(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 088 049 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.08.2009 Bulletin 2009/33

(51) Int Cl.:
B61F 5/04 *(2006.01)*

(21) Application number: **09466002.4**

(22) Date of filing: **23.01.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(30) Priority: **06.02.2008 CZ 20080069**

(71) Applicant: **VÚKV a.s.**
158 00 Praha 5 (CZ)

(72) Inventors:
- **Zelingr, Milos**
  16300 Praha 6 (CZ)
- **Kural, Jan**
  11000 Praha 1 (CZ)
- **Malinský, Jan**
  14000 Praha 4 (CZ)
- **Musil, Jan**
  43201 Most (CZ)

(74) Representative: **Loskotová, Jarmila**
K Závetinám 727
155 00 Praha 5 (CZ)

(54) **Device for connecting the bogie of a railway vehicle to the bolster or to the vehicle underframe**

(57) A device for longitudinal guiding of mutually spring-loaded parts of a rail vehicle, consisting of a bogie frame (R) and a bogie bolster (K) or the coach bottom, with a longitudinal rod (1), connecting the mutually spring-loaded parts of the vehicle by means of cross-pin joints (4) and two brackets (6,7) respectively attached to the bogie frame (R) and to the bolster (K) or the coach bottom, the longitudinal draw rod (1) being provided with forks (2) at both ends in which two friction or anti-friction bearings (3) are embedded with their outer rings, their inner rings being embedded on two pins of the cross-pin joint (4); two further friction or anti-friction bearings (5) being embedded by their inner rings on the other two pins of the cross-pin joint (4) and the bearings (5) being also embedded on one of the brackets (6,7) with their outer rings.

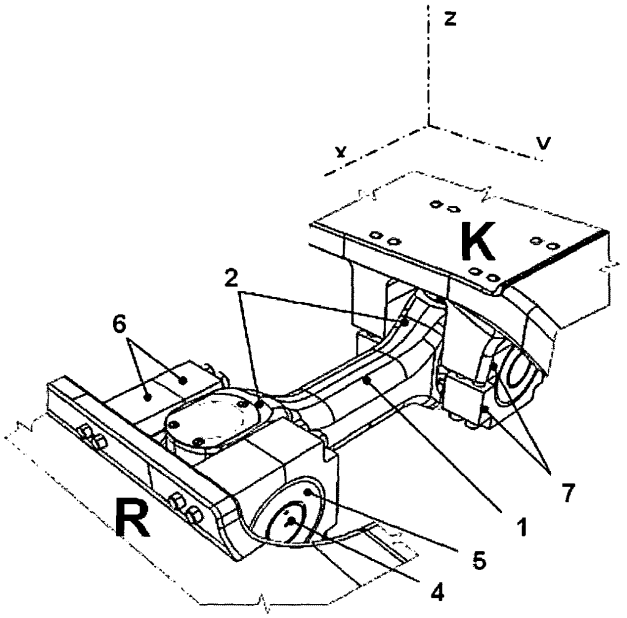

Fig. 3

EP 2 088 049 A2

Description

The Technical Field

[0001] The invention deals with guiding and stabilizing of mutually spring-loaded parts of rail vehicles, particularly low-deck ones.

The Prior Art

[0002] Current bogies of rail vehicles use mutually spring-loaded parts, for example a bogie bolster and a bogie frame or a coach body bottom and a bogie frame, which are mutually spring loaded by means of secondary springing, equipped with guiding for transfer of longitudinal - tracking and braking forces. This guiding may be arranged as a longitudinal draw rod or a pair of draw rods, that have to transfer all longitudinal forces acting between the mutually spring-loaded parts of the bogie and they also have to enable the mutually spring-loaded parts of the bogie to perform vertical and transversal movement necessary for achievement of acceptable driving properties of the vehicle. The longitudinal rods are arranged in horizontal or slightly oblique direction, in horizontal projection they are parallel with the vehicle main axis, while the position slightly changes according to the mutual position of the spring-loaded parts. The rods T on Fig. 1 are usually attached to the mutually spring-loaded parts of the bogie by ball or rubber-metallic joints KL, which enable mutual vertical and transversal movement of the mutually spring-loaded parts. The longitudinal draw rods arranged this way are only able to transfer longitudinal forces in the direction given by the rod longitudinal axis thanks to the flexibility of the ball or rubber-metallic joints, i.e. tensile and pressure forces in terms of stress.

[0003] Side tilt - coach body rocking is one of the parameters influencing driving properties of a vehicle. Its size not only affects operation quality, but it is also an important parameter from the point of view of meeting the requirements of the regulations for meeting the structure clearance. The vehicle rocking extension is particularly influenced by the parameters of vehicle secondary springing. The requirements for springing - stroke, own frequency, space for secondary springing embedment might however be in contrast to the secondary springing function as a limiter of stabilizer - rocking. This is why secondary springing is complemented with a rocking stabilizer, see Fig. 2, usually arranged as a torsion torque arm embedded in two bearings L on one of the mutually spring-loaded parts of the vehicle, while the arm is provided with arms on both ends, usually connected with the other mutually spring-loaded part by two draw rods TS. During vertical movement in the secondary springing both the ends of the stabilizer turn in the same direction and the whole stabilizer turns in the bearings. When the vehicle is rocking each end of the stabilizer tend to turn in the opposite direction, causing torsion strain of the rod, which limits the rocking.

[0004] Modern vehicles, particularly low-deck ones have limited space in the bogie, so the common arrangement of longitudinal draw rods connecting the mutually spring-loaded parts, for example a bolster and a frame of the bogie and the rocking stabilizer may be difficult to implement from this point of view. The usual stabilizer solution moreover demands space and is weighty, manufacturing of torque arm is complicated and thus expensive.

The Nature of Invention

[0005] The above drawbacks are solved by the device - longitudinal draw rod for longitudinal guidance of mutually spring-loaded parts of a rail vehicle based on the fact that it connects the mutually spring-loaded parts of the vehicle, a bogie frame and a bolster or the coach bottom by means of cross-pin joints and brackets attached to the bogie frame and to the bolster or the coach bottom. The new design and arrangement of the longitudinal rod is not only useful for transfer of longitudinal forces, but also for transfer of torque stabilizing rocking of a moving coach.

[0006] The longitudinal rod is provided with forks at both ends. There are two friction or anti-friction bearings embedded in the forks by their outer rings while their inner rings are attached on two pins of the cross-pin joint, while two more friction or anti-friction bearings are attached with their inner rings on the other two pins of the cross-pin joint and their outer rings are embedded in brackets arranged on the opposite mutually spring-loaded parts of the vehicle, to the bogie frame and to the bolster or the coach bottom.

[0007] The cross-pin joints transfer the torque necessary for limitation of the side tilt or rocking of the moving vehicle, and they also transfer the longitudinal forces between the mutually spring-loaded parts of the coach and enable the mutually spring-loaded parts of the coach to perform mutual vertical and transversal movement.

[0008] There must be an element enabling side tilt or rocking of the coach body to the appropriate extent, included in the longitudinal draw rod arranged this way.

[0009] The central part of the longitudinal rod between the forks with the cross-pin joints, which is designed as a torque arm, which enables limited rocking of the bolster and thus the vehicle body thanks to its flexibility, may serve as such a member.

[0010] Alternatively a torsionally loaded cylindrical rubber-metallic insert may be integrated in the longitudinal rod, where the longitudinal rod with the forks for embedment of the cross-pin joints at each end have the central part consisting of two coaxial cylindrical parts, each of which is connected to one fork, and there is a rubber insert arranged, for example pressed or vulcanized between the coaxial cylindrical parts, which provides torsion plasticity of the longitudinal rod, which enables limitation of rocking of the bolster or coach bottom and thus also the vehicle body.

[0011] Some of the bearings of the cross-pin joints may alternatively be made as elastic rubber-metal springs.

Outline of the Figures in Drawing

[0012] The invention is presented in more detail in the attached drawing, where fig. 1 shows usual design of the longitudinal rod in axonometric projection, fig. 2 shows usual design of the rocking stabilizer in axonometric projection, fig. 3 shows the new design of the longitudinal rod in axonometric projection, fig. 4 shows a cross section through the central part of the new longitudinal rod with the rubber insert and fig. 5 shows a cross section through the cross-pin joint with the rubber-metallic springs.

Example Version of the Invention

[0013] The device for longitudinal guiding of mutually spring-loaded parts of a rail vehicle illustrated in the example embodiment in figures. 3, 4 and 5, consists of a draw rod 1 , connecting mutually spring-loaded parts of a vehicle, a bogie frame R and a bolster K or a coach bottom by means of cross-pin joints /4/ and split clam brackets /6/ and /7/, which are attached to the bogie frame /R/ and to the bolster /K/ or to the coach bottom.

[0014] The longitudinal draw rod 1 is provided with forks 2 at both ends, in which there are two friction or anti-friction bearings 3 impressed with their outer rings. During movement of the bolster K in relation to the bogie frame R in the y axis direction the bearings 3 turn around their common axis. The bearings 3 are pressed with their inner rings on two pins of a cross-pin joint 4. Two more friction or anti-friction bearings 5 are impressed with their inner rings on the other two pins of the cross-pin joint 4 and their outer rings are embedded in split clam brackets 6, and 7, which are arranged on the opposite mutually spring-loaded parts of the vehicle, i.e. to the bogie frame R and to the bolster 7 or to the bogie frame R and to the coach bottom. During movement of the bolster K in relation to the bogie frame R in the z axis direction the bearings 5 turn around their common axis.

[0015] In another embodiment of the longitudinal draw rod 1 at least one part of the bearings 3 or 5 in each rod 1 is designed as an elastic rubber-metallic spring 3a or 5a. This couple of bearings, rubber-metallic springs then enables the appropriate movement of the bolster K in relation to the bogie frame R thanks to torsion deformation of the rubber layer between the inner and outer cases of these cylindrical springs - bearings 3a or 5a. The pair of springs also enables limited rotary movement of the bolster K in relation to the bogie frame R around the x axis, which stabilizes the bolster and thus also the vehicle body against rocking

Industrial Applicability

[0016] The longitudinal draw rods according to the invention are applicable to rail vehicles, particularly to the low-deck ones.

Claims

1. The device for longitudinal guiding of mutually spring-loaded parts of a rail vehicle, **characterized by** the fact that the mutually spring-loaded parts of the vehicle, a bogie frame (R) and a bogie bolster (K) or the coach bottom are mutually connected by at least one longitudinal draw rod (1) by means of cross-pin joints (7) and brackets (6) and (7), while the brackets (6) are arranged on the bogie frame (R) and the brackets (7) are arranged on the bolster (K) or on the coach bottom.

2. The device according to claim 1., **characterized by** the fact that the draw rod (1) is provided with forks (2) at both the ends, in which there are two friction or anti-friction bearings (3) embedded with their outer rings, while the bearings (3) are embedded on two pins of the cross-pin joint (4) with their inner rings, and there are two more friction or anti-friction bearings (5) embedded by their inner rings on the other two pins of the cross-pin joint (4) and the bearings (5) are also embedded in the brackets (6) or (7) with their outer rings.

3. The device according to claims 1 and 2, **characterized by** the fact that the brackets (6) and/or (7) are designed as non split and are mounted to the mutually spring-loaded parts of the vehicle, the bogie frame (R) and the bogie bolster (K).

4. The device according to claims 1, 2 and 3, **characterized by** the fact that at least one couple of the bearings (3) and (5) are designed as flexible rubber-metallic springs_(3a), (5a).

5. The device according to claims 1, 2, 3 and 4, **characterized by** the fact that the central part of the longitudinal draw rod (1) between the forks (2) is designed as a torque bar, whose elasticity enables limited rocking of the bolster and thus of the coach body.

6. The device according to claims 1, 2, 3 and 4, **characterized by** the fact that the central part of the longitudinal draw rod (1) consists of an inner coaxial cylindrical part (8) and an outer coaxial cylindrical part (9), each of which is connected to one fork (2), of the rod (1) and a rubber insert (10) is arranged between the coaxial cylindrical parts (8), (9), providing torsion plasticity of the longitudinal draw rod (1), which enables limited rocking of the bolster (K) and thus also of the vehicle body.

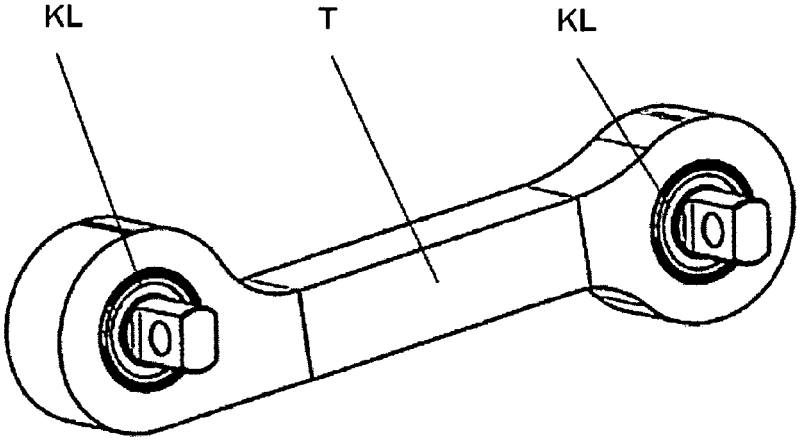

Fig. 1

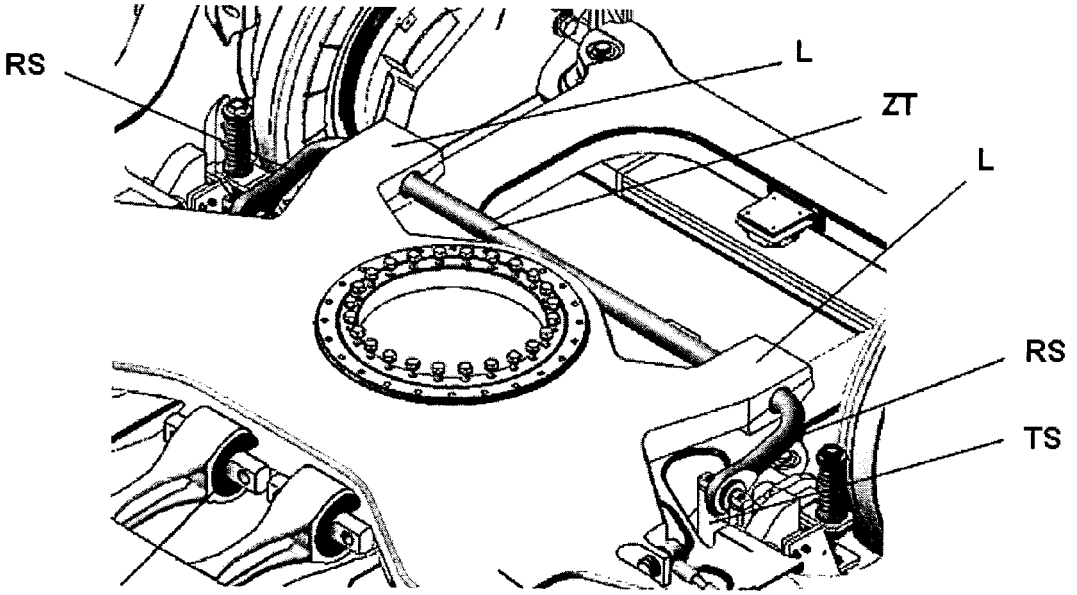

Fig. 2

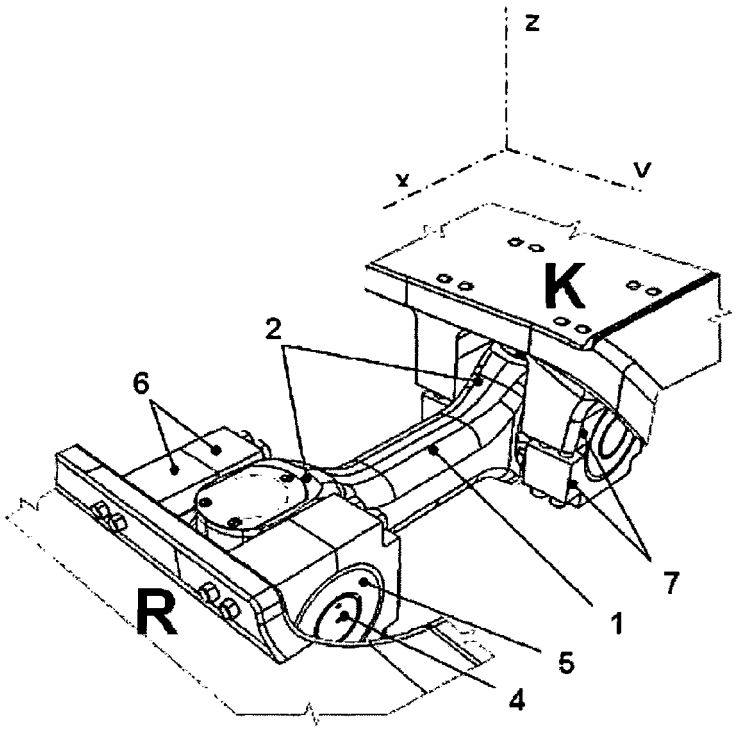

Fig. 3

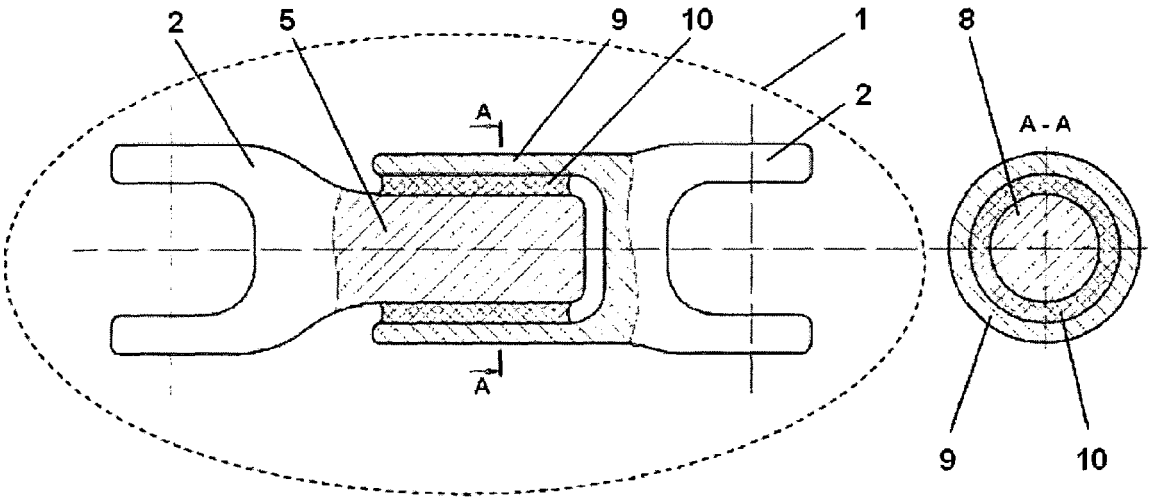

Fig. 4

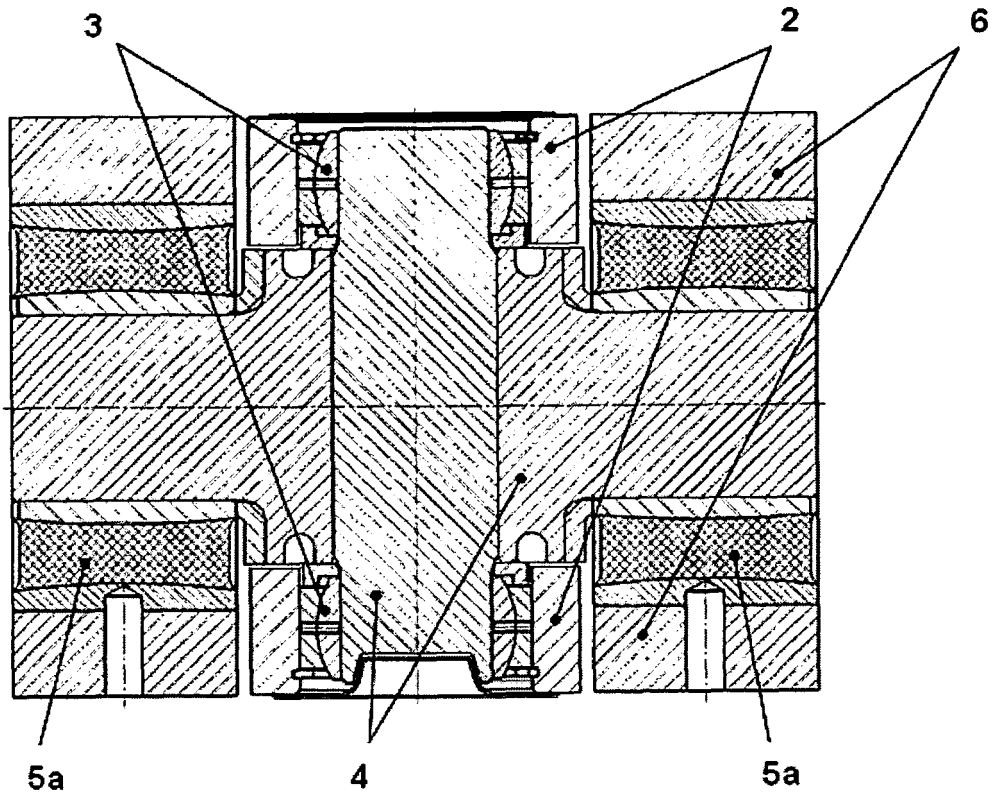

Fig. 5