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(54) **Railway vehicle bogie**

Drehgestell für ein Schienenfahrzeug

Bogie de véhicule ferroviaire

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## Description

**[0001]** The present invention is related to railway vehicle bogies, of the type comprising a frame, two axles whose shafts are connected to the frame through respective journal boxes, a load bearing transom located above the center area of the frame and intended to be fixed to a railway vehicle body, resilient suspension means interposed between the center area of the frame and the load bearing transom, vertical shock absorber means and lateral shock absorber means operatively associated to said resilient suspension means, and hunting absorber means arranged substantially longitudinally at the opposite sides of the bogie.

**[0002]** Traditionally, in the railway vehicle bogies of the above-referenced type the hunting absorber means comprise, at each bogie side, a single damper interposed substantially horizontally, between the bogie frame and the corresponding end of the load bearing transom to be secured to the railway vehicle body.

**[0003]** This arrangement, besides involving huge amounts of energy to be dissipated, exhibits functional limits deriving from the fact that intervention of the hunting absorbers to avoid axle instability is indirect, since as previously explained these absorbers operate between the body and the bogie frame.

**[0004]** The object of the present invention is to overcome the above drawbacks, and to provide a railway vehicle bogie of the type defined at the beginning, having enhanced functional efficiency in connection to the damping of hunting instability, and thus providing improved dynamic behaviour.

**[0005]** A further object of the invention is to simplify the bogie construction, with particular reference to the arrangement of the vertical shock absorber means and/or of the lateral shock absorber means.

**[0006]** In order to achieve the above objects, the invention is directed to a railway vehicle bogie of the type set forth at the beginning, the main feature of which resides in that said hunting absorber means comprise, at each bogie side, a pair of symmetrically disposed telescopic dampers each having one end pivotally connected to the load bearing transom and the opposite end pivotally connected to the corresponding journal box of a respective axle.

**[0007]** By virtue of this idea of solution, the anti-hunting performance of the bogie according to the invention is remarkably enhanced, since the two pairs of hunting absorbers directly operate on the axles, thus avoiding that instability thereof be transmitted to the bogie frame and from the latter to the railway vehicle body. Improvement of the bogie stability is equivalent to a reduction of the hunting oscillation transmitted thereby to the body, thus resulting into a better travel comfort for the passengers of a railway vehicle equipped with bogies according to the invention. Moreover, the energy which has to be dissipated by the hunting absorbers is lower than in the case of the traditional bogies.

**[0008]** A further advantage of the arrangement according to the invention, which is particularly appreciable in the case of a railway vehicle not provided with a body tilt system for balancing the non-compensated centrifugal acceleration along a curve, resides in that the two pairs of hunting dampers apply steering forces onto the axles along the entry and exit sections of the curve.

**[0009]** According to a preferred embodiment of the invention, the telescopic hunting dampers of each pair are arranged obliquely: particularly, inclination thereof in the vertical plane is about 10-20°, conveniently between 12° and 15°, and inclination thereof in the horizontal plane is about 4-6°.

**[0010]** This arrangement, besides enhancing the said self-steering effect of the axles, additionally enables employing the two pairs of hunting dampers possibly even for integrating or replacing the vertical shock absorber function and/or the lateral shock absorber function. At the best, the vertical shock absorbers and/or the lateral shock absorbers provided in the traditional railway vehicle bogies may be suppressed, thus achieving evident advantages in terms of construction simplicity and weight, encumbrance and cost reduction.

**[0011]** The invention will now be disclosed in detail with reference to the accompanying drawings, purely provided by way of non limiting example, in which:

- figure 1 is a diagrammatic lateral elevational view of a railway vehicle bogie according to a first embodiment of the invention,
- figure 2 is a plan view from above of figure 1,
- figure 3 is a view same as figure 1 showing a second embodiment of the railway vehicle bogie according to the invention, and
- figure 4 is a plan view from the above of figure 3.

**[0012]** Referring initially to figures 1 and 2, a bogie for railway vehicles according to the invention comprises a frame 1 formed by two longitudinal members 2, 3 connected by two transverse members 4, 5 and carrying, near to the respective ends, two axles 6, 7. Each axle 6, 7 is comprised in a conventional way of a shaft 8, 9 supporting a pair of wheels 10, 11 and the ends of which are connected to the longitudinal members 2, 3 of the frame 1 through respective journal boxes 12, 13 of a conventional type.

**[0013]** Primary suspension members also of a conventional type, generally designated as 14, 15 in figure 1, are provided between the frame 1 of the bogie and the axles 6, 7.

**[0014]** Reference numeral 16 indicates a load bearing transom arranged above the center area of the frame 1, parallelly to the transverse members 4, 5, which is intended to be rigidly secured to the floor of a railway vehicle body. Between the load bearing transom 16 and the frame 1 secondary vertical and lateral suspension springs 17 are interposed, also in a conventional fash-

ion, through which the necessary rotations of the bogie relative to the body around a vertical axis are also enabled.

**[0015]** In the example shown in figure 1, the bogie is also equipped with vertical shock absorbers 18 arranged at one side of the suspension springs 17 between the center areas of the longitudinal members 2, 3 and the load bearing transom 16, and with lateral shock absorbers 19 located transversally with one end thereof articulated to a respective longitudinal member 2, 3 and the opposite end thereof intended to be articulated to a corresponding attachment element fixed to the floor of the railway vehicle body. In figure 2, reference numerals 20 diagrammatically designate two linear, normally hydraulic actuators arranged transversally and included in an active lateral suspension system operating, in a way known per se, when the railway vehicle is travelling along a curve. The bogie may further be equipped with a tilt system of the body around its longitudinal axis, also known per se, acting to balance the non-compensated centrifugal force along a curve.

**[0016]** The bogie is provided with a hunting absorbing system which, according to the invention, comprises two pairs of juxtaposed telescopic dampers 21, 22 arranged at the opposite sides of the frame 1. Namely, each hunting damper 21, 22 has one end pivotally connected to a bracket 23, 24 fixedly secured to the journal box 12, 13 of a corresponding axle 6, 7, and the other end pivotally connected to the load bearing transom 16. In the example shown in figures 1 and 2, each end of the transom 16 is lowerly provided with a central attachment element 25, 26 for the pivoted connection of the corresponding hunting dampers 21 and 22, respectively.

**[0017]** The dampers 21 and 22 of each pairs are arranged obliquely both in the vertical plane and in the horizontal plane. As depicted in figure 1, inclination thereof in the vertical plane is about 10-20°, and preferably between 12° and 15°. As shown in figure 2, inclination in the horizontal plane is about 4-6°.

**[0018]** By virtue of the above disclosed arrangement of the hunting dampers 21 and 22, the bogie according to the invention exhibits a remarkable improved dynamic performance. More particularly, the following advantages are achieved:

- higher bogie stabilization efficiency, due to direct intervention of the dampers 21, 22 on the hunting oscillation motion of the axles 6, 7. This enables both to reduce the energy to be dissipated, and to increase the intervention speed and damping efficiency as compared with the conventional construction in which the hunting absorbers are interposed between the vehicle body and the frame of the bogie;
- the symmetry in the vertical plane determines cancellation of the vertical forces related to the movements in the horizontal plane, and consequently vertical vibration excitation of the vehicle body is prevented;

- in the case of standard vehicles (i.e. without body tilt system), steering forces on the axles 6, 7 are applied when running entry and exit curve sections.

**[0019]** A further and remarkable advantage which may be achieved through the invention consists of that the dampers 21, 22 can provide, in addition to the anti-hunting function, the task of vertical shock absorbers and/or lateral shock absorbers.

**[0020]** Figures 3 and 4 show a second embodiment of the invention, in which the vertical and lateral shock absorbers 18 and 19 of the previously disclosed embodiment are suppressed, and the function thereof is performed by the two pairs of dampers 21, 22. In figures 2 and 3, in which parts which are identical or similar to those previously disclosed with reference to figures 1 and 2 are designated by the same reference numerals, the dampers 21 and 22 have an inclination in the vertical plane which is greater than in the first embodiment: this is achieved by shifting the positioning of the pivotal connections of these dampers 21, 22 with respect to the load bearing transom 16, closer to the axles 6, 7, i.e. in correspondence of attachment members 27, 28 located near to the front and rear edges of the load bearing transom 16.

**[0021]** Naturally intermediate configurations between the arrangement depicted in figures 1 and 2 and the construction shown in figures 3 and 4 can be envisaged, wherein only the vertical shock absorbers 18 or only the lateral shock absorbers 19 are suppressed. In such a case the dampers 21, 22 will perform, further to the specific anti-hunting function, also only the shock absorbing function in the vertical plane or only the shock absorbing function in the horizontal plane, respectively.

**[0022]** Naturally the details of construction and the embodiments may be widely varied with respect to what has been disclosed and illustrated, without thereby departing from the scope of the present invention, such as defined in the appended claims.

## Claims

1. A railway vehicle bogie including a frame (1), two axles (6, 7) whose shafts (8, 9) are connected to the frame (1) through respective journal boxes (12, 13), a load bearing transom (16) located above the center area of the frame (1) and intended to be fixed to a railway vehicle body, resilient suspension means (17) interposed between said center area of the frame (1) and said load bearing transom (16), vertical shock absorber means (18) and lateral shock absorber means (19) operatively associated to said resilient suspension means (17), and hunting absorber means (21, 22) arranged substantially longitudinally at the opposite sides of the bogie, characterized in that said hunting absorber means comprise at each bogie side, a pair of symmetrically dis-

posed telescopic dampers (21, 22) each having one end pivotally connected to said load bearing transom (16) and the opposite end pivotally connected to the corresponding journal box (12, 13) of a respective axle (8, 9).

2. Bogie according to claim 1, characterized in that the telescopic hunting dampers (21, 22) of each pair are arranged obliquely.
3. Bogie according to claim 2, characterized in that the telescopic hunting dampers (21, 22) of each pair are inclined in the vertical plane of about 10-20°, preferably between 12° and 15°.
4. Bogie according to claim 2, characterized in that the hunting telescopic dampers (21, 22) of each pair are inclined in the horizontal plane of about 4-6°.
5. Bogie according to any of claims 1 through 4, characterized in that said telescopic hunting dampers (21, 22) also constitute said vertical shock absorber mean.
6. Bogie according to any of claims 1 through 4, characterized in that said telescopic hunting dampers (21, 22) also constitute said lateral shock absorber means.

#### Patentansprüche

1. Schienenfahrzeugdrehgestell, einschließend einen Rahmen (1), zwei Achsen (6,7), deren Wellen (8,9) jeweils durch die entsprechenden Achslager (12,13) mit dem Rahmen (1) verbunden sind, einen tragenden Querträger (16), befindlich über dem Mittelbereich des Rahmens (1) und dazu gedacht, an einem Schienenfahrzeugwagenkasten befestigt zu werden, federnden Aufhängungsmitteln (17), eingefügt zwischen dem Mittelbereich des Rahmens (1) und dem tragenden Querträger (16), Dämpfungsmittel für senkrechte Stöße (18) und Dämpfungsmittel für seitliche Stöße (19), funktional verbunden mit den federnden Aufhängungsmitteln (17) und an den gegenüberliegenden Seiten des Drehgestells im wesentlichen längs angeordnete Schwingungsdämpfungsmittel (21,22), dadurch gekennzeichnet, dass die Schwingungsdämpfungsmittel an jeder Drehgestellseite ein Paar symmetrisch angeordnete Teleskopdämpfer (21,22) umfasst, wobei jeder an einem Ende mit dem tragenden Querträger (16) und an dem gegenüberliegenden Ende mit dem entsprechenden Achslager (12,13) der jeweiligen Achse (6,7) schwenkbar verbunden ist.
2. Drehgestell nach Anspruch 1, dadurch gekenn-

zeichnet, dass die Teleskop-schwingungsdämpfer (21,22) jedes Paares geneigt angeordnet sind.

3. Drehgestell nach Anspruch 2, dadurch gekennzeichnet, dass die Teleskop-schwingungsdämpfer (21,22) jedes Paares in der senkrechten Ebene um etwa 10-20°, vorzugsweise zwischen 12° und 15° geneigt sind.
4. Drehgestell nach Anspruch 2, dadurch gekennzeichnet, dass die Teleskop-schwingungsdämpfer (21,22) jedes Paares in der horizontalen Ebene um etwa 4-6° geneigt sind.
5. Drehgestell gemäß einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass die Teleskop-schwingungsdämpfer (21,22) auch das Dämpfungsmittel für senkrechte Stöße bilden.
6. Drehgestell gemäß einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass die Teleskop-schwingungsdämpfer (21,22) auch das Dämpfungsmittel für seitliche Stöße bilden.

#### Revendications

1. Bogie de véhicule ferroviaire comprenant un châssis (1), deux essieux (6, 7) dont les arbres (8, 9) sont reliés au châssis (1) par l'intermédiaire de boîtes d'essieu (12, 13) respectives, une traverse de support de charge (16) située au-dessus de la zone centrale du châssis (1) et prévue pour être fixée sur une caisse de véhicule ferroviaire, des moyens de suspension élastique (17) interposés entre ladite zone centrale du châssis (1) et ladite traverse de support de charge (16), des moyens d'amortissement vertical (18) et des moyens d'amortissement latéral (19) associés de manière opérationnelle aux dits moyens de suspension élastique (17), et des moyens d'amortissement de lacet (21, 22) disposés sensiblement longitudinalement au niveau des côtés opposés du bogie, caractérisé en ce que lesdits moyens d'amortissement de lacet comportent au niveau de chaque côté de bogie une paire d'amortisseurs télescopiques disposés de manière symétrique (21, 22) ayant chacun une extrémité reliée de façon pivotante à ladite traverse de support de charge (16) et l'extrémité opposée reliée de façon pivotante à la boîte d'essieu correspondante (12, 13) d'un essieu respectif (8, 9).
2. Bogie selon la revendication 1, caractérisé en ce que les amortisseurs de lacet télescopiques (21, 22) de chaque paire sont disposés en oblique.
3. Bogie selon la revendication 2, caractérisé en ce que les amortisseurs de lacet télescopiques (21,

22) de chaque paire sont inclinés dans le plan vertical d'environ 10 à 20°, de préférence entre 12° et 15°.

4. Bogie selon la revendication 2, caractérisé en ce que les amortisseurs de lacet télescopiques (21, 22) de chaque paire sont inclinés dans le plan horizontal d'environ 4 à 6°. 5
5. Bogie selon l'une quelconque des revendications 1 à 4, caractérisé en ce que lesdits amortisseurs de lacet télescopiques (21, 22) constituent également lesdits moyens d'amortissement vertical. 10
6. Bogie selon l'une quelconque des revendications 1 à 4, caractérisé en ce que lesdits amortisseurs de lacet télescopiques (21, 22) constituent également lesdits moyens d'amortissement latéral. 15

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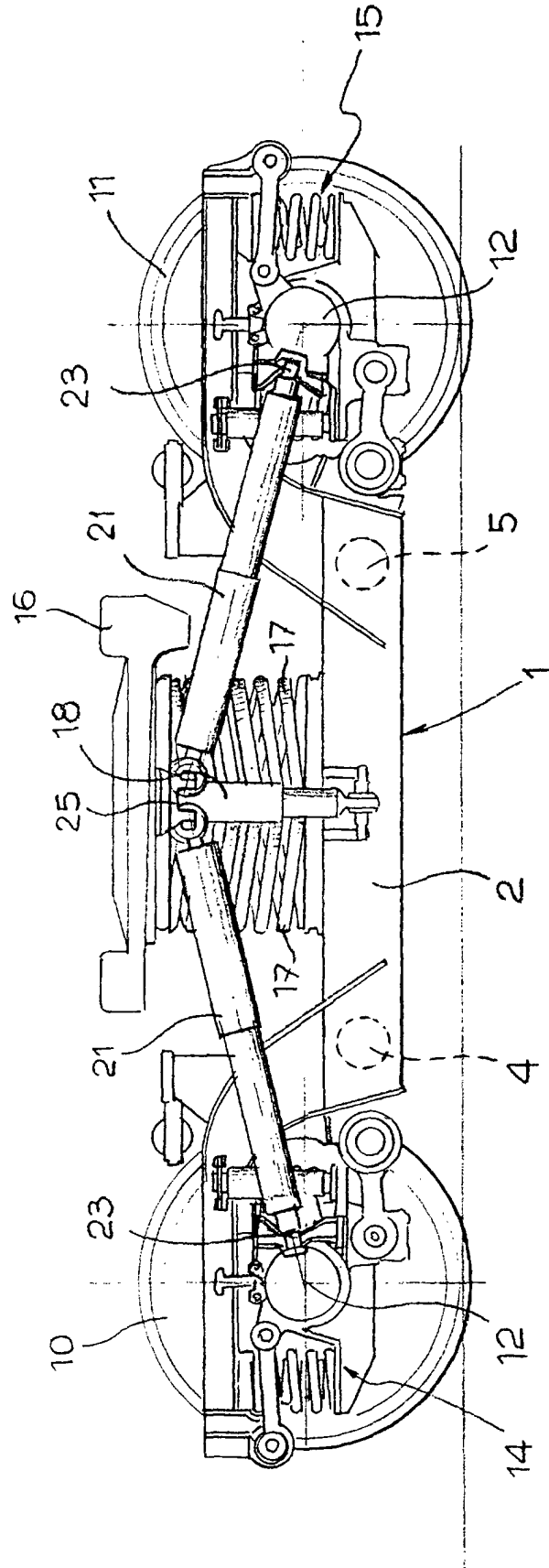
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FIG. 1



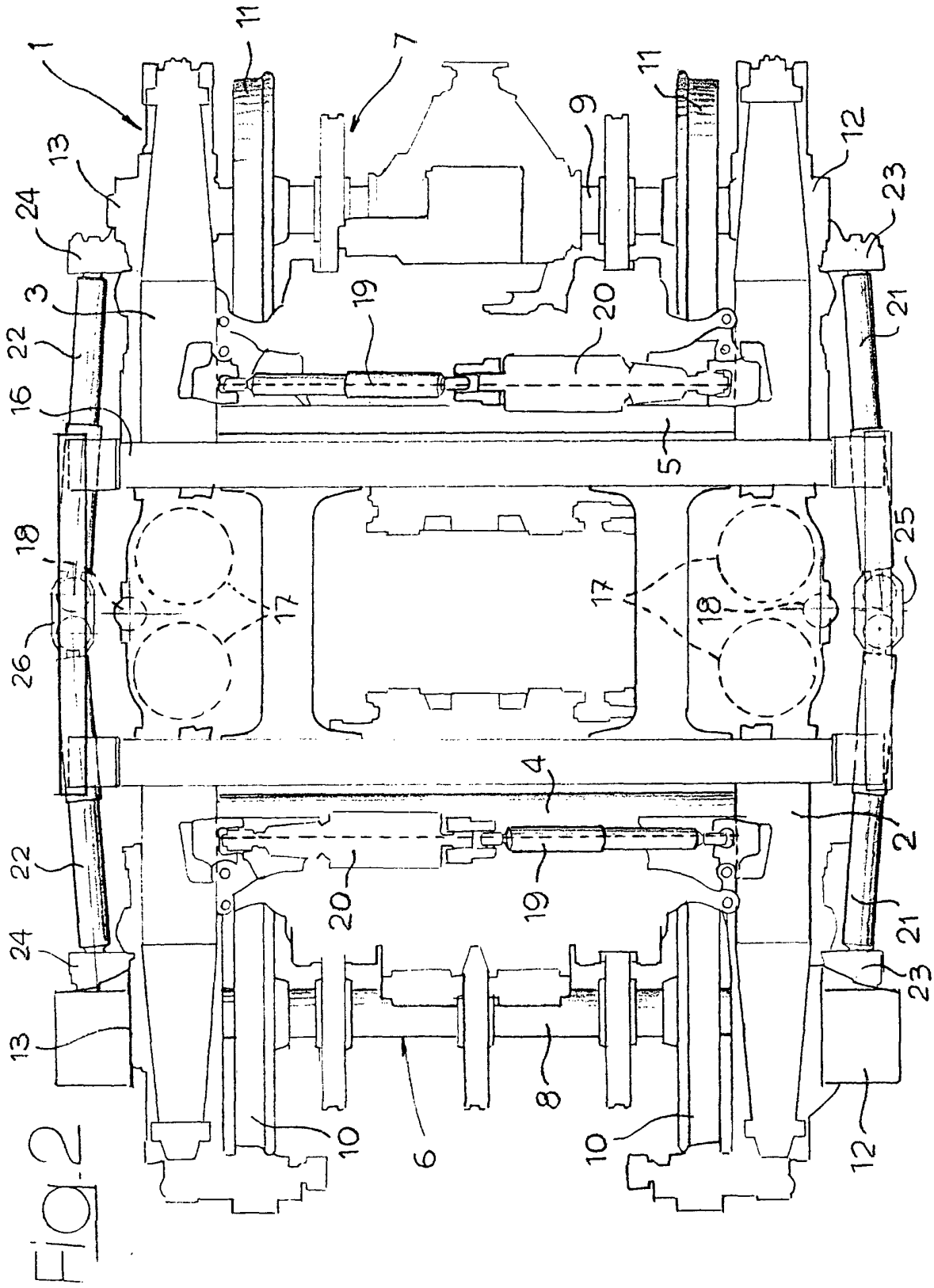


FIG. 3

