The bogey according to the invention comprises two wheel axle units which are pivotally connected with each other in the vertical plane at each side of the bogey by means of a chain link device formed by the ends of two longitudinal girders united with each other through a resilient bearing with a horizontal axle, said girders pertaining each to one wheel axle unit, and a frame girder unit provided for carrying carriage body elements and supported on the two wheel axle units by means of springs, and is characterized in that each wheel axle unit is constructed as a four-wheel partial bogey having two wheels mounted immediately after one another in the longitudinal beam at either side, and that on the wheel axle units the springs for supporting the frame girder unit at either side are disposed in such a way that through the weight of the frame girder unit and of the carriage body element resting thereon, said weight being transmitted by the two wheel axle units, there is created a tensile force in the chain link devices in order to return these to their position of rest after swinging movements caused by for instance wheel bouncing.

On account of this embodiment of the bogey the wheels may be reduced considerably in size compared to what was possible previously, without causing any risk of derailing.

Further objects and advantages of the invention will be apparent from the accompanying drawings showing an embodiment of the invention chosen by way of example, and in which

FIG. 1 is a horizontal projection of a low-built railway carriage bogey constructed in accordance with the invention.

FIG. 2 is a side view of the bogey illustrated in FIG. 1, taken in the direction of arrow 2 in FIG. 1.

FIG. 3 is a section view of the bogey illustrated in FIG. 1, taken substantially one the line 3—3 in FIG. 1 and illustrating a railway carriage body element connected thereto in phase.

FIG. 4a is a diagrammatic elevation view of the bogey illustrated in FIG. 1, taken in the direction of arrow 2 in FIG. 1 and illustrating the wheel contact of the bogey with a convex rail surface.

FIG. 4b is a diagrammatic elevation view of the bogey illustrated in FIG. 1, taken in the direction of arrow 2 in FIG. 1 and illustrating the wheel contact of the bogey with a concave rail surface.

FIG. 5 is a horizontal projection of a wheel axle unit of the bogey illustrated in FIG. 1, showing some of the parts thereof in section.

FIG. 6 is a section view of the wheel axle unit of the bogey illustrated in FIG. 5, taken substantially on the line 6—6 in FIG. 5.

FIG. 7 is a section view of the wheel axle unit of the bogey illustrated in FIG. 5, taken substantially on the line 7—7 in FIG. 5.

FIG. 8 is a side view of the wheel axle unit of the bogey illustrated in FIG. 5, taken substantially in the direction of the arrow 8 in FIG. 5.

FIG. 9 is a section view of the wheel axle unit of the bogey illustrated in FIG. 5, taken substantially on the line 9—9 in FIG. 5.

FIG. 10 is a vertical side view of part of a low-built railway carriage, including a plurality of bogies as illustrated in FIG. 1.

FIG. 11 is an enlarged horizontal projection of part of the railway carriage illustrated in FIG. 10.

FIG. 12 is a partial section view of the railway carriage part illustrated in FIG. 11, taken substantially on the
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line 12-12, with a bogey constructed as illustrated in FIGS. 1 to 3, is composed of two wheel axle units 1, one of which is shown in FIGS. 5 to 8, and a frame girder unit consisting of a longitudinal box girder 2 on either side of the two wheel axle units 1 and a transversal box girder 3 uniting the two girder units 2.

Each wheel axle unit 1 is built up from one transversal box girder 4 and two longitudinal beams 5 which are fixedly united with the box girder 4 at each end thereof. In the beams 6 the wheels 6 of the wheel axle unit 1 are mounted independently of each other. As shown in FIGS. 5 and 8, two wheels are mounted immediately after each other in one unit on either side thereof. The wheels have a diameter of 13.4 to 13.8 inches, the wheel axle units each acting as a partial bogey having full bogey effect.

Two pneumatically operated disk brake systems are integrated with each wheel axle unit 1, said systems comprising two pairs of exchangeable rod-shaped brake shoes 7 and 8 of cast iron. One brake system is operated from a brake cylinder 9 via two levers 10 mounted on the box girder 4 and connected by push rods with the shoes 7 acting against the flange side of the wheels, while the other brake system is actuated from a brake cylinder 9 via two levers 12 which are also mounted on the box girder 4 and connected by pull rods with the shoes 8 acting on the outside of the wheels. Of the brake systems only the former is permanently switched on during braking, while the other system is adapted to be switched on automatically when the system has been loaded to about half the maximum load by means of a valve device (not shown) acting in dependence of the load.

The beams 5 in each wheel axle unit are also connected with each other by means of an extra strut 13, whose purpose is to take up horizontal torques on the beams, partly arising during braking and for the rest as will be described in the following.

The two wheel axle units 1 in one and the same bogey are connected with each other through a chain link device at each side. This device is formed by extensions 14 of the longitudinal beams 5 located at each side of the bogey at the ends thereof which face one another, said extensions 14 being pivotally connected with each other by means of a connecting bolt 15 which is fixedly united with one extension but connected with the other by means of a rubber bearing bushing 16. The wheel axle units 1 thus are pivotally connected in such a way that the wheels 6 can only simultaneously touch straight lines or concave or convex arcs, as is shown more clearly in FIGS. 4a, b and c. This provides for rail safety (absence of wheel bouncing). The two rubber bearing bushings 16 and the resiliency of the rail bedding provide for the flexibility required for the bogey's own resiliency.

The frame girder unit mentioned above is supported by the wheel axle units 1 with the aid of four obliquely disposed rubber springs 17 which are provided between opposite oblique surfaces on the ends of the box girders 2 and on lateral projections 18 on the longitudinal beams 5 of the wheel axle units 1. These rubber springs 17, whose centre of pressure is on the same level above the rail as the joint 15 of the chain link device, are adapted to produce prestress in the said device amounting to approximately the double force on one pair of wheels. During vertical swinging or composite swinging in the link system a force which may exceed 20,000 pounds on each side of the bogey will strive to return the link system to zero position. As the weight of the movable parts is low in relation to the prestress force, which amounts to about 40,000 pounds the number of natural vibrations of the system will be very high, for which reason the bogey may be used even at the highest train speeds. The prestresses in the chain link devices in each bogey make themselves felt in each wheel axle unit as a torque acting thereon and taken up partly by the strut 13 by tensile forces therein, partly by the girder 4 by compression forces thereof.

The frame girder unit consisting of the longitudinal box girders 2 and the transversal box girder 3 in their turn support carriage body elements which are illustrated at 19 in FIGS. 2 and 3. The said unit rests on four rubber buffers 20, which are provided in pairs in each of the girders 2. In the centre of the transversal girder 3 there is provided a rubber bearing 21 for mounting a king pin 22 which is disposed in the bottom of the carriage body and, together with a rubber bushing 23, constitutes a connecting element between two carriage body elements 19, whereby the said elements 19 obtain sufficient freedom of movement in relation to each other (FIGS. 3, 11 and 12). The rubber journal 21 permits the torques of the bogey in relation to the carriage body which arise when the carriage moves through curves, and the rubber buffers 20 also permit the bogey to sustain this torque and besides gives it freedom to pivot. Local irregularities caused for instance by rail joints are thus dampened by double bogey effect and double systems of rubber springs. Depressions and other more protracted disturbances are evened out by the double rubber spring system.

The bogey according to the invention may be used for goods carriages of different types, including those having a carriage body of the conventional kind, or carriages for specific transportation purposes as well as for two-storied carriages or sleeping carriages. In the first place it has, however, been provided in order to permit the building of long and low railway carriages composed of several carriage elements which are internally articulated to a limited extent, in order to provide a European equivalent of the American so-called "roll-on/roll-off" train sets for railway transportation of heavy and high road vehicles, such as truck trailers and semi-trailers. A low-buit carriage of this kind is shown in FIGS. 10 and 11. It comprises a number of bogies according to FIGS. 1 to 9, two of which are shown in FIG. 10, and carriage body elements 19 carried on the said bogies in a row, each of which extends between two of the bogies. A carriage may for instance consist of ten body elements carried by eleven bogies. The ends of the body elements are consequently supported by the bogies by means of the rubber buffers 20 mentioned above and are also to a limited extent pivotable horizontally in relation to each other by means of the bearing 21. Between the ends of each body element the said bearing is recessed so that its loading plane is at a level of only 13 to 13.8 inches above the rail. Trailers 24 and semi-trailers 25 may be moved onto the loading plane from one of the ends of the carriage or in most cases from the side of the loading plane.

We claim:

1. A bogey for low-built railway carriages or the like, comprising a pair of wheel axle units each including transversely spaced apart longitudinal beams, means pivotally connecting one end of each of the longitudinal beams of one end of each of the longitudinal beams of the other wheel axle unit for vertical swinging movement about a horizontal pivot axis, at least one wheel rotatably secured to the other end of each of the longitudinal beams and a transverse beam connecting the European equivalent of the longitudinal beams of each wheel axle unit, whereby the spaced apart longitudinal beams of each wheel axle unit will swing together about the horizontal pivot axis, a frame girder unit positioned over the wheel axle units, means positioned between the wheel axle units and the frame girder unit for supporting the frame girder unit over the wheel axle units, and means carried by the frame girder unit for securing a railway carriage body element thereto.

2. Structure as set forth in claim 1, wherein two separate longitudinally spaced apart wheels are rotatably mounted in each of the longitudinal beams of each wheel axle unit.

3. Structure as set forth in claim 2, wherein the frame...
girder unit and each of the longitudinal beams of the wheel axle units include opposed surfaces extending at an angle to the vertical and the means for supporting the frame girder unit comprises resilient means positioned between the opposed surfaces whereby tension is provided on the wheel axle units tending to pivot the wheel axle units downwardly and to move the wheel axle units away from each other.

5. Structure as set forth in claim 1, wherein the means for pivotally connecting one end of the longitudinal beams of the wheel axle units together is resilient.

6. Structure as set forth in claim 1, wherein the frame girder unit extends transversely between the longitudinal beams of the wheel axle units and includes pivot means located centrally thereof for pivotally supporting the carriage body element.

7. Structure as set forth in claim 5, and further including resilient means at each end of the frame girder unit extending between the frame girder unit and the carriage body element supported thereby for maintaining the carriage body element in a substantially horizontal position.

8. A railway carriage bogey as set forth in claim 1, wherein the longitudinal beams are box girders, two longitudinally spaced apart wheels are rotatably secured to and extend within each of the longitudinal beams, the transverse beams are box girders, the pivotal connection between the longitudinal beams is resilient, each wheel axle unit includes a strut extending between the spaced apart longitudinal beams adjacent the pivot connection thereof, the frame girder unit extends transversely between the longitudinal beams of the wheel axle units, the wheel axle units and frame girder unit include opposed surfaces between the frame girder unit and the outer end of each of the longitudinal beams of the wheel axle units inclined with respect to the vertical and the means for supporting the frame girder unit is resilient and positioned between the inclined opposed surfaces for applying tension to the pivot connection of the wheel axle units tending to cause the wheel axle units to swing downwardly and away from each other.

9. Structure as set forth in claim 8, wherein the means for securing the railway carriage body element to the frame girder unit comprises a centrally located resilient pivot mounting for the railway carriage body element carried by the frame girder unit and resilient means acting between the frame girder unit and the carriage body element supported on the frame girder for maintaining the carriage body element in a substantially horizontal position.

References Cited

UNITED STATES PATENTS

1,265,374 5/1918 Pilchuk 105—194
1,576,298 3/1926 Barbey et al. 105—179
2,197,727 4/1940 Ledwinka 105—224.1 XR
2,411,978 12/1946 Porteous 105—180
1,241,105 9/1917 Prindl 105—183
3,333,551 8/1967 Gross et al. 105—183

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