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(54) **Sliding door stopper where opening and closing effort is adjustable**

(57) The present invention relates to a door stopper providing the sliding doors, used in vehicles in the automotive sector, to be in open position, and where the door opening and door closing efforts are adjustable, characterized by comprising the following which provide adjustment of the door opening and door closing efforts in a separate manner: at least two bending element housings (1.2); at least two bending elements (3); at least two adjustment covers (4); andramp element (2) or roller system (M).

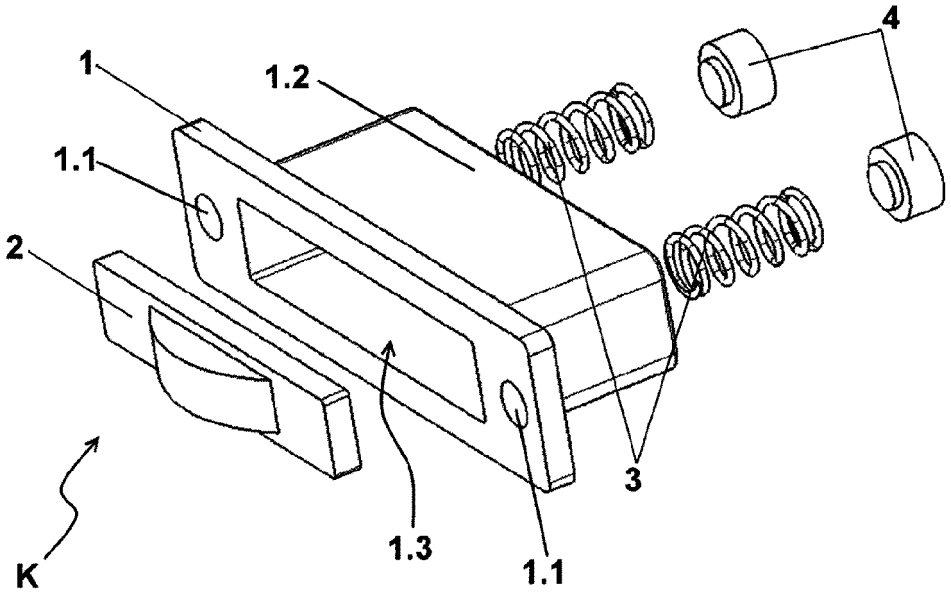

Figure 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to door stoppers used in stopping sliding doors in open position utilized in pluralities of sectors.

[0002] The present invention particularly relates to a door stopper having adjustable door opening and closing efforts, and providing the sliding doors to be in open position used in automotive sector.

KNOWN STATE OF THE ART

[0003] Door stoppers known in the present art provide sliding doors, used in pluralities of sectors, to be in open position.

[0004] Today, pluralities of door stoppers are used. Door stopper systems are classified in 3 groups depending on the spring utilized: leaf spring systems, twisting spring systems and press spring systems. In addition to these, there are door stoppers made of plastic. These are systems using bending property of plastics as a spring. The common characteristic of all these systems is that they realize the functions thereof by using a single spring.

[0005] The momentum/force tolerance range in the production of said springs is 15-20%. This tolerance range leads to a variability of ±15-20% in the force/momentum applied by the spring to the door stopper. Thus, because of the spring of the door stopper, the force applied to the sliding door systems cannot give the same values in every production; it cannot be stable.

[0006] Since the door stoppers, used in the present system, has a single spring, and since there is no possibility to realize any adjustment thereon, it is not possible to adjust opening and closing efforts of said door stoppers.

[0007] In the adjustable systems used in the present art, the opening and closing efforts cannot be adjusted in a separate manner by means of a change of the spring stroke (compressibility / compression amount); they increase or decrease in a correlated manner.

[0008] In the known state of the art, since there is no adjustment possibility on the door stoppers or since the adjustability is limited, the following problems occur:

- The expectations of the customer demanding the product are not met.
- Since the opening and closing efforts are moving in a correlated manner, it takes a very long time to take opening and closing efforts into the expectations of the customer.
- Due to the production tolerances, the dimensions of some pieces cannot be adjusted and these pieces lead to waste cost.
- It leads to inefficiency in production and extends the labor periods.
- In order to maintain mass production, additional labor and/or additional equipment investment is required.
- If 100% force control is not realized in the production lines, the products, exiting the line, may lead to injuries of automobile drivers.

[0009] In the literature, the U.S. application US6035488 and with title "Vehicle sliding doorstopper having concavities formed therein" can be given as an example to the technical field of the invention. Said invention has an abstract as follows: the sliding door stopper used in sliding door vehicles and functioning on the guide assembled to the body and guided by the guides and hung such that the sliding door is movable on the guides, realizes a padding movement for limiting the movement of the door in the opening direction. This sliding door stopper has an end extending in the inverse direction adjusted for sliding door contact by means of an elastic body extending along the guide and far from the end of the guide. There are pluralities of concave forms which are parallel with respect to the guide direction formed so as to correspond to the outer surface of the elastic body. However, the subject matter invention of said U.S. application does not comprise elastic members like spring, etc., the door opening and door closing efforts of the product used as door stopper cannot be adjusted in a separate manner.

[0010] As a result, because of the abovementioned disadvantages and because the present solutions are insufficient, a different improvement or development is required in the field related to door stoppers.

OBJECTS OF THE PRESENT INVENTION

[0011] The object of the present invention is to eliminate the disadvantages in the abovementioned separate door opening and door closing effort adjustments and to improve the door stopper mechanisms.

[0012] The main object of the present invention is to eliminate the present disadvantages in door stoppers used in sliding door systems.

[0013] Another object of the present invention is to meet customer expectations in automotive sector and to adjust opening and closing efforts according to the specifications.

[0014] Another object of the present invention is to prevent injuries which may be faced as a result of malfunctioning of door stoppers.

[0015] Another object of the present invention is to provide a simpler mechanism when compared with the systems used for a similar purpose and to eliminate the inefficiencies in production.

[0016] An object of the present invention is to eliminate the manual adjustment processes realized for providing a solution to the effort problems occurring during control by the assembly equipment. Thus, the costs, resulting from this adjustment process, are prevented.

[0017] In order to realize the abovementioned objects, the present invention is a door stopper providing the sliding doors, used in vehicles in the automotive sector, to be in open position, and the present invention comprises at least two adjustment covers and ramp element or roller system; at least two bending elements; at least two bending element housings; providing the door opening and door closing efforts to be adjusted in a separate manner. In the preferred embodiment of the present invention, said bending element is a spring. Moreover, in the preferred embodiment of the present invention, said roller system comprises a roller holder, door stopper roller and a pin.

[0018] In the alternative embodiment of the present invention, the present invention is completely plastic, completely metal or some parts thereof are made of plastic and some parts thereof are made of metal.

[0019] The structural and characteristic properties of the present invention and all of the advantages thereof will be understood in a clear manner thanks to the figures given below and with reference to said figures, and therefore, the assessment should be realized by taking into consideration these figures and the detailed description.

BRIEF DESCRIPTION OF THE FIGURES

[0020] **In Figure 1,** the exploded perspective view of the ramped form of the subject matter door stopper is given.

[0021] **In Figure 2,** the exploded perspective view of the roller form of the subject matter door stopper is given.

[0022] **In Figure 3,** the view, where the sliding door guides of the subject matter door stopper functioning in a correlated manner on the vehicle, is given.

[0023] **In Figure 4,** the view, where the positions of the sliding door guides and the mechanisms of the subject matter door stopper functioning in a correlated manner on the vehicle, is given.

REFERENCE NUMBERS

[0024]

K. Door stopper
1. Body
1.1. Assembly holes
1.2. Bending Element Housing
1.3.Ramp Element Housing
1.4. RollerHousing
2. Ramp Element
3. Bending Element
4. Adjustment Covers
M. Roller System
5. Roller holder
6. Door holder roller
7. Pin
20. Upper guide
21. Intermediate guide
22. Bottom guide
30. Upper mechanism
31. Intermediate mechanism
32. Bottom mechanism

[0025] The drawings may not be scaled and the unnecessary details may be omitted for understanding the present invention. Besides, the elements, which are at least substantially identical or having at least substantially identical functions, are illustrated with the same number.

DETAILED DESCRIPTION OF THE INVENTION

[0026] In this detailed description, the preferred embodiments of the subject matter door stopper (K) providing the vehicle sliding door to be in open position and where opening and closing effort adjustments can be realized in a separate manner are described for providing understanding of the subject matter in a better manner.

The operation principle of the door stopper (K) having the ramp element (2) is as follows:

[0027] In sliding door vehicles, the door stopper (K) should be in open position while the vehicle is in park position. Said door stopper (K) can be assembled to one or more than one of the upper guide (20), the intermediate guide (21) or the bottom guide (22), which are assembled on the vehicle body.

[0028] The sliding door comprises mechanism rollers on the upper mechanism (30), the intermediate mechanism (31) and the bottom mechanism (32). During functioning of the sliding door systems, while the door is brought to the open position, any of said mechanism rollers pass through the ramp element (2) of the door stopper (K).

[0029] Meanwhile, the ramp element (2) is sliding back by taking a slight angle inside the ramp element housing (1.3). During said sliding, as a result of the pressure applied to the bending elements (3), the bending elements (3) are installed and a reaction force is applied to the ramp element (2).

[0030] As an alternative embodiment of the subject matter door stopper (K), a roller system (M) can be integrated instead of the ramp element (2).

[0031] The operation principle of the door stopper (K) having the roller system (M) is as follows:

[0032] The sliding door comprises mechanism rollers on the upper mechanism (30), the intermediate mechanism (31) and the bottom mechanism (32). During the operation of the sliding door systems, while the door is brought to the open position, any of said mechanism rollers pass through the door holder roller (6) of the door holder (K). Meanwhile, the roller holder (5) slides back by taking a slight angle inside the roller housing (1.4). During this sliding, as a result of the pressure applied to the bending elements (3), the bending elements (3) are

installed and a reaction force is applied to the roller holder (5). This force transfer between the door holder roller (6) and the roller holder (5) is provided by means of the pin (7) in the roller system (M).

[0033] Said roller system (M) can be placed to the roller housing (1.4) provided on the door holder (K) without any connection member.

[0034] Depending on the demanded opening and closing force/effort values, the adjustment covers (4) are fixed at different positions. Since there are two different bending elements (3) and since there are two different adjustment covers (4), in the integration of the door stopper (K) to the sliding door system, the bending element (3) strokes providing the opening and closing efforts are determined by the positions where the adjustment covers (4) are fixed independent of the direction.

Claims

1. The present invention is a door stopper (K) providing the sliding doors, used in vehicles in the automotive sector, to be in open position, **characterized by** comprising the following which provide adjustment of the door opening and door closing efforts in a separate manner:

    - at least two bending element housings (1.2);
    - at least two bending elements (3);
    - at least two adjustment covers (4) ; and
    - ramp element (2) or roller system (M).

2. A door stopper (K) according to Claim 1, **characterized in that** said bending element (3) is a spring.

3. A door stopper (K) according to Claim 1, **characterized in that** said roller system (M) comprises a roller holder (5), a door stopper roller (6) and a pin (7).

4. A door stopper (K) according to any of the preceding claims, **characterized in that** it is made of plastic and/or metal.

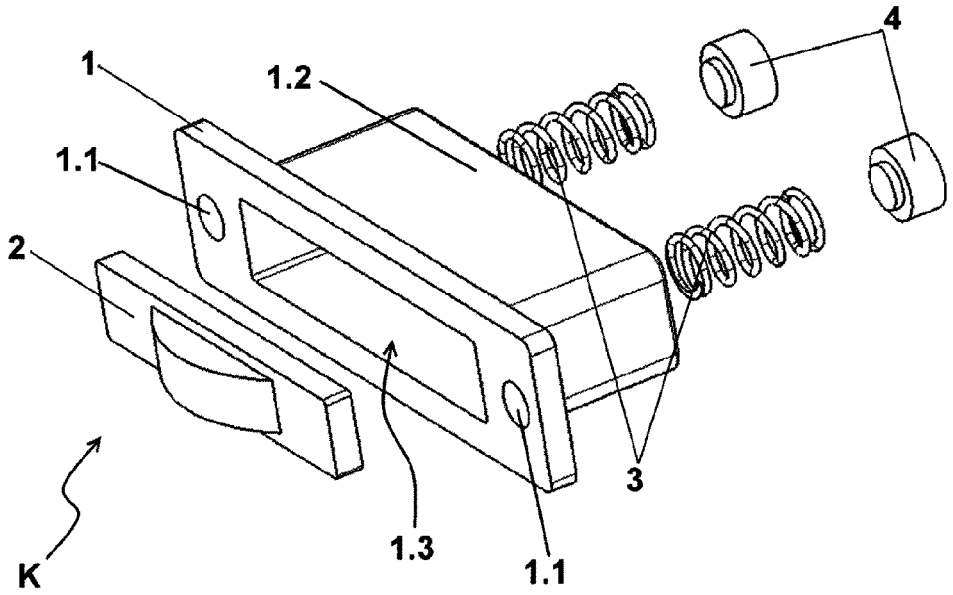

Figure 1

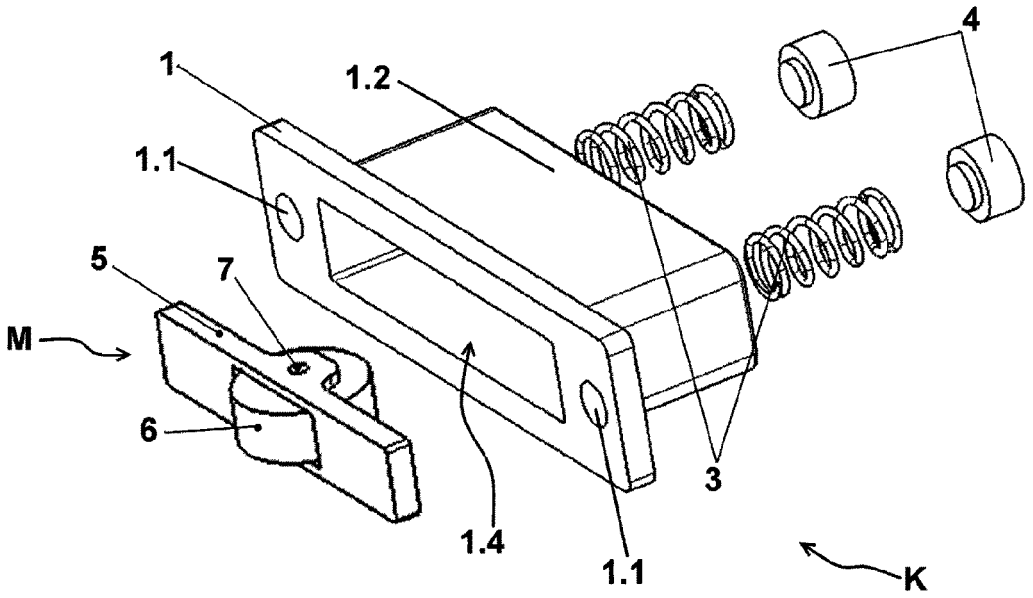

Figure 2

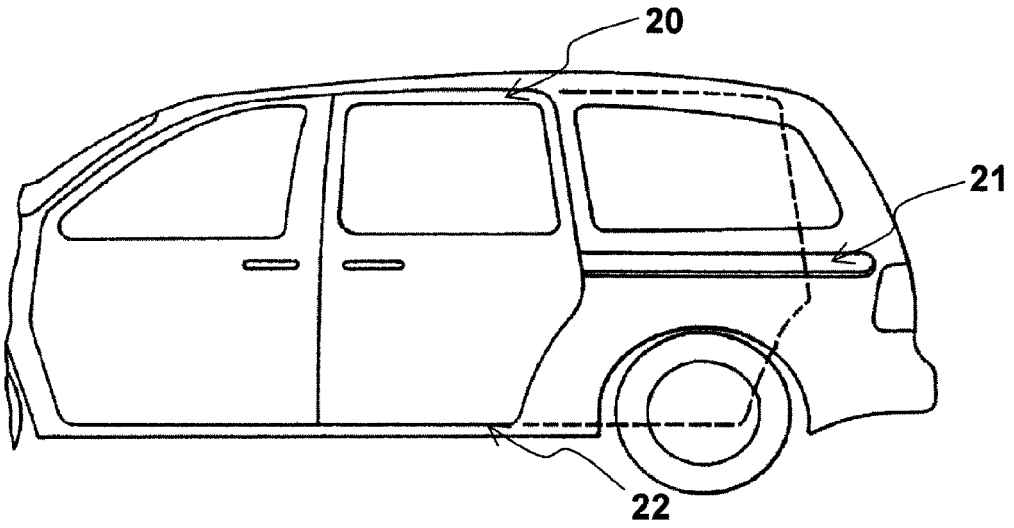

Figure 3

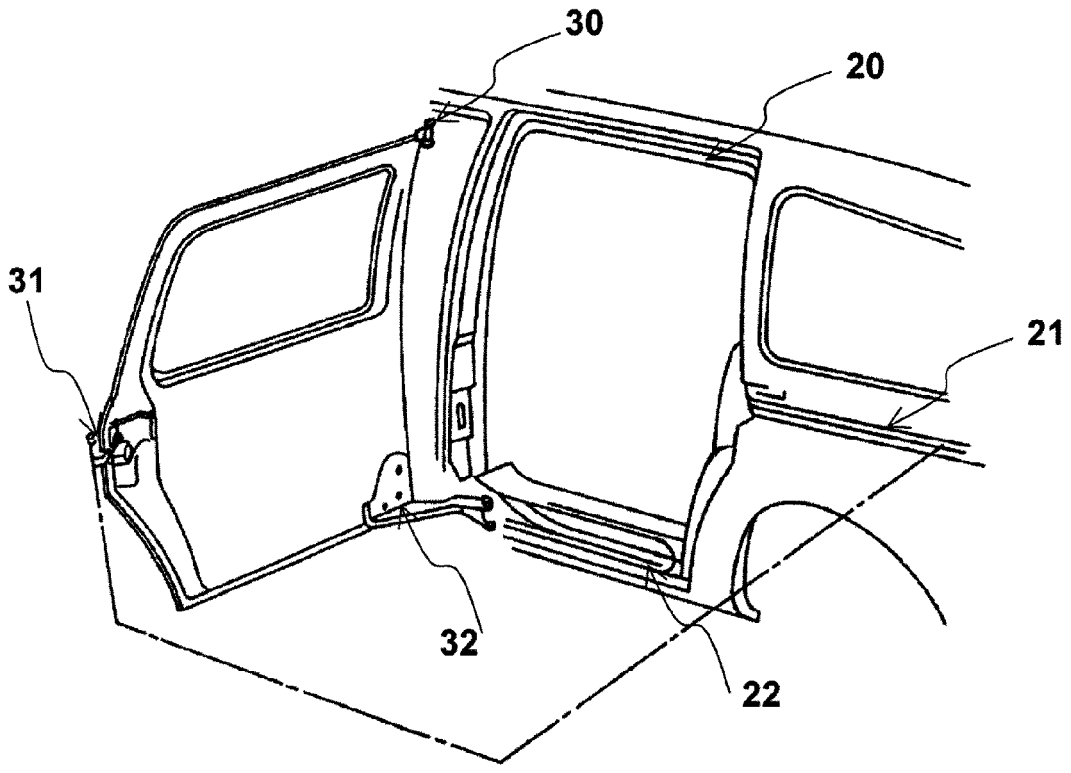

Figure 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 6035488 A **[0009]**