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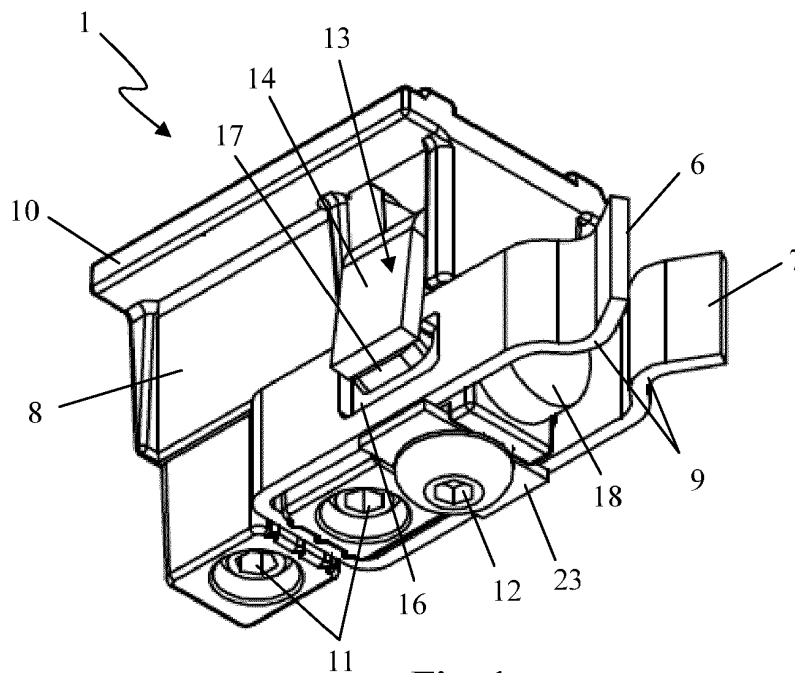
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(54) **DOOR STOPPER FOR A SLIDING DOOR ASSEMBLY**

(57) The present invention relates to a door stopper (1) for a sliding door assembly (5), comprising a mounting body (8) for mounting the door stopper (1) in a running rail (2) and a first and a second resilient detaining element (7), each of which is at least partly elastically deflectable

with respect to the mounting body (8) in order to keep a carriage (4) which is rollable in the running rail (2) in an end position, in which the respective spring forces of the detaining elements (6, 7) are substantially directed towards opposite longitudinal sides of the carriage (4).



**Fig. 1**

## Description

**[0001]** The present invention relates to a door stopper for a sliding door assembly, comprising

- a mounting body for mounting the door stopper in a running rail of the sliding door assembly;
- and a resilient detaining element which is at least partly elastically deflectable with respect to the mounting body for keeping a carriage of the sliding door assembly which is rollable in the running rail in an end position.

**[0002]** Similar door stoppers have already been described, for example, in EP 1 080 290 B1, BE 1 020 253 A5 and in CH 657 415 A5. With the door stopper in the sliding door assembly as described in EP 1 080 290 B1, a resilient detaining element forms part of the mounting body and the prestress of the resilient detaining element is adjustable by means of an adjusting screw. In BE 1 020 253 A5, a separate resilient element is adjustably connected to the mounting body. Analogously, in CH 657 415 A5 a separate resilient element is securely attached to an end on the mounting body as a detaining element and displaceable with respect to the mounting element at its other end by means of an adjusting screw.

**[0003]** When using such a door stopper in a sliding door assembly, the carriage in the running rail will roll towards this door stopper when a sliding door which is suspended from the carriage is taken to its end position. In this case, the carriage knocks against the resilient detaining element, as a result of which this elastically deflects and the carriage is detained by this detaining element. When the carriage is being acted on by the detaining element, the carriage is pushed downwards at the location of this detaining element and is lifted up slightly at its other end. This causes a noise which is often regarded as a nuisance. In addition, this causes a torsional force on the carriage, resulting in increased wear, not only of this carriage, but also of the adjoining parts of the sliding door assembly, onto which this torsional force is transferred.

**[0004]** It is therefore an object of the present invention to provide a door stopper which solves the abovementioned problems.

**[0005]** This object of the invention is achieved by providing a door stopper for a sliding door assembly, comprising

- a mounting body for mounting the door stopper in a running rail of the sliding door assembly;
- a resilient detaining element which is at least partly elastically deflectable with respect to the mounting body for keeping a carriage of the sliding door assembly which is rollable in the running rail and which is arranged in such a manner that, viewed in the fitted position of the sliding door assembly, the spring force thereof is substantially directed towards a first lon-

gitudinal side of the carriage, in an end position;

- and a second resilient detaining element which is at least partly elastically deflectable with respect to the mounting body for keeping the carriage in the end position and which is arranged in such a manner that, viewed in the fitted position of the sliding door assembly, the spring force thereof is substantially directed towards a second longitudinal side of the carriage, opposite the first longitudinal side.

**[0006]** By no longer acting on the upper side of the carriage in order to keep it in its end position, it is no longer pushed down when it is being acted on, so that the other end of the carriage is no longer lifted up. This results in less wear and less noise pollution.

**[0007]** By acting on the two longitudinal sides of the carriage, the forces acting on the carriage in order to secure it can be dimensioned in such a manner that they compensate each other, so that the carriage does not deflect when it is being acted on. Due to these two detaining elements, the carriage can automatically be centred in its end position when it is being acted on.

**[0008]** As with the detaining element of the different types of prior-art door stoppers, these detaining elements of a door stopper according to the present invention may either form part of the mounting body or be provided as separate parts, in which case they are either partly securely attached to the mounting body and partly adjustable or completely adjustable.

**[0009]** Typically, with a sliding door assembly in which a door stopper according to the present invention is incorporated, the running rail is suspended in a substantially horizontal position. A door leaf is suspended from the carriage so that it is rollable with respect to the running rail by means of this carriage. The spring forces which are exerted by this door stopper will then typically be directed virtually horizontally, with the spring force of the second detaining element being directed virtually opposite to the spring force of the first detaining element.

**[0010]** That side of a door stopper which, in the fitted position thereof in a sliding door assembly, faces the carriage is regarded as the front side of the door stopper in this patent application. That side of the door stopper which faces away from the carriage is referred to as the rear side of the door stopper. That side of the door stopper which is directed upwards is the top side and that side of the door stopper which is directed downwards is the bottom side. The other two sides of the door stopper are the longitudinal sides. In most embodiments, these longitudinal sides will also be the longest sides which are directed sideways (and thus do not form a top side or bottom side).

**[0011]** In a preferred embodiment of a door stopper according to the present invention, the first-mentioned detaining element and the second detaining element are arranged at a distance apart, in such a manner that when the carriage is being held, this carriage extends partly between these detaining elements. Preferably, the de-

taining elements in this case act on parts of the carriage which extend between the detaining elements in order to detain the carriage.

**[0012]** Alternatively, but less preferred, the detaining elements may also be arranged in such a way that they extend, for example, in a cavity of the carriage when detaining it, in such a way that they act on parts of the carriage which delimit this cavity.

**[0013]** The spring constant of the first-mentioned detaining element and the spring constant of the second detaining element of a door stopper according to the present invention are preferably virtually equal. In this way, it is simpler to prevent lateral deflections of the carriage when it is being acted on by the detaining elements. In addition, the detaining elements are preferably arranged in such a manner that they act on the carriage virtually simultaneously when the carriage rolls towards the door stopper. This also contributes to preventing lateral deflection of the carriage. Furthermore, the construction of the door stopper is preferably virtually symmetrical.

**[0014]** In a specific embodiment of a door stopper according to the present invention, the detaining elements are configured as a leaf spring.

**[0015]** Preferably, the detaining elements of such a door stopper form part of the same leaf spring.

**[0016]** More specifically, the leaf spring may to this end be folded to essentially form a U-shape, so that the first leg of the U-shaped leaf spring forms the first-mentioned detaining element and the second leg of the U-shaped leaf spring forms the second detaining element, in which each leg is provided with a bend in order to enable a corresponding part of the carriage to engage behind it in order to secure the carriage.

**[0017]** A particular embodiment of a door stopper according to the present invention comprises adjustment means for adjusting the position of the detaining elements with respect to the mounting body.

**[0018]** Such an adjustment facility offers various advantages.

**[0019]** By means thereof, it is possible to choose to close the door more forcefully or more gently, as desired.

**[0020]** If the elasticity of the detaining elements decreases over the course of time, it is also possible to readjust the spring force by adjusting the position of the detaining elements with respect to the mounting body.

**[0021]** In addition, due to this adjustment facility, it is possible to use the same door stopper for sliding door assemblies having different types of wall elements. The reason for this is that, with relatively heavy wall elements, the detaining elements have to be in a different position than with relatively lightweight wall elements to be able to exert a similar detaining force on the carriage.

**[0022]** Said adjustment means are preferably configured to act on each detaining element on its side facing away from the side with which the detaining element is provided for acting on the carriage in order to detain it.

**[0023]** In this way, a door stopper whose detaining el-

ements lose elasticity over the course of time can be readjusted for a longer period of time, so that the door stopper can be used for a longer period of time.

**[0024]** When such an embodiment of a door stopper comprises a said virtually U-shaped leaf spring, whose legs form the detaining elements, then the adjustment means preferably comprise a virtually U-shaped adjustment element, the legs of the U shape of which diverge from each other increasingly further towards their free end and a first leg of which acts on the first leg of the leaf spring, at a fixed distance from the free end of this leg of the leaf spring, and a second leg acts on the second leg of the leaf spring, at a fixed distance from the free end of this leg of the leaf spring. This adjustment element is then preferably displaceably arranged with respect to the leaf spring, so that the legs of the adjustment element act on the legs of the leaf spring at a smaller or greater distance from their free end, in such a manner that the legs of the leaf spring are brought closer together or moved further apart, respectively.

**[0025]** Less preferably, the adjustment means may also comprise, for example, a spear-shaped adjustment element which is arrangeable between the legs of the leaf spring at a distance from their free end and is height-displaceable in order to cause these legs to come together or move them further apart.

**[0026]** As another alternative, adjusting screws may for example be provided as adjustment means and act on the legs of the leaf spring laterally in order to be able to adjust the position thereof with respect to the mounting body.

**[0027]** The object of the present invention is furthermore also achieved by providing a sliding door assembly, comprising

- a running rail;
- a sliding door leaf;
- a carriage which is arrangeable in the running rail so as to be rollable and is attachable to the sliding door leaf in order to suspend this sliding door leaf from this running rail so as to be rollable between a first end position and a second end position;
- and a door stopper according to the present invention.

**[0028]** If, with such a sliding door assembly, this door stopper is an abovementioned door stopper which comprises a virtually U-shaped adjustment element and if the running rail of this sliding door assembly comprises an access opening which is delimited on at least one side by a running surface for arranging the carriage thereon so as to be rollable, then the adjustment means preferably comprise an adjusting screw for displacing the adjustment element, in which said adjusting screw is adjustable via the access opening of the running rail.

**[0029]** In this way, said adjusting screw always remains accessible for adjusting or readjusting the position of the detaining elements with respect to the mounting

body, irrespective of the way in which the running rail is fitted.

**[0030]** The running rail of a sliding door assembly according to the present invention will typically comprise such a passage opening which is delimited on at least one side by a running surface in order to arrange the carriage thereon so as to be rollable. Preferably, this passage opening is delimited on two sides by a running surface, so that the forces which are exerted on this running rail when suspending a sliding door leaf from a carriage which is fitted in this running rail and when displacing the carriage in this running rail, can be distributed more evenly across the running rail. The running rail then typically has a virtually C-shaped opening, in which the opening between the legs of the C shape is directed downwards when the running rail has been suspended and forms said passage opening.

**[0031]** If the running rail does comprise such a virtually C-shaped cross section, in which the access opening extends between the ends of the legs of the C shape, the running rail is furthermore preferably provided with a fitting rib in the cavity of the C shape on both legs at a distance from their ends and the mounting body of the door stopper preferably comprises a mounting flange on both longitudinal sides which are fittable over the respective fitting rib in order to secure the mounting body in the running rail.

**[0032]** This sliding door assembly then advantageously also comprises clamping screws by means of which the mounting flanges are clampable to the fitting ribs in order to secure the mounting body in the running rail.

**[0033]** Door stoppers according to the prior art are typically secured in the running rail by clamping them to the running surface for the carriage. As a result thereof, a running rail is typically twisted, as a result of which the running surface is no longer smooth and flat. By now clamping the mounting body of the door stopper to the mounting ribs at a distance from the running surface, the running rail will be twisted to a lesser degree, resulting in a more even running surface. As a result thereof, the carriage can roll over the running surface in a smoother and more noiseless way.

**[0034]** The present invention will now be explained in more detail by means of the following detailed description of a preferred sliding door assembly according to the present invention. The sole aim of this description is to give illustrative examples and to indicate further advantages and particulars of the present invention and can thus not be interpreted as limiting the area of application of the invention or of the patent rights defined in the claims.

**[0035]** Reference numerals are used in this detailed description to refer to the attached drawings, in which:

- Fig. 1 shows an embodiment of a door stopper according to the present invention in perspective;
- Fig. 2 shows the door stopper from Fig. 1 in side view;
- Fig. 3 shows the door stopper from Fig. 1 in bottom

view, with the adjustment means in a first position;

- Fig. 4 shows the door stopper from Fig. 1 in bottom view, with the adjustment means in a second position;
- 5 - Fig. 5 shows a part of a sliding door assembly according to the present invention with a door stopper according to the present invention partly in side view, with the running rail partly in longitudinal cross section, with the carriage detained in its end position;
- 10 - Fig. 6 shows a part of a sliding door assembly according to the present invention with a door stopper according to the present invention partly in side view, with the running rail partly in longitudinal cross section, with the carriage released from its end position.

**[0036]** The illustrated door stopper (1) comprises a mounting body (8) and a leaf spring (6, 7), as can be seen in Figs 1 to 4.

**[0037]** This illustrated door stopper (1) is configured to be fitted in a running rail (2) which is arranged at the top of a sliding door assembly (5), as can be seen in Figs 5 and 6. However, it will be clear to a person skilled in the art that a door stopper (1) according to the present invention is, mutatis mutandis, also usable with sliding door assemblies having a running rail (2) which is arranged below the sliding door leaf (3), in which case said door stopper (1) is then fitted in said bottom running rail (2).

**[0038]** The leaf spring (6, 7) of the illustrated door stopper (1) is folded so as to be substantially U-shaped and accommodated in the mounting body (8), in such a manner that the free ends of the legs (6, 7) extend freely forwards with respect to the mounting body (8). These legs (6, 7) extend at an intermediate distance from one another, with the intermediate space between the legs (6, 7) extending vertically inside the leaf spring (6, 7) and thus remaining unlimited towards the top and bottom. Both legs (6, 7) are provided with a bend (9) which is directed towards the other leg (7 or 6, respectively) of both legs (6, 7). This leaf spring (6, 7) may be made from stainless steel or from any other suitable material, such as for example from plastic. Furthermore, the action of this leaf spring (6, 7) is illustrated.

**[0039]** The mounting body (8) comprises a mounting flange (10) in order to mount it in a running rail (2) of a sliding door assembly (5). By means of clamping screws (11), the mounting body (8) can be clamped into this running rail (2), as can be seen in Figs 5 and 6. To this end, the running rail (2) may be provided with fitting ribs against which this mounting flange (10) can be clamped in order to mount the mounting body (8) in the running rail (2). The running rail (2) then preferably has a substantially C-shaped cross section, with an access opening to the running rail (2) extending between the ends of the legs of the C shape. The fitting ribs are then provided on both legs of the C shape at a distance from their ends. By tightening the clamping screws (2) at the top of the cavity of the C shape, the mounting flange (10) is pulled against the fitting ribs. The running rail (2) will typically

be made from aluminium by means of extrusion, but could also be made of, for example, plastic. The mounting body (8) will typically be made from plastic, but may obviously also be made from other suitable materials.

**[0040]** The access opening of the running rail (2) of the illustrated sliding door assembly is delimited on both sides by a running surface (19), on which carriages (4) of the sliding door assembly (5) are rollable, as can be seen in Figs 5 and 6. These figures show one carriage (4) from which a sliding door leaf (3) is suspended. Such a sliding door leaf (3) is typically suspended using at least two such carriages (4). By means of these carriages (4), the sliding door leaf (3) is then displaceable with respect to the running rail (2) between a closed position, as illustrated in Fig. 5, and a completely open position. Fig. 6 shows an open position between the closed position and the completely open position.

**[0041]** As is known, a carriage (4) of a sliding door assembly may come in several shapes and be provided with one or more wheels (20) in order to fit it in a running rail (2) so as to be rollable. In the illustrated sliding door assembly (5), the carriage (4) comprises four wheels (20) which are rotatably fitted to a rotation shaft (21) in pairs and are in each case arranged on respective sides of the base body (22) of the carriage (4), so that they are rollable on the respective running surfaces (19) which extend next to the access opening to the running rail (2).

**[0042]** When the sliding door leaf (3), which is suspended from the carriages (4), is taken to its closed position, as is illustrated in Fig. 5, the illustrated carriage (4) rolls towards the door stopper (1) in the running rail (2). In this case, the end of the carriage (4) acts on the legs (6, 7) of the leaf spring and pushes these against the bends (9). In this case, the legs (6, 7) elastically move apart and thus hold the carriage (4) securely on both sides. The carriage (4) in this case then extends partly between the legs (6, 7). When the carriage (4) moves relatively fast towards the door stopper (1), the knock is cushioned by a buffer element (18) which is fitted on the front side of the mounting body (8) of the door stopper (1), so that the carriage (4) does not recoil immediately and stays between the legs (6, 7) of the leaf spring. Due to the fact that the leaf spring comprises two legs (6, 7) which are spaced apart and extend an equal distance from the mounting body (8), the carriage (4) can act on both legs (6, 7) in a self-centring manner.

**[0043]** In order to return the sliding door leaf (3) to an open position, a sufficiently great force has to be exerted thereon in order to cause the legs (6, 7) of the leaf spring to elastically move apart and to be able to pull the carriage (4) from between these legs (6, 7).

**[0044]** The force with which the legs (6, 7) of the leaf spring can be force apart may be adjusted, with the illustrated door stopper (1), by means of a virtually U-shaped adjustment element (13) and an adjusting screw (12). The legs (14, 15) of the virtually U-shaped element (13) move increasingly further apart towards their free end. At their free end, they are then provided with an engage-

ment element (17) which is directed towards the other leg (15 or 14, respectively). A first leg (14) of this adjustment element (13) acts on the first leg (6) of the leaf spring, at a fixed distance from the free end of this leg (6) of the leaf spring, in such a manner that the engagement element (17) thereof engages in a cavity (16) in the first leg (6) of the leaf spring. Analogously, the second leg (15) of this adjustment element (13) acts on the second leg (7) of the leaf spring, at a fixed distance from the free end of this leg (7) of the leaf spring, in such a manner that the engagement element (17) thereof engages in an opening (16) in the second leg (7) of the leaf spring. The adjustment element (13) is height-displaceable with respect to the leaf spring, with the engagement elements (17) being height-displaceable in the respective openings (16). The adjusting screw (12) passes through a float (23) and through a part of the mounting body (8) which extends between the legs (6, 7) of the leaf spring and engages in the adjustment element (13). This adjusting screw (12) is in this case situated on the bottom side of the door stopper (1) in such a manner that it is accessible via the access opening to this running rail (2) after the door stopper (1) has been fitted in the running rail (2). By turning the adjusting screw (12), the adjustment element (13) is raised or lowered. When raising the adjustment element (13), the legs (6, 7) of the leaf spring move further apart. As a result thereof, only a smaller force is required to be able to push these legs (6, 7) apart by means of the carriage (4). By lowering the adjustment element (13), the legs (6, 7) of the leaf spring are brought closer together. As a result thereof, a greater force is required to be able to push these legs (6, 7) apart by means of the carriage (4).

### Claims

1. Door stopper (1) for a sliding door assembly (5), comprising

- a mounting body (8) for mounting the door stopper (1) in a running rail (2) of the sliding door assembly (5);
- and a resilient detaining element (6) which is at least partly elastically deflectable with respect to the mounting body (8) for keeping a carriage (4) of the sliding door assembly (5) which is rollable in the running rail (2) in an end position;

**characterized in that** the detaining element (6) is arranged in such a manner that, viewed in the fitted position of the sliding door assembly (5), the spring force thereof is substantially directed towards a first longitudinal side of the carriage (4), and **in that** the door stopper (1) comprises a second resilient detaining element (7) which is at least partly elastically deflectable with respect to the mounting body (8) for keeping the carriage in the end position and which

- is arranged in such a manner that, viewed in the fitted position of the sliding door assembly (5), the spring force thereof is substantially directed towards a second longitudinal side of the carriage (4), opposite the first longitudinal side.
2. Door stopper (1) according to Claim 1, **characterized in that** the first-mentioned detaining element (6) and the second detaining element (7) are arranged at a distance apart, in such a manner that when the carriage (4) is being held, this carriage (4) extends partly between these detaining elements (6, 7).
  3. Door stopper (1) according to one of the preceding claims, **characterized in that** the spring constant of the first-mentioned detaining element (6) and the spring constant of the second detaining element (7) are virtually equal.
  4. Door stopper (1) according to one of the preceding claims, **characterized in that** the detaining elements (6, 7) are arranged in such a manner that they act on the carriage (4) virtually simultaneously when the carriage (4) rolls towards the door stopper (1).
  5. Door stopper (1) according to one of the preceding claims, **characterized in that** the construction of the door stopper (1) is virtually symmetrical.
  6. Door stopper (1) according to one of the preceding claims, **characterized in that** the detaining elements (6, 7) are configured as a leaf spring.
  7. Door stopper (1) according to Claim 6, **characterized in that** the detaining elements (6, 7) form part of the same leaf spring.
  8. Door stopper (1) according to Claim 7, **characterized in that** the leaf spring is folded to essentially form a U-shape, so that the first leg (6) of the U-shaped leaf spring forms the first-mentioned detaining element (6) and the second leg (7) of the U-shaped leaf spring forms the second detaining element (7), and **in that** each leg (6, 7) is provided with a bend (9) in order to enable a corresponding part of the carriage (4) to engage behind it in order to secure the carriage (4).
  9. Door stopper (1) according to one of the preceding claims, **characterized in that** the door stopper (1) comprises adjustment means (13, 12) for adjusting the position of the detaining elements (6, 7) with respect to the mounting body (8).
  10. Door stopper (1) according to Claim 9, **characterized in that** the adjustment means (13, 12) are configured to act on each detaining element (6, 7) on its side facing away from the side with which the detaining element (6, 7) is provided for acting on the carriage (4) in order to detain it.
- 5 11. Door stopper (1) according to Claims 2, 8 and 10, **characterized in that** the adjustment means (13, 12) comprise a virtually U-shaped adjustment element (13), the legs (14, 15) of the U shape of which diverge from each other increasingly further towards their free end and a first leg (14) of which acts on the first leg (6) of the leaf spring, at a fixed distance from the free end of said leg (6) of the leaf spring, and a second leg (15) acts on the second leg (7) of the leaf spring, at a fixed distance from the free end of said leg (7) of the leaf spring, and **in that** said adjustment element (13) is displaceably arranged with respect to the leaf spring, so that the legs (14, 15) of the adjustment element (13) act on the legs (6, 7) of the leaf spring at a smaller or greater distance from their free end, in such a manner that the legs (6, 7) of the leaf spring are brought closer together or moved further apart, respectively.
  12. Sliding door assembly (5) comprising
    - a running rail (2);
    - a sliding door leaf (3);
    - a carriage (4) which is arrangeable in the running rail (2) so as to be rollable and is attachable to the sliding door leaf (3) in order to suspend said sliding door leaf (3) from said running rail (2) so as to be rollable between a first end position and a second end position;
    - a door stopper (1) in order to keep the sliding door leaf (3) in said end position, in which said door stopper (1) comprises a resilient detaining element (6) for detaining the carriage (4) in said end position;

**characterized in that** the door stopper (1) is a door stopper (1) according to one of the preceding claims.
  13. Sliding door assembly (5) according to Claim 12, **characterized in that** the door stopper (1) is a door stopper (1) according to Claim 11, **in that** the running rail (2) comprises an access opening which is delimited on at least one side by a running surface (19) for arranging the carriage (4) thereon so as to be rollable, and **in that** the adjustment means (13, 12) comprise an adjusting screw (12) for displacing the adjustment element (13), in which said adjusting screw (12) is adjustable via the access opening.
  14. Sliding door assembly (5) according to Claim 13, **characterized in that** the running rail (2) has a virtually C-shaped cross section, in which the access opening extends between the ends of the legs of the C shape, **in that** the running rail (2) is provided with

a fitting rib in the cavity of the C shape on both legs at a distance from their ends, and **in that** the mounting body (8) of the door stopper (1) comprises a mounting flange (10) on both longitudinal sides which are fittable over the respective fitting rib in order to secure the mounting body (8) in the running rail (2).

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15. Sliding door assembly (5) according to Claim 14, **characterized in that** said sliding door assembly (5) comprises clamping screws (11) by means of which the mounting flanges (10) are clampable to the fitting ribs in order to secure the mounting body (8) in the running rail (2).

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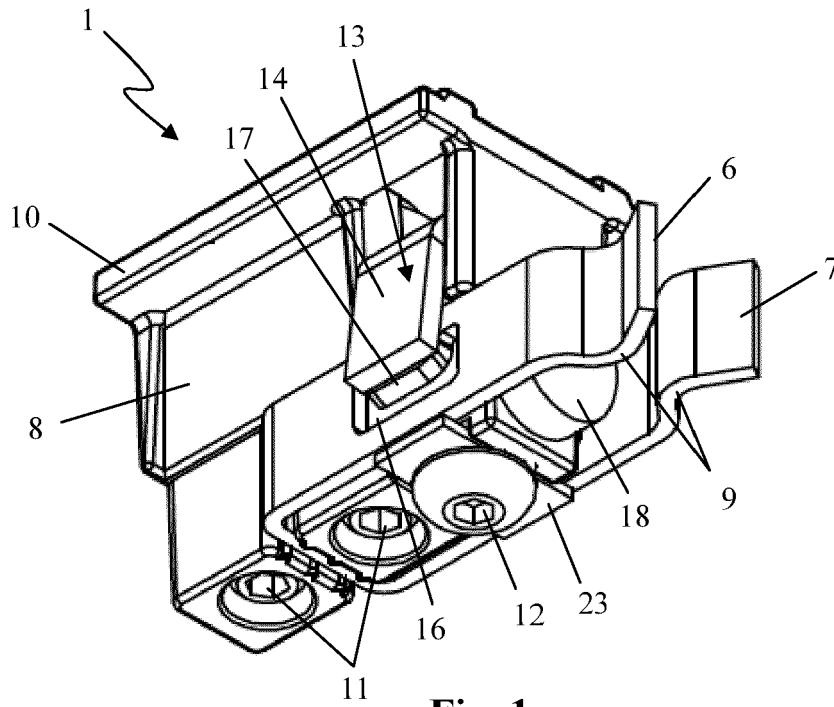
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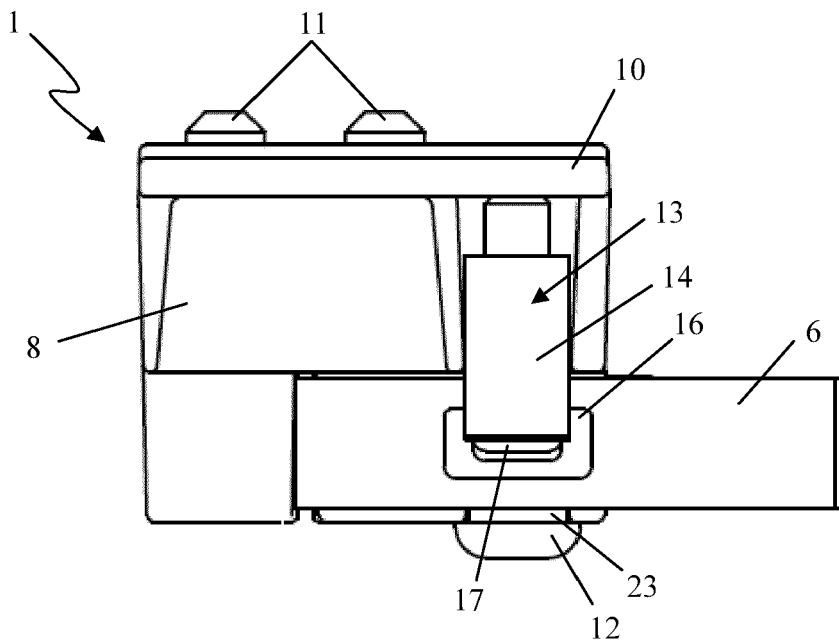
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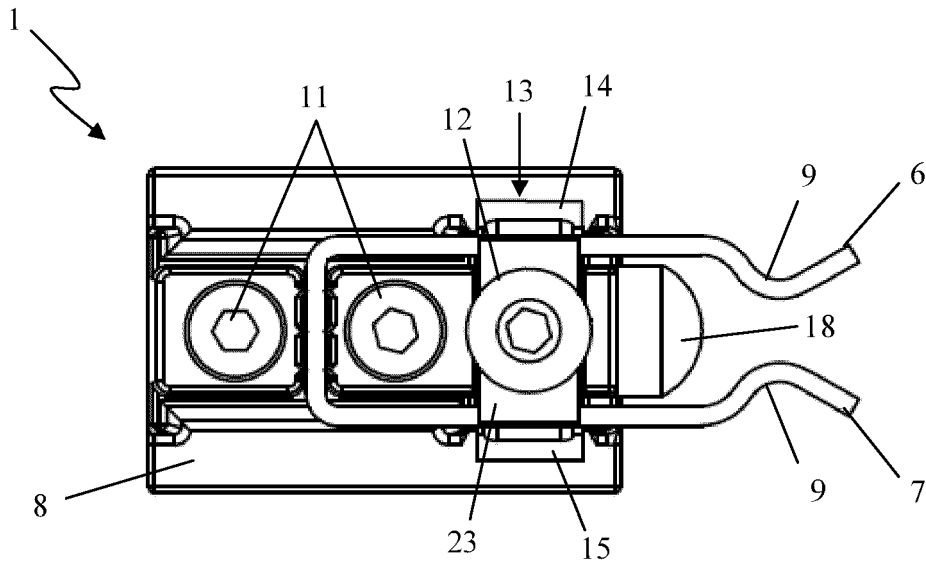


**Fig. 1**

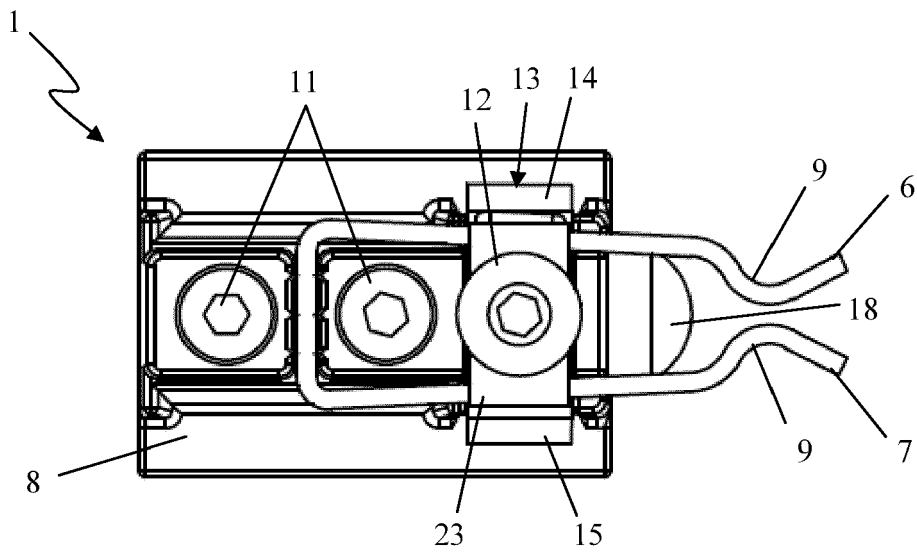


**Fig. 2**

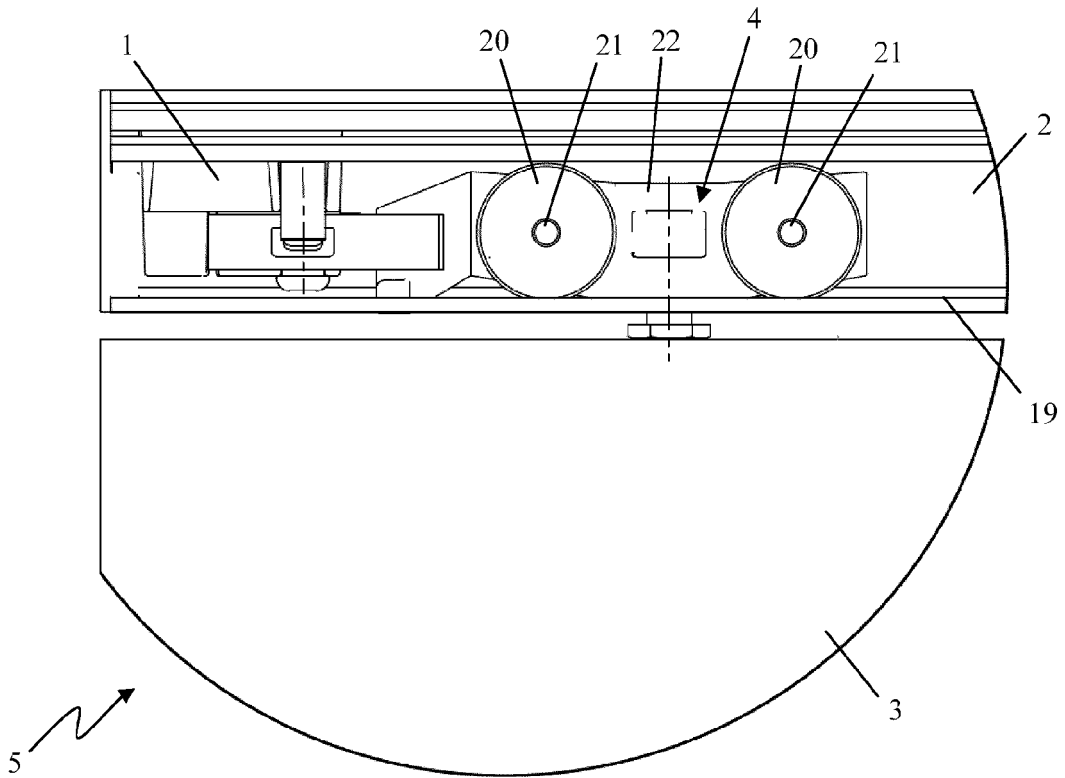




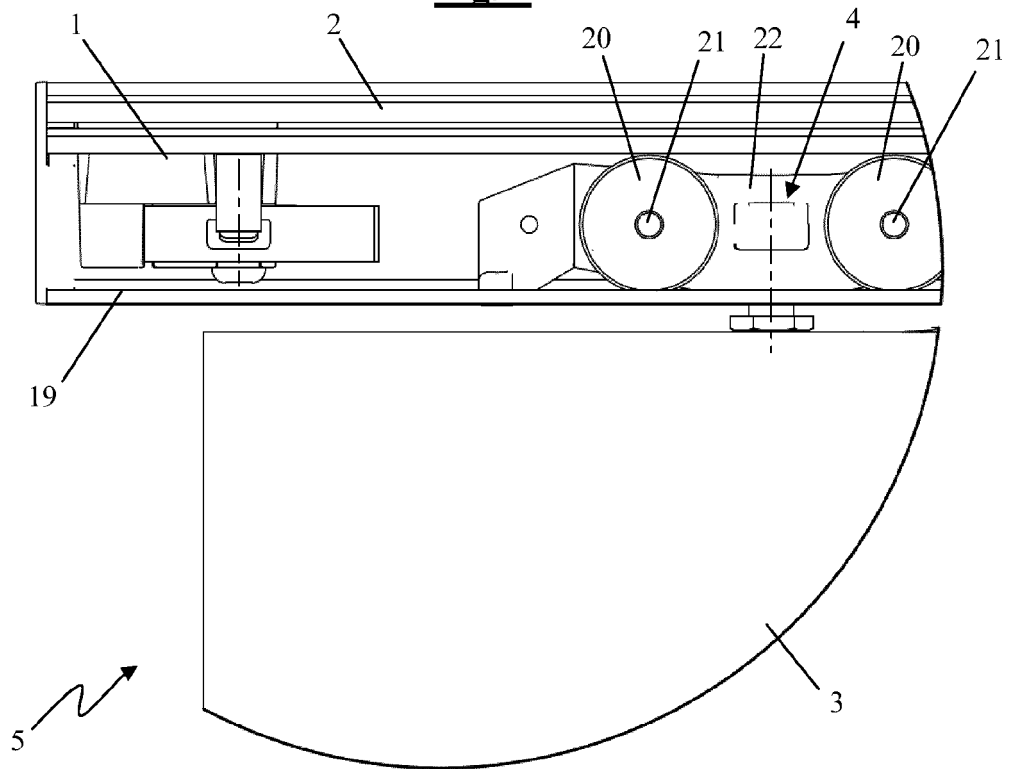
**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**



EUROPEAN SEARCH REPORT

Application Number  
EP 15 16 4588

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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	US 2010/205772 A1 (HAAB GREGOR [CH] ET AL) 19 August 2010 (2010-08-19)	1-10,12	INV. E05F5/00
A	* paragraph [0093] - paragraph [0098] * * figures 12-14 *	11	
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