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Device for providing elastic support to the coupling shaft of the central buffer coupling in a railway vehicle

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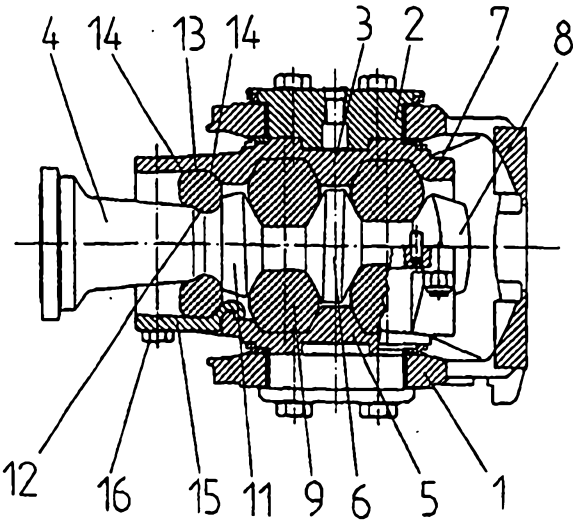
(54) Title: DEVICE FOR PROVIDING ELASTIC SUPPORT TO THE COUPLING SHAFT OF THE CENTRAL BUFFER COUPLING IN A RAILWAY VEHICLE

(54) Bezeichnung: VORRICHTUNG ZUM ELASTISCHEN ABSTÜTZEN DES KUPPLUNGSSCHAFTS EINER MITTELPUFFERKUPPLUNG AN EINEM SCHIENENFAHRZEUG

(57) Abstract

The invention relates to a device for providing elastic support to the coupling shaft (4) of the central buffer coupling in a railway vehicle. Said device comprises a spring device formed by rings (9) that are vertically and successively arranged at a reciprocal distance in the longitudinal direction of the coupling shaft. The prestressed rings (9) are retained in the ring torus (5, 6) of the coupling shaft (4) and the housing (3). In order to improve production and prestressing adjustment of the spring device, the coupling shaft (4) has a collar (11) on which the back ends of a prestressing ring (12) and the front ends of the ring (9) closest to the opening of the housing (3) are located, whereby the prestressing ring (12) prestresses the rings (9) in the longitudinal direction of the coupling shaft (4) when the device is in an unloaded position.



(57) Zusammenfassung

Die Erfindung betrifft eine Vorrichtung zum elastischen Abstützen des Kupplungsschafts (4) einer Mittelpufferkupplung an einem Schienenfahrzeug mit einem Federapparat, der durch mit gegenseitigem Abstand in Kupplungsschaftlängsrichtung hintereinander und vertikal angeordnete Ringe (9) gebildet ist. Die vorgespannten Ringe (9) sind in Ringwülsten (5, 6) des Kupplungsschafts (4) und des Gehäuses (3) gehalten. Um die Erzeugung und Einstellbarkeit der Vorspannung des Federapparats der Vorrichtung zu verbessern, weist der Kupplungsschaft (4) einen Bund (11) auf, gegen den einerseits ein Vorspannring (12) mit seiner hinteren Seite und andererseits der zur Öffnung des Gehäuses (3) nächstliegende Ring (9) mit dessen Vorderseite anliegt, wobei der Vorspannring (12) die Ringe (9) in unbelasteter Lage der Vorrichtung in Längsrichtung des Kupplungsschafts (4) vorspannt.

DEVICE FOR PROVIDING ELASTIC SUPPORT TO THE COUPLING SHAFT OF A CENTRAL BUFFER COUPLING IN A RAIL VEHICLE

The invention relates to a device for providing elastic support to the coupling shaft of a central buffer coupling in a rail vehicle.

Devices of this kind are known, for example, from DE 27 01 984 A1. In this device the coupling shaft is supported not only against the tensile and impact forces acting on the central buffer coupling in axial direction, but is also supported in vertical direction with respect to the rail vehicle. Moreover, the device comprises a housing that is open towards the central buffer coupling, and the axis of said housing extends in longitudinal direction of the vehicle. The coupling shaft protrudes coaxially into said opening of the housing at a radial distance from the inner peripheral surface of the housing. Prestressed, resilient rings made of an elastic material are placed between the peripheral surfaces of the coupling shaft and the inner peripheral surfaces of the housing. The central planes of the rings are arranged vertically and place at a distance to each other in longitudinal direction of the shaft. The rings are retained in the space between two adjacent toruses on the peripheral surface of the coupling shaft and the inner peripheral surface of the housing respectively. The housing and the coupling shaft as well as the rings have an oval cross-section, whose largest diameter is arranged in the horizontal centre plane of the housing and the coupling shaft. The housing is split in its horizontal centre plane into two shells, which are joined by detachable fastening means. The rings are split on at least one side in the horizontal centre plane of the housing, and each ring lies directly against the peripheral surface of the coupling shaft and against the inner peripheral surface of the housing. In the no-load condition of the device, that is, when no tensile or impact forces are acting on the device, the toruses of the coupling shaft are in alignment with the respective toruses of the housing.

In a device of this kind it is difficult to endow the elastic apparatus with a specific, reproducible prestress in terms of amount and direction.

Hence it is the object of the invention to improve the way the prestressing of the elastic apparatus of the above described device is achieved and adjusted.

According to one aspect of the invention, there is provided a device for providing elastic support to the coupling shaft of a central buffer coupling in a rail

vehicle, in which the coupling shaft is supported against tensile and/or impact forces acting on the central buffer coupling in the direction of its axis as well as in vertical direction with respect to the rail vehicle, with a housing attached to the rail vehicle and open towards the central buffer coupling, into which opening extends the coupling shaft coaxially with a radial distance to the inner peripheral surface of the housing, and with elastic rings made of a resilient material that are prestressed between the peripheral surface of the housing and which are oriented vertically with their central planes and are arranged successively in longitudinal direction of the coupling shaft at a certain distance to each other, in which toruses are formed successively on the inner peripheral surface of the housing in longitudinal direction of the coupling shaft at a certain distance to each other and in which the rings are retained in the spaces between two adjacent toruses with respect to the coupling shaft and the housing, in which the housing can be split, and in which each ring is pressed against the peripheral surface of the coupling shaft as well as the inner peripheral surface of the housing, and in which the toruses of the coupling shaft are in alignment with the respective toruses of the housing when the device is in no-load condition with regards to tensile and impact forces, characterised in that the coupling shaft features a collar against which presses a prestressing ring with its rear face as well as ring with its front face, which is the first ring after the opening, in which the prestressing ring prestresses the rings in the longitudinal direction of the coupling shaft when the device is in a no-load condition.

The invention is now explained in detail by way of the schematic drawings of two non-limiting exemplary embodiments.

Shown are in

Fig. 1 a longitudinal section of a device according to the invention in no-load condition,

Fig. 2 a section along line I-I in Fig. 1,

Fig. 3 a longitudinal section of a second exemplary embodiment of the invention in no-load condition, and

Fig. 4 a plan view of the device as per Fig. 3.

A support 1, which is fastened to a not depicted rail vehicle, is attached via tenon 2 to a housing 3, which coaxially surrounds, with a radial gap, a coupling shaft 4, which carries a central buffer coupling. Said coupling shaft 4 as well as housing 3 have preferably a circular cross-section or a cross-section with a long and a short axis, whose larger diameter is arranged in the horizontal centre plane of the housing or the coupling shaft respectively. The invention, however, can also be applied to devices of a similar type, where housing 3 and coupling shaft may have any other kind of cross-section.

The coupling shaft 4 as well as the inner periphery of housing 3 feature toruses 6 and 5 all around, which are aligned to each other in no-load condition. The ends 7 of housing 3 are drawn inwards, thus forming toruses 5 at the end sections, whereas the shoulders 8 of the coupling shaft 4, which are assigned to these ends, are shaped accordingly. The coupling shaft 4 is retained in the predetermined radial distance to housing 3 by way of rings 9, which are made of an elastic material, for example rubber or a synthetic material. Said rings 9 are

arranged vertical to the longitudinal axis of the vehicle and between the ends 7 or the shoulders 8 and the toruses 5 and 6.

To facilitate the installation of rings 9, housing 3 consists of two shells of the same shape that are detachably joined by means of bolts 10, and the rings 9 are split on one or both sides. Moreover, due to the rings 9 being slightly oversize, they can be prestressed during installation in vertical direction to the longitudinal coupling shaft axis by means of bolts 10. This provides a solid retention of the rings 9 between coupling shaft 4 and housing 3.

On the section pointing to the opening of the housing, the coupling shaft 4 features a collar 11. Against one side of said collar 11 rests a prestressing ring 12 with its rear face, and against the other side rests the first ring 9 closest to the housing opening with its front face. Said prestressing ring 12 applies an initial stress on the rings 9 in longitudinal direction of the coupling shaft when the device is in no-load condition.

The prestressing ring 9 is placed into a peripheral, through-shaped recess 13 of coupling shaft 4 and a similar recess 13 of housing 3. The recesses 13 have lead-in bevels 14, which retain prestressing ring 9 (roller ring).

The lead-in bevels 14 of housing 3 and/or coupling shaft 4 are less steep in the direction of the housing opening than the axially opposite lead-in bevels 14, which have a

maximum angle of 90° to the coupling shaft or which lead into collar 11.

The prestressing of the device by means of the prestressing ring 12 in longitudinal direction of the coupling shaft, that is, in the compression or impact direction, can be achieved in the same way as in the exemplary embodiment according to Fig. 1 and Fig. 2 by joining the sections of the split housing, usually by means of bolts 10.

A more exact and finer adjustment of the prestressing force in the device in longitudinal direction of the coupling shaft, that is, in the compression or impact direction, is possible in the design according to the second exemplary embodiment of the invention according to Fig. 3 and Fig. 4. In this exemplary embodiment the prestressing force in longitudinal direction of the coupling shaft 4 is achieved and adjusted via a compression element 15, which is fastened to and supported on the housing by means of bolts 16. The compression element 15 may feature an additional fine adjustment means (not depicted).

The device may be constructed with one or multiple rings 9 for applications with different load conditions.

The number of rings 9 and toruses 5 and 6 must be calculated in accordance with the expected forces. A greater number of rings 9 allows the application of greater forces.

As a tensile force is applied to coupling shaft 4, the prestressing ring 12 is drawn by collar 11, and the rings 9 are drawn by the toruses 6 of coupling shaft 4. Since prestressing ring 12 and the rings 9 are retained by housing 3, the rings 9, 12 are elastically deformed over the entire cross-section. However, the prestress in the prestressing ring 12 and in the rings 9 is first reduced by the amount of the tensile force.

The prestress force in longitudinal direction of coupling shaft 4, that is, the coupling shaft 4 is prestressed in thrust or impact direction, is greater than the maximum tensile force that occurs on coupling shaft 4 during operation. The result is that the device always remains under a certain amount of prestress even during tension/compression load changes. This leads to a more quiet, vibration-free rolling of rail vehicles that are coupled with these devices.

If impact forces are applied to coupling shaft 4, the rings 9, which are on the one hand pushed by the toruses 6 of coupling shaft 4 and, on the other hand, retained by the toruses 5 of housing 3, are elastically deformed over the entire cross-section, and the initial stress on the rings 9 is a thrust stress. As the load increases further, the thrust stress changes gradually into a compression stress since the rings 9 are increasingly compressed between two successive toruses 5 and 6, and the rings 9 are finally prevented from deforming any further. Thus a progressive spring characteristic is achieved. The prestressing ring 12 remains largely without load since the shallow lead-in bevels 14 provide an escape towards the side of the housing opening.

As a result of its weight and the weight of the central buffer coupling, the coupling shaft is subject to a downward moment. For a smooth coupling action, however, the coupling shaft must always be close to the horizontal centre. The prestressing ring 12 provides vertical support that acts in addition to the support provided by the rings 9. Due to the larger support basis, constructions with prestressing ring 12 are able to support longer coupling shafts 4 or greater weights without additional vertical support.

Reference number list

1	Support
2	Tenon 2
3	Housing
4	Coupling shaft
5	Torus
6	Torus
7	End
8	Shoulder
9	Ring
10	Bolt
11	Collar
12	Prestressing ring
13	Recess
14	Lead-in bevel
15	Compression element
16	Bolt

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Device for providing elastic support to the coupling shaft of a central buffer coupling in a rail vehicle, in which the coupling shaft is supported against tensile and/or impact forces acting on the central buffer coupling in the direction of its axis as well as in vertical direction with respect to the rail vehicle, with a housing attached to the rail vehicle and open towards the central buffer coupling, into which opening extends the coupling shaft coaxially with a radial distance to the inner peripheral surface of the housing, and with elastic rings made of a resilient material that are prestressed between the peripheral surface of the housing and which are oriented vertically with their central planes and are arranged successively in longitudinal direction of the coupling shaft at a certain distance to each other, in which toruses are formed successively on the inner peripheral surface of the housing in longitudinal direction of the coupling shaft at a certain distance to each other and in which the rings are retained in the spaces between two adjacent toruses with respect to the coupling shaft and the housing, in which the housing can be split, and in which each ring is pressed against the peripheral surface of the coupling shaft as well as the inner peripheral surface of the housing, and in which the toruses of the coupling shaft are in alignment with the respective toruses of the housing when the device is in no-load condition with regards to tensile and impact forces, characterised in that the coupling shaft features a collar against which presses a prestressing ring with its rear face as well as ring with its front face, which is the first ring after the opening, in which the prestressing ring prestresses the rings in the longitudinal direction of the coupling shaft when the device is in a no-load condition.

2. Device according to claim 1, characterised in that the prestressing ring prestresses the rings in compression or impact direction.

3. Device according to any one of the claims 1 or 2, characterised in that the amount of prestressing force is greater than the maximum tensile force that occurs during operation.

4. Device according to any one of the claims 1 to 3, characterized in that the prestressing ring is placed into a peripheral, trough-shaped recess of coupling shaft and similar recess of house.

5. Device according to claim 4, characterised in that the recesses feature lead-in bevels for the prestressing ring.

6. Device according to claim 5, characterised in that the lead-in bevel of housing is shallower in the direction of the housing opening than the opposite lead-in bevel.

7. Device according to any one of the claims 1 to 6, characterised in that the prestressing of the device in longitudinal direction of the coupling shaft is achieved by joining the parts of the split housing

8. Device according to any one of the claims 1 to 6, characterised in that the prestressing of the device in longitudinal direction of the coupling shaft is achieved by a compression element that is attached to and supported by housing.

9. Device according to claim 6, characterised in that the compression element features an adjustment facility for setting the prestress load.

10. Device according to any one of the claims 1 to 9, characterised in that the prestressing ring and/or the rings are split in at least one place.

11. Device according to claim 10, characterised in that the place or places where the prestressing ring and/or the rings are split, are arranged in the horizontal plane of the coupling shaft

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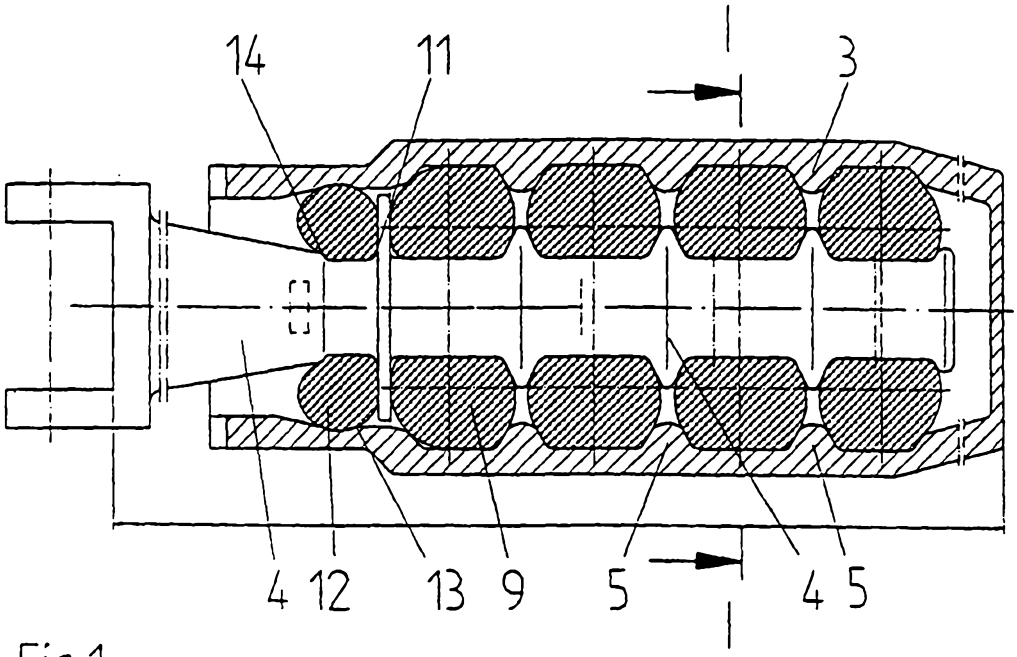

Fig.1

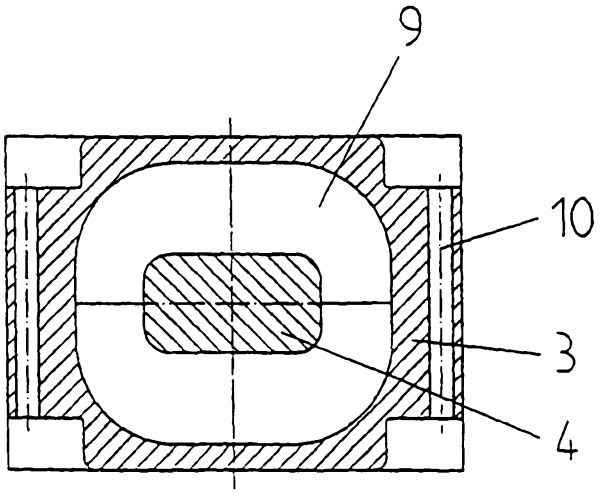

Fig.2

Fig.3

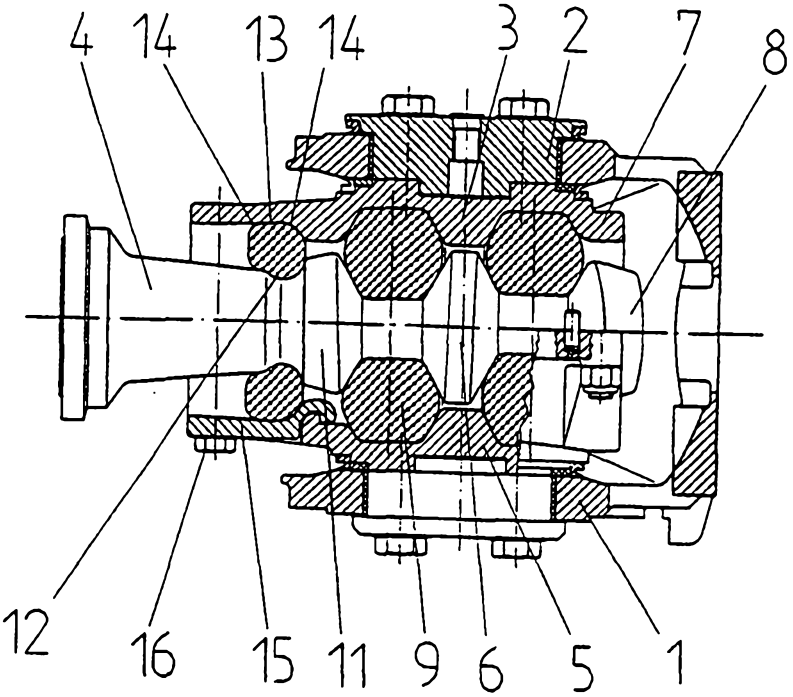

Fig.4