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(72) Inventor: **Pagliaroli, Gerardo**
00137 Roma (IT)

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(74) Representative: **Cinquantini, Bruno et al**
Notarbartolo & Gervasi S.p.A.
Corso di Porta Vittoria, 9
20122 Milano (IT)

(71) Applicant: **Slinding S.r.l.**
00137 Roma (IT)

(54) **Return and damping device for sliding doors, drawers and the like**

(57) A return and damping device for sliding doors, drawers and the like comprising a sliding rail or profile for sliding shutters 204 and a shutter 200, between which the device is interposed to accompany the shutter or door to be received at the full opening or closing stop position of the shutter. Said damping device 1 comprises a shock absorber 4 of the piston type, connected by a first end 42 to the rail and pivotally at the second end 41 to a hook 5.

The hook 5 is adapted to slide in a guide between a first position, in which the shock absorber 4 is retracted

and the door is in a distal position, and a second position in which the shock absorber is extended and the door is in a proximal position with respect to the device 1.

The hook 5 is adapted to keep the door blocked. In particular, it is caused by the guide to rotate about said end 41 close to the sliding position in which the shock absorber is retracted, so as to release the shutter, while in some intermediate positions until the extended position of the shock absorber, the door remains secured to the hook which, by cooperating with the shock absorber, accompanies it in a damped manner to the full opening or closing.

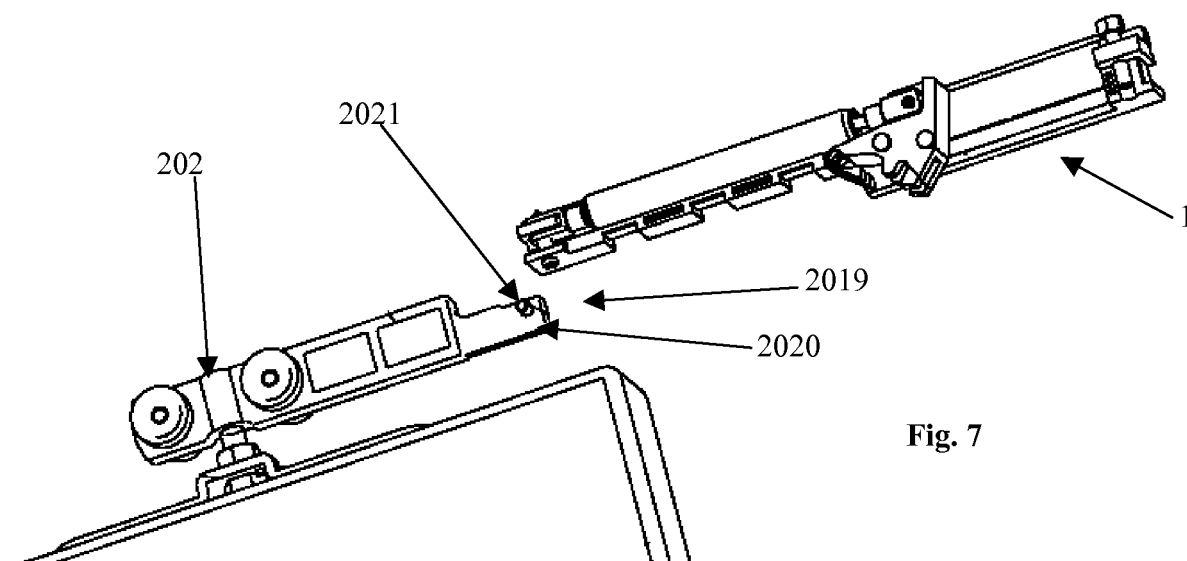


Fig. 7

Description

Field of the invention

[0001] The present invention relates to a return and damping device for sliding doors, drawers and the like.

State of the art

[0002] Garnishments for damping the closing movement of sliding doors or shutters, as well as drawers and movable panelling in general are known.

[0003] Garnishments for returning doors or shutters to the opening and/or closing position for the purpose of holding the door in a full opening or closing position are also known.

[0004] Said garnishments represent two discrete categories of functional elements, indeed they are assembled separately by the installer with the obvious problems which derive from manual operations related to the inaccuracy of the result and cost of the operation.

[0005] The return is obtained, according to the prior art, by means of a spring, which is in an extended position when opening the door or shutter and a rest position when closing it.

[0006] The shock absorber or decelerator, according to the best solutions suggested by the prior art, is of the piston type charged with gas, oil or air and, when accepting the door or shutter, either in opening or closing position, the rod is extended, i.e. the device is indicated as disarmed.

[0007] The acceptance of the door occurs in the closing position of the door for the closing shock absorber and in the opening position for the opening shock absorber.

[0008] Therefore, the technical problem is the need to procure two discrete functional elements and separately assemble them along with the movable member to control the closing position thereof and two further elements to control the opening position thereof.

Summary of the invention

[0009] It is an object of the present invention to provide a return and damping device adapted to solve the aforesaid problem.

[0010] This object is achieved by the device of the present invention which, in accordance with claim 1, comprises a piston shock absorber, a movable member adapted to receive an engaging member, said engaging member being adapted to be either directly or indirectly secured to the shutter, or to form part of the shutter; said shock absorber being adapted to be secured by a first end thereof to a sliding profile and being pivotally secured by a second end to said movable member, the shock absorber being in an extended condition when the engaging member is in a proximal receiving position with respect to said movable member (5) and in a retracted

condition when the engaging member is in a distal position with respect thereto, and wherein the movable member comprises a hook.

[0011] Said device may be integrated in sliding rails or profiles for sliding doors, or may be enclosed in a housing to be more simply applied to general sliding profiles for sliding doors and other profiles.

[0012] The dependent claims describe preferred embodiments of the invention, thus forming an integral part of the description.

Brief description of the drawings

[0013] Further features and advantages of the invention will be more apparent in the light of a detailed description of a preferred, but not exclusive, embodiment of a return and damping device for sliding doors, drawers and the like, shown by way of non-limitative example with the aid of the accompanying drawings, in which:

Fig. 1 shows the diagram of a sliding door with a sliding rail or profile comprising the device of the invention;

Fig. 2 shows an enlarged detail of the device of the invention;

Fig. 3 shows another enlarged detail of the device of the invention;

Fig. 4 shows the device in a completely extended condition of the shock absorber, i.e. at the full opening or closing of the door;

Fig. 5 shows the device in an intermediate extended condition of the shock absorber in which the shutter is secured by means of the carriage to the hook which cooperates with the shock absorber to accompany it while releasing or blocking;

Fig. 6 shows the device in the condition in which the shock absorber is completely retracted and the carriage is released;

Fig. 7 shows a perspective view of the device in figure 2 with a member engaging the device, integral with a roller support of the shutter;

Fig. 8 shows a perspective view of an exploded view of the device;

Fig. 9 shows an enlargement of a detail in the previous figure;

Fig. 10 shows an opposite perspective view of the exploded view in figure 7;

Fig. 11 shows the operation of a hooked member included in the hook cooperating with the shock absorber to ensure the restoration of the original operating conditions of the device, i.e. with the shock absorber retracted and the shutter in the distal position, and the shock absorber extended with the shutter in the proximal position;

Fig. 12 shows the section view of a sliding profile in which the device of the invention is inserted.

[0014] The same reference numbers and letters in the

figures refer to the same elements or components.

Detailed description of a preferred embodiment of the invention

[0015] Figure 1 shows the use of a first device, object of the present invention, for dumping the approach of a door shutter to a full opening position, while a second device 1' is used for damping the same shutter close to the full closing position.

[0016] The present invention, as shown in figure 2, comprises a shock absorber 4 of the piston type, shaped to operate as a return for a door or shutter, connected by a first end 42 to a sliding profile 204 of a sliding shutter or door 200 and pivotally at the second end 41 to a hook 5, so that the shock absorber is retracted or armed when the shutter is in the distal position, and extended or disarmed when the shutter is in the proximal and blocking position. In particular, the blocking position is obtained by said hook 5, which by sliding in a specific guide is caused to rotate about said second end 41 thus holding the shutter in any proximal sliding position, accompanying it in a damped manner to the disarming condition which preferably corresponds to the complete closing or opening of the shutter.

[0017] Said sliding guide, rail or profile may be directly made in the frame or supporting structure of the sliding shutter or door 200.

[0018] For convenience only, the device 1 is described in an example which comprises an external shell 230 for an easier use even in pre-existing profiles.

[0019] Said external shell 230 comprising at least two bodies, right 2 and left 3; figure 2 shows the device with the left body 3 removed for a better understanding.

[0020] Said hook 5 is pivotally connected by means of a pin 6c on a plane passing through the axis of the shock absorber, to the first end 41 of the shock absorber 4, while the second end 42 of the shock absorber is secured either to the shell 230 or one of the bodies 2 and 3 which form it.

[0021] Both said first and second ends 41 and 42 of the shock absorber 4 form a transversally perforated fork in the example.

[0022] In the two bodies, the same number of reciprocally specular, L-shaped splines 21 and 31 are obtained, which define a guide within which two sliding pins 511, 512 are forced to slide, the pins thoroughly protruding from a first side of the hook 5 and from the opposite side (see figure 3). These pins may be replaced by two single pins on each side, integrally obtained in relief in the block forming the hook 5, for example by moulding plastic. Said splines are joined, i.e. do not have sharp edges, so as to prevent any jamming when said sliding pins 511, 512 slide.

[0023] The splines 21 and 31, which consist of a straight segment which, at one end thereof, has a splined segment arranged at an angle other than zero with respect to the straight segment, form a guide for the sliding

pins 511, 512, so that the external application of force which causes the shutter, and the carriage 202 therewith, to move away from the device 1, makes the hook 5 firstly be drawn in translation by the carriage 202, thus arming the shock absorber 4. Then, close to the complete re-arming condition of the shock absorber 4, the hook 5 is caused to rotate due to the path section 211 and 311 arranged aslant from the guide, therefore the hook 5 releases the carriage 202. Conversely, when an external action leads to receive the carriage 202 by the device 1, i.e. when the carriage 202 moves the device 1 to a proximal position, the bias imposed to the shutter causes the hook 5 to rotate, in a direction opposite to the previous one, thus hooking to one end 2019 of the carriage 202 which is accompanied to the stop position while the shock absorber 4 is disarming. During the operations of rearming and disarming the shock absorber 4, this serves its function of damping the energy possessed by the moving door. Reference is made to the spreading apart sequence in figures 4 to 6, which becomes a receiving sequence if the figures are considered in a reversed sequence.

[0024] Since the carriage 202 remains secured to the movement of the shock absorber 4 due to the hook 5, then a returning function of the shutter 200 is added to the damping function.

[0025] Therefore, the hook 5 serves the function of holding the door by means of the carriage 202, for a part 2019 thereof, in a proximal receiving position by the device 1, thus returning the shutter in cooperation with the shock absorber 4.

[0026] The part 2019 of the carriage 202 comprises an elongated member 2020, oriented towards the device 1 which is substantially flat in shape, which comprises on each of the two faces a respective pin 2021 and 2022, reciprocally symmetric with respect to the flat shape of the elongated member 2020. In the preferred embodiment shown in the figure, said part 2019 represented by the elongated member is either connected to or integral with the carriage 202.

[0027] The example shown in the figures and described heretofore is a variant in which the sliding shutter 200 is suspended by means of several carriage supports 202 adapted to slide along the rail 204 to allow the shutter itself to open and close.

[0028] This preferred embodiment is not limitative, indeed for the invention to effectively carry out its function, it is sufficient for the hook itself consisting of the part 2019 to be either fixed or incorporated in another appropriate point of the shutter itself or in a support thereof. For example, in a variant (not shown), it may be constructed in the form of a plate fixed in a point of the shutter suited for the purpose and on which appropriate hooks such as the two pins 2021 and 2022 are obtained.

[0029] Another variant (not shown), should include a hook-shaped member on the hook 5 to directly mesh in a recess obtained on an upper surface of the shutter 200. Said hook-shaped member may be even directly con-

nected to the shutter 200 instead of being integrated in the carriage support 202.

[0030] The hook 5 comprises a transversal groove 51 adapted to receive two pins 2021 and 2022. In particular, when the hook 5 is at any point of the rail segment 204 along which it moves, it is angularly placed so that the transversal groove 51 holds the pins therein. When the hook 5 is drawn by the shutter 200 by means of the carriage 202 to its stop position in which the shock absorber 4 is armed, the pin 512 is inserted by sliding into the segment 211 and 311 of the guides 21 and 31, while the pin 511 remains in the straight segment of the guide 21 and 31. This translation of the hook 5 is accompanied by a sufficient angular rotation thereof for the pins 2021 and 2022 to be removed from the transversal groove 51 and the carriage 202 to be released.

[0031] The flat member 2020 may also comprise a single pin 2021, and accordingly said hook 5 is shaped to seize a single pin.

[0032] Since the pins 2021 and 2022 are mounted to the elongated member 2020 of the carriage 202, a substantially medial longitudinal slit 53 is obtained in the hook 5 to allow the pins to engage the transversal groove 51.

[0033] In a useful variant, the hook 5 is intended to comprise a hooked member or rearming lever 52, also provided with a longitudinal slit 53 to prevent interference with said elongated member 2020, so that in an anomalous operating situation, i.e. if the carriage 202 is away from the device 1 in the disarmed position, e.g. immediately after assembling the door, then the rearming lever 52, by virtue of its elasticity, is adapted to allow the pins 2021 and 2022 to slide on the external surface thereof (see figure 11) up to engage them. Thereby, when the carriage 202 is moved away from the device 1, this draws the hook 5 therewith, which hook may arm the shock absorber 4.

[0034] It is worth underlining that during normal operation of the device 1, when it is armed and the carriage 202 is moved away therefrom, the hooked member 52 is raised so as not to hinder the engagement of the pins 2021 and 2022 with the transversal groove 52 of the hook 5.

[0035] The assembly of the two bodies 2 and 3 is allowed by the engaging members, which in the example comprise toothed tongues 22 and respective slots 32. Furthermore, the assembly is completed by means of the threaded dowel 6a, adapted to engage the perforated and/or threaded tongues 23 and 33 of the right 2 and left 3 bodies, respectively, and also the end 42 of the shock absorber 4, which may be threaded, and by means of the threaded dowel 6b, adapted to engage the perforated tongues 24 and 34 of the right 2 and left 3 bodies, respectively. The shell may be made of various materials with appropriate features. If the shell is made of plastic material, a seat 241 for a nut 641 b is preferably obtained in the in the body of the tongue 24, so that the threaded dowel 6b grips onto metal also for the reasons which will be explained below. Furthermore, it is worth noting that

the access for both said threaded dowels 6a and 6b is allowed on the same side of the device 1 where the slit of the rail 204 is arranged.

[0036] Device 1 is advantageously adapted to smoothly accompany the reception of a shutter, door, drawer and the like, thus holding it in a rest position, i.e. completely open or closed.

[0037] The stroke portion of the shutter to which it is accompanied in receiving or removing condition depends on the stroke of the shock absorber 4.

[0038] The engagement of the shutter 200 by means of the hook 5 may be structured with a single central pin 2021 fixed to a fork, for example, while the transversal groove 51 does not present the longitudinal slit 53.

[0039] These are deemed to be equivalent variants only. Similarly, an equivalent variant would also have a hook 5 integral with the shutter and having an elongated member provided with at least one pin and connected to the shock absorber 4, so that if caused to slide and rotate, it engages the hook to return the carriage 202.

[0040] With reference to figure 12, the shell of device 1 may be advantageously shaped, with specific sliding means, to longitudinally slide along the rail 204, so that the position of the device 1 with respect to the receiving point of the carriage 202 may be fixed by acting on said threaded dowels 6a and 6b, which block the sliding of the device 1 on the rail by contrast between the rail and the crests 2031, as described below. Typically, in using the device in sliding door rails, said dowels are conveniently accessible from the bottom with respect to the upper horizontal member of the rail 204, thus allowing an adjustment until the door is assembled.

[0041] The shell 230 may be dimensioned so that, at the maximum extension of the shock absorber 4, the hook 5 does not impact on the wall defined by the juxtaposition of the perforated tongues 24 and 34 of the right and left bodies. Alternatively, a compressible member, such as a plug made of rubber or cloth or of the bellows type, may be interposed to muffle the noise which would be generated by the above impact.

[0042] Said sliding means comprise, in the example, crests 2031 obtained along the inner walls of the rail 204 and recesses 231 in the shell 230. Said crests and corresponding slots are placed so as to allow, net of tolerances, a perfect reciprocal alignment of the device 1 within the rail 204.

[0043] The return and damping device comprising the shell may be fitted even outside the rail, e.g. in the case of pre-existing sliding door rails which have not a sufficient internal space, the operating principle remaining completely the same.

[0044] The rail 204 in figure 12, substantially double C-shaped, along with said crests 2031, may be easily obtained by extrusion or milling. The seat for receiving the device therein does not require specific holes for the application of the device 1 to the rail, because the dowels 6a and 6b cut into the rail itself.

[0045] The shape of the rail 204 may obviously take

other shapes in its cross section. The shape of the section of rail 20 is generally appropriately chosen according to the type of carriage which is employed, e.g. there are carriages which may slide within a rail and carriages which may slide outside a rail.

[0046] According to another aspect of the invention, the guide defined by said grooves 21 and 31 may be directly made in the rail, e.g. by milling the side walls of the rail, or by milling plates subsequently applied to the inner or outer walls of the rail. Thus, if the device free from outer shell 230 is applied, the first end 41 of the shock absorber 4 is directly secured to the rail, e.g. by means of a pin and a spacer, so that the shock absorber works substantially parallel to the inner or outer walls of the rail. Other constructional solutions are possible.

[0047] Furthermore, the shock absorber 4 is preferably a gas shock absorber. Although not ensuring the same performance, it may be either hydraulic or spring-operated. And, since piston shock absorbers present on the market are normally of the open or disarmed type, then the shown configuration offers a better behaviour of the device during the operations of approaching with decelerated return or removing the shutter from a full opening and/or closing position.

[0048] Other further advantages deriving from the application of the present invention are:

- halving the number of members to be stocked in order to obtain the combination of the damped return effects of a shutter and to hold it in the opening or closing position;
- simplifying the assembly of the device of the invention on the door or shutter or drawer;
- possibility of applying the device to pre-existing sliding rails or profiles;
- lower visual impact to the advantage of appearance;
- absence of the need to adjust or assemble plates on the shutter;
- first installation simplicity by operating from the bottom and thus without needing to remove the sliding rail or profile if already present.

[0049] The specific embodiments described herein do not limit the content of this application which covers all the embodiments of the invention defined in the claims.

Claims

1. A damping device for sliding doors, drawers and the like, in particular for damping the reception towards an opening or closing position of a sliding member (200) such as a shutter, comprising a piston shock absorber (4), a movable member (5) adapted to receive an engaging member (2019), said engaging member (2019) being adapted to be either directly or indirectly secured to the door (200) or to form part of the shutter;

said shock absorber (4) being adapted to be secured by a first end (42) thereof to a sliding profile (204) and being pivotally secured by a second end (41) to said movable member (5), the shock absorber being in an extended condition when the engaging member (2019) is in a proximal receiving position with respect to said movable member (5), and in a retracted condition when the engaging member is in a distal position with respect thereto, and wherein the movable member comprises a hook (5).

2. A device according to claim 1, wherein sliding means (511, 512, 21, 31) slidably securing the movable member (5) are provided; said sliding means (511, 512, 21, 31) being adapted to cause a rotation of the hook (5), when the shock absorber (4) is close to the retracted condition, so that the rotation takes the hook (5) to engage/disengage the engaging member (2019).
3. A device according to claim 2, wherein said rotation in a first direction is adapted to take the hook (5) to engage said engaging member (2019), when the engaging member approaches the hook (5) to cause the shock absorber (4) to extend; and in a second direction to disengage said engaging member (2019) for a complete retraction of the shock absorber (4).
4. A device according to claim 2 or 3, wherein said hook (5) comprises a hook-shaped member (52) adapted to be engaged by said engaging member (2019) when the shock absorber (4) is extended, so as to be able to draw the hook (5) therewith, when the carriage (202) is moved in the distal direction, and to arm the shock absorber (4).
5. A device according to claim 4, wherein the engaging member (2019) comprises a flat-shaped elongated member (2020), incorporating at least one pin (2021, 2022) on one face.
6. A device according to claim 5, wherein said hook (5) comprises a longitudinal slit (53) particularly adapted to be engaged by said elongated member (2020) of the engaging member (2019).
7. A device according to claim 6, wherein said hook (5) comprises a transversal groove (51), adapted to be engaged by said at least one pin (2021, 2022).
8. A device according to claim 2, wherein said sliding means comprise at least two sliding pins (511, 512) integral with said hook (5), and two L-shaped splines (31 e 21), reciprocally specular and adapted to receive said sliding pins (511, 512).
9. A device according to claim 8, wherein fixing means

(6a and 6b) are included to be fixed to the sliding profile (204).

10. A device according to claim 9, wherein a shell (230) is included, comprising two half shells (2, 3) reciprocally assembled by means of toothed tongues (22) and perforated tongues (23, 24) and comprising holes in which fixing means (6a and 6b) are engaged. 5
11. A device according to claim 2, wherein said engaging member (2019) is obtained in the shutter (200) itself. 10
12. A device according to claim 2, wherein said engaging member (2019) is separated from the shutter and integrally fixed thereto. 15
13. A device according to claim 12, wherein the fastening member (2019) is an integral part of a carriage (202) adapted to slide either inside or outside the sliding profile (204). 20
14. A supporting carriage (2029) for a sliding shutter or door, comprising an engaging member (2019) adapted to engage with a hook (5) of a damping device according to any one of the preceding claims. 25
15. A sliding shutter or door support comprising a sliding profile (204) adapted to engage a damping device according to any one of the claims from 1 to 13. 30

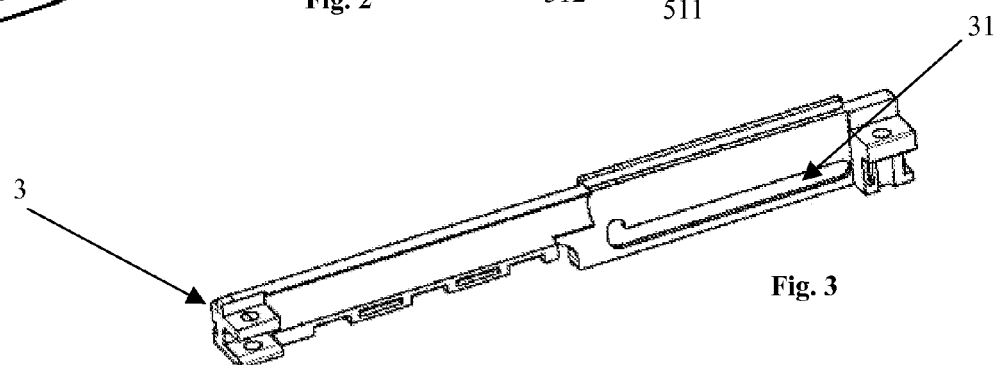
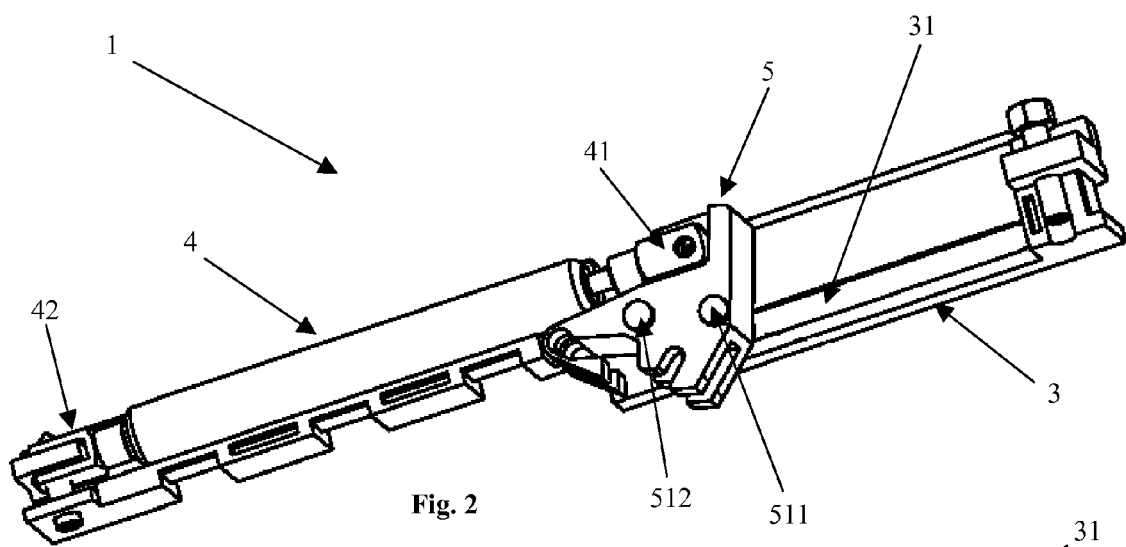
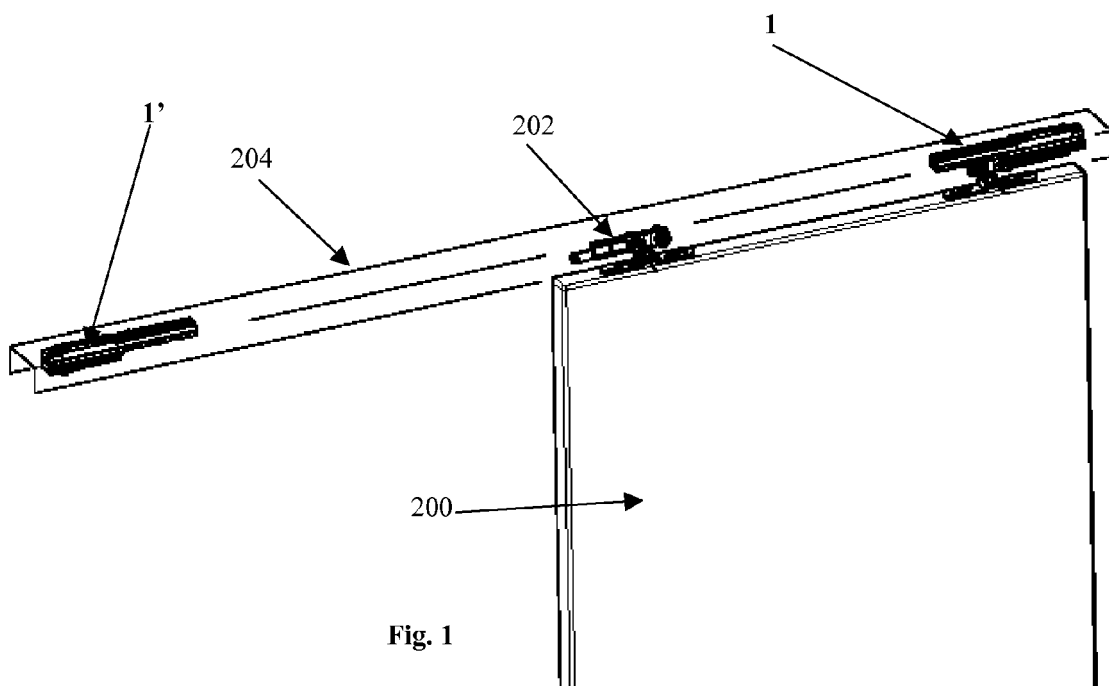
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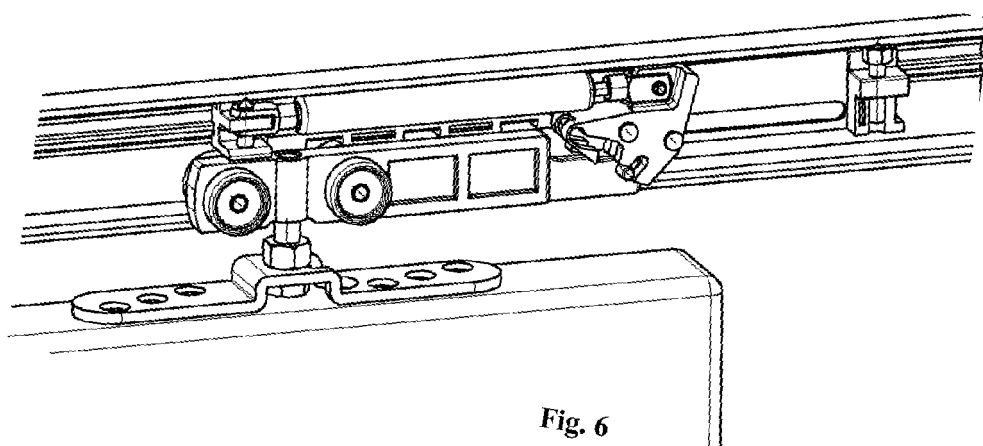
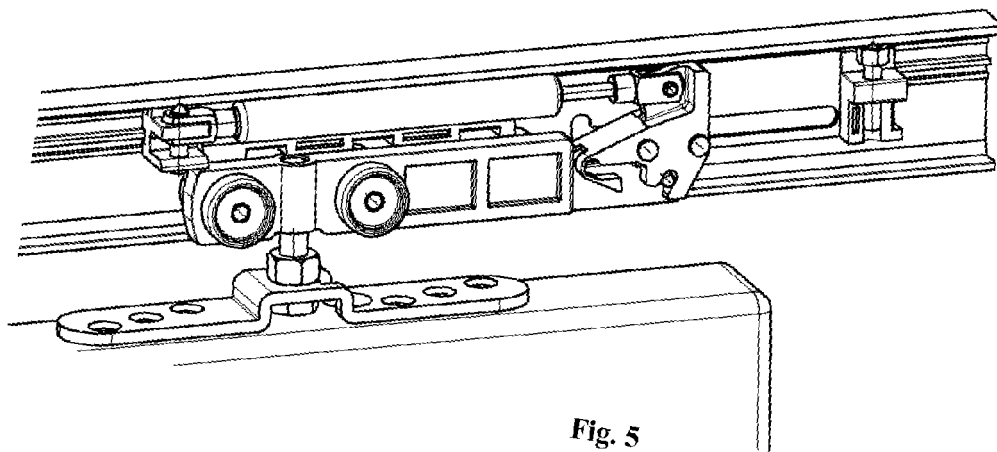
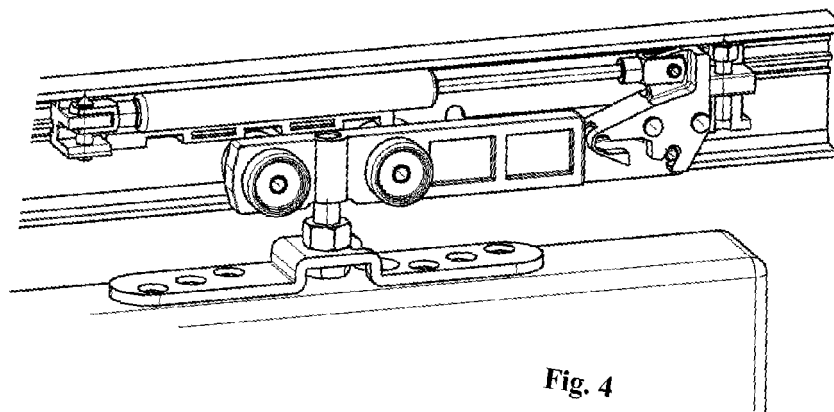
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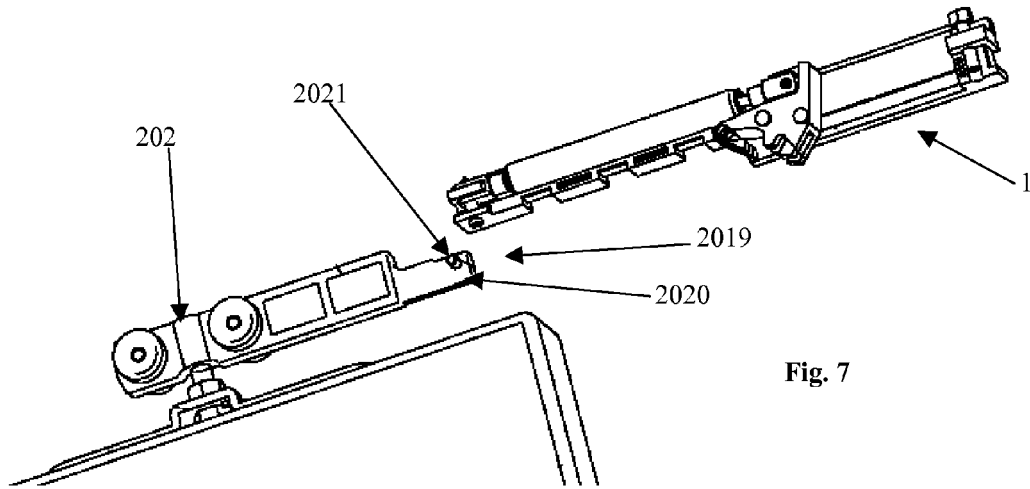


Fig. 7

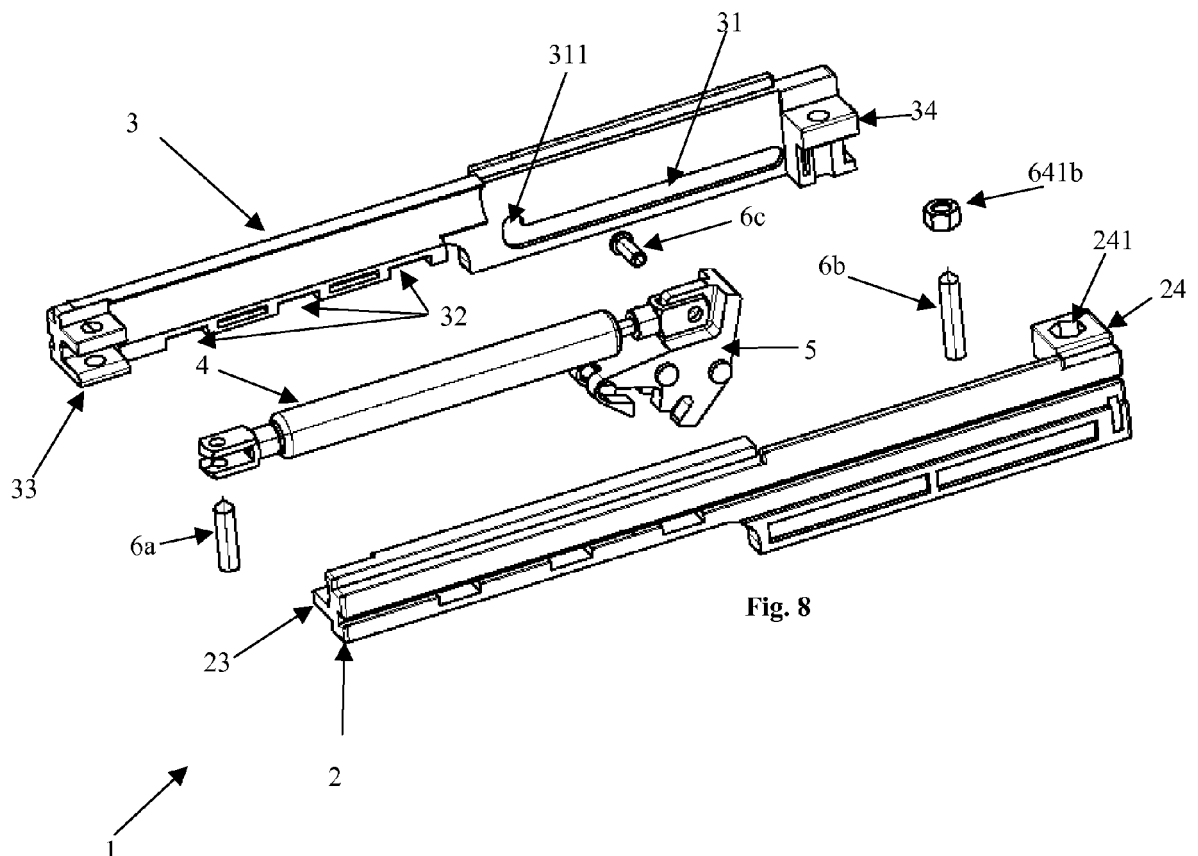
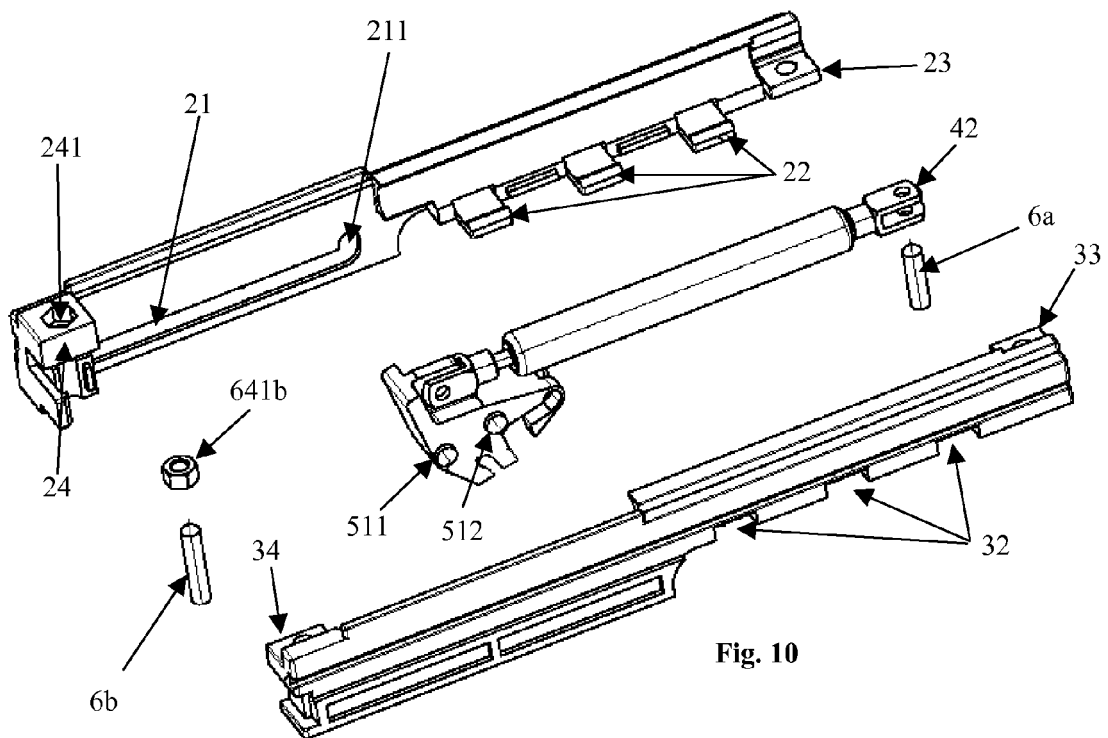
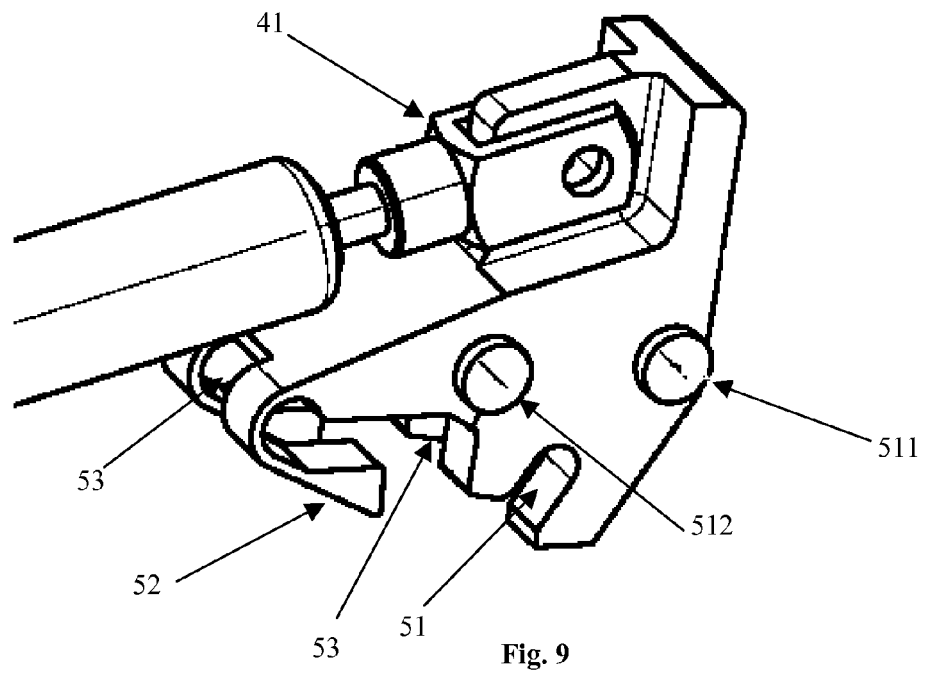


Fig. 8



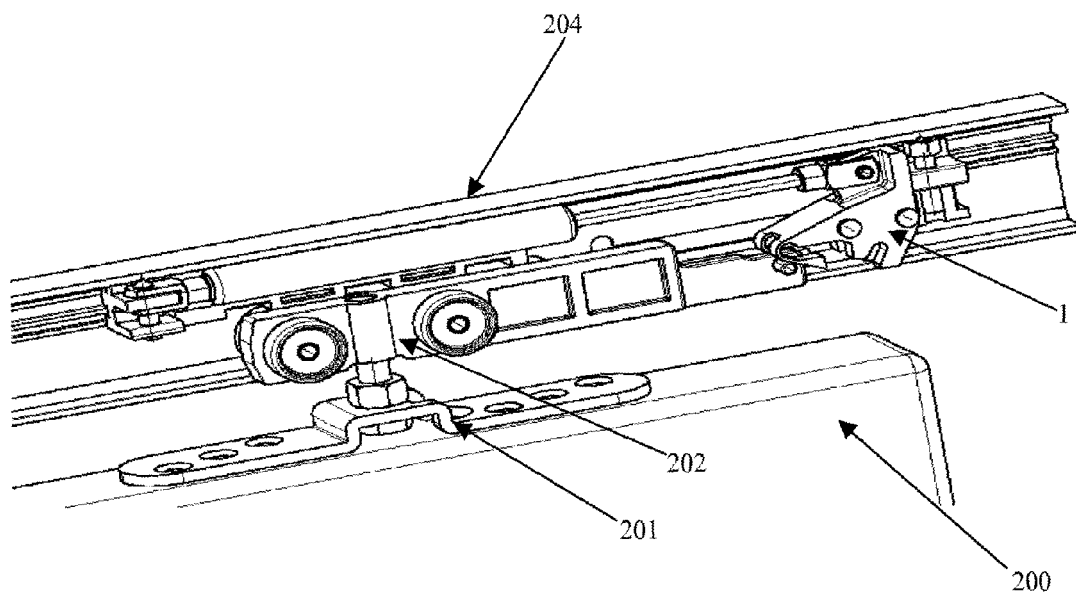


Fig. 11

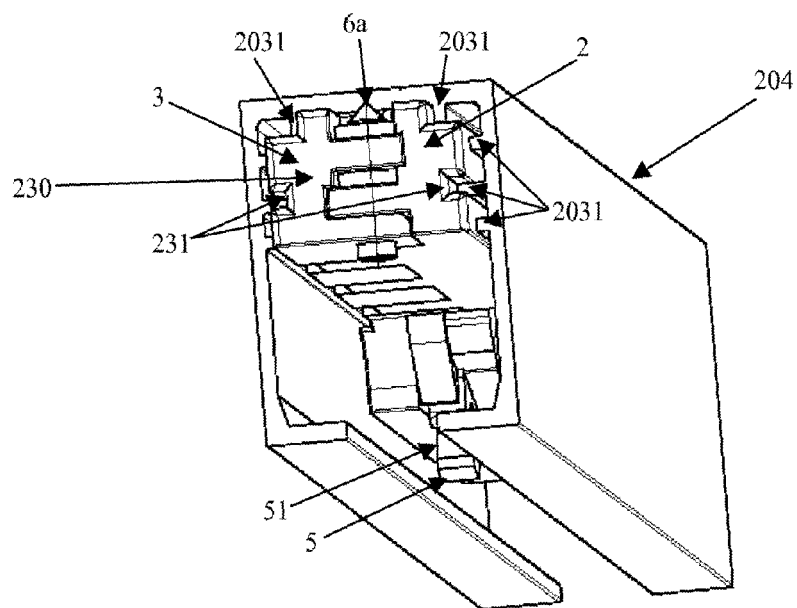


Fig. 12