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(71) Applicant: **Gammastamp S.p.A.**
10121 Torino (IT)

(72) Inventor:
Audisio, Vittorio,
c/o Gammastamp Spa
13041 Bianzé (Vercelli) (IT)

(74) Representative:
Marchitelli, Mauro et al
Buzzi, Notaro & Antonielli d'Oulx Srl,
Corso Fiume 6
10133 Torino (IT)

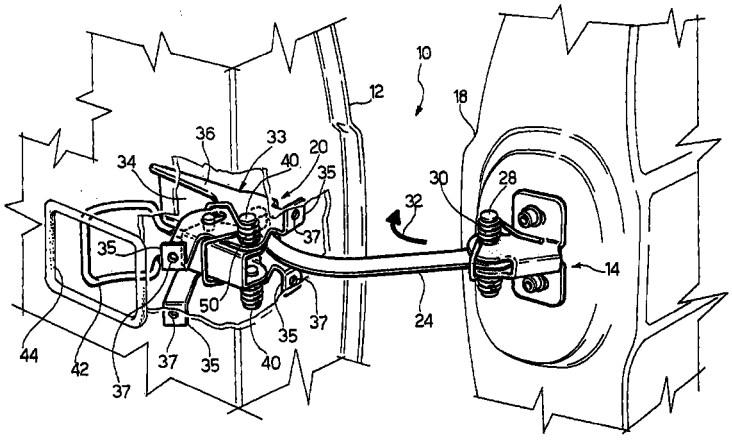
(54) A disengageable door stop for vehicles

(57) A door stop for a pivoting door (12) of a vehicle, comprising:

- a first and a second support (14, 20) intended to be fixed one to a vehicle body pillar (18) and the other to the door (12), and
- a retaining arm (24) articulated to the first support (14) about an axis (28) parallel to the articulation axis of the door (12).

The retaining arm (24) carries at its free end at least one roller (52) and the second support (20) comprising a stop surface (56) and a rolling surface (54) carried by respective elements (38, 33) articulated to each other about an axis (41) parallel to the axis of rotation of said roller (52). Elastic means (50) are provided for holding said elements (38, 33) in a relative position which prevents disengagement of said roller (52) from the second support (20).

FIG. 1



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Description

[0001] The present invention relates to a door stop for a pivoting door of a vehicle, of the type defined in the preamble of claim 1.

[0002] A device of this type is known from the French patent No. 2721649, wherein a retaining arm is articulated to a first support fixed to a vehicle body pillar and is slidable between a pair of rollers which are elastically biassed towards each other, carried by a second support fixed to the door. The rollers of this known device are rotatably mounted about an axis parallel to the articulation axis of the retaining arm and one of the rollers is movable in a direction orthogonal to its own axis of rotation under the action of a spring. A release lever is provided for disengaging the arm from the rollers, for enabling the door to be opened beyond a normal open position of about 90°.

[0003] The object of the present invention is to provide an improved device which is less expensive and has less components than the known device.

[0004] In accordance with the present invention, this object is achieved by a door stop having the features forming the subject of the main claim.

[0005] The present invention now will be disclosed in detail with reference to the attached drawings, given purely by way of non-limiting example, in which:

- figure **1** is a perspective view of a first embodiment of a door stop according to the invention,
- figure **2** is a plan view showing the device of figure 1 in two different operating positions,
- figures **3** and **4** are cross-sections taken along the lines III-III and IV-IV of figure 1,
- figure **5** is a plan view similar to figure 1, showing the phase of disengagement of the device according to the invention,
- figure **6** is a cross-section taken along the line VI-VI of figure 5,
- figure **7** is a cross-section similar to figure 3, showing a variant of the device according to the invention,
- figure **8** is a perspective view showing a second embodiment of the device according to the invention,
- figure **9** is a plan view showing the device of figure 8 in two different operating positions, and
- figures **10** and **11** are cross-sections taken along the lines X-X and XI-XI of figure 9.

[0006] With reference to figures 1 and 2, the numeral reference 10 indicates a door stop adapted to hold a vehicle door 12 in a normal open position (for instance with an opening angle of about 90°). As better disclosed in the following, the door stop 10 is disengageable for enabling the door 12 to assume an extra-opening position with an opening angle greater than the one of the normal open position, for instance close to 180°.

[0007] The door stop 10 comprises a first support 14 which is intended to be fixed to a vehicle body pillar 18. A second support 20 is intended to be fixed to the door 12. The device 10 comprises a retaining arm 24 which is articulated to the first support 14 about a vertical axis parallel to the articulation axis of the door 12. The articulation axis of the arm 24 is formed by a pin 28 on which a helical torsion spring 30 is mounted, which biasses the arm 24 in the direction indicated by the arrow 32.

[0008] The second support 20 comprises a metal base element 33 with a substantially U-shaped cross-section, having a bottom wall 34 and a pair of lateral walls 36. The base element 33 has fixing portions 35 having holes 37 which can be engaged by screws (not shown) adapted to fix the base element 33 to the door 12.

[0009] A pivoting element 38 with U-shaped cross-section is arranged inside the base element 32 and is articulated to the lateral walls 36 thereof by means of a pair of coaxial pins 40 which define a pivoting axis 41 parallel to the articulation axis of the arm 24 (see also figure 3). The pivoting element 38 is fixed to a handle 42 which faces an aperture 44 formed on the internal side of the door 12. As shown in figure 4, on one of the lateral walls of the pivoting element 38 there is provided a slot 46 engaged with play by a pin 48 fixed to a lateral wall 36 of the base element 33. The slot 46 and the pin 48 define two stop positions of the pivoting element 38 with respect to the base element 33. A torsion helical spring 50 is coaxially mounted on the pins 40 and applies to the pivoting element 38 an elastic force which bias the pivoting element 38 in the direction indicated by the arrow 52 in figure 2. Figures 3 and 4 show the rest position of the pivoting element 38 under the action of the spring 50. As better disclosed in the following, this is a stop position in which the door is held in a normal open position, for instance with an opening angle of about 90°. By pulling manually the handle 42, the pivoting element 38 is rotated about the articulation pins 40 against the action of the spring 50 and is brought in a disengagement position shown in figures 5 and 6.

[0010] The retaining arm 24 carries a pair of rollers 52 rotatably mounted at the end of the arm 24 about an axis 53 parallel to the articulation axis of the arm 24. As shown in figure 2, during the movement of the door 12 from the closed position shown by a solid line to the open position shown by dotted line, and viceversa, the rollers 52 roll on a rolling surface 54 formed by the internal surface of the bottom wall 34 of the base element 33. The pivoting element 38 has a pair of stop surfaces 56 which in the rest position of the pivoting element 38 are placed at a distance from the rolling surface 54 which is less than the diameter of the rollers 52. When the door 12 reaches its normal open position, the rollers 52 interfere with the stop surfaces 56 and the retaining arm 24 prevents a further opening of the door 12

beyond the position shown by broken line in figure 2. When the door 12 is in its normal open position, shown by broken line in figure 2, it can be closed by simply pushing the door in the closing direction, without the need to operate the handle 42. Starting from the normal open configuration, the door 12 can be brought in a extra-opening position, with an opening angle for instance close to 180° For opening the door 12 beyond the normal opening angle, the user pulls the handle 42 as shown in figure 2. The rotation of the pivoting element due to the rotation of the handle 42 brings the stop surfaces 56 at a distance from the rolling surface 54 greater than the diameter of the rollers 52. As shown in figure 5, after the rotation of the pivoting element 38 there is no other restrain between the second support 20 and the retaining arm 24. Consequently, the door 12 can be opened beyond its normal opening angle. After the retaining arm 24 has been disengaged from the second support 20, the spring 30 holds the retaining arm 24 in a fixed position against a stop element (not shown) so that when the door will be closed again the rollers 52 will enter spontaneously inside the support 20 by pivoting about the pins 40 the pivoting element 38.

[0011] Figure 6 shows a variant of the device according to the present invention, which corresponds to the cross-section shown in figure 3. The elements corresponding to the ones previously disclosed are indicated by the same numeral references. In the variant of figure 6, the retaining arm 24 carries only one roller 52 and the pivoting element 38 is formed by a simple plate instead of an element with U-shaped section as in the previously disclosed embodiment. In the embodiment of figure 6 there is therefore provided only one articulation pin 40 for the pivoting element 38. The spring 50 is arranged on the articulation pin and, as in the case previously disclosed, tends to bias the element 38 towards its engagement position. The remaining part of the structure of the device remains unchanged with respect to what has been disclosed above, therefore figures 1 and 2 serve also for showing the operation of the device according to the variant of figure 6.

[0012] A second embodiment of the device according to the present invention will be disclosed with reference to figures 8-11. In these figures the elements corresponding to the ones previously disclosed are indicated by numeral references increased of 100. The second embodiment of the door stop 110 comprises an arm 124 articulated to a first support 114 by means of a pin having a vertical axis 128. The first support 114 is intended to be fixed to a vehicle body pillar 118. A helical torsion spring 130 is mounted on the pin 128 and applies a force which tends to bias the arm 124 in the direction indicated by the arrow 132. A pair of rollers 152 are freely rotatably mounted at the free end of the arm 124, about an axis 153 parallel to the articulation axis of the arm.

[0013] As in the previously disclosed case, the door stop 110 comprises a second support 120 which is intended to be fixed to a door 112 articulated to the body pillar 118 about a vertical axis parallel to the articulation axis of the arm 124. The base element 133 has a bottom wall 134 and a pair of lateral walls 136. A stop element 138 is permanently fixed to the bottom wall 134 of the base element 133. As an alternative, the stop element 138 could be integrally formed with the base element 133. A pivoting element 160 is articulated to the base element 133 about an axis 162 parallel to the axis of rotation 153 of the rollers 152. The pivoting element 160 has a U-shaped cross-section with two parallel walls 164 arranged inside the lateral walls 136 of the base element 133. The articulated connection between the pivoting element 160 and the base element 133 is obtained by means of a pair of pins 166 which, for instance, are fixed to the lateral walls 164 of the base element 133 and are free to rotate into aligned holes of the lateral walls 136 of the base element 133. A pair of spacer 168 are coaxially mounted on the pins 166 between the facing lateral walls 164 and 136. The pins 166 have projecting portions extending outside of the base element 133. A helical torsion spring 150 is mounted on such projecting portions and tends to bias the pivoting element 160 in the direction indicated by the arrow 170 in figure 9. The pivoting element 160 is fixed to a handle 142 projecting from the internal side of the door 112 through an aperture 144.

[0014] The lateral walls 164 of the pivoting element 166 have edges 172 which form a pair of rolling guides on which the rollers 152 roll during the movement of the door 112 from the closed position shown by broken line in figure 9 to the normal open position shown in the same figure by solid line. The lateral walls 164 are tapered towards the front end of the pivoting element 160, so as to form an entering zone for the introduction of the rollers 152 inside the second support 120.

[0015] The operation of the door stop 110 now will be disclosed with reference to figure 9. In the closed door position shown by broken line in figure 9, the rollers 152 are placed in correspondence with the back portion of the pivoting element 160. The spring 130 which biasses the arm 124 in the direction 132 biasses the rollers 152 against the rolling guides 172. During the opening movement of the door, the rollers 152 roll on the rolling guides 172 until they reach the position shown by solid line in figure 9 when the door 112 reaches a normal open position, for instance with an opening angle of about 90°. In this position the rollers 152 engage the stop surface 156 of the stop element 138. The rollers 152 can not disengage from the stop surface 156 because the spring 150 biasses the pivoting element 160 against the rollers 152 and holds the same in engagement with the stop surface 156. For opening the door 112 with an angle greater than the normal opening angle, the user pulls the handle 142 in the direction indicated by the arrow 174 thereby provoking a rotation of the pivoting element 160 about the axis 162 in an anticlockwise direction, against the action of the spring 150.

This rotation of the pivoting element 160 moves the rolling guides 172 away from the stop surface 156. The rollers 152 automatically disengage from the stop surface 156 because the spring 130 biasses the arm 124 in the direction 132, that is in the direction which tends to disengage the rollers 152 from the stop surface 156. The arm 124 is therefore free to disengage from the second support 120 and the door 112 can be brought in an extra-open position for instance with an opening angle close to 180°, shown by broken line in figure 9. When the door 112 is closed starting from the extra-open position, the rollers 152 enter spontaneously into the second support 120 by virtue of the entering surfaces formed between the stop element 138 and the front tapered portion of the pivoting element 160.

Claims

1. A door stop for a pivoting door (12) of a vehicle, comprising:

- a first and a second support (12, 20; 114, 120) intended to be fixed one to a vehicle body pillar (18; 118) and the other to the door (12; 112),
- a retaining arm (24; 124) articulated to the first support (14; 114) about an axis (28; 128) parallel to the articulation axis of the door (12; 112), the retaining arm (24; 124) being slidable with respect to the second support (20; 120),
- stop means (56; 156) carried by the second support (20; 120), adapted to hold the retaining arm (24; 124) in a position corresponding to a normal open position of the door (12; 112),
- elastic means (50; 150) adapted to bias said stop means (56; 156) towards a position in which they prevent disengagement of the arm (20; 120) from the second support (20; 120), and
- a disengagement member (42; 142) which can be manually operated for disengaging the arm (24; 124) from said stop means (56; 156) and enabling the door (12; 112) to be opened with an opening angle greater than the one of said normal open position,

  characterized in that the retaining arm (24; 124) carries at its free end at least one roller (52; 152) which is free to rotate about an axis (53; 153) parallel to the articulation axis (28; 128) of the arm (24; 124) and in that the second support (20; 120) comprises a stop surface (56; 156) and a rolling surface (54; 172) carried by respective elements (38, 33; 138, 160) articulated to each other about an axis (41; 162) parallel to the axis of rotation of said roller (52; 152).

2. A door stop according to claim 1, characterized in that the second support (20; 120) comprises:

- a base element (33; 133) provided with means (35, 37; 135, 137) for its connection to the door (12; 112), and
- a pivoting element (38; 160) articulated to said base element (33; 133) and carrying either said stop surface (56; 156) or said rolling surface (54; 172),
- a handle (42; 142) fixed to the pivoting element (38; 160) and manually operable for bringing the pivoting element (38; 160) in a position in which it enables disengagement of said roller (52; 152) from the second support (20; 120).

3. A door stop according to claim 2, characterized in that the base element (33; 133) has a substantially U-shaped cross-section with a bottom wall (34; 134) and a pair of lateral walls (36; 136), and in that the pivoting element (38; 160) is articulated to the base element (33; 133) by means of a pair of pins (40; 166) which engage said lateral walls (36; 136).

4. A door stop according to claim 3, characterized in that said elastic means comprise at least a helical torsion spring (50; 150) arranged coaxially with said pins (40; 166).

5. A door stop according to claim 3, characterized in that said rolling surface (54) is formed by the internal wall of said bottom wall (34).

6. A door stop according to claim 3, characterized in that said pivoting element (160) has a substantially U-shaped cross-section with a pair of lateral walls (164) whose edges (172) define said rolling surface.

7. A door stop according to claim 2, characterized in that a retaining device including a pin and a slot (46, 48) is provided between the base element and the stop element (38), the retaining device defining two stop positions for stopping the pivoting movement of the stop element (38) with respect to the second support (20).

8. A door stop according to claim 1, characterized in that the retaining arm (24) carries a pair of rollers (52) arranged symmetrically with respect to the arm (24).

9. A door stop according to claim 1, characterized in that the retaining arm (24) carries a single roller (52) placed on one side of the retaining arm (24).

FIG. 1

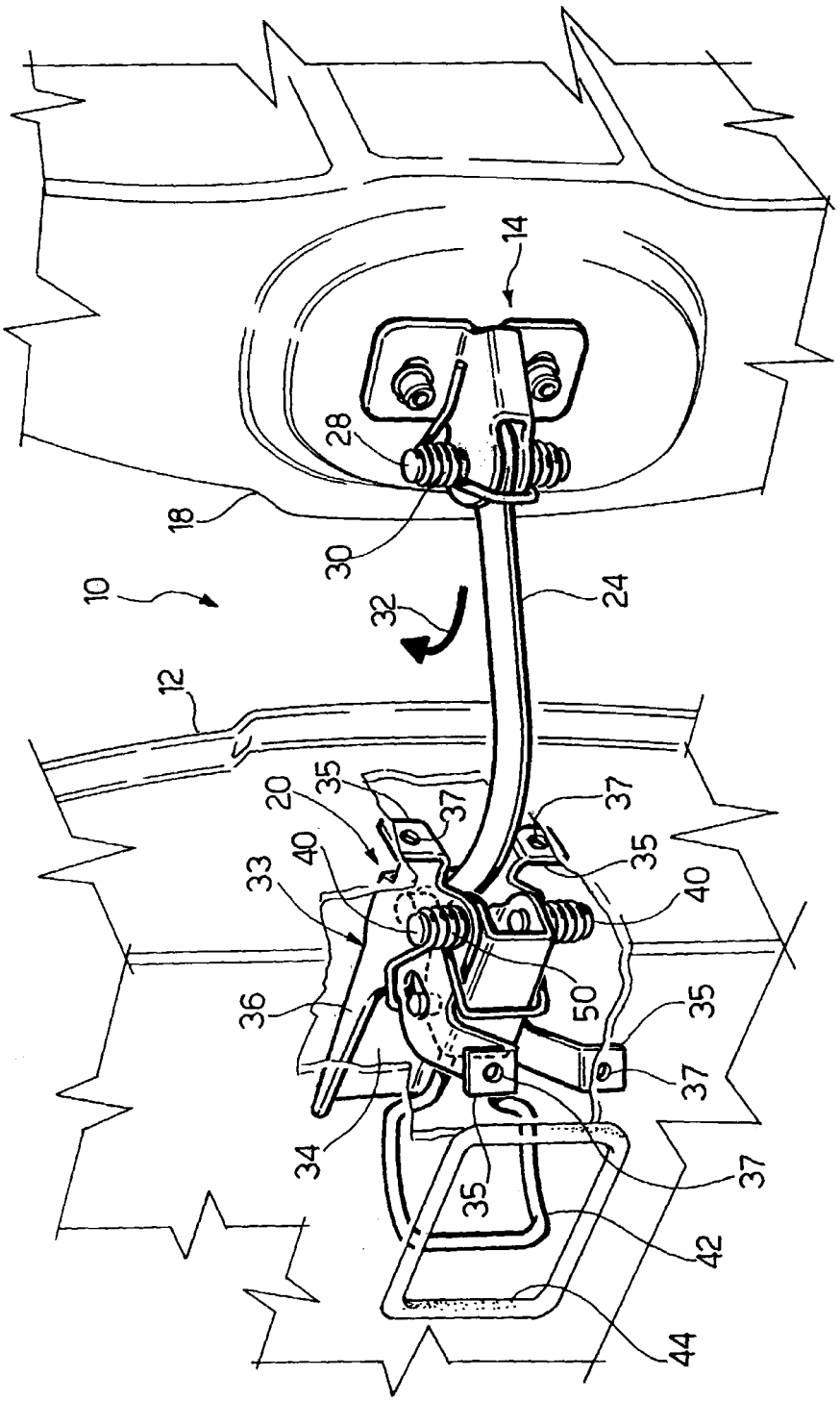
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FIG. 2

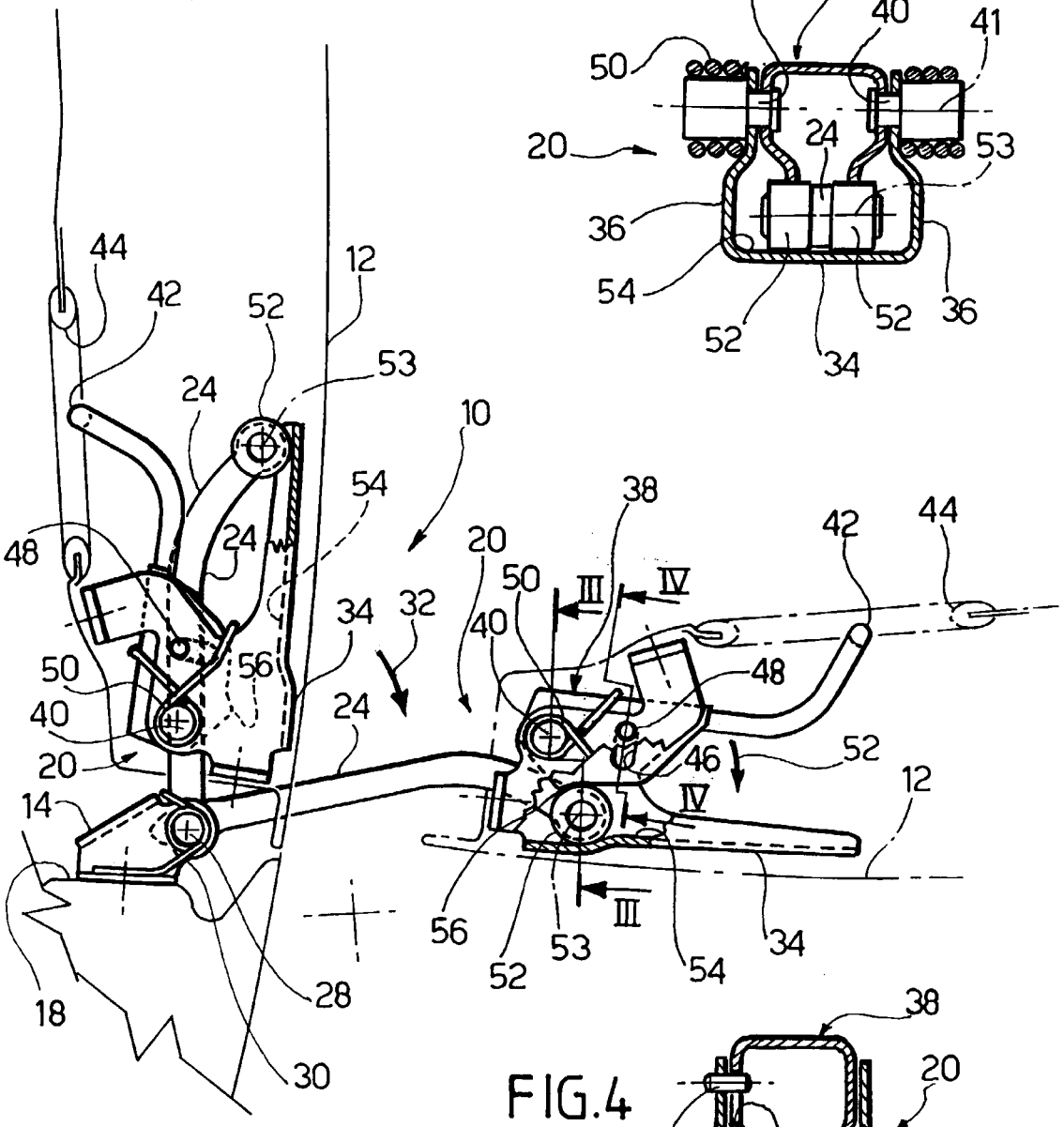

FIG. 3

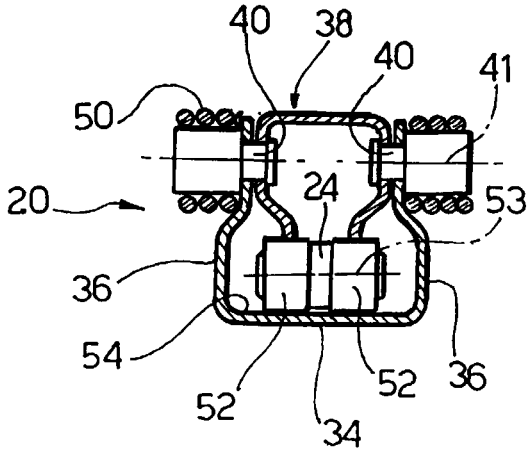

FIG.4

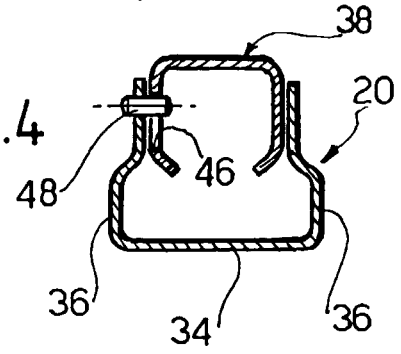

FIG. 6

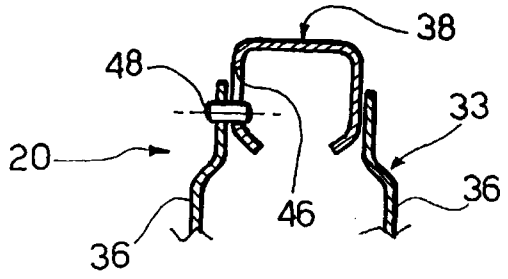
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FIG. 5

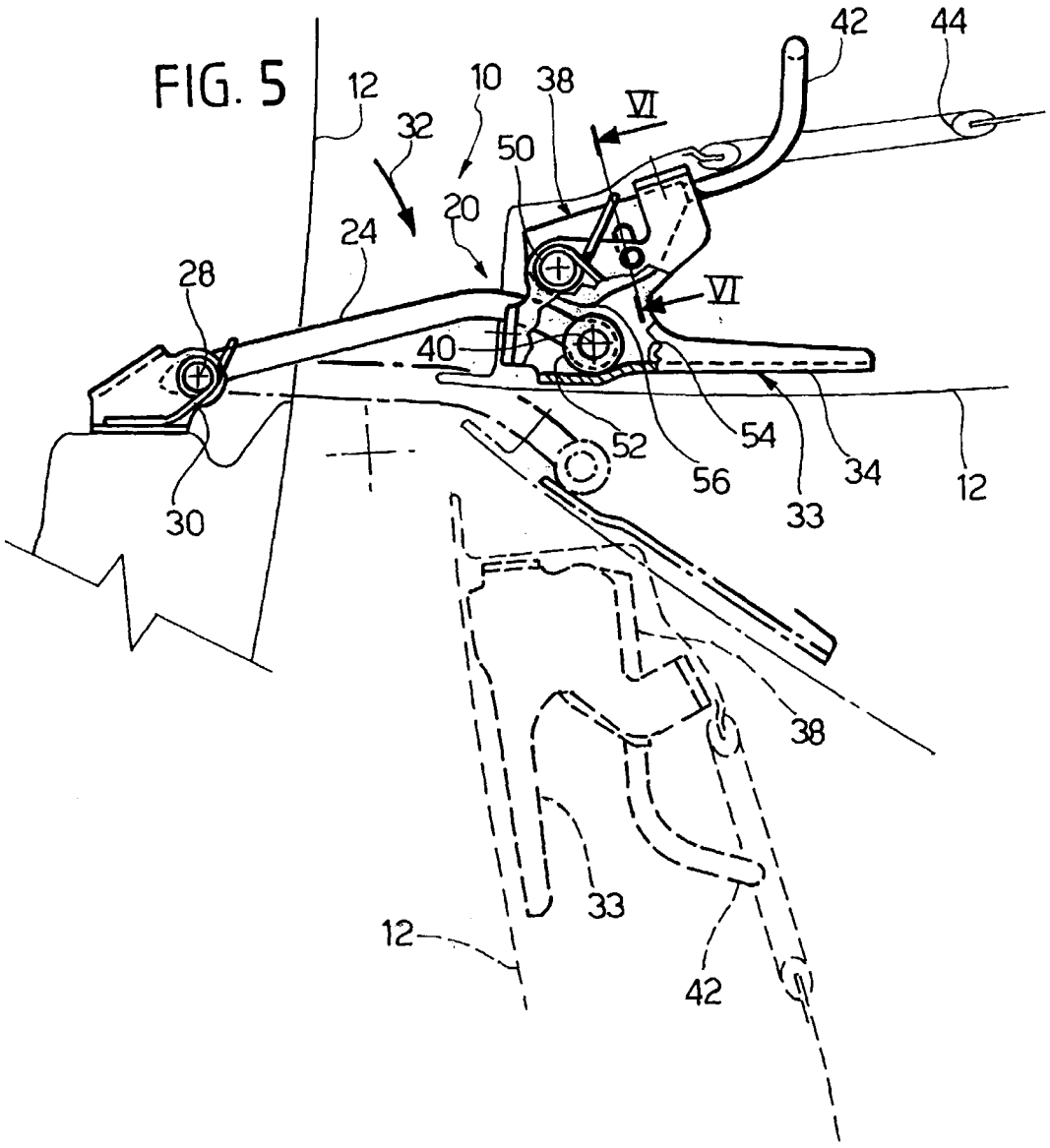
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FIG. 7

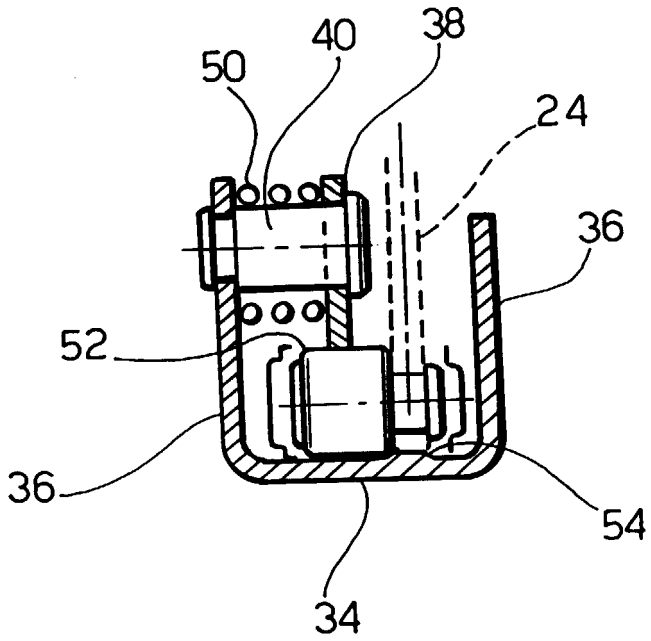

FIG. 8

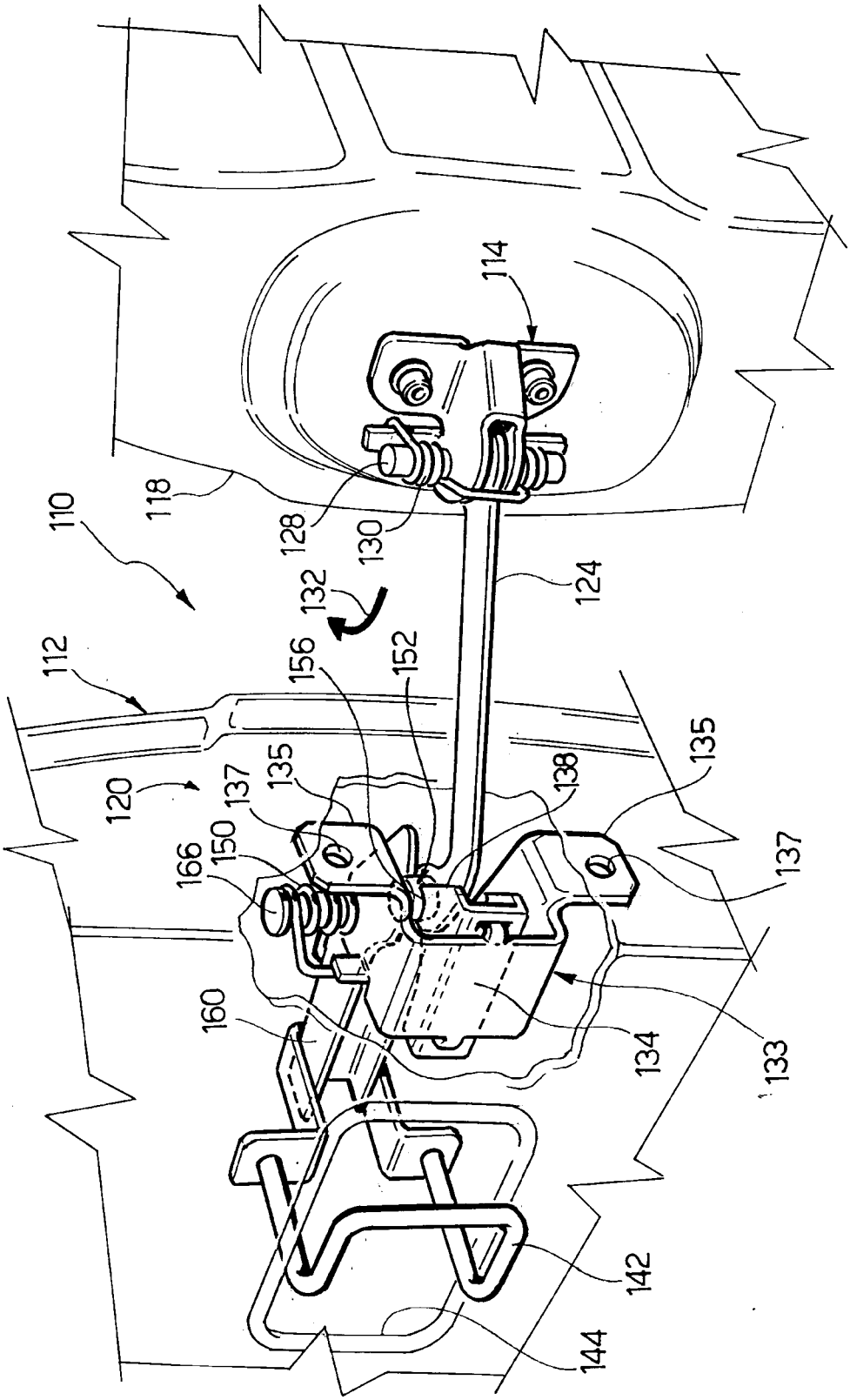
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FIG. 9

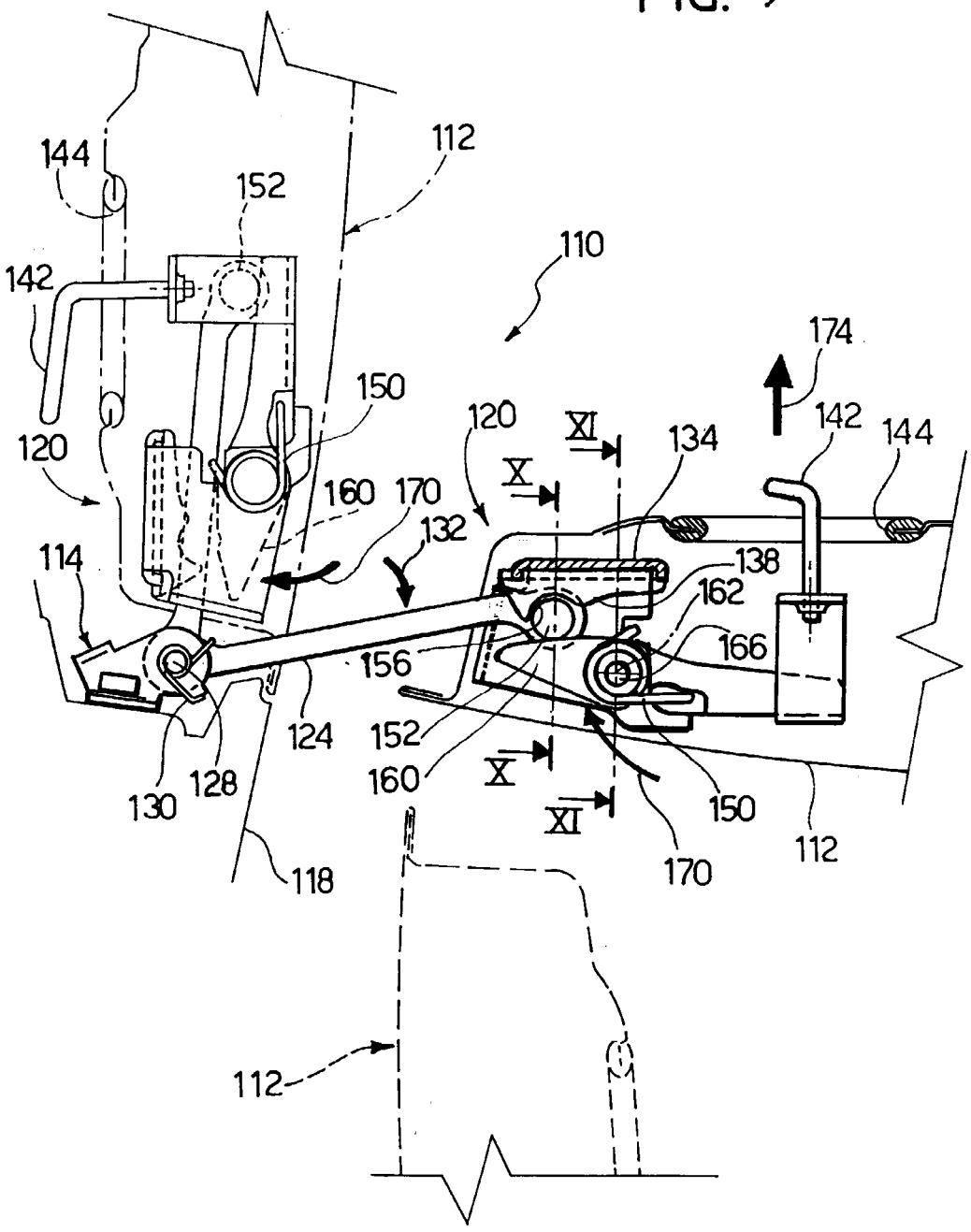
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FIG. 11

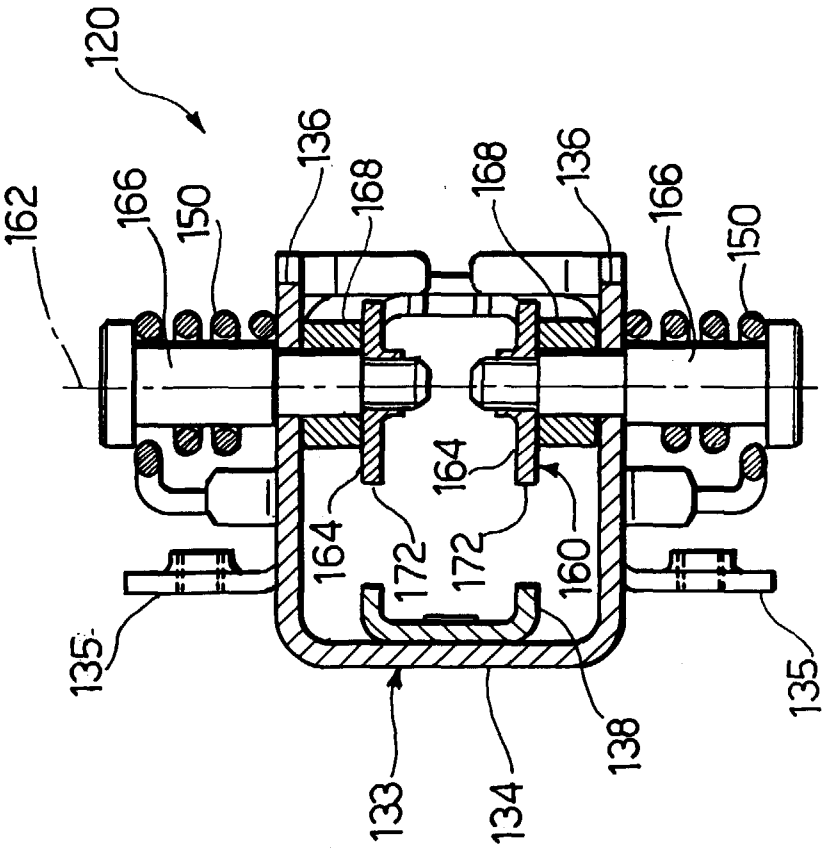
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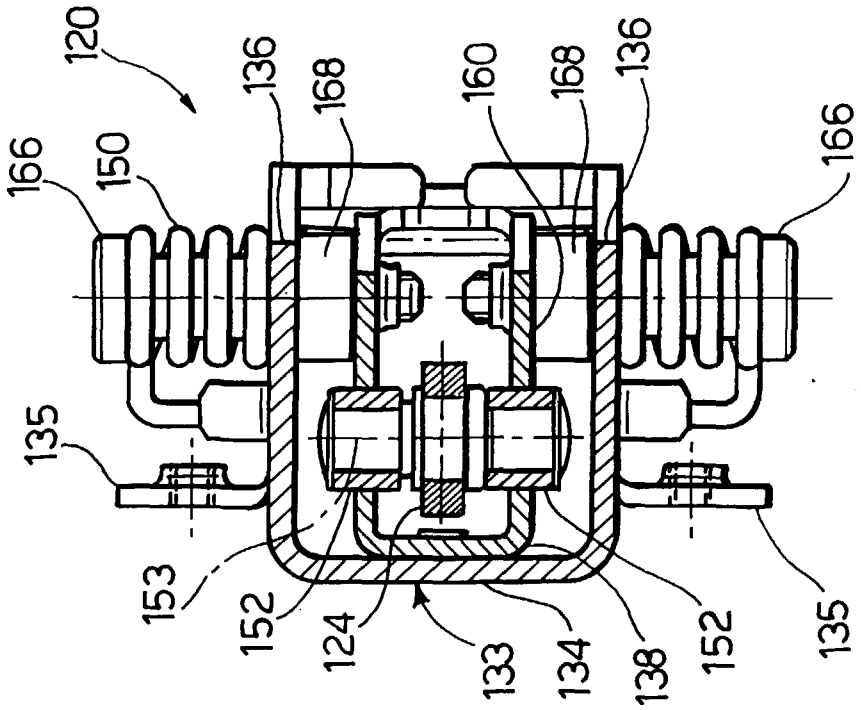
FIG. 10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