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(54) Bump stop for vehicle closure damping

Anschlagpuffer für Fahrzeugtürschließdämpfung

Dispositif de butée pour amortissement de fermeture de véhicule

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Description

[0001] The present invention relates to a bump stop installed on the body of a motor vehicle for the purposes of damping the closing force of a closure, such as a tailgate or a bonnet, and preventing metal-on-metal contact. The bump stop is adapted to reduce vibration of the closure while the vehicle is being driven. Aspects of the invention relate to a bump stop, and to a vehicle body assembly comprising a bump stop.

BACKGROUND TO THE INVENTION

[0002] The use of a bump stop arrangement to provide a resilient contact interface between closing parts of a motor vehicle, e.g. a bonnet or tailgate, and the body of the vehicle is known. In a most basic form, a bump stop would comprise a rubber/plastic element adhered to or plugged into a surface of the tailgate/bonnet or vehicle body, or both; to prevent metal-on-metal contact. The rubber element ideally also reduces vibration noise between the closed parts when the vehicle is moving.

[0003] DE102009044166A1 describes a height-adjustable bump stop for a vehicle bonnet that enables some adjustability during installation, which accounts for small variations in the clearances of closing parts of the vehicle. The device utilises a shaft received into a housing, where ratchet teeth on both components co-operate to provide an adjustable height means for the shaft extending into the housing. The relative height is locked in place by a key inserted into a slot in the shaft, thereby maintaining the ratchet teeth in an engaged position, where further relative movement of the teeth cannot be achieved unless the key is removed.

[0004] Insertion of the shaft into the housing also causes flanges at a base end of the housing to be fixed in an extended position, which fastens the housing to an opening in the motor vehicle body.

[0005] This prior art device can be quickly placed manually in position on the vehicle body (e.g. adjacent an engine bay) with the shaft extended, followed by the bonnet being closed to drive the shaft into the housing, against resistance from the ratchet. (It is preferred to avoid a slamming action, as this may over-adjust the bump stop, leaving an excessively large clearance.) Finally, the extension height of the shaft defined by the bonnet closing action is set in place by inserting the key. A rubber head on the shaft is therefore maintained in position to provide a bump stop function for future closing of the bonnet, adapted to the exact clearances of the particular vehicle. However, while the rubber head does provide continued protection against metal-on-metal contact, it cannot account for minor displacements between the closed parts that may cause a drumming noise during driving. The relative rigidity of the prior art rubber head also minimizes protection from damage which may be incurred to a vehicle if a closure is repeatedly slammed shut.

[0006] US 6,039,388 discloses a bump stop in two parts, mounted on a vehicle body and closure respectively. EP 2,031,168A2 discloses a bump stop with lockable height adjustment.

SUMMARY OF THE INVENTION

[0007] The present invention seeks to improve upon height-adjustable bump stop devices known in the prior art and, particularly, to achieve reduced vibration noise experienced while driving. It also provides improved protection from slam damage. According to a first aspect of the invention, there is provided a bump stop adapted for location between a vehicle body and a vehicle closure in use, said bump stop comprising: a housing arranged to contact one of the body and the closure in use; and a moveable element attached to the housing; the moveable element comprising a resilient contact portion arranged to contact the other of the body and the closure in use; the contact portion comprising: a contact face arranged to contact the body or the closure in use; and an outer wall spaced outwardly from said contact face; wherein a diaphragm is arranged between the contact face and the outer wall, the diaphragm being arranged to be a rolling diaphragm in use; the moveable element also comprising a shaft extending from said housing, wherein the extension of the shaft from the housing is height adjustable, and wherein said height adjustment is lockable by a height adjustment means to set relative extension of the moveable element from the housing, the height adjustment means being adapted to be adjusted during an initial closing of the closure; wherein a lower face of the contact portion has a spatial clearance from an upper platform of the moveable element in use, when the closure is opened; and wherein the stiffness of the diaphragm and of the height adjustment means is set so that during said initial closing of the closure, the clearance between the lower face of the contact portion and the upper platform is reduced before the height adjustment means is adjusted.

[0008] The rolling of the diaphragm allows rapid and low-load takeup of tolerances between the vehicle body and closure. For the diaphragm to roll, it must have a convex upper surface between the contact face and the wall.

[0009] In the preferred form, the bump stop is intended to be installed on the main vehicle body, but there may be situations where installation is preferable on the hinged closure component, i.e. the bonnet or tailgate. Therefore, "closing part" can be interpreted as either the vehicle itself; or the closure component.

[0010] In an example, the outer wall of the contact portion is at least partly thicker than the diaphragm. This ensures that the diaphragm rolls before the wall flexes significantly.

[0011] In an example, the contact face, the diaphragm, and the outer wall are integrally moulded as a single component. In a further example, the moveable element com-

prises an upstanding ring element adjacent to the contact portion.

[0012] The thickened wall section and upstanding ring element help to control movement of the diaphragm, keeping it substantially centrally aligned along a longitudinal axis of the bump stop; also retaining the contact portion laterally.

[0013] In an example, the contact portion comprises inner and outer substantially cylindrical dependent portions. In a further example, the inner and outer substantially cylindrical dependent portions are joined by substantially radial ribs.

[0014] These features can be tuned to define the force/displacement and damping characteristics of the contact part. The rolling diaphragm may also be tuned in its form and thickness, this gives a very adaptable design.

[0015] In an example, the outer wall is substantially concentric with the substantially cylindrical dependent portions.

[0016] According to a second aspect of the invention, there is provided a vehicle body assembly comprising a main body, a closure, and a bump stop according to any of the preceding paragraphs, wherein the resilient contact portion is separated from the body or closure in use when the closure is opened.

[0017] In an example, the bump stop outer wall and diaphragm are recessed below the contact face in a free state, when the closure is opened. This allows for a progressive increase in damping forces as the contact part is depressed in use.

[0018] In a further example, the bump stop contact portion is adapted to provide a prevailing reaction force against the closure in its closed condition, after the relative extension of the moveable element has been locked by a locking means associated with the height adjustment means.

[0019] In a further example, the bump stop is constructed and arranged to dampen vibration of a closed vehicle closure in use.

[0020] In a yet further example, the bump stop is constructed and arranged to provide an effective overslam protection feature for the closure while maintaining smooth landing of the closure during normal operation.

[0021] The height adjustment means may be lockable by manual insertion of a key. However, it is possible that the locking function of the height adjustment means could be automatic, i.e. not requiring manual intervention. Such a system could be reversible or non-reversible depending on the method employed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] An embodiment of the invention will now be described, by way of example only, with reference to the drawings, in which:

Figure 1 illustrates a sectional view of a bump stop device according to the invention installed in a motor vehicle;

Figure 2 illustrates a partially sectioned view along arrow II in Figure 1 of a bump stop according to the invention;

Figure 3 illustrates a sectional view of the resilient contact portion shown in Figure 2, along line III-III in Figure 4;

Figure 4 illustrates a general perspective view of the resilient contact portion;

Figure 5 illustrates an underneath plan view of the resilient contact portion of the bump stop of the invention; and

Figure 6 illustrates a graphical representation of force versus displacement during height adjustment of a bump stop according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] The purpose and function of the invention is best understood by describing the installation and shaft height adjustment method as follows.

[0024] Figure 1 illustrates a bump stop device, generally denoted 10, used on a motor vehicle body B adjacent to a bonnet panel (shown figuratively at 110). In this case, installation is in a position at the periphery of an engine bay of the vehicle.

[0025] In a conventional way (e.g. as known from DE102009044166), a housing 11 of the bump stop device is inserted into an opening O in the vehicle body B. Resilient retention tabs 12 (illustrated in Figure 2 which is perpendicular to the view of Figure 1) locate the housing within opening O, whereupon a moveable element 13 in the form of a shaft is inserted into a channel or opening 14 through housing 11. Shaft 13 generally has a degree of resilience to being squeezed inwardly (from left and right in the context of Figure 1), by virtue of its flexible, preferably plastic, construction; and a central open channel 21. A leading end 15 of the shaft 13, once substantially inserted into or through channel 14, effectively locks retention tabs 12 in semi-permanent engagement with edges of the opening O. Housing 11 is thus fixed to vehicle body B.

[0026] Shaft 13 is suspended in an inserted state by virtue of a lockable height adjustment means, e.g. mating ratchet teeth formed both externally (16) on the shaft 13, and internally (17) within the housing 11, on the surface of channel 14. Shaft 13 is inserted to a convenient depth where retention tabs 12 are engaged. However, initially, it must not be inserted into housing 11 to its full extent. Preferably, shaft 13 is left with a short length of the shaft and resilient contact portion 18 (i.e the head of shaft 13) protruding some way into the open space above vehicle body B.

[0027] In order to set the shaft extension at a height that will account for small variations in the clearance between vehicle parts, the bonnet panel is shut with a controlled closing action, thereby spontaneously contacting

the resilient head 18 and driving shaft 13 further into housing 11. Ratchet teeth 16/17 give way until the end of the controlled closing movement, thereby maintaining shaft 13 at the displacement set by the controlled closing action. The vehicle bonnet is then opened to enable access for a key or plug element 19 (Figure 2) to be manually inserted into the like-sized opening of a channel 20 in the side of housing 11. Preferably channel 20 passes all the way through housing 11, and the key 19 could be inserted from either side. Since key 19, located in channel 20, is positioned adjacent the ratchet teeth 17 of the housing 11, and dimensioned to fit perpendicularly through the slot 21 that extends through most of the length of shaft 13, the ratchet height adjustment system is effectively locked so that further longitudinal movement of the shaft 13 in the direction of arrow S (or the reverse) is not possible.

[0028] As previously mentioned, the above procedure and components relating to height adjustment of a bump stop device are generally known from DE102009044166. However, the incorporation of a resilient contact portion 18 will impart additional features during the bonnet controlled closing step which are useful for minimising or eliminating vibration noise; and for protection against overslam conditions.

[0029] Figure 3 illustrates a detailed view of the resilient contact portion 18 (head of shaft 13); which is also shown in perspective view in Figure 4. A rubber cap element 22 incorporates a diaphragm portion 23 to provide a resilience, during compression from a closing vehicle body part, of the contact face 24 of cap 22. Particularly, the force required to displace contact face 24 by virtue of deflection of diaphragm 23 is less than the force required to displace the stepwise movement of ratchet teeth 16 against the fixed teeth 17 of housing 11. However, the ratchet teeth will allow height adjustment of shaft 13 before contact face 24A is pressed down against upper platform 26A of the main part of the moveable element 13.

[0030] Diaphragm 23 is connected to an outer diametral wall 25; which is supported by an upstanding ring element 26. Axis BS-BS is a longitudinal axis of the bump stop. Dimension C_O represents the clearance between upper platform 26A of shaft 13, and lower face 24A of cap 22. It is intended that uppermost point 23U of diaphragm 23 should always be above wall 25; and will usually be below contact face 24. For clarity in illustration of clearances, the line across the top of ring 26 which can be seen in Figure 2 has been omitted from Figure 3. Dimension C_O will be reduced during height adjustment of the shaft; but cap 18 will spring back once height adjustment is completed and the closure is opened. There is thus some clearance between the cap 18 and the shaft 13 under all normal operating conditions; but this clearance C_0 will be reduced when the closure is shut, to provide effective and progressive damping of the closure by a steady state deformation of diaphragm 23, and to a degree, of wall 25.

[0031] It will be apparent that, while the underneath view of Figure 5 shows support structures in the form of substantially cylindrical dependent portions 27 and radial ribs 28 for the rubber cap, other arrangements that provide resilient displacement will be possible within the scope of the first aspect of the invention. Furthermore, the cross-sections and relative thicknesses of wall 25 and diaphragm 23 may be tuned to control their deflection characteristics, firstly to give a partial deflection during height adjustment as described above; but also to allow clearance C_o to be fully taken up when the closure is slammed shut. This would lead to a rapid increase in the stiffness of cap 18 as forces acting on contact face 24 are transmitted through the cap to shaft 13. Under more normal loading conditions, diaphragm 23 and wall 25 would deflect together to allow vibration damping of the closure; and to allow a smooth landing of the closure when it is closed according to the car maker's recommendations, rather than being carelessly slammed shut.

[0032] A graphical representation of the force applied to the bump stop device during installation is illustrated by Figure 6. Referring to this graph, it will be apparent that an initial force (controlled closing of the bonnet) is sufficient to compress cap 22; and to commence relative displacement of the ratchet teeth that are spaced 1mm apart (in the present example). According to the invention, the relative force required to compress cap 22 is less than the force required to "jump" one ratchet step. This means that at the end of the controlled closing action there is a residual (prevailing) reaction force provided by cap 22 against the closed body part (e.g. bonnet) *after* the last ratchet step displacement. This is not the case in prior art bump stops, where the force required to "jump" one ratchet step is significantly lower, and results in minimal deflection of the relatively hard and inflexible rubber cap element of the bump stop. The force line to the right of point NT shows a rapid increase in force once all adjustment has been taken up - i.e., there are no more teeth left. An analogous increase in force will occur when the height adjustment means has been locked in place, and the closure is carelessly slammed, as described above. It should be noted that this force is a force required to compress the bump stop when the resilient contact portion is pressed down against the shaft. This increase in stiffness will react against the closure to progressively brake and stop its movement before temporary deformation of the base vehicle structure can occur. When the vehicle closure is closed in a more appropriate fashion, it will land on the vehicle body with a more progressively damped action.

[0033] According to the preferred embodiment, a nominal preload ("upwards" force PL from the resilient cap as shown in Figure 3) after the ratchet has stopped moving could be between 10 to 30 N $\pm$ 20%, e.g. 20 N. This preload requires the cap to be in contact with the closure panel. Without any reaction force built into the resilient contact element, each zig-zag step illustrated in Figure 6 would return to zero. Furthermore, after the final step,

the resistance would return to zero; which would result in no preload against the closed vehicle part (bonnet); and therefore, minimal damping of vibration of the bonnet in use, particularly where there is a static clearance between the cap and the bonnet. According to the invention, the amount of force required to displace the resilient means is less than the amount of force required to displace (stepwise) movement of the adjustable height means. In practice this means that, during installation, the general height of the bump stop device can be set (by a controlled closing action of the vehicle closure); but a prevailing resistance will remain to press back against the closure due to the resilient contact portion of the moveable element. This prevailing load from the bump stop device against a closing part of the vehicle (e.g. tailgate or bonnet) acts to minimise vibration and any resultant drumming noise when the vehicle is in motion. The damping of the movement of the vehicle closure is progressive because of the prevailing resistance - there is always some load against the closure, rather than the load varying from zero to positive.

[0034] It is clear that, as a result of the resilient features built into the cap 22 of shaft 13, a constant reaction force is supplied against a closed part of the vehicle after initial fitting and height adjustment. This reaction force will dampen vibration, and any resultant drumming noise that could occur while driving the vehicle. By contrast, DE102009044166 utilises a relatively hard rubber head for the insertion shaft with little or no resilience or compressibility that will provide a prevailing reaction force once the height adjustment is locked; and relatively low force for height adjustment, which will encourage a static clearance between the bump stop and the bonnet.

[0035] It is noteworthy that the operation of a bump stop according to the present invention is improved by utilising a coarser height adjustment means, i.e. larger ratchet teeth, compared to the prior art. This ensures that the force required to move one ratchet step is greater than the displacement force required to compress cap 22, but that the displacement force of the cap is still significant enough to be meaningful when applied against the vehicle body part. In other words, the rubber construction of cap 22 cannot be too soft, but must meet a minimum stiffness; albeit less than the force required to move a ratchet step.

[0036] The present invention benefits from a relatively quick installation time and procedure that is analogous to the prior art. The effectiveness of the prevailing reaction force in provision of damping does not require any manual adjustment, as it is automatically present at installation.

[0037] It is intended that the components of the bump stop device according to the invention are manufactured using conventional techniques and materials, e.g. injection moulded plastic and rubber parts. However, any suitable material or procedure could be used for manufacture.

[0038] It should be noted to ensure clarity, that throughout the description and claims, terms such as "above" or "below" should be interpreted with regard to the bump stop as shown in the Figures, although said bump stop may be installed on a vehicle at various angles to the vertical or horizontal; and where the bump stop is installed on a vehicle closure, will sweep through an arc defining a series of angular positions as the closure is opened or closed. Furthermore, the word "outwardly" should be taken to mean "away from a central axis of a bump stop or of a component thereof", rather than having a meaning relating to a vehicle body layout.

Claims

1. A bump stop (10) adapted for location between a vehicle body (B) and a vehicle closure (110) in use, said bump stop comprising:

a housing (11) arranged to contact one of the body and the closure in use;
and a moveable element (13) attached to the housing;

the moveable element comprising:

a resilient contact portion (18) arranged to contact the other of the body and the closure in use;
the contact portion (18) comprising:

a contact face (24) arranged to contact the body or the closure in use;
and an outer wall (25) spaced outwardly from said contact face;

wherein a diaphragm (23) is arranged between the contact face and the outer wall (25), the diaphragm being arranged to be a rolling diaphragm in use;
the moveable element also comprising:

a shaft extending from said housing (11), wherein the extension of the shaft from the housing is height adjustable, and wherein said height adjustment is lockable by a height adjustment means (16, 17) to set relative extension of the moveable element (13) from the housing (11), the height adjustment means being adapted to be adjusted during an initial closing of the closure (110);
wherein a lower face (24A) of the contact portion (18) has a spatial clearance (C_o) from an upper platform (26A) of the moveable element (13) in use, when the closure (110) is opened; and wherein
the stiffness of the diaphragm (23) and of the height adjustment means (16, 17) is set so that during said initial closing of the closure (110), the clearance (C_O) between the lower face (24A)

of the contact portion (18) and the upper platform (26A) is reduced before the height adjustment means (16, 17) is adjusted.

2. A bump stop (10) according to claim 1, wherein the outer wall (25) of the contact portion (18) is at least partly thicker than the diaphragm (23).

3. A bump stop (10) according to claim 1 or claim 2, wherein the contact face (24), the diaphragm (23), and the outer wall (25) are integrally moulded as a single component.

4. A bump stop (10) according to any one of claims 1 to 3, wherein the moveable element (13) comprises an upstanding ring element (26) adjacent to the contact portion (18).

5. A bump stop (10) according to any one of claims 1 to 4, wherein the contact portion (18) comprises inner and outer substantially cylindrical dependent portions (27).

6. A bump stop (10) according to claim 5, wherein the inner and outer substantially cylindrical dependent portions (27) are joined by substantially radial ribs (28).

7. A bump stop (10) according to claim 5 or claim 6, wherein the outer wall (25) is substantially concentric with the substantially cylindrical dependent portions (27).

8. A vehicle body assembly comprising a main body (B), a closure (110), and a bump stop (10) according to any one of claims 1 to 7, wherein the resilient contact portion (18) is separated from the body or closure in use when the closure is opened.

9. A vehicle body assembly according to claim 8, wherein the bump stop outer wall (25) and diaphragm (23) are recessed below the contact face (24) in a free state, when the closure (110) is opened.

10. A vehicle body assembly according to claim 9, wherein the bump stop contact portion (18) is adapted to provide a prevailing reaction force against the closure (110) in its closed condition, after the relative extension of the moveable element (13) has been locked by a locking means (19, 20) associated with the height adjustment means (16, 17).

11. A vehicle body assembly according to claim 10, wherein the bump stop (10) is constructed and arranged to dampen vibration of a closed vehicle closure (110) in use.

12. A vehicle body assembly according to any one of claims 8 to 11, wherein the bump stop (10) is constructed and arranged to provide an effective overslam protection feature for the closure (110) while maintaining smooth landing of the closure (110) during normal operation.

Patentansprüche

1. Anschlagpuffer (10), angepasst für eine Stelle zwischen einer Fahrzeugkarosserie (B) und einem Fahrzeugverschluss (110) im Gebrauch, wobei der Anschlagpuffer Folgendes umfasst:

ein Gehäuse (11), angeordnet, eines aus der Karosserie und dem Verschluss im Gebrauch zu berühren;
und ein an dem Gehäuse angebrachtes bewegliches Element (13);

wobei das bewegliche Element Folgendes umfasst:

einen elastischen Berührungsabschnitt (18), angeordnet, das andere aus der Karosserie und dem Verschluss im Gebrauch zu berühren; wobei der Berührungsabschnitt (18) Folgendes umfasst:

eine Berührungsfläche (24), angeordnet, im Gebrauch die Karosserie oder den Verschluss zu berühren;
und eine Außenwand (25), nach außen hin von der Berührungsfläche beabstandet;

wobei eine Membran (23) zwischen der Berührungsfläche und der Außenwand (25) angeordnet ist, wobei die Membran angeordnet ist, im Gebrauch eine Rollmembran zu sein;
wobei das bewegliche Element ferner Folgendes umfasst:

einen Schaft, der sich von dem Gehäuse (11) aus erstreckt, wobei die Auskragung des Schafts von dem Gehäuse höhenverstellbar ist und wobei die Höhenverstellung durch ein Höhenverstellmittel (16, 17) feststellbar ist, um ein relatives Auskragen des beweglichen Elements (13) von dem Gehäuse (11) einzustellen, wobei das Höhenverstellmittel angepasst ist, bei einem ersten Schließen des Verschlusses (110) eingestellt zu werden;
wobei eine untere Fläche (24A) des Berührungsabschnitts (18) im Gebrauch einen räumlichen Abstand (Co) von einer oberen Plattform (26A) des beweglichen Elements (13) aufweist, wenn der Verschluss (110) geöffnet ist; und wobei die Steifheit der Membran (23) und des Höhenverstellmittels (16, 17) derart eingestellt ist,

dass beim ersten Schließen des Verschlusses (110) der Abstand (Co) zwischen der unteren Fläche (24A) des Berührungsabschnitts (18) und der oberen Plattform (26A) verringert wird, bevor das Höhenverstellmittel (16, 17) eingestellt wird.

2. Anschlagpuffer (10) nach Anspruch 1, wobei die Außenwand (25) des Berührungsabschnitts (18) wenigstens teilweise dicker ist als die Membran (23).

3. Anschlagpuffer (10) nach Anspruch 1 oder 2, wobei die Berührungsfläche (24), die Membran (23) und die Außenwand (25) einstückig als ein einziges Bauteil geformt sind.

4. Anschlagpuffer (10) nach einem der Ansprüche 1 bis 3, wobei das bewegliche Element (13) ein aufrechtes Ringelement (26) neben dem Berührungsabschnitt (18) umfasst.

5. Anschlagpuffer (10) nach einem der Ansprüche 1 bis 4, wobei der Berührungsabschnitt (18) einen inneren und einen äußeren im Wesentlichen zylindrischen abhängigen Abschnitt (27) umfasst.

6. Anschlagpuffer (10) nach Anspruch 5, wobei der innere und der äußere im Wesentlichen zylindrische abhängige Abschnitt (27) über im Wesentlichen radiale Rippen (28) verbunden sind.

7. Anschlagpuffer (10) nach Anspruch 5 oder 6, wobei die Außenwand (25) im Wesentlichen mit den im Wesentlichen zylindrischen abhängigen Abschnitten (27) konzentrisch ist.

8. Fahrzeugkarosserieanordnung, umfassend einen Hauptkörper (B), einen Verschluss (110) und einen Anschlagpuffer (10) nach einem der Ansprüche 1 bis 7, wobei der elastische Berührungsabschnitt (18) im Gebrauch von der Karosserie oder dem Verschluss getrennt ist, wenn der Verschluss geöffnet ist.

9. Fahrzeugkarosserieanordnung nach Anspruch 8, wobei die Außenwand (25) und die Membran (23) des Anschlagpuffers in einem freien Zustand unter die Berührungsfläche (24) zurückversetzt werden, wenn der Verschluss (110) geöffnet ist.

10. Fahrzeugkarosserieanordnung nach Anspruch 9, wobei der Berührungsabschnitt (18) des Anschlagpuffers angepasst ist, eine vorherrschende Reaktionskraft gegen den Verschluss (110) in dessen geschlossenem Zustand aufzubringen, nachdem die relative Erweiterung des beweglichen Elements (13) mit einem mit dem Höhenverstellmittel (16, 17) verknüpften Feststellmittel (19, 20) festgestellt worden ist.

11. Fahrzeugkarosserieanordnung nach Anspruch 10, wobei der Anschlagpuffer (10) ausgelegt und angeordnet ist, Vibrationen eines geschlossenen Fahrzeugverschlusses (110) im Gebrauch abzudämpfen.

12. Fahrzeugkarosserieanordnung nach einem der Ansprüche 8 bis 11, wobei der Anschlagpuffer (10) ausgelegt und angeordnet ist, ein wirksames Zuschlagschutzmerkmal für den Verschluss (110) bereitzustellen und gleichzeitig ein weiches Auftreffen des Verschlusses (110) bei normalem Betrieb beizubehalten.

Revendications

1. Butée de suspension (10) adaptée pour être localisée entre une carrosserie de véhicule (B) et une fermeture de véhicule (110) en utilisation, ladite butée de suspension comprenant:

un logement (11) agencé pour entrer en contact avec l'une de la carrosserie et de la fermeture en utilisation ;
et un élément mobile (13) attaché au logement ; l'élément mobile comprenant :

une partie de contact résiliente (18) agencée pour entrer en contact avec l'autre de la carrosserie et de la fermeture en utilisation ; la partie de contact (18) comprenant :

une face de contact (24) agencée pour entrer en contact avec la carrosserie ou la fermeture en utilisation ;
et une paroi externe (25) espacée vers l'extérieur de ladite face de contact ;

dans laquelle un diaphragme (23) est agencé entre la face de contact et la paroi externe (25), le diaphragme étant agencé pour être un diaphragme de roulement en utilisation ;
l'élément mobile comprenant également :

un arbre s'étendant depuis ledit logement (11), l'extension de l'arbre depuis le logement étant réglable en hauteur, et ledit réglage en hauteur étant blocable par un moyen de réglage de hauteur (16, 17) pour fixer une extension relative de l'élément mobile (13) depuis le logement (11), le moyen de réglage de hauteur étant adapté pour être réglé pendant une fermeture initiale de la fermeture (110) ;
dans laquelle une face inférieure (24A) de la par-

tie de contact (18) a un débattement spatial (C_o) depuis une plateforme supérieure (26A) de l'élément mobile (13) en utilisation, lorsque la fermeture (110) est ouverte ; et dans laquelle la raideur du diaphragme (23) et du moyen de réglage de hauteur (16, 17) est fixée pour que pendant ladite fermeture initiale de la fermeture (110), le débattement (C_o) entre la face inférieure (24A) de la partie de contact (18) et la plateforme supérieure (26A) soit réduit avant que le moyen de réglage de hauteur (16, 17) soit réglé.

2. Butée de suspension (10) selon la revendication 1, dans laquelle la paroi externe (25) de la partie de contact (18) est au moins en partie plus épaisse que le diaphragme (23).

3. Butée de suspension (10) selon la revendication 1 ou la revendication 2, dans laquelle la face de contact (24), le diaphragme (23) et la paroi externe (25) sont moulés d'une seule pièce sous forme de composant unique.

4. Butée de suspension (10) selon l'une quelconque des revendications 1 à 3, dans laquelle l'élément mobile (13) comprend un élément de bague droit (26) adjacent à la partie de contact (18).

5. Butée de suspension (10) selon l'une quelconque des revendications 1 à 4, dans laquelle la partie de contact (18) comprend des parties dépendantes sensiblement cylindriques interne et externe (27).

6. Butée de suspension (10) selon la revendication 5, dans laquelle les parties dépendantes sensiblement cylindriques interne et externe (27) sont jointes par des nervures sensiblement radiales (28).

7. Butée de suspension (10) selon la revendication 5 ou la revendication 6, dans laquelle la paroi externe (25) est sensiblement concentrique avec les parties dépendantes sensiblement cylindriques (27).

8. Ensemble carrosserie de véhicule comprenant une carrosserie principale (B), une fermeture (110) et une butée de suspension (10) selon l'une quelconque des revendications 1 à 7, dans lequel la partie de contact résiliente (18) est séparée de la carrosserie ou de la fermeture en utilisation lorsque la fermeture est ouverte.

9. Ensemble carrosserie de véhicule selon la revendication 8, dans lequel la paroi externe (25) et le diaphragme (23) de la butée de suspension sont en retrait en dessous de la face de contact (24) dans un état libre, lorsque la fermeture (110) est ouverte.

10. Ensemble carrosserie de véhicule selon la revendication 9, dans lequel la partie de contact (18) de la butée de suspension est adaptée pour fournir une force de réaction prévalente contre la fermeture (110) dans sa condition fermée, après que l'extension relative de l'élément mobile (13) a été bloquée par un moyen de blocage (19, 20) associé au moyen de réglage de hauteur (16, 17).

11. Ensemble carrosserie de véhicule selon la revendication 10, dans lequel la butée de suspension (10) est construite et agencée pour amortir les vibrations d'une fermeture de véhicule fermée (110) en utilisation.

12. Ensemble carrosserie de véhicule selon l'une quelconque des revendications 8 à 11, dans lequel la butée de suspension (10) est construite et agencée pour fournir une particularité efficace de protection contre un claquement excessif pour la fermeture (110) tout en maintenant une réception en douceur de la fermeture (110) pendant un fonctionnement normal.

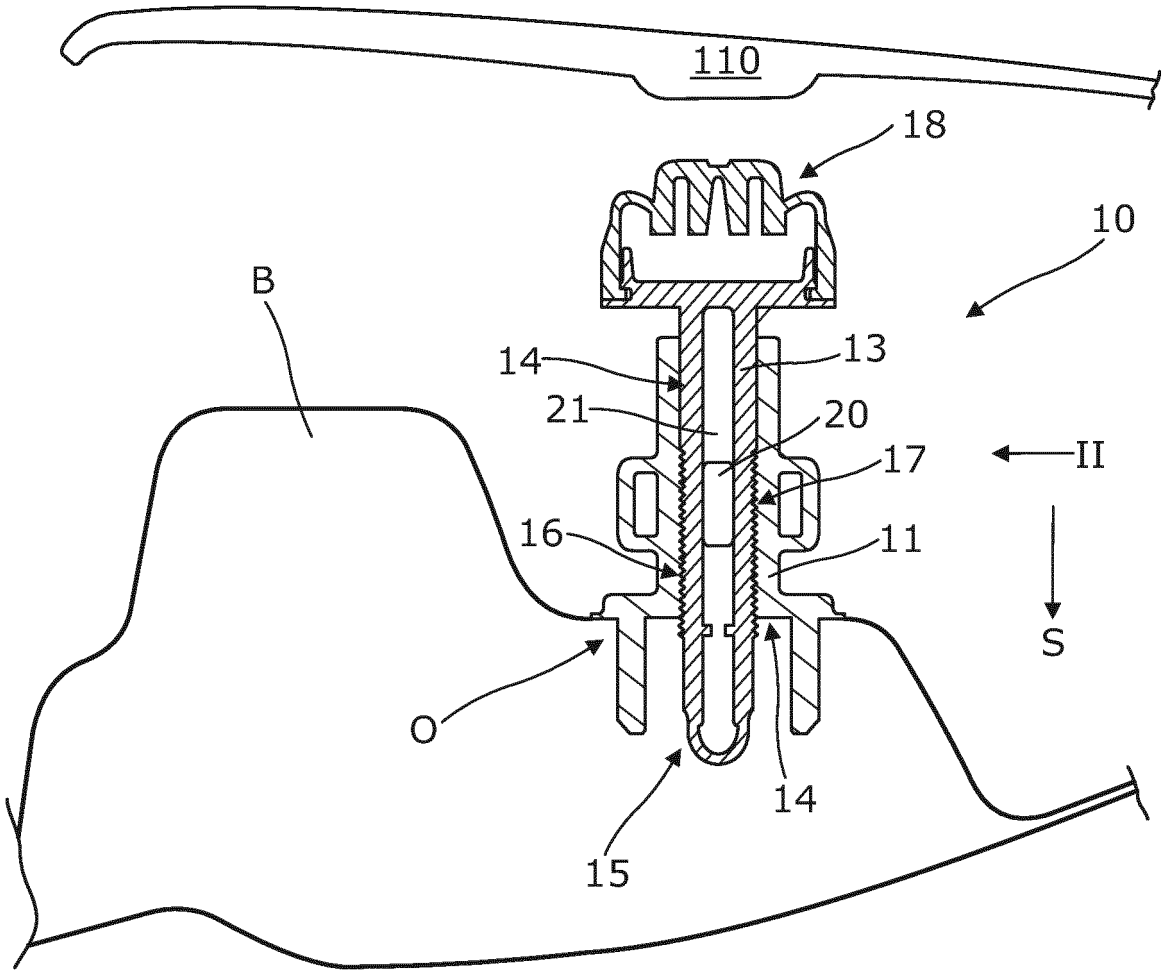


Fig. 1

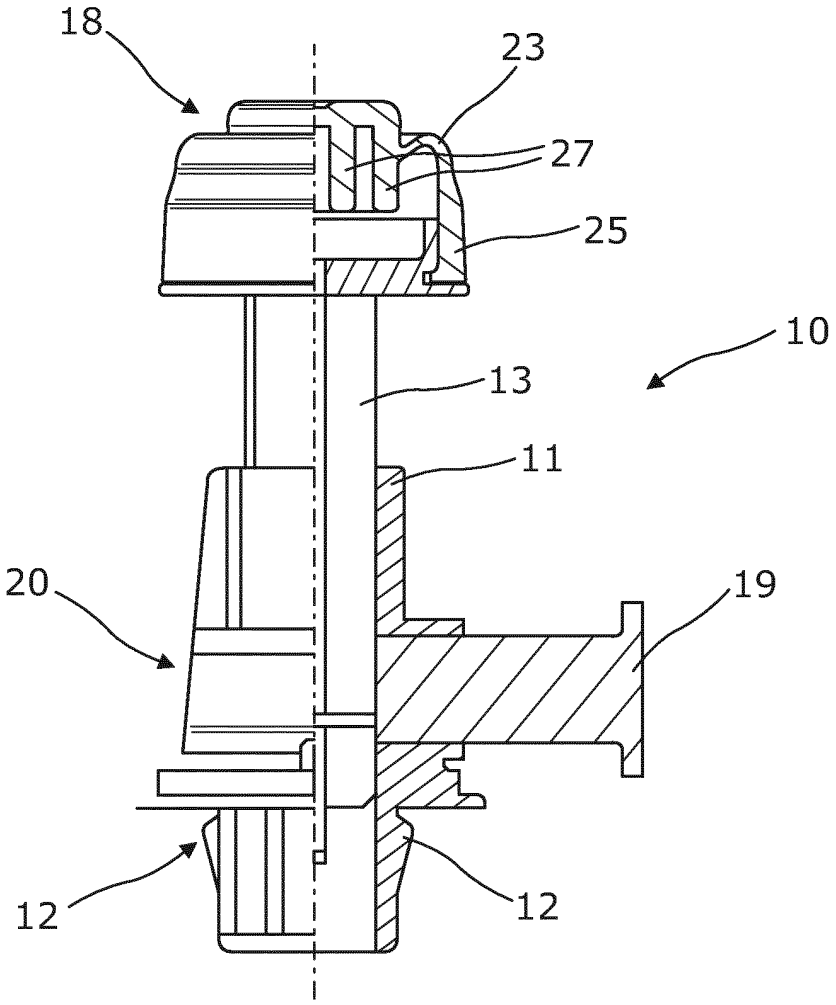

18
23
27
25
10
13
11
20
19
12
12

Fig. 2

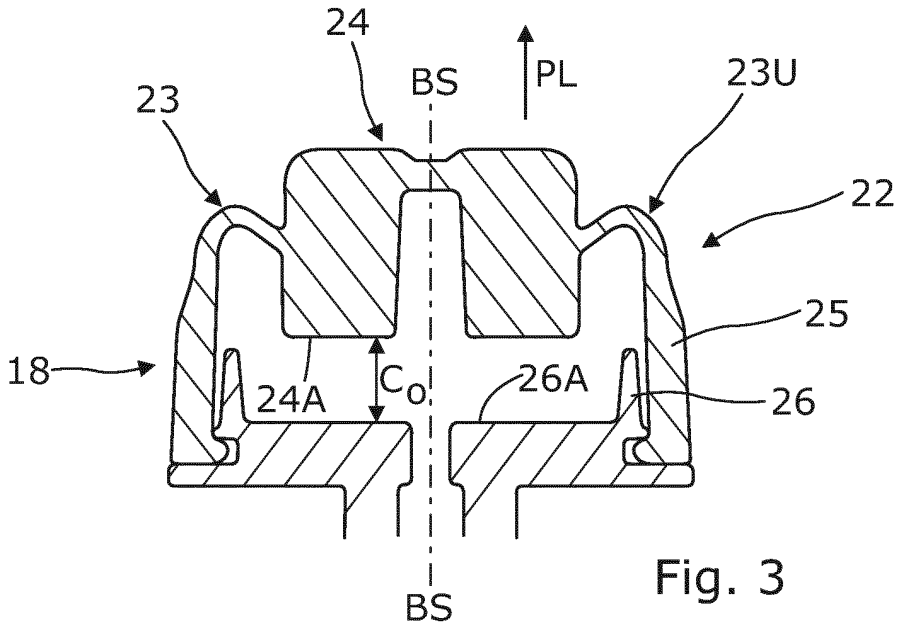

24
BS
PL
23U
23
22
25
18
24A
Co
26A
26
BS

Fig. 3

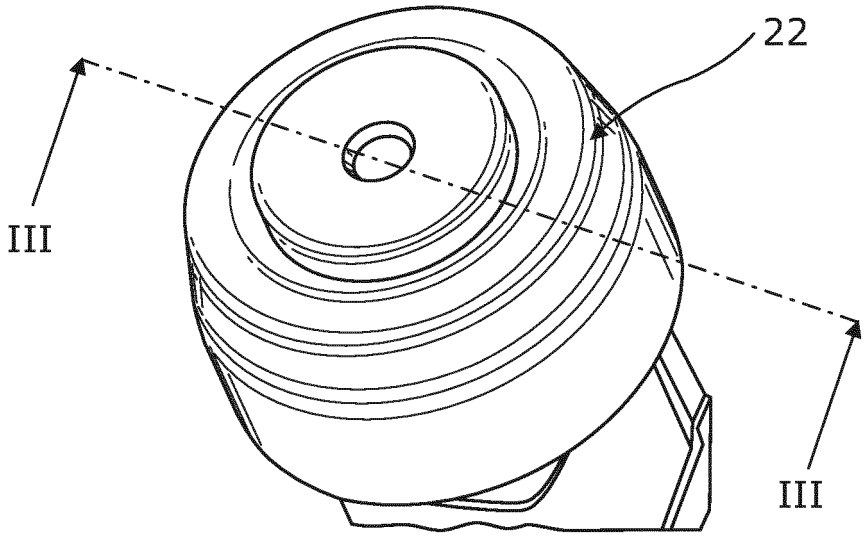


Fig. 4

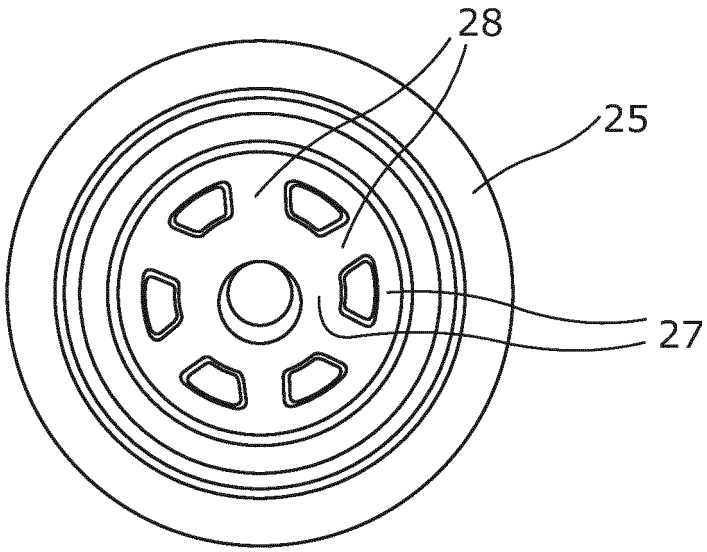


Fig. 5

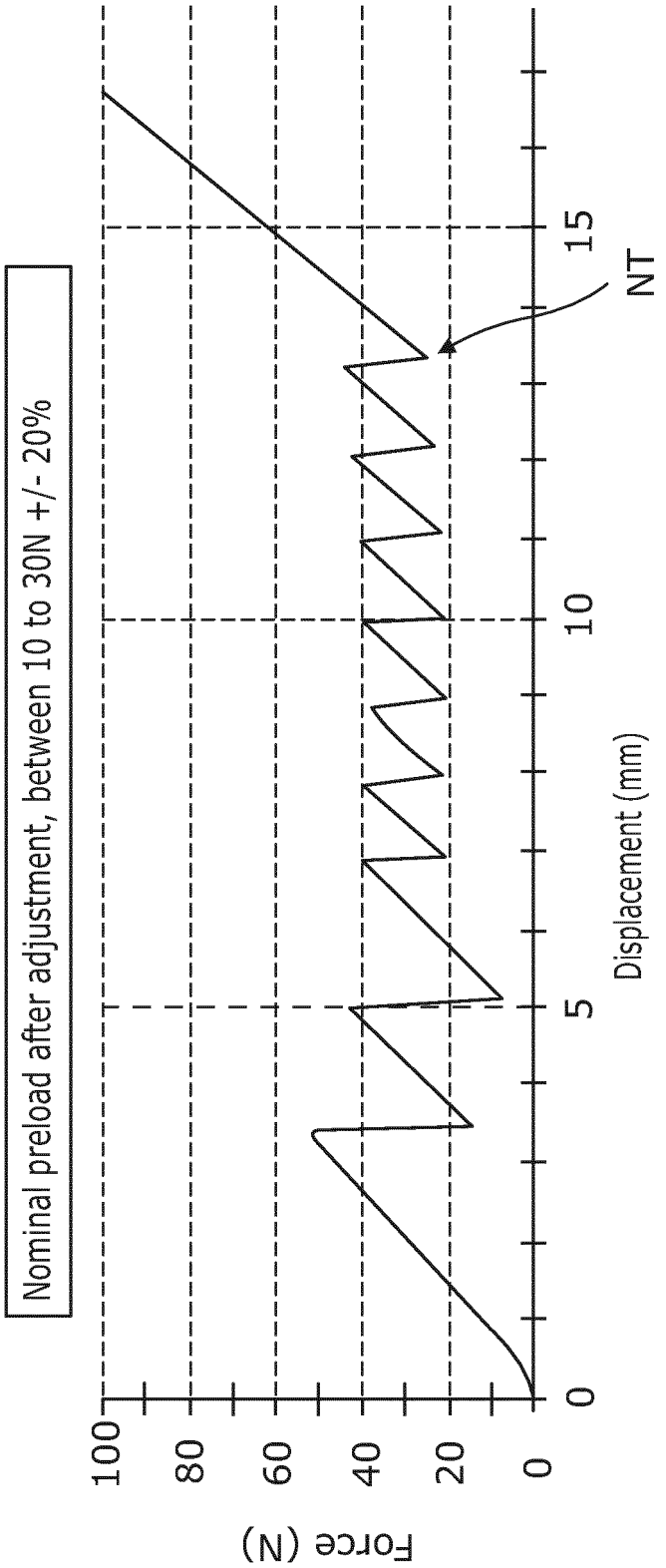

Nominal preload after adjustment, between 10 to 30N +/- 20%
NT
Force (N)
Displacement (mm)
0
20
40
60
80
100
0
5
10
15

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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