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(54) RAILWAY VEHICLE AND VIBRATION DAMPING AND SUSPENSION DEVICE THEREOF

SCHIENENFAHRZEUG UND VIBRATIONSDÄMPFENDE UND AUFHÄNGUNGSVORRICHTUNG DAFÜR

VÉHICULE FERROVIAIRE ET DISPOSITIF DE SUSPENSION ET D'AMORTISSEMENT DES VIBRATIONS DE CELUI-CI

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Description

FIELD

[0001] The present application relates to the technical field of a vibration damping and suspension structure for a railway vehicle, particularly to a railway vehicle and a vibration damping and suspension device.

BACKGROUND

[0002] A railway vehicle is generally driven by a locomotive or a power car to run on two parallel tracks. For ensuring the operational safety of the railway vehicle, a running portion, that is a bogie, is required to allow the vehicle to make a translational motion along the tracks by the rotation of a wheel set. As one of core structures of the bogie, a vibration damping and suspension device has a critical influence on the stability and safety of the vehicle running at a high speed.

[0003] Document DE 1150702 B discloses a lateral support between a main frame and a bogie frame of a rail vehicle, which comprises at least two successively connected rubber bodies arranged between their shapes and compensating both the vertical and horizontal movements between the bogie frame and the main frame. At least one rubber body is a rubber hollow cone which is loosely inserted between its supporting bodies and is provided with a single outwardly directed annular bead. The other rubber body is a rubber disc with biconcave faces which is loosely inserted between its annular collars. In document US 2327954 A a side bearing for use with railway vehicles is described which is capable of cushioning or snubbing the rock or roll of a railway car body. Therefore, the side bearing comprises a plurality of tubular members, a cap having a bearing plate and resilient material positioned in each of said tubular members (cf. col. 1, lines 1-6 and claim 1).

[0004] According to the mounting position, the vibration damping and suspension device of the railway vehicle can be divided as a primary suspension device, a secondary suspension device and an elastic side bearing.

[0005] The primary suspension device is installed between an axle box and a bogie frame, and is used to transfer a force between the wheel set and the bogie and has a positioning function. A specific structure of a conventional primary suspension device can refer to a Chinese utility model No. ZL200620147882.5 titled "BOGIE POSITIONING DEVICE FOR RAILWAY HIGH SPEED WAGON".

[0006] The secondary suspension device is installed between the bogie frame and a swing bolster and is used for buffering impacts, damping vibrations and improving the operational stability of the vehicle. A specific structure of a conventional secondary suspension device can refer to a Chinese patent No. ZL201110000333.0 titled "CENTRAL SUSPENSION AND HIGH SPEED WAGON BOGIE HAVING THE SAME".

[0007] The elastic side bearing is installed between the vehicle body and the bogie swing bolster. When the bogie generates a rotation motion around a vertical axis with respect to the vehicle body, a rotation resistance torque is generated between the bogie and the vehicle body by the elastic side bearing, and the rotation resistance torque can restrain and damp the rotation vibration of the bogie with respect to the vehicle body, thereby controlling a yawing vibration of the vehicle body and improving the operational stability of the running vehicle. A specific structure of a conventional elastic side bearing can refer to a Chinese utility model No. ZL201020554552.4 titled "ELASTIC STOPPING PLATE AND ELASTIC SIDE BEARING".

[0008] However, a vertical damping of each of these three types of suspension and vibration damping devices only depends on a deformation amount of an elastic member thereof, and the vibration damping effect is not ideal. Furthermore, these three types of suspension and vibration damping devices use different structures and thus having a low universality.

[0009] In view of this, it is urgent for the person skilled in the art to improve the conventional vibration damping and suspension device to solve the problems that the conventional vibration damping and suspension device has a small vertical damping and a low universality.

SUMMARY

[0010] An object of the present application is to provide a vibration damping and suspension device for a railway vehicle to solve the problems that the conventional vibration damping and suspension device has a small vertical damping and a low universality. On this basis, a railway vehicle having the vibration damping and suspension device is further provided according to the present application.

[0011] This object is solved by a vibration damping and suspension device comprising the features of claim 1.

[0012] Optionally, the wearing ring is a non-metal wearing ring.

[0013] Optionally, the number of the opening is two, and the two openings are bilaterally symmetrical with respect to a longitudinal central line of the elastic annular member.

[0014] Optionally, the elastic annular member is a conical elastic annular member.

[0015] Optionally, the elastic annular member includes a plurality of elastic members and a plurality of bushings, which

are superposed alternately in the radial direction and fixedly connected, the inner positioning pillar is fixedly inserted into an innermost bushing, and the outer sleeve is fixedly connected with an outermost elastic member.

[0016] Besides the vibration damping and suspension device, a railway vehicle is further provided according to the present application, which includes a primary suspension device, a secondary suspension device and/or an elastic side bearing, wherein each of the primary suspension device, the secondary suspension device and the elastic side bearing is the above vibration damping and suspension device;

in a case that the vibration damping and suspension device functions as the primary suspension device, the top cover is configured to be fixedly connected to a bogie swing bolster of the railway vehicle and the outer sleeve is configured to be fixedly connected to the axle box of the railway vehicle;
in a case that the vibration damping and suspension device functions as the secondary suspension device, the top cover is configured to be fixedly connected to a bogie swing bolster or a sleeper beam of the railway vehicle and the outer sleeve is configured to be fixedly connected to the bogie frame of the railway vehicle; and
in a case that the vibration damping and suspension device functions as the elastic side bearing, the top cover is configured to form a fraction pair with a side bearing wearing plate of a train body of the railway vehicle, and the outer sleeve is configured to be fixedly connected to the bogie swing bolster of the railway vehicle.

[0017] When the vibration damping and suspension device functions as the primary suspension device and the secondary suspension device and is subjected to a vertical downward outer loading, the elastic annular member generates an elastic deformation and drives the top cover to slide downward by a predetermined displacement with respect to the outer sleeve, thereby realizing the vibration damping function and form an upward vertical frictional damping at the same time. When the railway vehicle vibrates, the elastic annular member moves upward and drives the outer sleeve to move upward, to form a downward vertical frictional damping, and thus the stability and safety of the railway vehicle running at a high speed are improved. When the vibration damping and suspension device functions as the elastic side bearing, not only an effect of rotation damping and vertical damping is formed between the top cover and the outer sleeve but also a shear deformation occurs on the elastic annular member under the action of the outer loading. Therefore, the deformation travel is large and a side bearing force has a low sensitiveness to the permanent deformation, and thus the trains have a strong long-distance running ability.

[0018] Optionally, the top cover is detachably connected with the bogie frame, the bogie swing bolster and/or the sleeper beam.

[0019] Optionally, the top cover is in an interference fit with the bogie frame, the bogie swing bolster and the sleeper beam by a connecting pillar and a connecting hole which matches with each other, one of the connecting pillar and the connecting hole is arranged on the top cover, and the other one of the connecting pillar and the connecting hole is arranged on the bogie frame, the bogie swing bolster and the sleeper beam.

[0020] Optionally, the top cover is connected with the bogie frame, the bogie swing bolster and the sleeper beam by a fastener, the top cover has a top cover flange which is formed by extending outward in a horizontal direction, and the top cover flange is provided with a top cover mounting hole configured to cooperate with the fastener.

[0021] Optionally, the outer sleeve is detachably connected with the axle box, the bogie frame and the bogie swing bolster.

[0022] Optionally, the outer sleeve is in the interference fit with the connecting hole of each of the axle box, the bogie frame and the bogie swing bolster.

[0023] Optionally, the outer sleeve is connected with the axle box, the bogie frame and the bogie swing bolster by the fastener, the outer sleeve has an outer sleeve flange which is formed by extending outward in a horizontal direction, and the outer sleeve flange is provided with an outer sleeve mounting hole configured to cooperate with the fastener.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is a front axial sectional view which schematically shows the structure of an embodiment of a vibration damping and suspension device according to the present application;

Fig. 2 is a bottom view which schematically shows the structure of the vibration damping and suspension device in Fig.1;

Fig. 3a is a front axial sectional view which schematically shows the structure of a first embodiment of a top cover, and Fig. 3b is a bottom view which schematically shows the structure of the top cover;

Fig. 4a is a front axial sectional view which schematically shows the structure of a second embodiment of a top cover, and Fig. 4b is a bottom view which schematically shows the structure of the top cover;

Fig. 5a is a front axial sectional view which schematically shows the structure of an embodiment of an assembly of an elastic annular member and an outer sleeve, and Fig. 5b is a bottom view which schematically shows the structure of the assembly of the elastic annular member and the outer sleeve;

Fig. 6a is a front axial sectional view which schematically shows the structure of another embodiment of an assembly of an elastic annular member and an outer sleeve, and Fig. 6b is a bottom view which schematically shows the structure of the assembly of the elastic annular member and the outer sleeve; and

Fig. 7a is a front axial sectional view which schematically shows the structure of a wearing ring according to an embodiment and Fig. 7b is a bottom view which schematically shows the structure of the wearing ring.

[0025] Corresponding relationships between the reference numerals and the components in Figs. 1 to 7b:

1	top cover:		
11	inner positioning pillar,	12	outer gland,
13	top cover connecting pillar,	14	top cover flange,
14o	top cover mounting hole;		
2	elastic annular member:		
21	elastic member,	22	bushing;
3	outer sleeve:		
31	outer sleeve flange,	31o	outer sleeve mounting hole;
4	wearing ring;	O	opening.

DETAILED DESCRIPTION

[0026] A vibration damping and suspension device adapted to a railway vehicle is provided according to the present application and has a vertical frictional damping. On this basis, a railway vehicle having the vibration damping device is further provided according to the present application.

[0027] For those skilled in the art to better understand the technical solutions of the present application, the present application will be further described in detail in conjunction with drawings and embodiments.

[0028] It should be noted that, terms indicating direction and position, such as front and back, up and down, and left and right, are all defined with reference to a railway vehicle. A direction in parallel with a running direction of the railway vehicle is defined as the longitudinal direction. In the longitudinal direction, a direction that the running direction points to is defined as front, and a direction opposite to the running direction is defined as back. In a plane in parallel with a running track plane of the railway vehicle, a direction perpendicular to the longitudinal direction is a transverse direction. In the transverse direction, viewed in the running direction, a direction at the left hand side is defined as left and a direction at the right hand side is defined as right. A direction perpendicular to the running track plane of the railway vehicle is defined as a vertical direction. In the vertical direction, a direction close to the running track plane is defined as down and a direction away from the running track plane is defined as up. Reference is made to Figs. 1 and 2. Fig. 1 is a front axial sectional view which schematically shows the structure of an embodiment of a vibration damping and suspension device according to the present application, and Fig. 2 is a bottom view which schematically shows the structure of the vibration damping and suspension device in Fig.1.

[0029] In conjunction with Figs. 1 and 2, the vibration damping and suspension device includes a top cover 1, an elastic annular member 2 and an outer sleeve 3. The top cover 1 has an inner positioning pillar 11 and an outer gland 12 which are formed by extending downward from a lower end surface of the top cover 1. The outer sleeve 3 is fixedly connected to an outer circumferential wall of the elastic annular member 2. The elastic annular member 2 is fixedly sleeved on the inner positioning pillar 11 of the top cover 1. Both the outer sleeve 3 and the elastic annular member 2 are provided with an opening O extending in a radial direction, thus the elastic annular member 2 can be pre-pressed against the inner positioning pillar 11 in the radial direction under the action of the outer gland 12.

[0030] The vibration damping and suspension device can function as any of a primary suspension device, a secondary suspension device and an elastic side bearing of the railway vehicle. For example, when it functions as the primary suspension device, the top cover 1 is fixedly connected to a bogie frame of the railway vehicle, and the outer sleeve 3 is configured to be fixedly connected to an axle box of the railway vehicle. When it functions as the secondary suspension

device, the top cover 1 is fixedly connected to a bogie swing bolster of the railway vehicle, and the outer sleeve 3 is configured to be fixedly connected to the bogie frame of the railway vehicle. When it functions as the elastic side bearing, a fraction pair is formed by the top cover 1 and a side bearing wearing plate of the railway vehicle body, and the outer sleeve 3 is fixedly connected to the bogie swing bolster of the railway vehicle.

[0031] When the vibration damping and suspension device functions as the primary suspension device and the secondary suspension device and is subject to a vertical downward outer loading, the elastic annular member 2 generates an elastic deformation and drives the top cover 1 to slide downward by a predetermined displacement with respect to the outer sleeve 3, thereby realizing the vibration damping function and form an upward vertical frictional damping at the same time. When the railway vehicle vibrates, the elastic annular member 2 moves upward and drives the outer sleeve 3 to move upward, to form a downward vertical frictional damping, and thus the stability and safety of the railway vehicle running at a high speed are improved. When the vibration damping and suspension device functions as the elastic side bearing, not only an effect of rotation damping and vertical damping is formed between the top cover 1 and the outer sleeve 3 but also a shear deformation occurs on the elastic annular member 2 under the action of the outer loading. Therefore, the deformation travel is large and a side bearing force has a low sensitiveness to the permanent deformation, and thus the trains have a strong long-distance running ability.

[0032] It should be noted that the top cover 1 of the vibration damping and suspension device is detachably fixed to the bogie frame or the bogie swing bolster by a common means in the mechanical field such as an interference fit or a fastener and the like, so as to facilitate examining and maintaining.

[0033] In detail, referring to Figs. 3a and 3b, Fig. 3a is a front axial sectional view schematically showing the structure of an embodiment of a top cover, and Fig. 3b is a bottom view schematically showing the structure of the top cover, an upper end surface of the top cover 1 protrudes upwards to form a top cover connecting pillar 13 which extends upward in a vertical direction. Accordingly, the bogie frame and the bogie swing bolster are both provided with a connecting hole matching with the top cover connecting pillar 13 at corresponding positions. The top cover connecting pillar 13 is in an interference fit with the connecting holes, to realize a detachable connection between the top cover 1 and the bogie frame and between the top cover 1 and the bogie swing bolster.

[0034] It can be understood that, on the premise of meeting the requirements of the machining and assembling processes, the connecting pillar and the connecting hole can be arranged reversely, that is, the connecting pillar is arranged on the bogie frame and the bogie swing bolster and the connecting hole is arranged on the top cover 1.

[0035] In another example, referring to Figs. 4a and 4b, Fig. 4a is a front axial sectional view schematically showing the structure of another embodiment of a top cover, and Fig. 4b is a bottom view schematically showing the structure of the top cover, the top cover 1 has a top cover flange 14 which is formed by extending outward in a horizontal direction. The top cover flange 14 is provided with a top cover mounting hole 14o. Accordingly, the bogie frame and the bogie swing bolster are each provided with a matching fastener mounting hole such as a threaded hole or a through hole, thus the top cover 1 can be detachably connected with the bogie frame or the bogie swing bolster by the fastener such as a bolt assembly or a screw assembly.

[0036] Similarly, for the same purpose, the outer sleeve 3 of the vibration damping and suspension device is detachably connected with an axle box, the bogie frame and the bogie swing bolster by interference fit or the fastener.

[0037] In detail, referring to Figs. 5a and 5b, Fig. 5a is a front axial sectional view schematically showing the structure of an embodiment of an assembly of an elastic annular member and an outer sleeve, and Fig. 5b is a bottom view schematically showing the structure of the assembly of the elastic annular member and the outer sleeve, an outer peripheral wall of the outer sleeve 3 can be in direct interference fit with a mounting hole of the bogie frame or the bogie swing bolster.

[0038] Alternatively, referring to Figs. 6a and 6b, Fig. 6a is a front axial sectional view schematically showing the structure of another embodiment of an assembly of an elastic annular member and an outer sleeve, and Fig. 6b is a bottom view schematically showing the structure of the assembly of the elastic annular member and the outer sleeve, a lower end portion of the outer sleeve 3 has an outer sleeve flange 31 which is formed by extending outward in a horizontal direction. The outer sleeve flange 31 is machined to form an outer sleeve mounting hole 31o, such as a threaded hole or an unthreaded hole, thus the top cover 1 can be detachably connected with the bogie frame or the bogie swing bolster by the fastener such as a bolt assembly or a screw assembly.

[0039] Reference is further made to Figs. 1 and 2, the elastic annular member 2 includes multiple elastic members 21 and multiple bushings 22 which are superposed alternately in the radial direction and are fixedly connected. The inner positioning pillar 11 of the top cover 1 is fixedly inserted into an innermost bushing 22 of the elastic annular member 2, and the outer sleeve 3 is fixedly connected with an outermost elastic member 21. The elastic members 21 and other bushings 22 except for the innermost bushing 22 are all provided with an opening O extending in the radial direction, thus the outer gland 12 can pre-press the elastic members 21 and the bushings 22 against the inner positioning pillar 11 of the top cover 1 in the radial direction.

[0040] Compared with an elastic annular member 2 merely made by an elastic member, for example, rubber, the assembled elastic annular member 2 has a strong deformability and a better vibration damping effect.

[0041] In addition, it should be noted that, there are three elastic members 21 and three bushings 22 in this embodiment. However, the number of the two subassemblies of the elastic annular member 2 is not limited to the number as shown in the embodiment and can be adjusted by the person skilled in the art according to the practical requirements. Of course, on the basis of meeting the requirements of vibration damping and the processes of machining and assembling, the elastic annular member 2 can also be embodied as the elastic member 21 only. The elastic annular member 2 in the embodiment is a conical elastic annular member, which has a strong deformability under the action of a shear force and thus can bear a larger shear force.

[0042] Reference is further made to Figs. 1 and 2, a wearing ring 4 is further arranged between the outer gland 12 and the outer sleeve 3 in the vibration damping and suspension device according to this embodiment. The wearing ring 4 is also provided with a gap O extending in the radial direction, thus the elastic annular member 2 may generate an elastic deformation under the action of the outer gland 12 and thus being pre-pressed against the inner positioning pillar 11. For better understanding the specific structure of the wearing ring 4, reference is also made to Figs. 7a and 7b. Fig. 7a is a front axial sectional view which schematically shows the structure of an embodiment of the wearing ring 4 and Fig. 7b is a bottom view which schematically shows the structure of the wearing ring 4.

[0043] Thus, the top cover 1 and the wearing ring 4 are in sliding friction cooperation, thereby avoiding an abrasion caused by the contact friction between the outer sleeve 3 and the top cover 1 and increasing the working life of the overall vibration damping and suspension device.

[0044] Preferably, the wearing ring 4 is a non-metal wearing ring, which has a high wearing coefficient and a steady wearing performance and thus can increase the stability of the vertical friction damping.

[0045] At last, reference is further made to Fig. 2, each of the wearing ring 4, the outer sleeve 3 and the elastic annular member 2 is provided with two openings O, and the two openings O are bilaterally symmetrical with respect to a longitudinal central line of the elastic annular member 2.

[0046] With such an arrangement, a longitudinal rigidity of the vibration damping and suspension device is larger than its transverse rigidity, and the vibration damping and suspension device has a larger vertical deflection, which not only improves the stability of the railway vehicle running at a high speed but also reduces a dynamical force of a wheel set and thus reducing the abrasion of a wheel track.

[0047] Finally, it should be noted that, as set forth, when the vibration damping and suspension device functions as the secondary suspension device of the railway vehicle, the top cover 1 is fixedly connected to the bogie swing bolster of the railway vehicle, and the outer sleeve 3 is configured to be fixedly connected to the bogie frame of the railway vehicle. When the vibration damping and suspension device functions as the secondary suspension device of the railway vehicle, on the premise of realizing the function of suspension and vibration damping, the top cover 1 can also be fixedly connected to a sleeper beam of the railway vehicle. The top cover 1 can be fixedly connected to the sleeper beam in the same way as it is fixedly connected to the bogie swing bolster, which can be realized by the person skilled in the art according to the above disclosure and will not be described hereinafter.

[0048] The invention is not to be limited to the disclosed preferable embodiments, but on the contrary, is intended to cover modifications, equivalent replacements and improvements insofar as they fall within the scope of the invention as defined by the appended claims.

Claims

1. A vibration damping and suspension device for a railway vehicle, comprising a top cover (1), an elastic annular member (2) and an outer sleeve (3), wherein the top cover (1) has an inner positioning pillar (11) and an outer gland (12), the outer sleeve (3) is fixedly connected to an outer peripheral wall of the elastic annular member (2), the inner positioning pillar (11) is fixedly inserted in the elastic annular member (2), both the outer sleeve (3) and the elastic annular member (2) are provided with an opening (O) extending in a radial direction, to allow the outer gland (12) to pre-press the elastic annular member (2) against the inner positioning pillar (11) in the radial direction by means of the outer sleeve (3); and
   wherein a wearing ring (4) is arranged between the outer sleeve (3) and the outer gland (12), and the wearing ring (4) is provided with an opening (O) extending in the radial direction.

2. The vibration damping and suspension device according to claim 1, wherein the wearing ring (4) is a non-metal wearing ring (4).

3. The vibration damping and suspension device according to any one of claims 1 to 2, wherein the number of the opening (O) is two, and the two openings (O) are bilaterally symmetrical with respect to a longitudinal central line of the elastic annular member (2).

4. The vibration damping and suspension device according to claim 3, wherein the elastic annular member (2) is a conical elastic annular member (2).

5. The vibration damping and suspension device according to claim 3, wherein the elastic annular member (2) comprises a plurality of elastic members (21) and a plurality of bushings (22) which are superposed alternately in the radial direction and are fixedly connected, the inner positioning pillar (11) is fixedly inserted into an innermost bushing (22), and the outer sleeve (3) is fixedly connected with an outermost elastic member (21).

6. A railway vehicle, comprising a primary suspension device, a secondary suspension device and/or an elastic side bearing, wherein each of the primary suspension device, the secondary suspension device and the elastic side bearing is the vibration damping and suspension device according to any one of claims 1 to 5;
in a case that the vibration damping and suspension device functions as the primary suspension device, the top cover (1) is configured to be fixedly connected to a bogie frame of the railway vehicle, and the outer sleeve (3) is configured to be fixedly connected to an axle box of the railway vehicle; or
in a case that the vibration damping and suspension device functions as the secondary suspension device, the top cover (1) is configured to be fixedly connected to a bogie swing bolster or a sleeper beam of the railway vehicle, and the outer sleeve (3) is configured to be fixedly connected to the bogie frame of the railway vehicle; or
in a case that the vibration damping and suspension device functions as the elastic side bearing, the top cover (1) is configured to form a fraction pair with a side bearing wearing plate of a vehicle body of the railway vehicle, and the outer sleeve (3) is configured to be fixedly connected to the bogie swing bolster of the railway vehicle.

7. The railway vehicle according to claim 6, wherein the top cover (1) is detachably connected with the bogie frame, the bogie swing bolster and/or the sleeper beam.

8. The railway vehicle according to claim 7, wherein the top cover (1) is in an interference fit with the bogie frame, the bogie swing bolster and the sleeper beam by a connecting pillar and a connecting hole which match with each other, one of the connecting pillar and the connecting hole is arranged on the top cover (1), and the other one of the connecting pillar and the connecting hole is arranged on the bogie frame, the bogie swing bolster and the sleeper beam.

9. The railway vehicle according to claim 7, wherein the top cover (1) is connected with the bogie frame and the bogie swing bolster by a fastener, the top cover (1) has a top cover flange (14) which is formed by extending outward in a horizontal direction, and the top cover flange (14) is provided with a top cover mounting hole (14o) configured to cooperate with the fastener.

10. The railway vehicle according to claim 6, wherein the outer sleeve (3) is detachably connected with the axle box, the bogie frame and the bogie swing bolster.

11. The railway vehicle according to claim 10, wherein the outer sleeve (3) is in an interference fit with a connecting hole of each of the axle box, the bogie frame and the bogie swing bolster.

12. The railway vehicle according to claim 10, wherein the outer sleeve (3) is connected with the axle box, the bogie frame and the bogie swing bolster by a fastener, the outer sleeve (3) has an outer sleeve flange (31) which is formed by extending outward in a horizontal direction, and the outer sleeve flange (31) is provided with an outer sleeve mounting hole (31o) configured to cooperate with the fastener.

Patentansprüche

1. Eine Schwingungsdämpfungs- und Aufhängungsvorrichtung für ein Schienenfahrzeug, umfassend eine obere Abdeckung (1), ein elastisches Ringelement (2) und eine äußere Hülse (3), wobei die obere Abdeckung (1) einen inneren Positionspfeiler (11) und eine äußere Stopfbuchse (12) aufweist, die äußere Hülse (3) fest mit einer äußeren Umfangswand des elastischen Ringelements (2) verbunden ist, der innere Positionspfeiler (11) fest in das elastische Ringelement (2) eingesetzt ist, sowohl die äußere Hülse (3) als auch das elastische Ringelement (2) mit einer sich in radialer Richtung erstreckenden Öffnung (O) versehen sind, so dass die äußere Stopfbuchse (12) das elastische Ringelement (2) mittels der äußeren Hülse (3) gegen den inneren Positionspfeiler (11) in radialer Richtung mit einem Vordruck beaufschlagen kann; und
wobei ein Verschleißring (4) zwischen der äußeren Hülse (3) und der äußeren Stopfbuchse (12) angeordnet ist,

und der Verschleißring (4) mit einer sich in radialer Richtung erstreckenden Öffnung (O) versehen ist.

2. Schwingungsdämpfungs- und Aufhängungsvorrichtung nach Anspruch 1, wobei der Verschleißring (4) ein nichtmetallischer Verschleißring (4) ist.

3. Schwingungsdämpfungs- und Aufhängungsvorrichtung nach einem der Ansprüche 1 bis 2, wobei die Anzahl der Öffnungen (O) zwei beträgt und die zwei Öffnungen (O) bilateral symmetrisch zu einer Längsmittellinie des elastischen Ringelements (2) sind.

4. Schwingungsdämpfungs- und Aufhängungsvorrichtung nach Anspruch 3, wobei das elastische Ringelement (2) ein konisches elastisches Ringelement (2) ist.

5. Schwingungsdämpfungs- und Aufhängungsvorrichtung nach Anspruch 3, wobei das elastische Ringelement (2) eine Vielzahl von elastischen Elementen (21) und eine Vielzahl von Buchsen (22) aufweist, die abwechselnd in radialer Richtung übereinanderliegen und fest verbunden sind, der innere Positionspfeiler (11) fest in eine innerste Buchse (22) eingesetzt ist und die äußere Hülse (3) fest mit einem äußersten elastischen Element (21) verbunden ist.

6. Ein Schienenfahrzeug, umfassend eine Primäraufhängungsvorrichtung, eine Sekundäraufhängungsvorrichtung und/oder ein elastisches Seitenlager, wobei jede der Primäraufhängungsvorrichtung, der Sekundäraufhängungsvorrichtung und des elastischen Seitenlagers die Schwingungsdämpfungs- und Aufhängungsvorrichtung nach einem der Ansprüche 1 bis 5 ist;

für den Fall, dass die Schwingungsdämpfungs- und Aufhängungsvorrichtung als die Primäraufhängungsvorrichtung fungiert, ist die obere Abdeckung (1) so konfiguriert, dass sie fest mit einem Drehgestellrahmen des Schienenfahrzeugs verbunden ist, und die äußere Hülse (3) ist so konfiguriert, dass sie fest mit einem Achsgehäuse des Schienenfahrzeugs verbunden ist; oder
für den Fall, dass die Schwingungsdämpfungs- und Aufhängungsvorrichtung als die Sekundäraufhängungsvorrichtung fungiert, ist die obere Abdeckung (1) so konfiguriert , dass sie fest mit einer Drehgestell-Schwenkwiege oder einem Schwellenbalken des Schienenfahrzeugs verbunden ist, und die äußere Hülse (3) ist so konfiguriert, dass sie fest mit dem Drehgestellrahmen des Schienenfahrzeugs verbunden ist; oder
für den Fall, dass die Schwingungsdämpfungs- und Aufhängungsvorrichtung als das elastische Seitenlager fungiert, ist die obere Abdeckung (1) konfiguriert, um eine Reibpaarung mit einer seitlichen Lagerverschleißplatte einer Karosserie des Schienenfahrzeugs zu bilden, und die äußere Hülse (3) ist konfiguriert, um fest mit der Drehgestell-Schwenkwiege des Schienenfahrzeugs verbunden zu sein.

7. Schienenfahrzeug nach Anspruch 6, wobei die obere Abdeckung (1) lösbar mit dem Drehgestellrahmen, der Drehgestell-Schwenkwiege und/oder dem Schwellenbalken verbunden ist.

8. Schienenfahrzeug nach Anspruch 7, wobei sich die obere Abdeckung (1) in einem Presssitz mit dem Drehgestellrahmen, der Drehgestell-Schwenkwiege und dem Schwellenbalken über einen Verbindungspfeiler und ein darauf abgestimmtes Verbindungsloch befindet, wobei eines von jeweils dem Verbindungspfeiler und dem Verbindungsloch an der oberen Abdeckung (1) und das andere von jeweils dem Verbindungspfeiler oder dem Verbindungsloch an dem Drehgestellrahmen, der Drehgestell-Schwenkwiege und dem Schwellenbalken angeordnet ist.

9. Schienenfahrzeug nach Anspruch 7, wobei die obere Abdeckung (1) mit dem Drehgestellrahmen und der Drehgestell-Schwenkwiege durch ein Befestigungselement verbunden ist, die obere Abdeckung (1) einen oberen Abdeckflansch (14) aufweist, der ausgebildet ist, indem er sich in horizontaler Richtung nach außen erstreckt, und der obere Abdeckflansch (14) mit einem oberen Abdeck-Montageloch (14o) versehen ist, das zum Zusammenwirken mit dem Befestigungselement konfiguriert ist.

10. Schienenfahrzeug nach Anspruch 6, wobei die äußere Hülse (3) lösbar mit dem Achslager, dem Drehgestellrahmen und der Drehgestell-Schwenkwiege verbunden ist.

11. Schienenfahrzeug nach Anspruch 10, wobei sich die äußere Hülse (3) in einem Presssitz mit einer Verbindungsbohrung von jeweils dem Achslager, dem Drehgestellrahmen und der Drehgestell-Schwenkwiege befindet.

12. Schienenfahrzeug nach Anspruch 10, wobei die äußere Hülse (3) mit dem Achslager, dem Drehgestellrahmen und der Drehgestell-Schwenkwiege über ein Befestigungselement verbunden ist, die äußere Hülse (3) einen Außen-

hülsenflansch (31) aufweist, der dadurch ausgebildet ist, indem er sich nach außen in horizontaler Richtung erstreckt, und der Außenhülsenflansch (31) mit einem Außenhülsen-Montageloch (31o) versehen ist, das zum Zusammenwirken mit dem Befestigungselement konfiguriert ist.

Revendications

1. Dispositif de suspension et d'amortissement des vibrations pour un véhicule ferroviaire, comprenant un couvercle supérieur (1), un élément annulaire élastique (2) et un manchon extérieur (3), le couvercle supérieur (1) possédant un pilier intérieur de positionnement (11) et un presse-étoupe extérieur (12), le manchon extérieur (3) étant solidarisé de manière fixe avec une paroi périphérique extérieure de l'élément annulaire élastique (2), le pilier intérieur de positionnement (11) étant inséré de manière fixe dans l'élément annulaire élastique (2), aussi bien le manchon extérieur (3) que l'élément annulaire élastique (2) étant munis d'un orifice (O) s'étendant dans un sens radial pour permettre au presse-étoupe extérieur (12) de pré-appuyer l'élément annulaire élastique (2) contre le pilier intérieur de positionnement (11) dans le sens radial au moyen du manchon extérieur (3), et

   - une bague d'usure (4) étant agencée entre le manchon extérieur (3) et le presse-étoupe extérieur (12), et la bague d'usure (4) étant munie d'un orifice (O) s'étendant dans le sens radial.

2. Dispositif de suspension et d'amortissement des vibrations selon la revendication 1, la bague d'usure (4) étant une bague d'usure non métallique (4).

3. Dispositif de suspension et d'amortissement des vibrations selon l'une quelconque des revendications 1 à 2, les orifices (O) étant au nombre de deux, et les deux orifices (O) étant bilatéralement symétriques par rapport à une ligne médiane longitudinale de l'élément annulaire élastique (2).

4. Dispositif de suspension et d'amortissement des vibrations selon la revendication 3, l'élément annulaire élastique (2) étant un élément annulaire élastique de forme conique (2).

5. Dispositif de suspension et d'amortissement des vibrations selon la revendication 3, l'élément annulaire élastique (2) comprenant une pluralité d'éléments élastiques (21) et une pluralité de bagues (22) qui sont superposés de manière alternée dans le sens radial et qui sont solidarisés de manière fixe, le pilier intérieur de positionnement (11) étant inséré de manière fixe dans une bague la plus intérieure (22), et le manchon extérieur (3) étant solidarisé de manière fixe avec un élément élastique le plus extérieur (21).

6. Véhicule ferroviaire comprenant un dispositif primaire de suspension, un deuxième dispositif de suspension et/ou un palier latéral élastique, chacun du dispositif primaire de suspension, du deuxième dispositif de suspension et du palier latéral élastique étant le dispositif de suspension et d'amortissement des vibrations selon l'une quelconque des revendications 1 à 5 ;

   - dans un cas où le dispositif de suspension et d'amortissement des vibrations fonctionne en tant que dispositif primaire de suspension, le couvercle supérieur (1) est conçu pour être solidarisé de manière fixe avec un cadre de bogie du véhicule ferroviaire, et le manchon extérieur (3) étant conçu pour être solidarisé de manière fixe avec une boîte d'essieux du véhicule ferroviaire ; ou
   - dans un cas où le dispositif de suspension et d'amortissement des vibrations fonctionne en tant que deuxième dispositif de suspension, le couvercle supérieur (1) est conçu pour être solidarisé de manière fixe avec un balancier transversal de bogie ou une traverse dormante du véhicule ferroviaire, et le manchon extérieur (3) est conçu pour être solidarisé de manière fixe avec le cadre de bogie du véhicule ferroviaire ; ou
   - dans un cas où le dispositif de suspension et d'amortissement des vibrations fonctionne en tant que palier latéral élastique, le couvercle supérieur (1) est conçu pour constituer un couple de fraction avec une plaque d'usure de palier latéral d'un corps de véhicule du véhicule ferroviaire, et le manchon extérieur (3) est conçu pour être solidarisé de manière fixe avec le balancier transversal de bogie du véhicule ferroviaire.

7. Véhicule ferroviaire selon la revendication 6, le couvercle supérieur (1) étant raccordé de manière amovible au cadre de bogie, au balancier transversal de bogie et/ou à la traverse dormante.

8. Véhicule ferroviaire selon la revendication 7, le couvercle supérieur (1) étant raccordé par ajustement serré au cadre de bogie, au balancier transversal de bogie et à la traverse dormante par le biais d'un pilier de raccordement et

d'un orifice de raccordement qui correspondent l'un à l'autre, l'un de soit le pilier de raccordement soit l'orifice de raccordement étant agencé sur le couvercle supérieur (1), et l'autre de soit le pilier de raccordement soit l'orifice de raccordement étant agencé sur le cadre de bogie, le balancier transversal et la traverse dormante.

9. Véhicule ferroviaire selon la revendication 7, le couvercle supérieur (1) étant solidarisé avec le cadre de bogie et le balancier transversal de bogie par un moyen de fixation, le couvercle supérieur (1) possédant une couronne de couvercle supérieur (14) qui est formée par une extension vers l'extérieur dans un sens horizontal, et la couronne de couvercle supérieur (14) étant pourvue d'un trou de fixation de couvercle supérieur (14o) conçu pour coopérer avec le moyen de fixation.

10. Véhicule ferroviaire selon la revendication 6, le manchon extérieur (3) étant raccordé de manière amovible à la boîte d'essieux, au cadre de bogie et au balancier transversal de bogie.

11. Véhicule ferroviaire selon la revendication 10, le manchon extérieur (3) étant raccordé par ajustement serré à un trou de raccordement à chacun de la boîte d'essieux, du cadre de bogie et du balancier transversal de bogie.

12. Véhicule ferroviaire selon la revendication 10, le manchon extérieur (3) étant solidarisé avec la boîte d'essieux, le cadre de bogie et le balancier transversal de bogie par un moyen de fixation, le manchon extérieur (3) possédant une couronne de manchon supérieur (31) qui est formée par une extension vers l'extérieur dans un sens horizontal, et la couronne de manchon extérieur (31) étant pourvue d'un trou de fixation de manchon extérieur (31o) conçu pour coopérer avec le moyen de fixation.

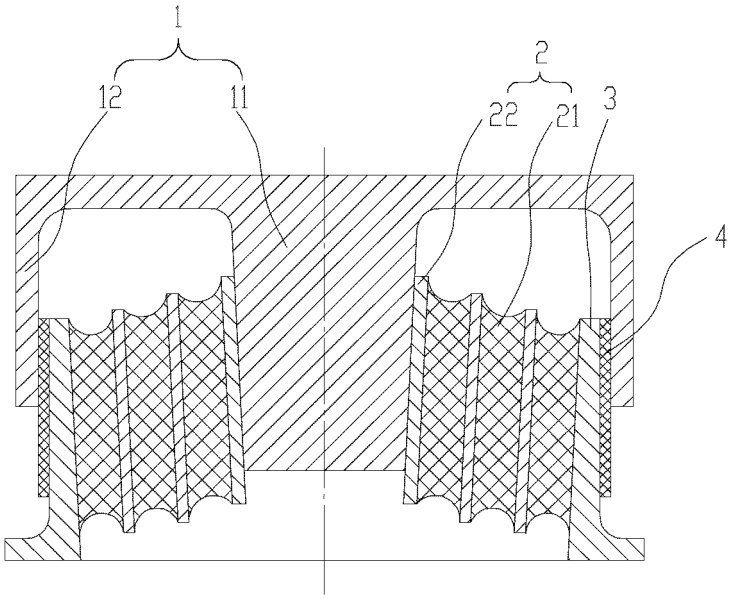
1
12
11
2
22
21
3
4

Fig. 1

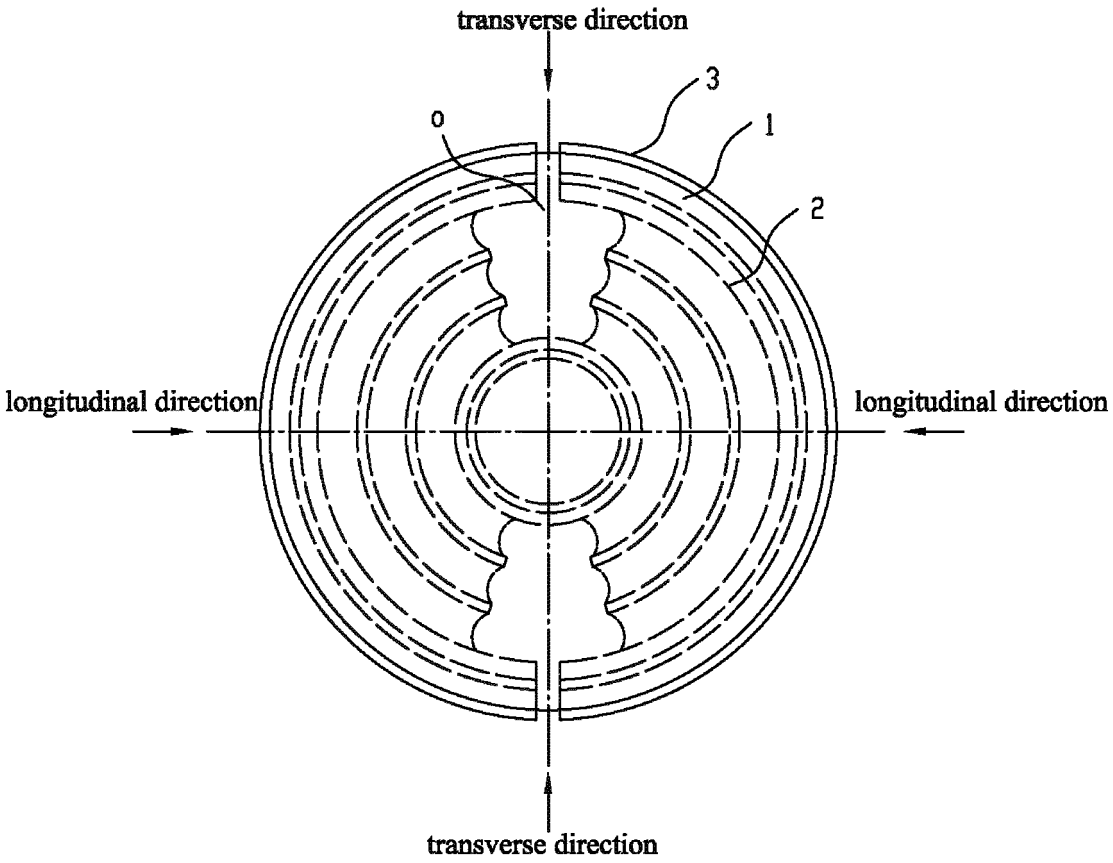
transverse direction
3
0
1
2
longitudinal direction
longitudinal direction
transverse direction

Fig. 2

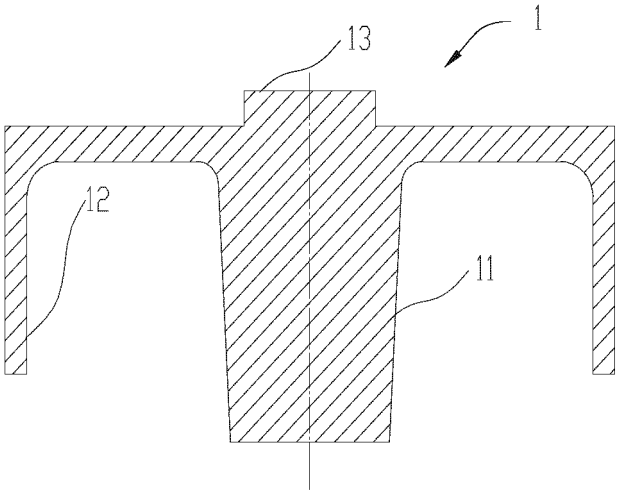

Fig. 3a

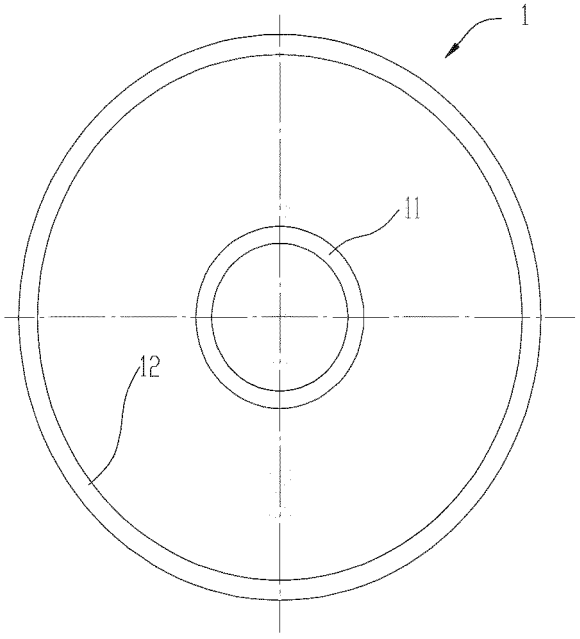

Fig. 3b

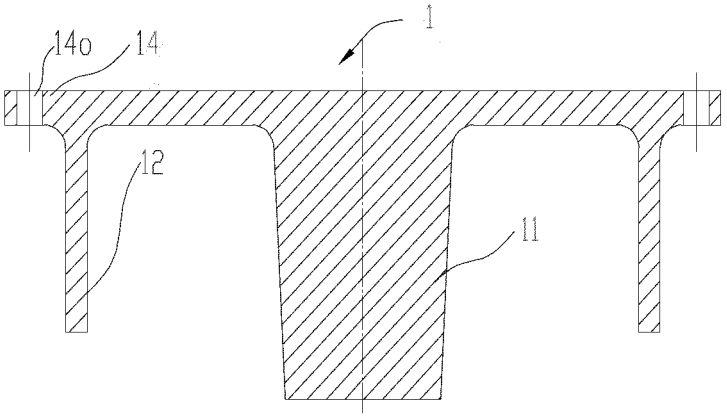

Fig. 4a

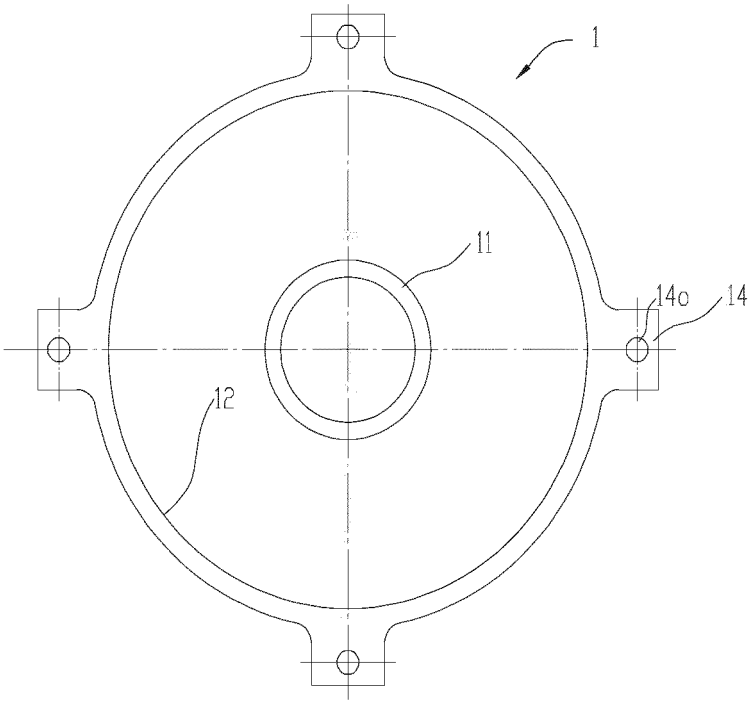

Fig. 4b

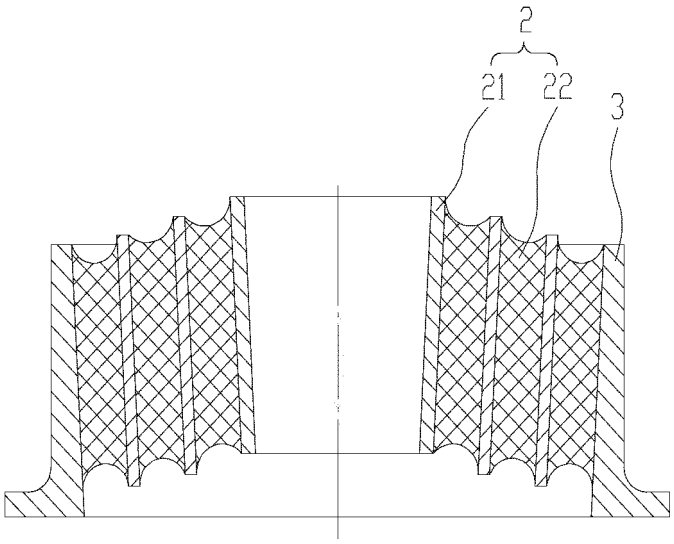

Fig. 5a

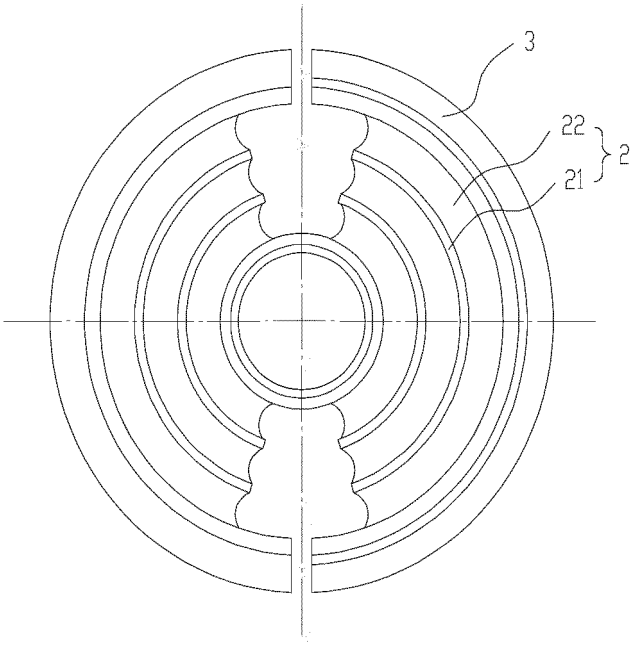

Fig. 5b

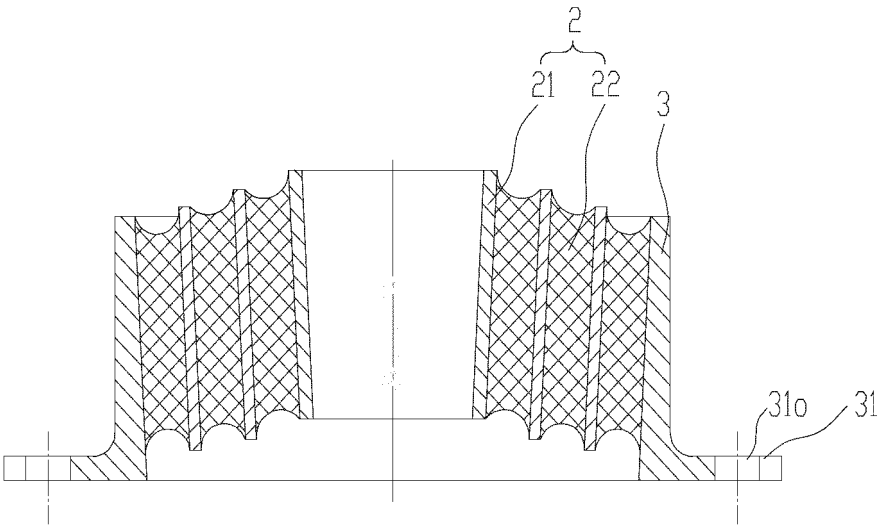

Fig. 6a

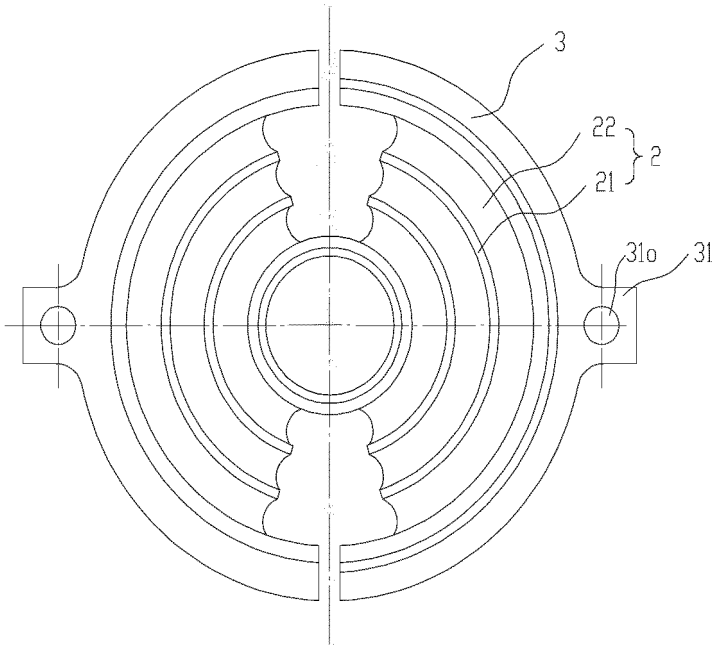

Fig. 6b

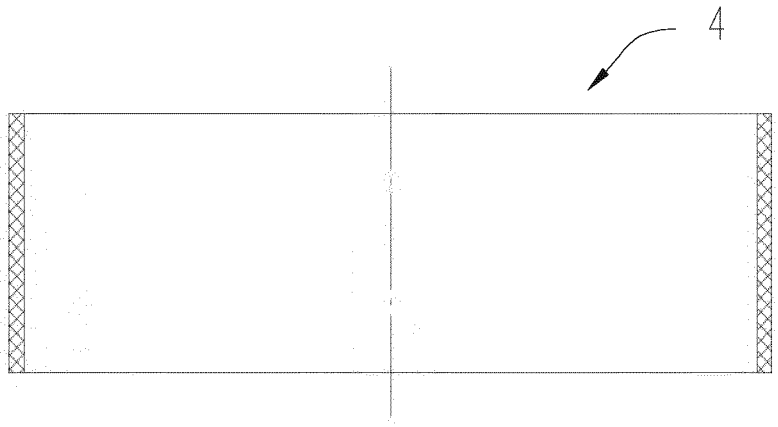

Fig. 7a

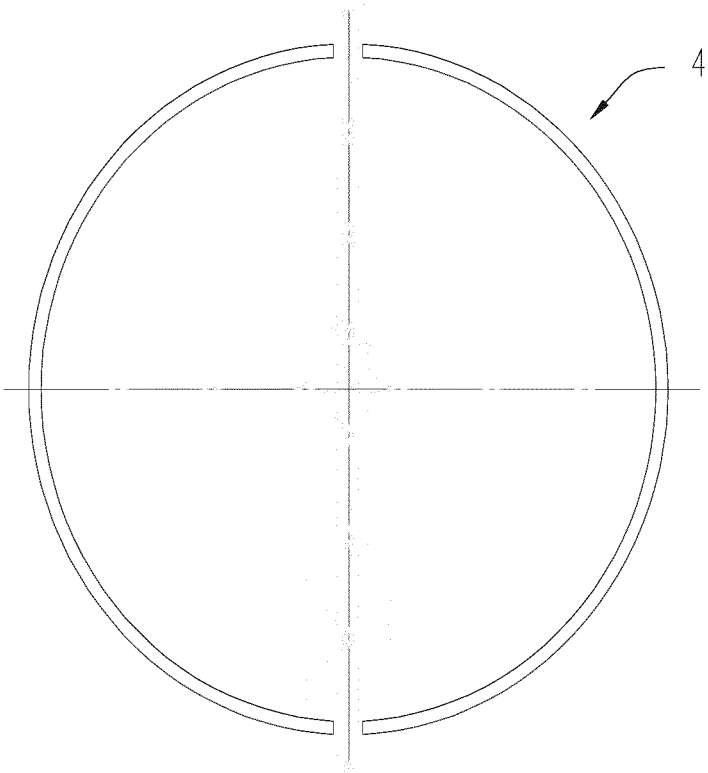

Fig. 7b

REFERENCES CITED IN THE DESCRIPTION

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