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(54) **Stop device for panels of sliding doors**

(57) A stop device for the panels (4) of sliding doors with a lower guide and a carriage (7) which moves in an upper track (5) comprises reciprocal interference means (1, 2), separately connected to the track (5) and to the panel (4), and able to interact following a movement of the panel (4), and elastic return means (3). The reciprocal interference means consist of a rigid pin (1) and means (2) for intercepting the rigid pin (1); a first end (31) of the elastic return means (3) is connected to the means (2)

for intercepting the rigid pin (1). Following interaction with the rigid pin (1), the intercepting means (2) pass from a disengaged position, in which they hold the elastic return means (3) under traction, to an engaged position, in which, following the movement due to the interaction with the rigid pin (1), they no longer hold the elastic return means (3) under tension, and the elastic return means (3), contracting, pull the panel (4) as far as the end of its stroke, both during opening and during closing.

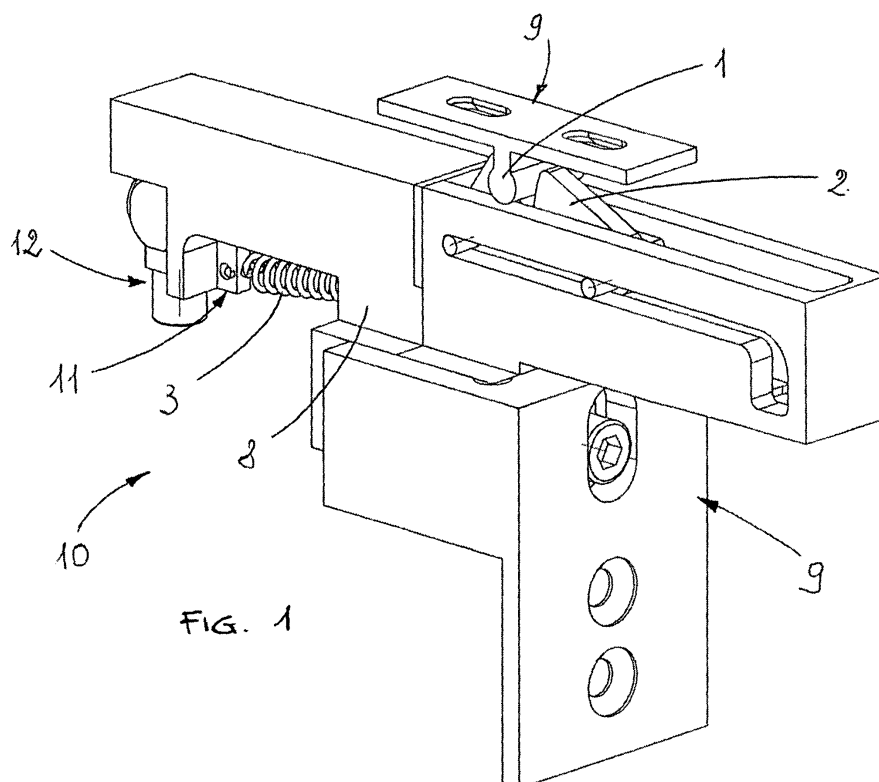


FIG. 1

Description

[0001] The invention relates to a stop device for panels of sliding doors. It can be used to dampen impacts both during panel opening and closing.

[0002] In recent decades devices for damping the movement of sliding components have become widespread in the furniture sector. These devices usually have the dual function of a brake for the sliding element and an end of stroke stop for its motion. They are used, for example, for wardrobe doors, for drawers in pieces of furniture, for the panels of slide-away doors, and they are designed to reduce as much as possible both the noise due to the impact and the wear on the parts which make contact.

[0003] In particular with reference to sliding doors, for many years components made of soft material were used, useful for damping the impact of the panel against the jamb. With the introduction of the above-mentioned braking devices, some companies which produce slide-away doors, in which there is a lower guide, called the "prong", and sliding of a carriage anchored to the door in an upper track, produced "purpose-designed" devices to be installed on their doors during production, although this left the problem unsolved for doors already installed and in any case obliged people buying the new doors to adapt to use of the device they produced.

[0004] In contrast, there are no devices which, during door panel opening or closing, accompany its movement in the final stretch of its path, which is the most critical, making human action completely superfluous.

[0005] The aim of the present invention is therefore to eliminate the above-mentioned disadvantages. This aim is achieved thanks to a stop device for the panels of sliding doors of the type indicated above, that is to say having a lower guide and an upper track, which also takes care of panel movement in the final part of its run, damping its impact at the end of its stroke.

[0006] The main advantage of the present invention basically consists of the fact that it allows the force of the panel impact during opening and/or closing to be minimised, since it applies a braking action to its motion with a damping effect. However, the invention also allows human intervention for opening and/or closing, to be suspended, from the moment when it begins working.

[0007] What is described above results in a noticeable reduction in both the noise and the wear on the parts in contact, in particular extending the life of the carriage.

[0008] Moreover, the invention is universal, since it can be used on any sliding door with an upper carriage and lower guide.

[0009] It can even be retrofitted on all sliding doors already in use, as regards its operation during closing, and on non-slide-away doors as regards its operation during opening.

[0010] Further advantages and features of the invention are more apparent in the detailed description which follows, with reference to the accompanying drawings,

which illustrate a preferred embodiment without limiting the scope of the invention, in which:

- Figure 1 is a perspective view of a preferred embodiment of the invention;
- Figure 2 is an exploded view of the invention;
- Figure 3 is a perspective view of the embodiment of Figure 1, with some parts cut away to better illustrate others, in a configuration for use;
- Figures 4 and 5 are side views of the invention in an operating sequence of the embodiment in the previous figure;
- Figure 6 is a side view of an alternative embodiment to the previous one, with some parts cut away to better illustrate others, in a configuration for use;
- Figure 7 is an exploded view of a detail of the invention, with some parts cut away to better illustrate others;
- Figures 8 and 9 are side views of the invention in an operating sequence of the embodiment in the previous figure.

[0011] The invention relates to a stop device for panels 4 of sliding doors which have a lower guide and a carriage 7 which moves in an upper track 5.

[0012] The stop device 10 comprises reciprocal interference means 1, 2, separately connected to the track 5 and to the panel 4, and designed to interact following a movement to the panel 4, and elastic return means 3, which in the example illustrated in the accompanying drawings consist of a spring.

[0013] The reciprocal interference means comprise at least one rigid pin 1 and means 2 for intercepting the rigid pin 1. A first end 31 of the elastic return means 3 is connected to the means 2 for intercepting the rigid pin 1. When, following interaction with the rigid pin 1, the intercepting means 2 pass from a disengaged position, in which they hold the elastic return means 3 under traction, to an engaged position, in which, due to the movement induced by the interaction with the rigid pin 1, they no longer hold the elastic return means 3 under tension, the latter means 3, contracting, pull the panel 4 as far as the end of its stroke, both during opening and during closing. As shown in Figure 2, the means 2 for intercepting the rigid pin 1 comprise a supporting rod 21 and an operating head 22, rotating relative to the rod 21 and having a cavity 23 shaped to match the rigid pin 1 and a projection 24 for stably and removably fixing the intercepting means 2 in the elastic return means 3 tensioning position.

[0014] The device 10 also comprises a casing 8 for housing the means 2 for intercepting the rigid pin 1, having a seat 81 for fixing a second end 32 of the elastic return means 3, a hollow cylinder 82 in which the rod 21 slides and a straight guide 83 for fixing projection 24 sliding after interaction with the rigid pin 1 and due to contraction of the elastic return means 3.

[0015] To allow it to be connected to all sliding doors having a lower guide and an upper track, the device 10

comprises position adjusting means 9, which can be connected to the rigid pin 1 and to the casing 8, so that they can be separately fixed to any track 5 and to any panel 4.

[0016] Figures 1 to 5 show a first embodiment of the invention, in which the rigid pin 1 is integral with the upper track 5 and the casing 8 is integral with the panel 4.

[0017] Figures 6 to 9 show an alternative embodiment of the invention, in which the rigid pin 1 is integral with the panel 4 and the casing 8 is integral with the upper track 5.

[0018] In the first version, the position adjusting means 9 comprise at least one plate 91 for anchoring the rigid pin 1 to the track 5 and at least one support 94 for fixing the casing 8 to the panel 4 and conventional connecting elements, for example screws. The plate 91 allows the pin 1 to be fixed in the desired position along the track 5. The support 94 allows the casing 8 to be positioned at the desired height on the panel 4. This guarantees the possibility of reciprocal interference between the pin 1 and the intercepting means 2.

[0019] In the second version, the position adjusting means 9 comprise at least one plate 92 for anchoring the casing 8 to the track 5 and at least one support 93 for fixing the rigid pin 1 to the panel 4 and conventional connecting elements, for example screws. The plate 92 allows the casing 8 to be fixed in the desired position along the track 5. The support 94 allows the pin 1 to be positioned at the desired height on the panel 4. This guarantees the possibility of reciprocal interference between the pin 1 and the intercepting means 2.

[0020] In both cases, the device 10 should also comprise means 11 for adjusting the tension of the elastic return means 3, for adjustment to panels 4 of different weight and dimensions, and means 12 for adjusting the damping effect, designed to modify the intensity of the panel 4 impact. In the embodiments illustrated, the means 11 for adjusting the tension of the elastic return means 3 comprise a movable support 111 to which the second end 32 of the elastic return means 3 is connected. The means 12 for adjusting the damping effect comprise a valve 121 for controlling the air coming out of the hollow cylinder 82 in which the rod 21 slides.

[0021] Figures 4 and 5 show an operating sequence relative to the first version of the device 10 described above. Figure 4 shows the moment when, after a panel 4 movement, the intercepting means 2 interact with the rigid pin 1 fixed to the upper track 5. Up to this point, the projection 24 guarantees that operating head 22 positioning inside the casing 8 tensions the elastic return means 3. When the pin 1 engages in the cavity 23 of the intercepting means 2, as illustrated in Figure 5, the operating head 22 rotates, causing the projection 24 to move upwards until it slides in the guide 83 and leaving the elastic return means 3 free to contract and to pull the panel 4 to the end of its stroke.

[0022] Figures 8 and 9 show an operating sequence relative to the second version of the device 10 described above. Similarly to the previous example, Figure 8 shows

the moment when, after a panel 4 movement, the rigid pin 1 interacts with the intercepting means 2 fixed to the upper track 5. Up to this point, the projection 24 guarantees that operating head 22 positioning inside the casing 8 tensions the elastic return means 3. When the pin 1 engages in the cavity 23 of the intercepting means 2, as illustrated in Figure 9, the operating head 22 rotates, causing the projection 24 to move downwards until it slides in the guide 83 and leaving the elastic return means 3 free to contract and to pull the panel 4 to the end of its stroke.

[0023] Although all the accompanying drawings show panel 4 situations during closing, similar behaviour would be observed if the device 10 described herein were installed at the opposite end of the panel 4 and track 5 to make it operate during panel 4 opening.

[0024] The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

[0025] Moreover, all details of the invention may be substituted by technically equivalent elements.

[0026] Obviously, in practice modifications and/or improvements are possible, all covered by the claims herein.

Claims

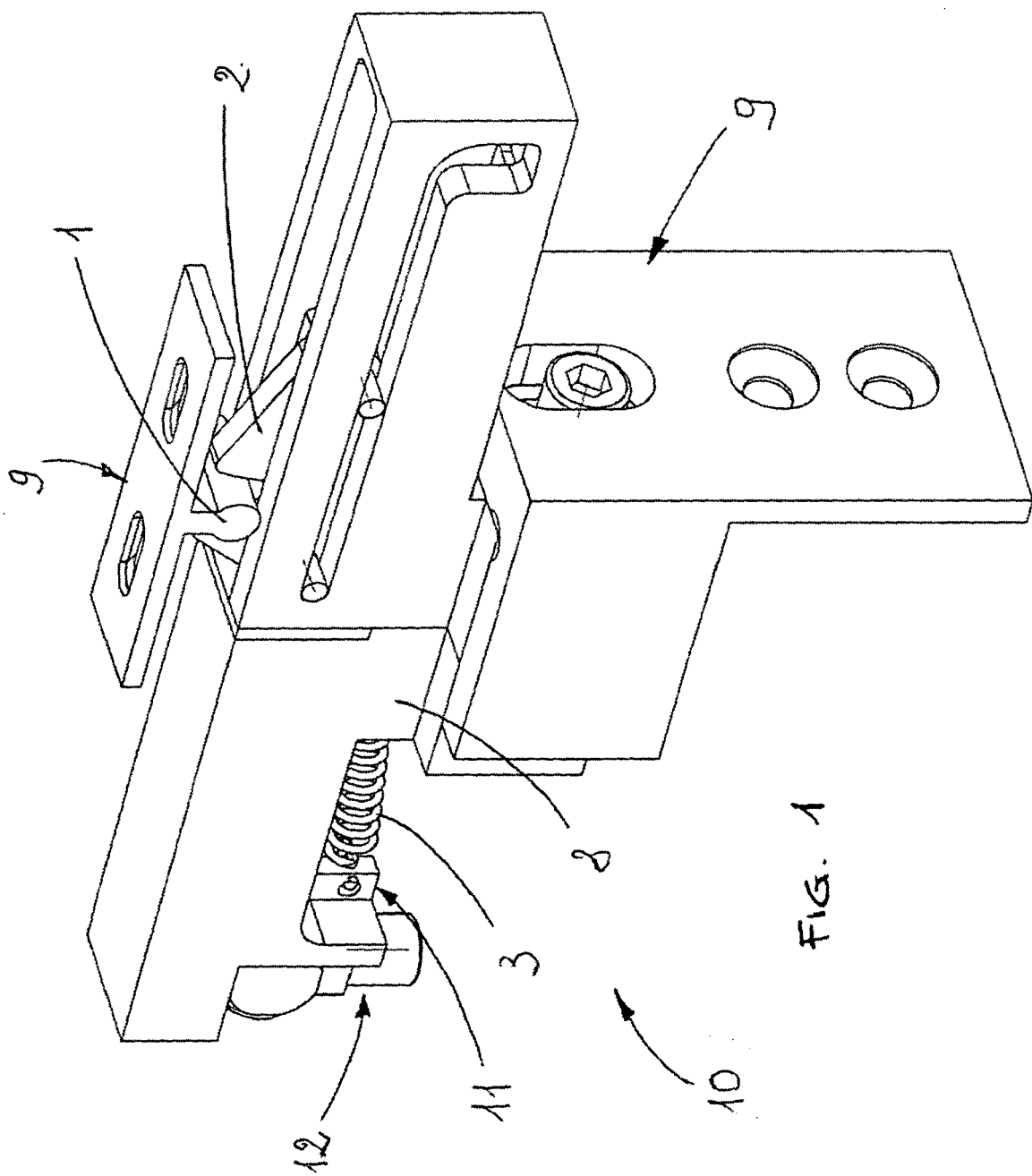
1. A stop device for panels (4) of sliding doors having a lower guide and a carriage (7) which moves in an upper track (5), comprising reciprocal interference means (1, 2) separately connected to the track (5) and to the panel (4), said interference means (1, 2) being designed to interact following a movement of the panel (4), the device being **characterised in that** it comprises a rigid pin (1), means (2) for intercepting the rigid pin (1) and elastic return means (3), connected at a first end (31) to the means (2) for intercepting the rigid pin (1), the intercepting means (2) being designed to pass from a disengaged position, in which they do not interact with the rigid pin (1) and they hold the elastic return means (3) under traction, to an engaged position, in which they interact with the rigid pin (1) and do not keep the elastic return means (3) under tension, that latter contracting and pulling the panel (4).
2. The device according to claim 1, **characterised in that** the means (2) for intercepting the rigid pin (1) comprise a supporting rod (21) and an operating head (22), rotating relative to the rod (21) and having a cavity (23) shaped to match the rigid pin (1) and a projection (24) for stably and removably fixing in the position for tensioning the elastic return means (3).
3. The device according to claim 2, **characterised in that** it comprises a casing (8) for housing the means (2) for intercepting the rigid pin (1), having a seat

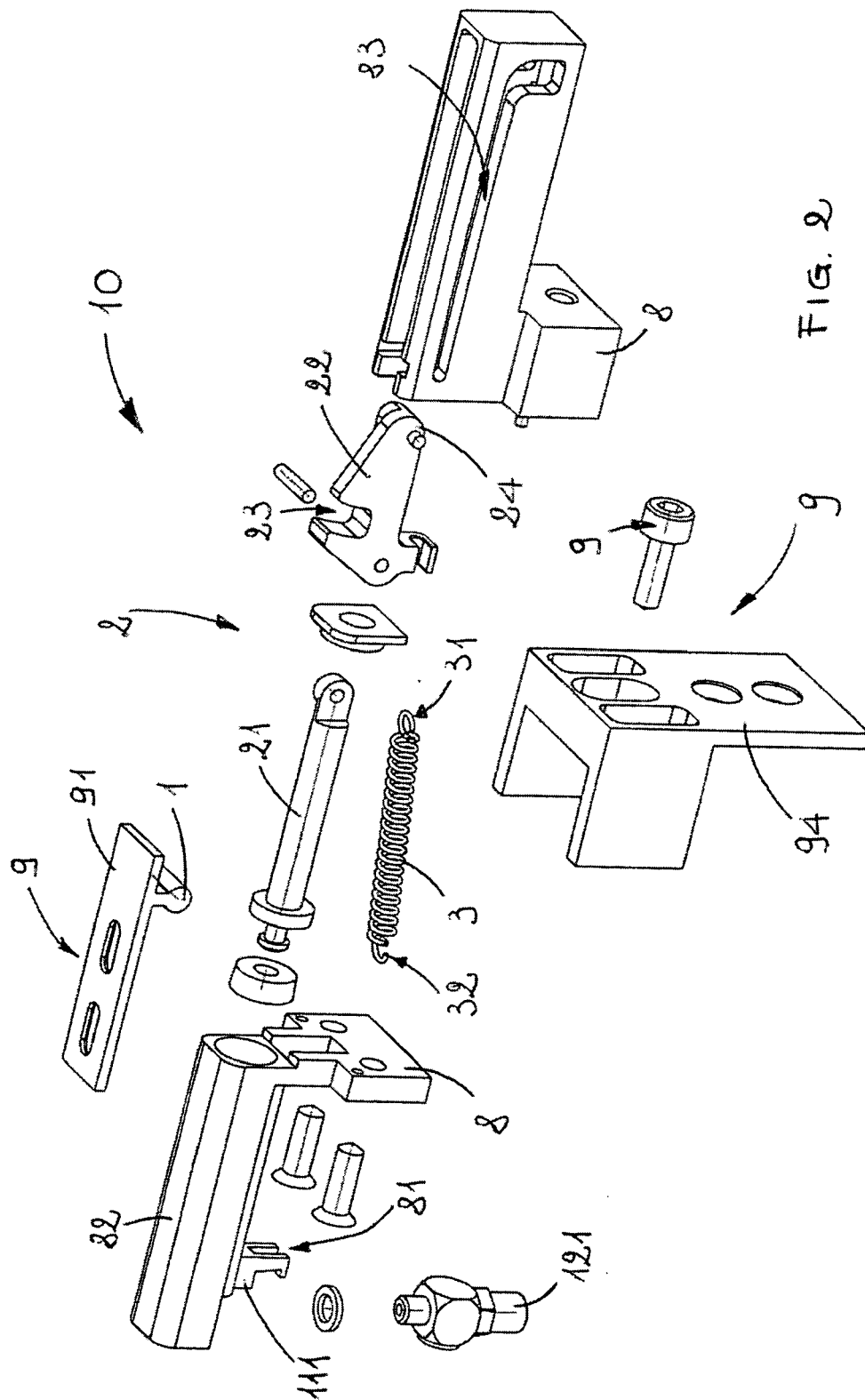
(81) for fixing a second end (32) of the elastic return means (3), a hollow cylinder (82) in which the rod (21) slides and a straight guide (83) for fixing projection (24) sliding.

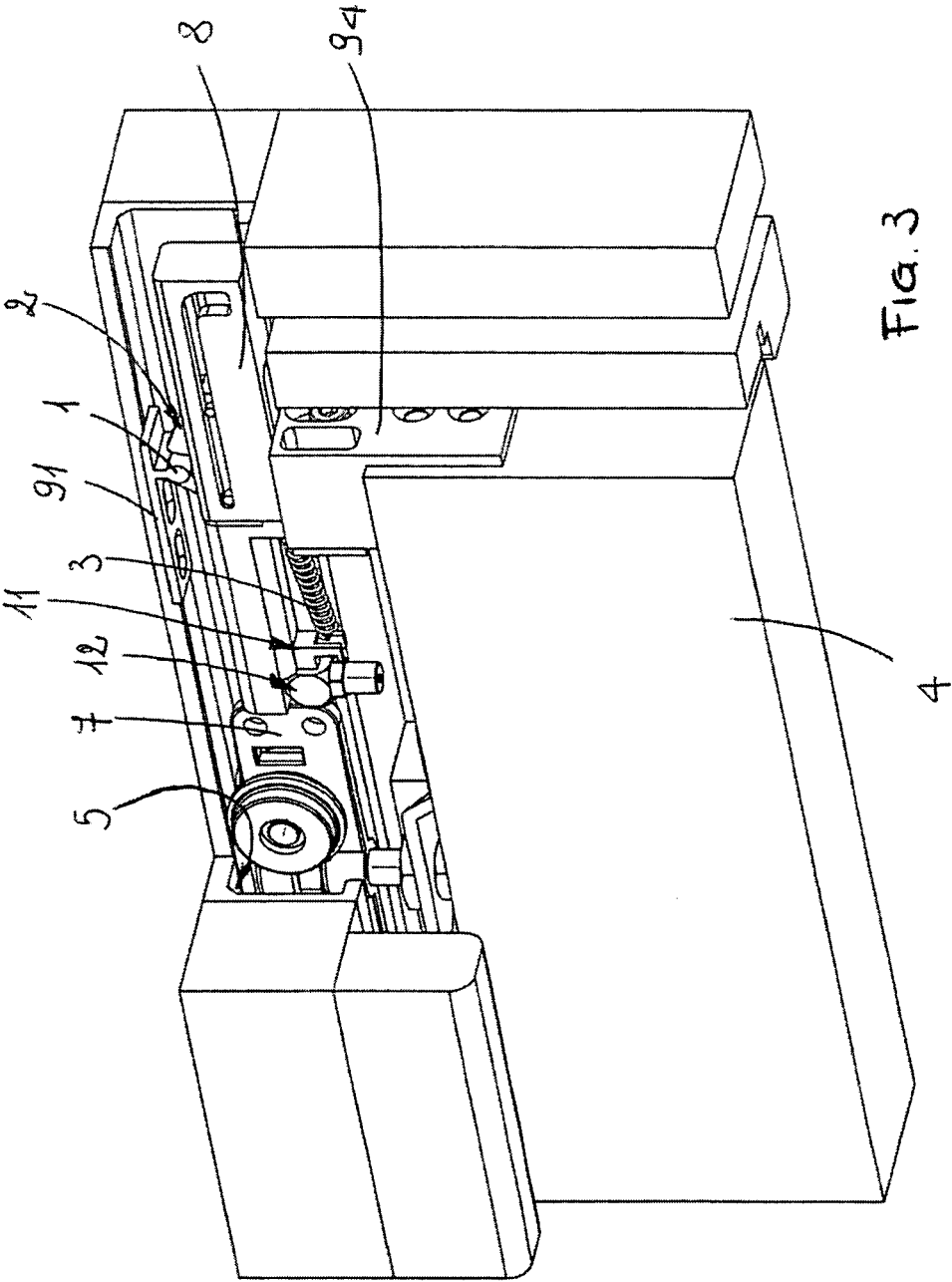
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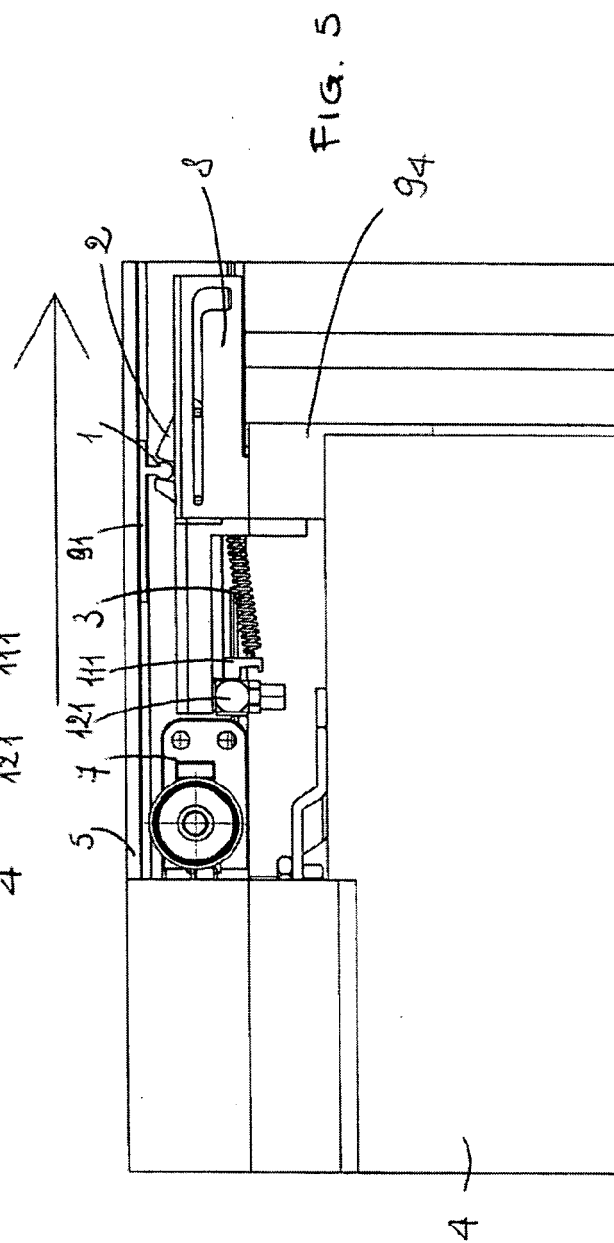
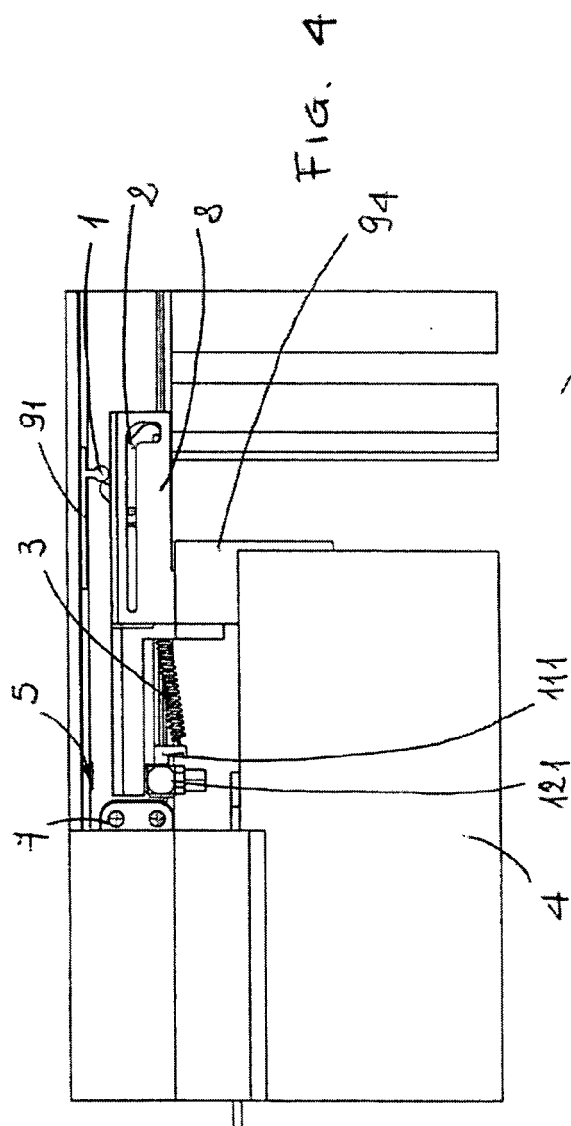
4. The device according to claim 3, **characterised in that** the rigid pin (1) is integral with the upper track (5) and the housing (8) is integral with the panel (4). 10
5. The device according to claim 3, **characterised in that** the rigid pin (1) is integral with the panel (4) and the housing (8) is integral with the upper track (5). 15
6. The device according to claim 4 or 5, **characterised in that** it comprises position adjusting means (9) which can be connected to the rigid pin (1) and to the housing (8), said position adjusting means (9) being designed to allow the device (10) to be connected to any track (5) and to any panel (4). 20
7. The device according to claim 6, **characterised in that** the position adjusting means (9) comprise at least one plate (91; 92) for anchoring to the track (5) and respective connecting elements. 25
8. The device according to claim 6, **characterised in that** the position adjusting means (9) comprise at least one support (93; 94) for fixing to the panel (4) and respective connecting elements. 30
9. The device according to claim 4 or 5, **characterised in that** it comprises means (11) for adjusting the tension of the elastic return means (3), for adapting to panels (4) of different weight and dimensions. 35
10. The device according to claim 4 or 5, **characterised in that** it comprises means (12) for adjusting the damping effect, said means (12) being designed to modify the intensity of the panel (4) impact. 40
11. The device according to claim 9, **characterised in that** the means (11) for adjusting the tension of the elastic return means (3) comprise a movable support (111) to which the second end (32) of the elastic return means (3) is connected. 45
12. The device according to claim 10, **characterised in that** the means (12) for adjusting the damping effect comprise a valve (121) for controlling the air coming out of the hollow cylinder (82) in which the rod (21) slides. 50

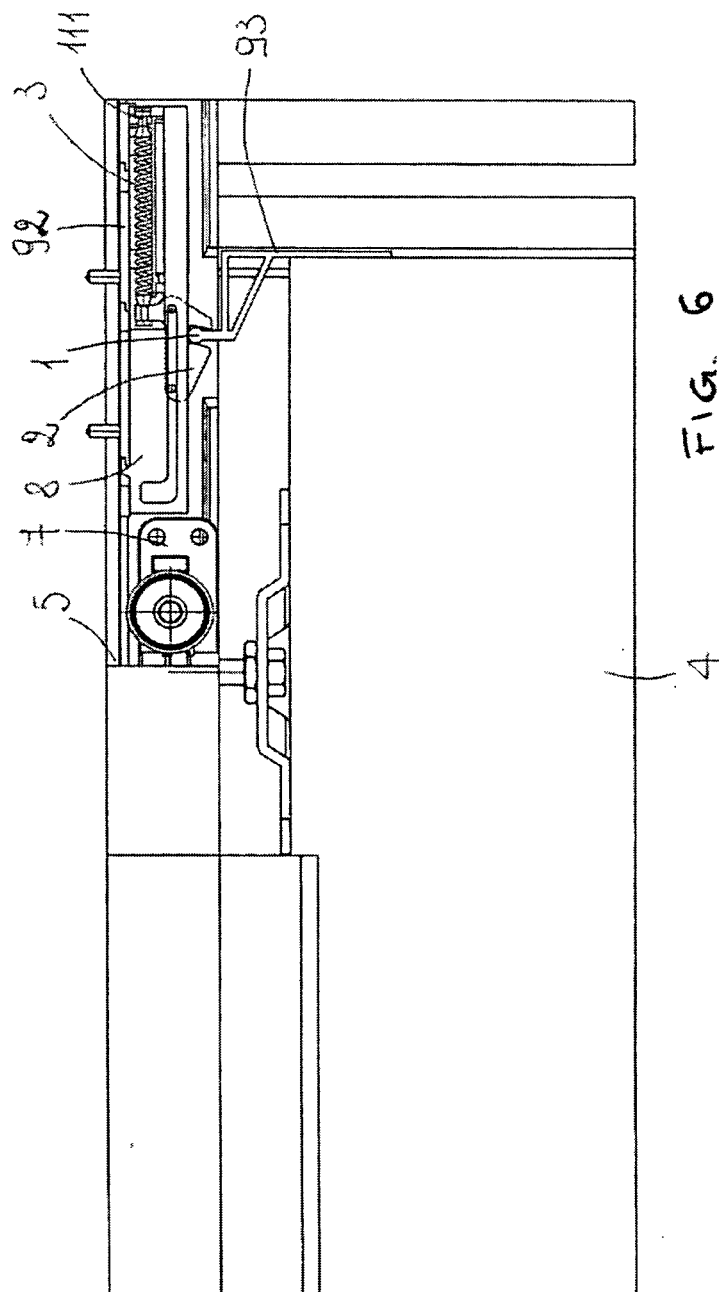
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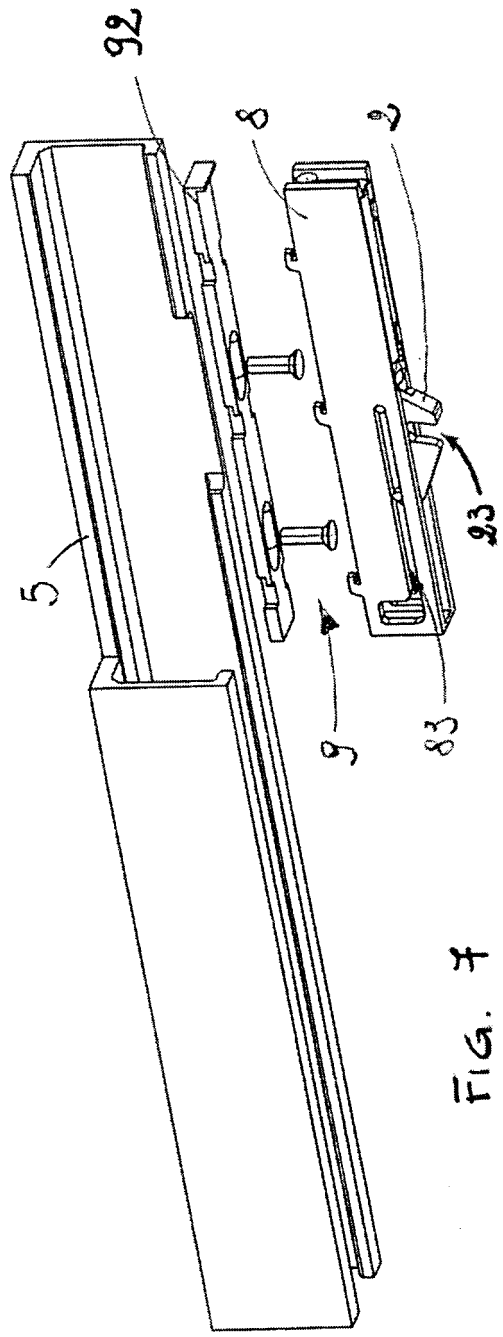
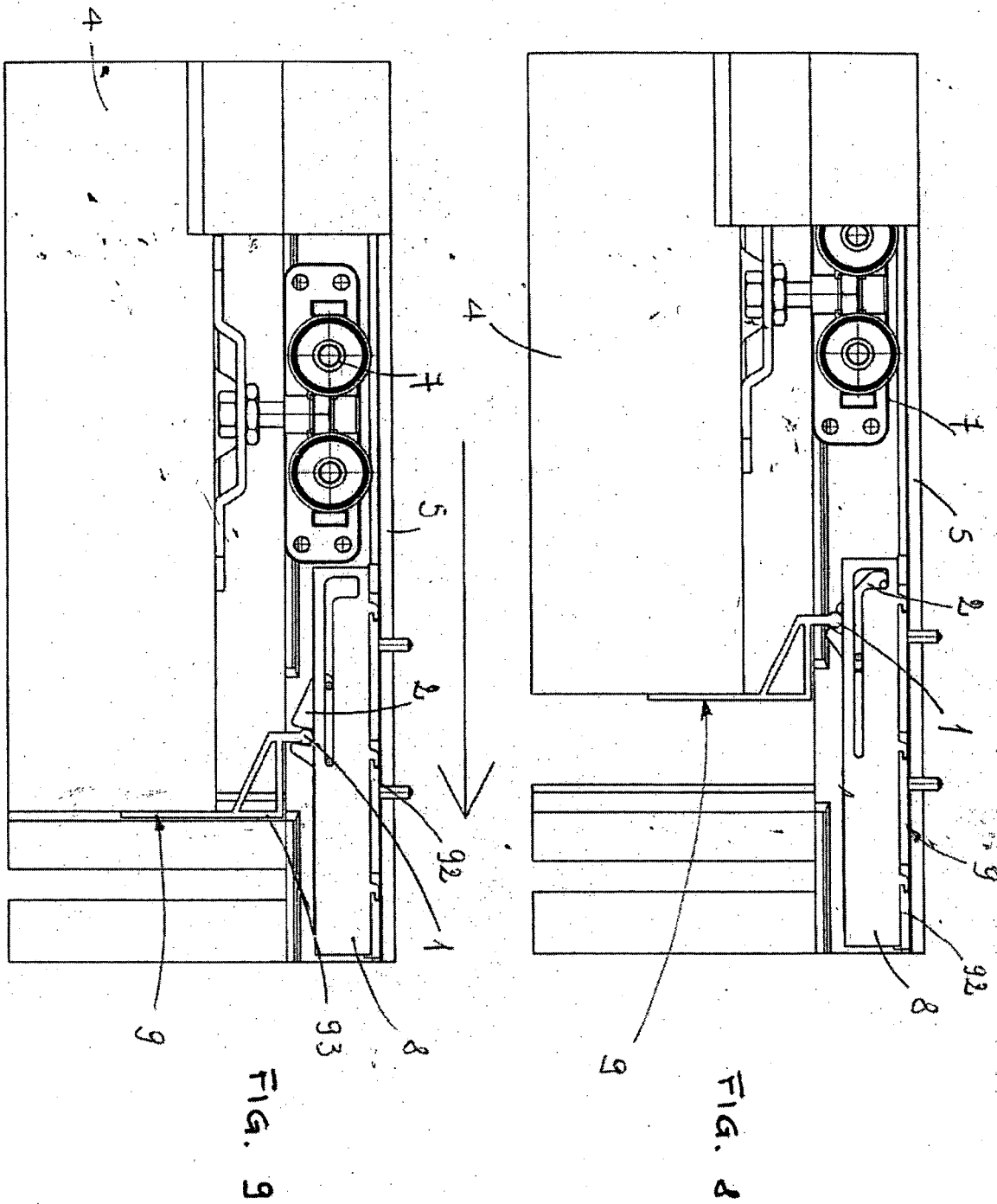


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5389

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05F A47B
Place of search		Date of completion of the search	Examiner
The Hague		6 October 2008	Guillaume, Geert
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 08 42 5389

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06-10-2008

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