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- (71) **Applicant: ANGST PFISTER GELİŞMİŞ TEKNİK ÇÖZÜMLER A.Ş.** [TR/TR]; Akçalar Sanayi Bölgesi Kale Cd. No:10, 16225 Nilüfer/Bursa (TR).
- (72) **Inventors: SERBEST, Ali Kamil;** Akçalar Sanayi Bölgesi Kale Cd. No:10, 16225 Nilüfer/Bursa (TR). **SANCAKSADE, Kubilay;** Akçalar Sanayi Bölgesi Kale Cd. No:10, 16225 Nilüfer/Bursa (TR).
- (74) **Agent: YALINBAŞ, Fatih;** Altınşehir Mh. Abdi Ipekçi Cd. No:20 A Blok Daire 13, 16120 Nilüfer/Bursa (TR).
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(54) **Title:** A VIBRATION DAMPING BUSH FOR SUSPENSION DROPLINKS

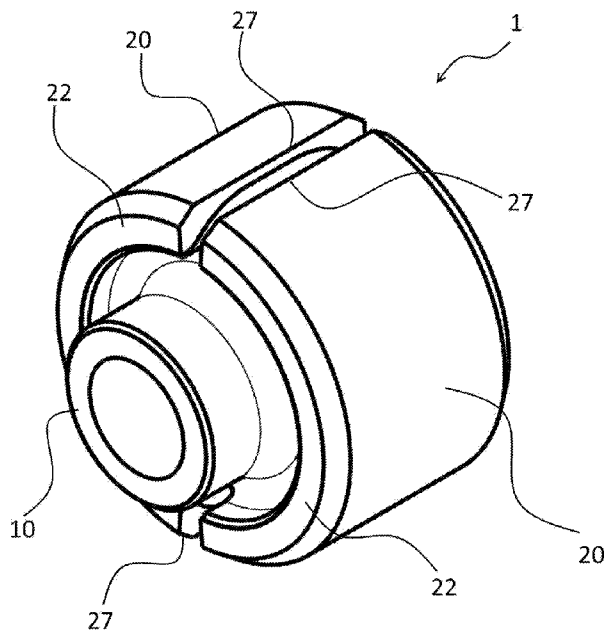


Figure 1

(57) **Abstract:** The invention is a damping bush (1) which connects especially the stabilizer bar and droplinks in the front and rear suspension systems of vehicles, eliminates the vibrations arised in this region and provides the torsional and conical angle values that this connection requires. The present bush (1) comprises outer shells (20) in at least two pieces which, having a flat cylindrical outer surface and cavities before mounting by standing of the merging zones (21) in a specific distance, allow the mentioned distance of cavities to provide the bush (1) to be tightly located when the bush (1) is mounted to the space formed for itself on the droplink, the bush (1) to hold on the space tightly and a great amount of rubber (40) to be hold inside the inner volume, and a hollow inner tube (10) surrounded by the mentioned outer shells (20). Besides, the bush (1) has a property of comprising a volume in which the outer shells (20) extends against to the inner tube (10) from both end portions (22) of the outer shells in a specific slope and specific distance,



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and which is filled homogeneously with the rubber (40) through that the cross-sectional area at a shell concave-slimming zone (26) on the inner middle part of the outer shells (20) gradually decreases while the inner tube (20) gradually expands outward at a tube convex-expansion zone (14) or the cross-sectional area of the inner tube (10) gradually increases in response to the slimming region. Since the diameter of the bush (1) is reducing in one axis while the other is not reducing in size thanks to the spaced positions of the outer shells edges (27) to each other, the bush (1) could be mounted to the cavity without any plastic deformation.

A VIBRATION DAMPING BUSH FOR SUSPENSION DROPLINKS

Technical Field

5 The invention relates to a damping bush which connects especially the stabilizer bar and droplinks in the suspension system located at the front and rear parts of the land vehicles, eliminates the vibrations arised in this region and fulfills the torsional and conical angle values that this connection requires.

10 More specifically, the present bush relates to a bush structure damping undesired mechanical vibrations which could be arised where the bush connects the stabilizer bar and droplinks connecting the stabilizer to the other elements related to wheel by carrying the stabilizer in vehicles.

Prior Art

There are various suspension configurations for damping the vibrations arised in vehicle during cruse. These configurations generally comprise a stabilizer bar and droplinks by which the ends of the stabilizer bar are connected to the edges.

15 In the system designs in which the connection axes of stabilizer bush and droplinks are not exactly perpendicular to each other, a bush to be mounted in this region is subjected to a preloading during mounting. The preloading, a case arising due to kinematics of the vehicle during mounting of the stabilizer bar and droplinks to each other, which causes the different requires of the torsional and conical angle values than the other bush solutions are emerged.

20 At this point, in the case of the bush supplying the connection could have certain torsional angle and conical angle through both ways, it is possible to damp the vibrations arised by connecting the mentioned stabilizer and droplinks to each other.

25 In the case in where the axes of stabilizer and droplinks are not perpendicular to each other and when angled mounting is required, the subjected preloading angle of a bush located in connection point of parts can vary according to the vehicle kinematic.

Besides, it is expected that a bush which will be mounted here and could damp the vibrations allows conical movement in both way from its center.

The kinematic values of the vehicle become already evident because the designs of the torque stabilizer bar providing the road-holding character and comfort properties of the vehicle and the droplinks which the stabilizer bar ends are connected to are made previously in vehicle designs so it is expected that the bushes to be mounted on the connection points provides these values.

5 As a result, since the technical solutions in the art are insufficient to provide these values, it was required a new bush structure of the present invention, enabling to provide all of them, to be revealed.

10 The patent document DE4421589 mentions a link bar for the spring leg stabilizer on the front axle of the vehicle. In the solution described here, there are two cardan joints of the link bar and a bar between these joints, and each joint comprises a shaft nest protruding and a bearing. Each bearing is in a rubber-metal bush form. The bearings may differ in angle and can be transformed to the cardan nest in bushes.

15 The patent document US 2015239319 mentions a bush for the stabilizer, fastening apparatus and a related method. The bonding power is obtained by bonding the bush to the stabilizer bar (inner circumferential surface) with the surface pressure on the bonding surface of the bush's hole part produced in a singular form. The first curve is formed at the opposite one side of the U-shaped part opening on the bracket in bonding and the second curve is shaped at the open side on the hole part of bush.

20 The patent document US 2016272026 mentions ring linkage assembly. In the solution described here, the ring linkage assembly is organized to connect safely a first component to a second component. The assembly may comprises a first nest which, comprising a first center, describes a first passage and a second nest in a same way. These first and second centers may be located on a common plane. The linkage bar connects the first nest to second nest and, the linkage bar is curved according to the common plane.

25 As a result, the need of the bush damping the vibrations arised in the region where the bush connects the stabilizer and droplinks by providing the torsional and conical angle values that this connection requires the solution of the present invention to come up.

Objectives and Short Description of the Invention

30 The object of the invention is to present a damping bush which connects especially the stabilizer bar and droplinks in the front and rear suspension systems of vehicles, eliminates the vibrations arised in this region and provides the torsional and conical angle values that this connection requires.

An another object of the invention is to present a damping bush comprising outer shells in at least two pieces which, having a flat cylindrical outer surface and cavities before mounting by standing of the connection zones in a specific distance, allow the mentioned distance of cavities to provide the bush to be tightly located when the bush is mounted to the space formed for itself on the droplink, the bush to hold on the space tightly and a great amount of rubber to be hold inside the inner volume, and a hollow inner tube surrounded by the mentioned outer shells.

An another object of the invention is to present a damping bush comprising a volume in which the outer shells extends against to the inner tube from both end portions of the outer shells in a specific slope and specific distance, and which is filled homogeneously with the rubber through that the cross-sectional area at a shell concave-slimming zone on the inner middle part of the outer shells gradually decreases while the inner tube gradually expands outward at a tube convex-expansion zone or the cross-sectional area of the inner tube gradually increases in response to the slimming region.

Description of the Figures

A perspective view of the present bush is given in figure 1.

A front view of the present bush according to the view in figure 1 is given in figure 2.

A cross-sectional view taken from vertical axis of the present bush according to the view in figure 1 is given in figure 3.

A cross-sectional view taken from horizontal axis of the present bush according to the view in figure 1 is given in figure 4.

Reference Numerals

1. Bush
10. Inner tube
11. Tube-increasing slope
12. Tube-top point
13. Tube-decreasing slope
14. Tube convex-expansion zone
20. Outer shells
21. Merging zone
22. End portions
23. Shell-increasing slope

- 24. Shell-top point
- 25. Shell-decreasing slope
- 26. Shell concave-slimming zone
- 27. Shell edges
- 5 30. Rubber positioning gap
- 40. Rubber

Detailed Description of the Invention

10 The present invention is a damping bush which connects especially the stabilizer bar and droplinks in the front and rear suspension systems of vehicles, eliminates the vibrations arised in this region and provides the torsional and conical angle values that this connection requires.

15 The suspension configurations damping the vibrations arised in vehicles during cruising comprise generally a stabilizer bar and droplinks by which the ends of the stabilizer bar are connected to the edges. The preloading exposed on the bush (1) during mounting which, an undesirable condition caused by the kinematics during the mounting of the stabilizer bar and the droplink to each other, causes different requires from the other bush (1) solutions in the torsional and conical angle values to emerge. In this point, damping of the vibrations emerged by the connection the mentioned stabilizer bar and droplinks is possible by that the connection bush (1) has a torsional angle until 80° ($\checkmark 40^{\circ}$) in total and a conical angle of 11° for both directions in total.

20 When the axes of the stabilizer bar and the droplinks are not perpendicular to each other and so there is a need of angled mounting, the present bush (1) is exposed to a preload during mounting. The preloading angle is change according to the vehicle kinematics, and for example, a preload of 15° according to 90° is applied on the bush (1) when the angle between axes is given as 75° .

25 Besides, it is expected that the present bush (1) lets the conical movement with the conical angle of 11° (5° for one direction (+) and 6° for other direction (-)) in total.

In addition, a very high torsional angle of 80° in total is encountered when it is viewed as perpendicular to the center of part.

Thus, since the previous technique solutions are insufficient for bush (1) to provide these values by overcoming mentioned difficulties, a new bush (1) allowing these has been released.

30 A perspective view of the present bush (1) is given in figure 1. A hollow inner tube (10) at its center is surrounded by the outer shells (20) in at least two pieces. The outer shells (20) have a flat cylindrical

outer surface and their merging zone (21) stand in a specific distance to each other. The distance allows the bush (1) to be located tightly when the bush is mounted to the space formed for itself on the droplink and allows the bush (1) to hold on the space.

5 The cross-sectional views of the present bush (1) are given in figure 3 and 4. The cross-sectional view in figure 4 is from the middle (from the cross-section of the horizontal axis of figures 1 and 2) of the outer shells (20) of the bush (1) before mounting while the cross-sectional view given in figure 3 is from the merging zone (21) of the outer shells (20) of the bush (1) before mounting too. Thus, the volume formed for the rubber (40), how the rubber (40) fills the volume and so how the functional qualifications expected from the bush (1) are provided are seen better via the cross-sectional view in
10 figure 4.

The outer shells (20) described here elongates from both end portions (22) to inner tube (10) at center with a specific slope in a specific distance. The inner tube (10) extending in center rises outwardly with a certain slope corresponding to the middle part of the mentioned outer shells (20), and thus increases the tube diameter in a specific distance inside. Although the cross-sectional thickness of
15 the volume filled by the rubber (40) is equal everywhere inside with the part referred as the inflated core of the inner tube (10) and the slimming on the corresponding region of the outer shells (20), it is provided that this section is not flat but takes a curved appearance that rises and falls with an outward slope by remaining only in the interior. As clearly seen in the cross-sectional view in figure 4, the rubber (40) remaining inside has a constant thickness but a height similar to a sinusoidal curve along
20 the horizontal axis of the bush (1). Consequently, for the rubber (40) to be formed like that, the inner tube (10) has a convex height on its middle portions while the outer shells (20) has a narrowing in the cross-section area on its regions corresponding to these portions.

Thus, the mentioned outer shells (20) are thick at its tip portions while the cross-sectional area towards the inner portions decreases with a certain slope. The cross-sectional area of the steel inner
25 tube (10) at the portion where the cross-sectional area of the mentioned outer shells (20) decreases and so it is formed an inner space here increases outwardly in a compatible form to other. A certain amount of rubber (40) is injected and filled into the rubber location space (30) formed between these two portions. The injected rubber (40) forms a filler material and, connects the mentioned outer shells (20) and the center inner tube (10) to each other by adhering to these parts. So, a rubber (40)
30 structure having a homogeneous cross-sectional area between the inner tube (10) and the outer shells (20) however, having a shape that is not flat but inclined as in figure 4 is formed.

The cross-sectional area of the inner tube (10) expands outward with a tube-increasing slope (11) corresponding to the middle portions of the bush (1) and reaches a tube-top point (12). Having a

certain distance at the pipe-top point (12) or coming to the initial level of the cross-sectional area of the inner tube (10) with a tube-decreasing slope (13) may vary according to the size and function of the bush (1). Similarly, the inward cross-sectional area of the outer shells (20) decreases with a shell-decreasing slope (25) corresponding to this cross-section change in the inner tube (10) and reaches a shell-top point (24). The cross-sectional area of the outer shells (20) reaches the initial thickness level with a shell-increasing slope (23) after the mentioned shell-top point (24). The mentioned shell-decreasing slope (25) and the tube-increasing slope (11) at the inner tube (10), also the shell-increasing slope (23) and the tube-decreasing slope (13) at the inner tube (10) are preferably equal slopes or too close to each other. The rubber (40) which, having a sloping structure in the bush (1) inner portion by means of these slopes, has a mechanical structure that could meet the torsional and conical angle expectations.

In a simple expression, the volume to be filled with rubber (40) is obtained by that the cross-sectional area at a shell concave-slimming (26) zone on the inner middle part of the outer shells (20) gradually decreases while the inner tube (10) gradually expands outward at a tube convex-expansion zone (14) or the cross-sectional area of the inner tube (10) gradually increases in response to the slimming region.

This geometrical structure of the present invention provides the rubber (40) located in bush (1) inner portion to be not flat, but in a sloped structure by an inward space formed with the decrease of the cross-sectional area in inward portions of the mentioned outer shells (20) and outwardly increase of the cross-sectional area in the corresponding inner tube (10) portion, and so the rubber (40) structure is trapped between the end portions (22) of the outer shells (20) and the inner tube (10). This geometry provides significant torsional capacity, axial movement restriction ability and mounting advantages.

Considering a high torsion value of 80° , when the outer shells are fixed and the inner tube (10) is forced to twist, the rubber (40) filler located inner volume extends to accomplish this twisting. For example, this could correspond to an extension of 5mm in a torsion value of 80° . In this case, it is possible by this geometry formed in bush (1) inner volume that the rubber (40) filler accomplishes the extension without tearing and thus the inner tube (10) enables to do torsional movement by reaching the torsional value of 80° with respect to the outer shells (20).

The diameter values of present bush (1) for before mounting and after mounting are different in order to meet the mentioned torsional values. Thanks to the opportunity supplied by the structure of the outer shells (20) forming least two parts and the preloading of the rubber (40), following the bush (1) installation, there is a diameter reduction of %10-30 compared to preassembly. The reduction

becomes possible by preloading of the rubber (40) in the inner volume. Accordingly, after mounting, the rubber is preloaded at the ratio %10-30 with respect to value of before mounting. For example, a bush (1) expected to be thickness of 5 mm after mounting and to provide the torsional values is produced with a rubber (40) having thickness of 8 mm before mounting. Thus, at the end point of the torsion provided by the rubber (40), it is possible that the unit shape change (strain) is accomplished without tearing and deforming of the rubber (40). Thanks to the inner volume geometry formed by the inner tube (10) at center and the outer shells (20) surrounding it and also to the rubber location gaps (30) between the outer shells (20), it is provided that the present bush (1) accomplishes the expected function without any exceeded load at the adhering regions of this parts with the rubber (40), consequently without an stickiness weakness due to the increasement of the preloaded rubber (40) amount in the inner volume.

The spaces between said least two outer shells (20) allow the inner volume to be filled with more rubber (40) and the bush (1) to be fitted to its nest with shrink fit manner by the reducement in the bush (1) periphery resulted from the squeezing of the rubber (40) during mounting. In other words, the inner volume filled with the rubber (40) before mounting is thicker to allow for squeezing after mounting. Thus, the inner volume decreases by preloading of the rubber (40) located here when the bush (1) is compressed from the outer shells (20). The strain of the bush can be held at appropriate levels for the function of the part by using the squeezing of rubber (40). The low torsional forces produced as a result of the high amount of radial compression is possible by that the outer shells (20) on the cylindrical structure have least two parts located with a certain distance. As seen in figure 1 and 2, the outer shell edges (27) on the outer surface of outer shells (20) before mounting stand at a certain distance from each other.

As seen in figure 2, the outer shell edges (27) form a flat cross-sectional area for the rubber (40) in the inner portion to be assembled during mounting. These flat areas on the outer shell edges (27) comprises a smooth surface which allows them combined mutually by allowing the preloading at one axis for the bush (1) to seating on the nest. By the closing of the distance after mounting, it is possible that the present bush (1) to fit to the space formed for itself with shrink fit manner. So, the bush (1) is mounted to the space without any plastic deformation since the bush (1) diameter decreases at one axis while there is not any decrease at the other axis during mounting thanks to the spaced positions of the outer shell edges (27).

If the outer shells (20) were made of a single piece, it could be possible to obtain a similar compression by subjecting the piece to plastic deformation. But, in this case, the rubber (40) material would expand sideways by the compressing of the piece from the outside, in which case it would not

be possible to obtain the desired torsional forces. However, the outer surfaces on the least two pieced outer shell (20) structure of present bush (1) are not subjected to plastic deformation. While the plastic deformation may provide a maximum compression of 1-2 mm in diameter, the bush (1) is fitted with shrink fit manner by a compression of 5-6 mm in diameter thanks to the least two pieced outer shell (20) of the present bush (1).

Another important advantage of the present bush (1) is that it can provide the conical angle values expected in the movement of the inner tube (10) along the axis thanks to the mentioned inner volume geometry. It is expected that such a bush (1) lets the conical movement with the conical angle of 11° (5° for one direction (+) and 6° for other direction (-)) in total and does not lose its functionality during this operation.

As described above, the expected torsional angle is provided by a spring comprising two pieced-outer shell (20) structure. However, since there is high amount of rubber (40) in the inner volume, this situation causes the motion at center to relax. The excess amount of rubber (40) here allows a distance to be formed through which the part can extend. But this motion ability is an undesired situation, so it is necessary to be restricted. For this motion restriction, the cross-sectional area of the inner tube (10) at center is increased by expanding its diameter toward the outer shells (20) in the inner portion with a certain distance while the cross-sectional area of the outer shells (20) corresponding the expansion region is narrowed by slimming of shells inward and thus, it is provided that the rubber (40) is trapped in this area. The outward increasement of the cross-sectional area in the middle portion of the inner tube (10) at center is achieved in a certain slope and the opposite of same slope is used for the inward decreasement in the cross-sectional area of the outer shells.

Thus, when the bush (1) compressed from outside, thanks to the bulge in the inner portion and to the inward slope at end portions (22) of the outer shells (20), it is ensured that the forces restricting the motion of the rubber (40) portion are formed. In this way, the desired angular motion (by the spherical structure formed at the bulge on the inner tube (10)) is provided while the motion of the part at horizontal axis is restricted.

In the art, there are two pieced bush structures surrounding a stabilizer bar. In these two-pieced bush structures, the two-pieced structure was used to determine a compression ratio between the stabilizer bar and the bush, where the torsional motion is very limited. However, the two-pieced outer shell (20) of the present invention by placing more rubber in the inner volume allows the unit shape chagement (strain) level to be kept in low and thereby the torsional angle to increase. The steel outer shells (20) located outside are completely attached to the inner rubber (40), not attached to any other component.

So, the conical motion is brought to a state allowing an increase of up to 11° from $2-3^\circ$ in the prior art while the axial motion is restricted. These are provided by the bulge structure constituted on the inner tube (10) at center and the concave twists of the outer shells (20).

5 By means of the present bush (1), it is possible to meet in a very small volume but significant kinematic expectations at point where the bush (1) connects the stabilizer bar and the droplinks, which are the balance and vibration damping elements, to each other. Here, for example, when a bush (1) is desired to be connected with a bolt in metric 14, they are crucial that the situation of the bolt to locate on the bush (1) due to the small area and the torque sufficiency formed when the bush (1) is compressed. In the art, the connection bolt supplies the location and torque sufficiencies since 10 the tube located center of the bushes (1) used at these points is thicker (as sectional area), these issues were not taken into consideration. However, in order to obtain the advantages of the present bush (1), it is necessary that the huge amount of rubber (40) could be in the inner volume and the sectional area at the inner tube (10) tip portions allowing bolt mounting reaches the critical levels for lightness and so, deformation may occur in this part when the bolt is torqued during mounting. In this 15 case, the steel materials that can be subjected to heat treatment for increasing its strength are used in the inner tube (10) to provide the expected torque values during mounting despite of the thin wall thickness (sectional area) of the inner tube (10). The strength values of these steel materials which can meet very high torque values despite of the very thin section could be increased with heat treatment to over the torque value of 700 Newton meter.

20 In addition, since the bush connecting the stabilizer bar and the droplinks is a full circle or made of full diameter material, it causes plastic deformation problems during mounting to this point. One of the most important advantages of the present bush (1) is that there is any change in the one axis of the bush (1) while the other axis of the bush (1) decreases when a compression is applied to the least two outer shells (20) surrounding the bush (1) in a cylindrical form with a certain interval. 25 So, the bush (1) can be mounted without plastic deformation. The meaning of the plastic deformation described here is that after mounting of bush (1) to its space, the outer part of the bush (1) is broken or is forced to change its shape by squeezing. Here, it does not require a plastic deformation thanks to these new innovations added to the bush.

CLAIMS

1. The invention is a damping bush (1) which connects especially the stabilizer bar and droplinks in the suspension system located at the front and rear parts of the land vehicles, eliminates the vibrations arised in this region and provides the torsional and conical angle values that this connection requires and, is characterized in that it comprises;
- 5 outer shells (20) in at least two pieces having a flat cylindrical surface and cavities before mounting by standing of the merging zones (21) in a specific distance in order to allow the mentioned distance of cavities to provide the bush (1) to be tightly located when the bush (1) is mounted to the space formed for itself on the droplink, the bush (1) to hold on the space tightly and a great amount of rubber (40) to be hold inside the inner volume,
- 10 and a hollow inner tube (10) surrounded by said outer shells (20), and that said outer shells (20) extends against to the inner tube (10) at the center from both end portions (22) of the outer shells (20) in a specific slope and specific distance and is filled homogeneously with the rubber (40) through that the cross-sectional area at a shell concave-
- 15 slimming zone (26) on the inner middle part of the outer shells (20) gradually decreases while the inner tube (10) gradually expands outward at a tube convex-expansion zone (14) or the cross-sectional area of the inner tube (10) gradually increases in response to said slimming region.
- 20 2. A damping bush (1) according to claim 1, characterized in that the inner tube (10) extending in center rises outwardly with a certain slope corresponding to the middle part of the mentioned outer shells (20), and thus thickens by increasing its diameter in a specific distance inside,
- 25 although the cross-sectional thickness of the volume filled by the rubber (40) is equal everywhere inside with the part referred as the inflated core of the inner tube (10) and the slimming on the corresponding region of the outer shells (20), it is provided that this section is not flat but takes a curved appearance that rises and falls with an outward slope by remaining only in the interior,
- 30 the rubber (40) remaining inside has a constant thickness but a height similar to a sinusoidal curve along the horizontal axis of the bush (1), for the rubber (40) to be formed like that, the inner tube (10) has a convex height on its middle portions while the outer shells (20) has a narrowing in the cross-section area on its regions corresponding to these portions, and thus,
- 35 the mentioned outer shells (20) are thick at its tip portions while the cross-sectional area towards the inner portions decreases with a certain slope.

3. A damping bush according to claim 1 and, characterized in that the cross-sectional area of the steel inner tube (10) at the portion where the cross-sectional area of the mentioned outer shells (20) decreases and so it is formed an inner space here increases outwardly in a compatible form to other, and,
5 a certain amount of rubber (40) is injected and filled into the rubber location space (30) formed between these two portions,
the injected rubber (40) forms a filler material and, connects the mentioned outer shells (20) and the center inner tube (10) to each other by adhering to these parts, and so,
10 a rubber (40) structure having a homogeneous cross-sectional area between the inner tube (10) and the outer shells (20) however, having a shape that is not flat but inclined as in figure 4 is formed.
4. A damping bush according to claim 1 and, characterized in that the cross-sectional area of the inner tube (10) expands outward with a tube-increasing slope (11) corresponding to the
15 middle portions of the bush (1) and reaches a tube-top point (12),
similarly, the inward cross-sectional area of the outer shells (20) decreases with a shell-decreasing slope (25) corresponding to this cross-section change in the inner tube (10) and reaches a shell-top point (24),
20 the cross-sectional area of the outer shells (20) reaches the initial thickness level with a shell-increasing slope (23) after the mentioned shell-top point (24),
the mentioned shell-decreasing slope (25) and the tube-increasing slope (11) at the inner tube (10), also the shell-increasing slope (23) and the tube-decreasing slope (13) at the inner tube (10) are the slopes in preferably equal values or values to close to each other,
25 the rubber (40) which, having a sloping structure in the bush (1) inner portion by means of these slopes, has a mechanical structure that could meet the torsional and conical angle expectations.
5. A damping bush (1) according to claim 1 and, characterized in that thanks to the opportunity
30 supplied by the structure of the outer shells (20) forming least two parts and the preloading of the rubber (40) that filled into the bush inner volume to provide the high torsion angles, following the bush (1) installation, there is a diameter reduction of %10-30 compared to preassembly.

6. A damping bush (1) according to claim 5 and, characterized by when the pressure is applied on the least two outer shells (20) which are positioned within specific intervals and surround the bush (1) cylindrically, one axis of the bush (1) reduces while there is any change in the other axis and thus the plastic deformation is prevented.

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7. A damping bush (1) according to claim 5 and, characterized in that the outer shell edges (27) on the outer surface of outer shells (20) before mounting stand at a certain distance from each other,

by the closing of the distance after mounting, the present bush (1) fits to the space formed for itself with shrink fit manner and so,

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the bush (1) is mounted to the space without any plastic deformation since the bush (1) diameter decreases at one axis while there is not any decrease at the other axis during mounting thanks to the spaced positions of the outer shell edges (27).

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8. A damping bush (1) according to claim 7 and, characterized in that the outer shell edges (27) form a flat cross-sectional area for the rubber (40) in the inner portion to be assembled during mounting,

these flat areas on the outer shell edges (27) comprises a smooth surface which allows them combined mutually by allowing the preloading at one axis for the bush (1) to seating on the nest.

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9. A damping bush (1) according to claim 1 and, characterized in that the desired angular motion as conically is provided via a spherical structure constituted at the convex bulge formed by increasing of the cross-sectional area in the inner portion on the inner tube (10) while the motion of the bush (1) at horizontal axis is restricted.

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10. A damping bush (1) according to claim 1 and, characterized in that when the bush (1) compressed from outside, thanks to the bulge formed on the mentioned tube convex-expansion zone (14) in the inner tube (10) and to the inward slope at end portions (22) of the outer shells (20), the forces restricting the motion of the rubber (40) inside the mentioned shell concave-slimming zone (26) are formed.

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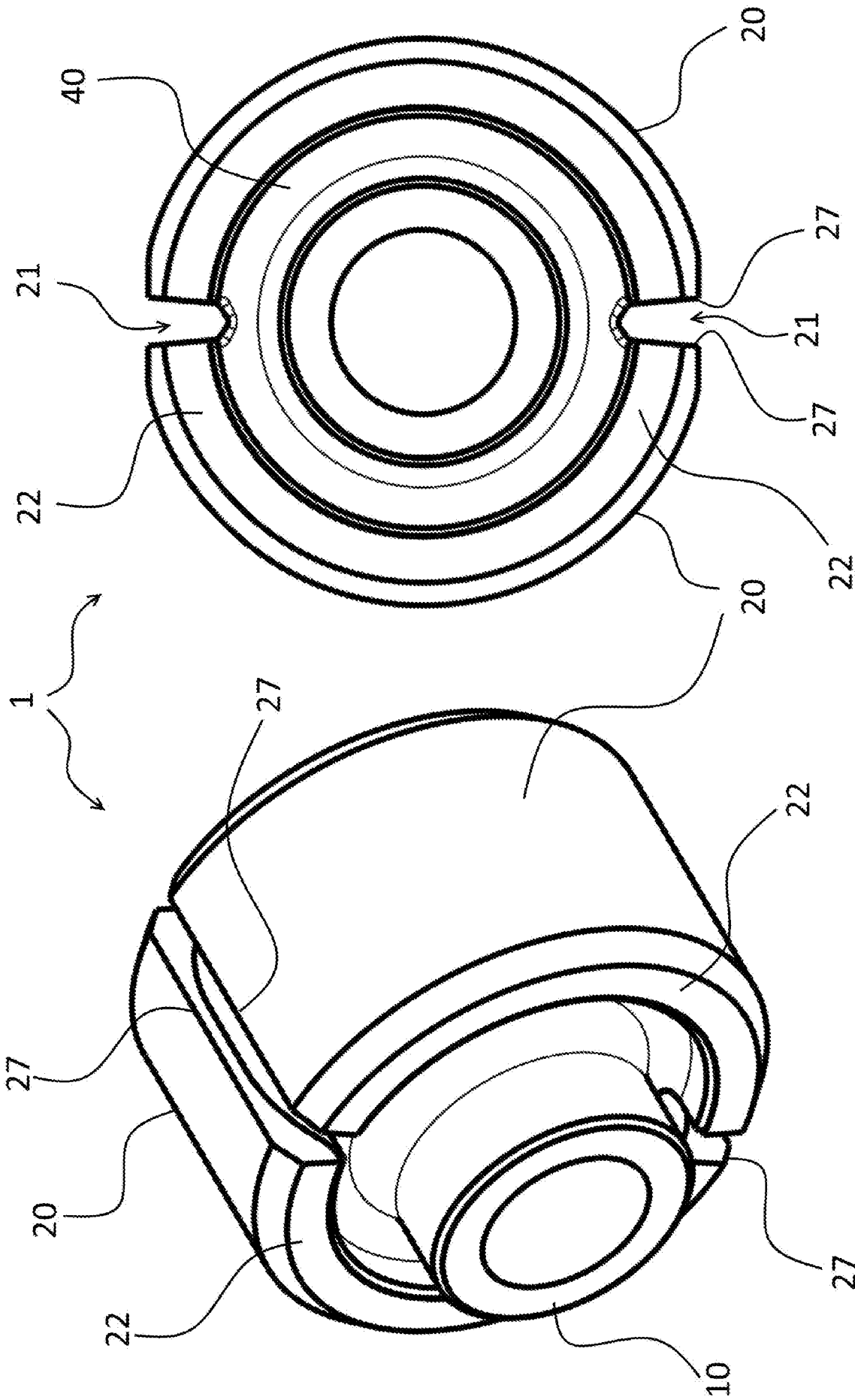


Figure 2

Figure 1

