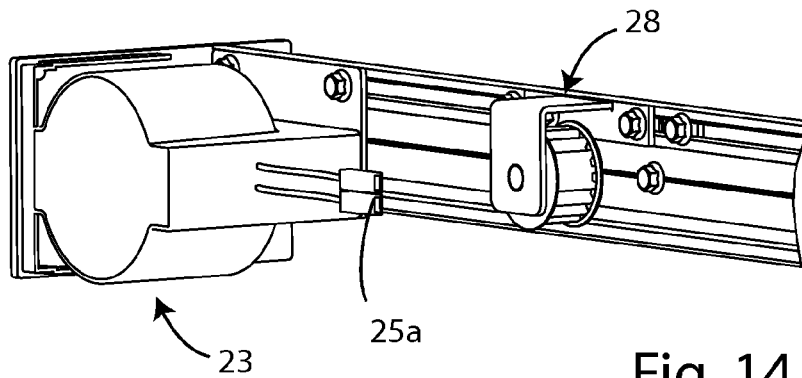
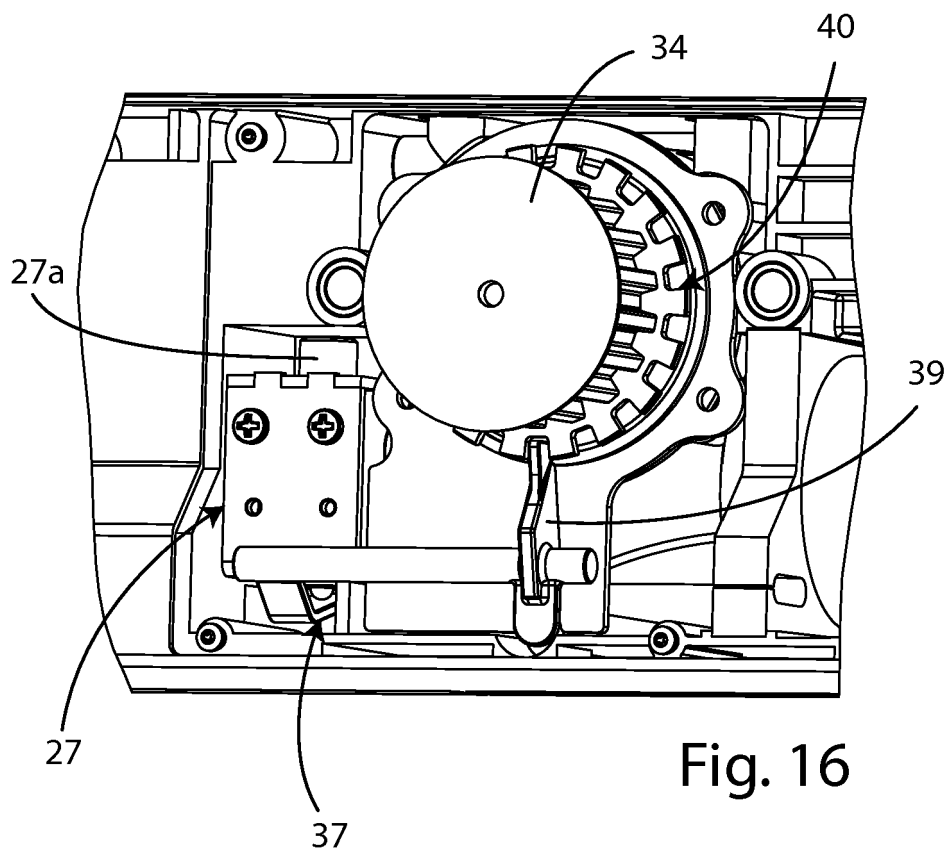
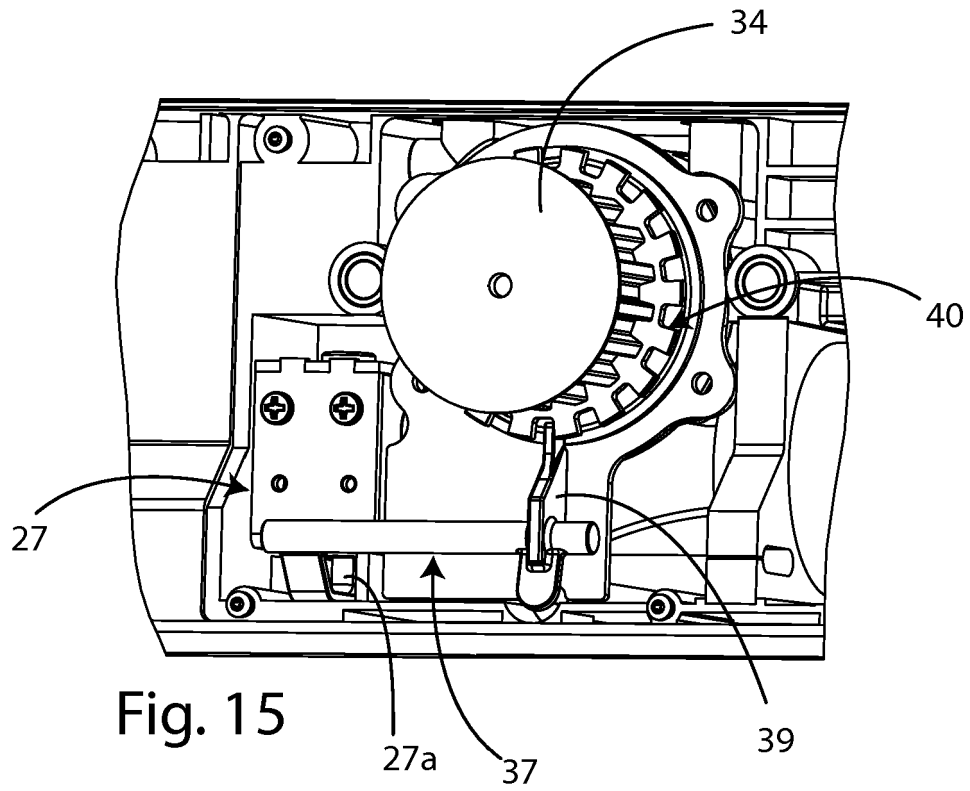


Fig. 14



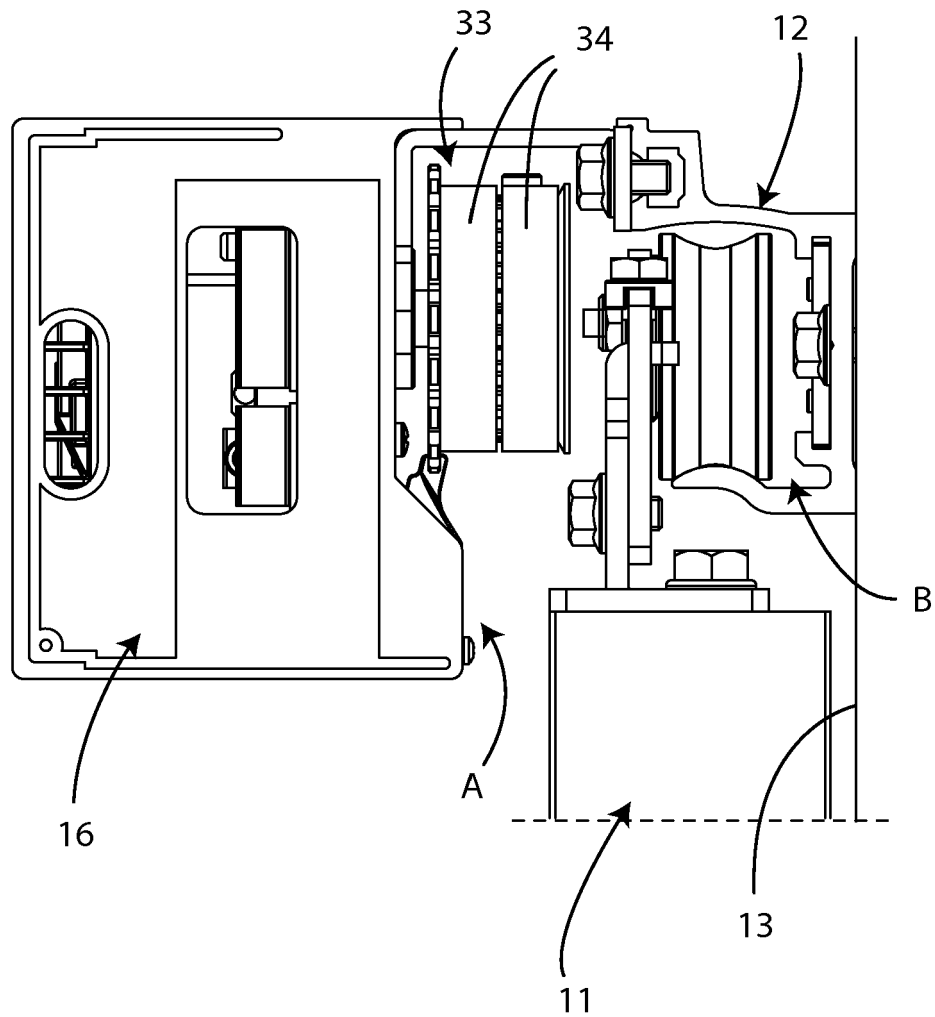


Fig. 17

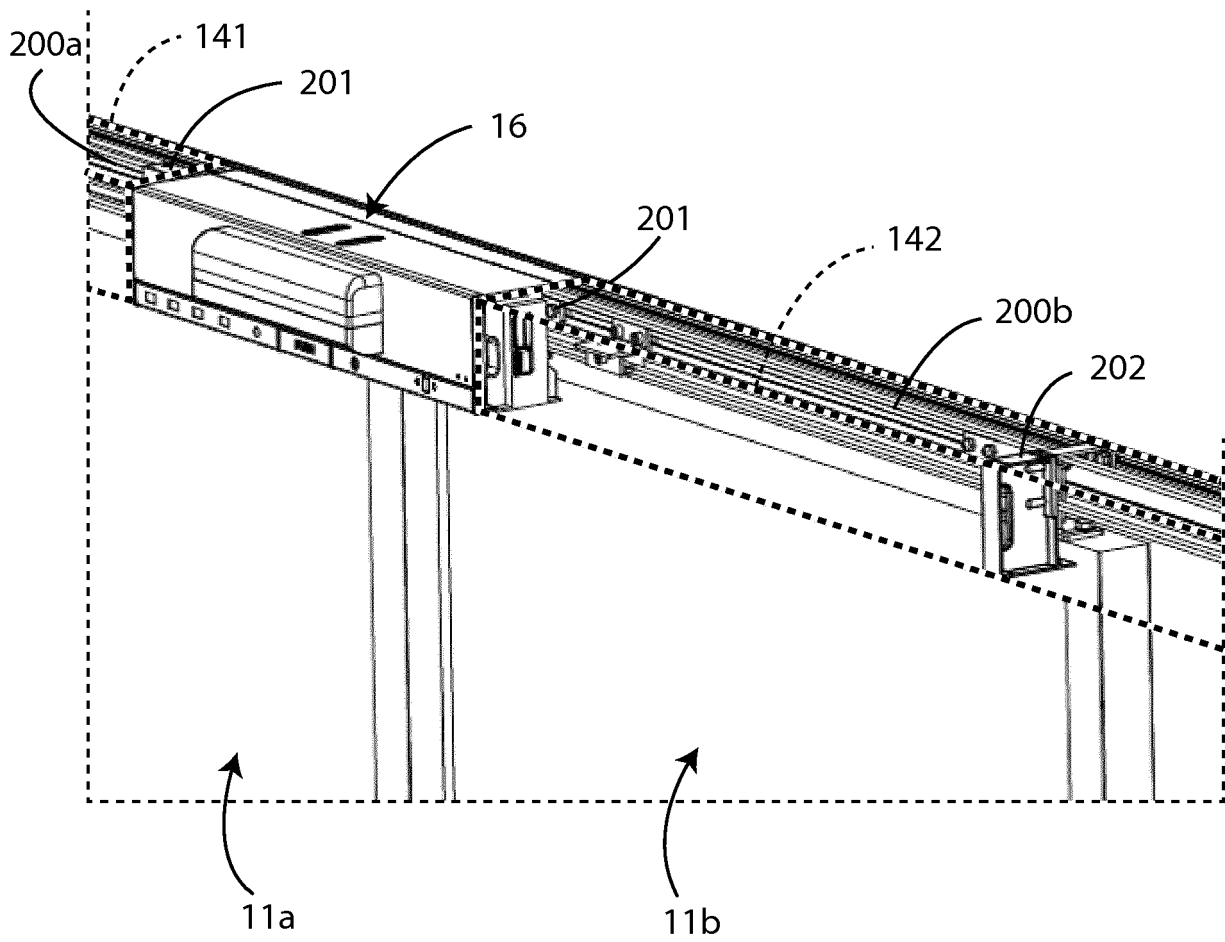


Fig. 18



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 20 1355

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 801 339 A2 (GEZE GMBH [DE]) 27 June 2007 (2007-06-27)	1,3-8,11	INV. E05D15/06 E05F15/643 E05F15/73 E05F15/632
Y	* paragraphs [0013], [0014], [0018] - [0035]; figures 1,2,4-9 *	2,9,10	
X	EP 1 612 364 A2 (GEZE GMBH [DE]) 4 January 2006 (2006-01-04)	1,6,11	
Y	* paragraphs [0022] - [0025], [0032]; figures 1-5,8 *	9,10	
X	DE 102 60 109 A1 (GEZE GMBH [DE]) 1 July 2004 (2004-07-01)	1,7	
Y	FR 2 952 960 A1 (FERMOD [FR]) 27 May 2011 (2011-05-27)	2	TECHNICAL FIELDS SEARCHED (IPC) E05D E05F
	* page 6, line 4 - line 28; figures 1,5 *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 March 2017	Examiner Rémondot, Xavier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

 1
 EPO FORM 1503 03.82 (P04C01)

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

EP 16 20 1355

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-03-2017

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1801339 A2	27-06-2007	AT 475771 T DE 102005061724 A1 EP 1801339 A2 ES 2345898 T3	15-08-2010 05-07-2007 27-06-2007 05-10-2010
EP 1612364 A2	04-01-2006	DE 102004031531 A1 EP 1612364 A2	26-01-2006 04-01-2006
DE 10260109 A1	01-07-2004	NONE	
FR 2952960 A1	27-05-2011	NONE	