

[54] ELASTOMERICALLY SPRING RAILWAY TRUCK BOLSTER

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105/224.1; 267/3

[57] ABSTRACT

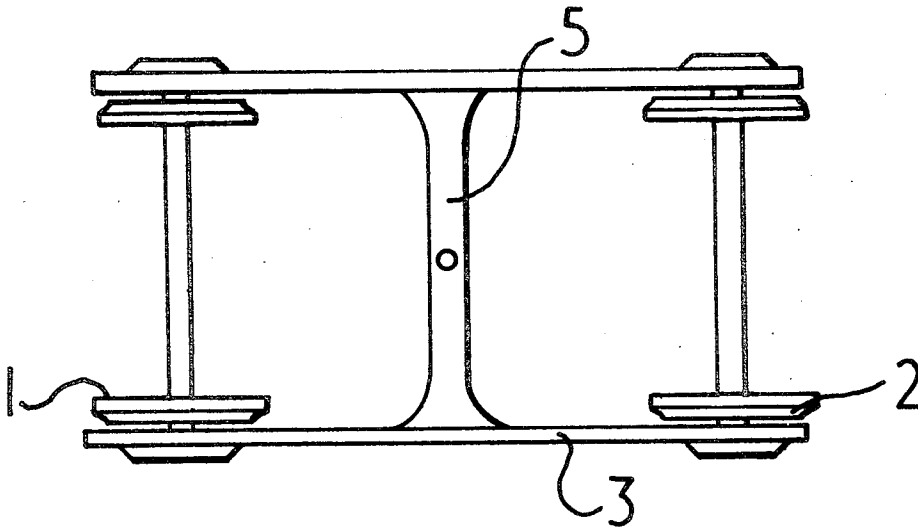
A three piece bogie for a railway vehicle in which the resilient connecting means between each solebar or side frame and the bolster comprises spring support means for vertical loads and at least two spaced-apart inter-engaging pairs of resilient members, one element of each pair mounted on the bolster and one on the solebar or side frame wherein the elements may only move relatively in a vertical direction and horizontal movement is resisted, of which the following is a specification.

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5 Claims, 3 Drawing Figures



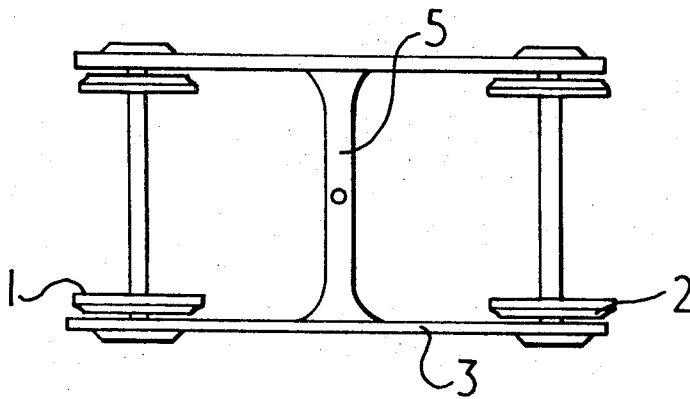
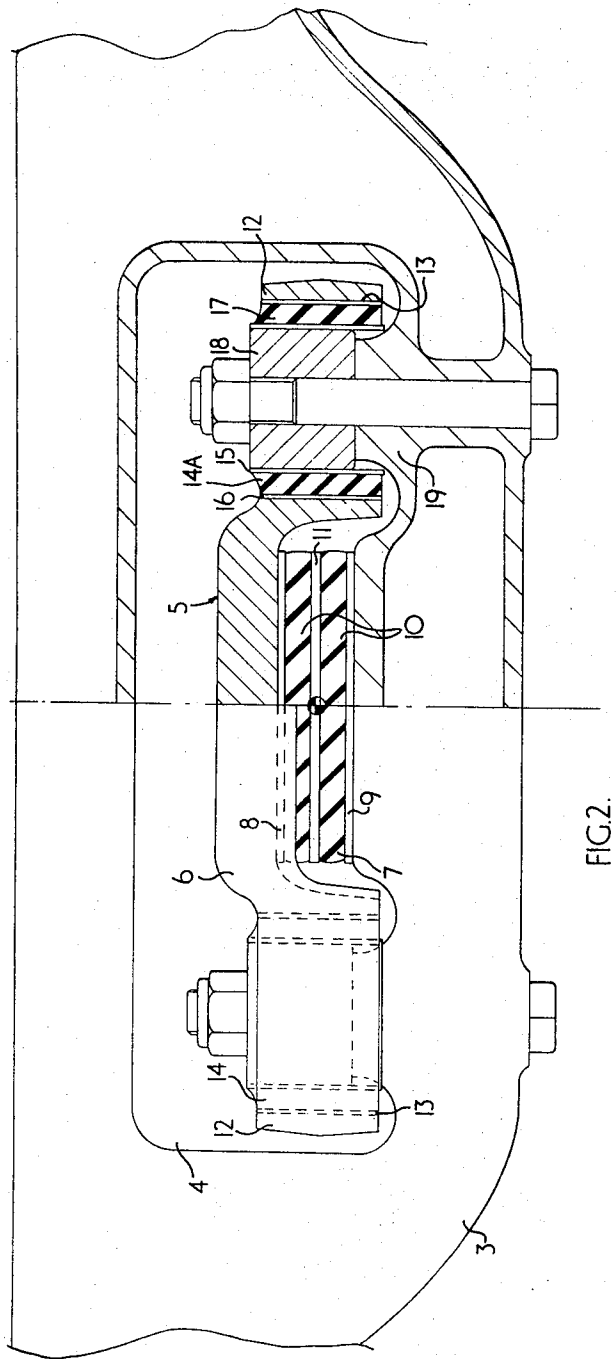
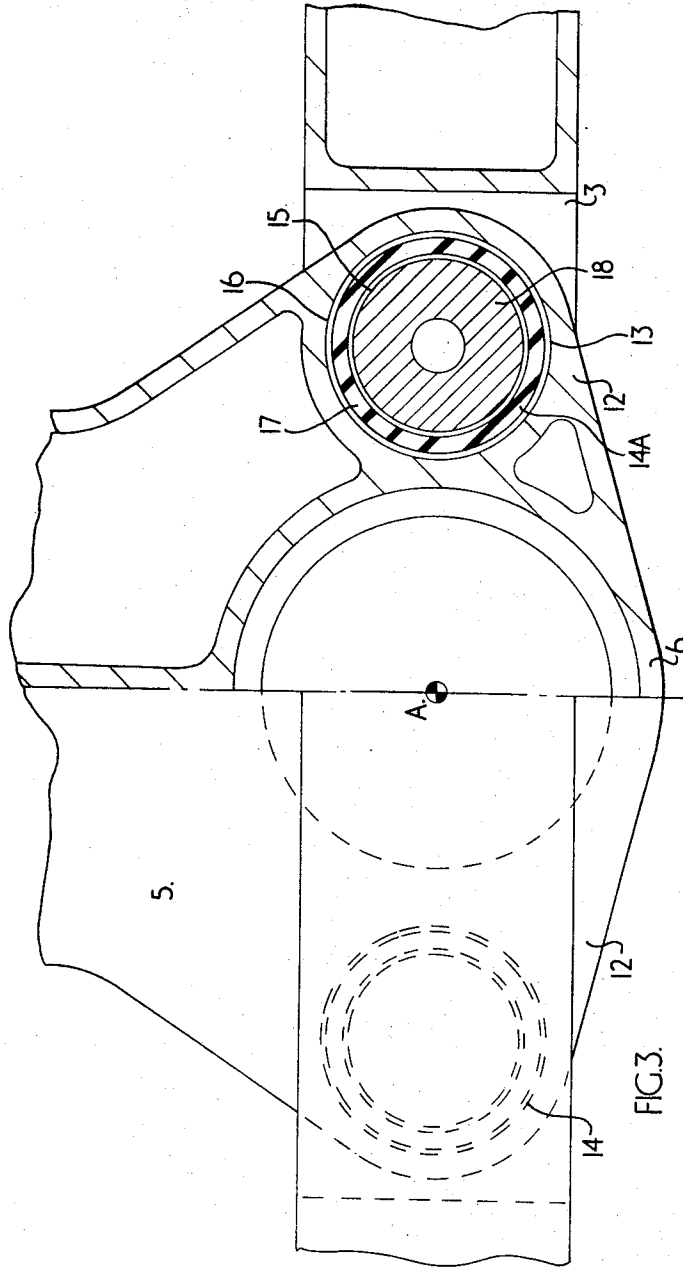


FIG. 1.





ELASTOMERICALLY SPRING RAILWAY TRUCK BOLSTER

This invention relates to suspension systems for railway vehicles and in particular for railway vehicle bogies of the three-piece type.

A three-piece bogie comprises a bolster, for pivotal connection to the underframe of the vehicle, extending across the central region of the bogie and two solebars or side frames. Each solebar or side frame is connected at its center to one end of the bolster and carries an axle-box at each of its ends. The arrangement of the bolster and solebars or side frames is generally that of an "H." A wheel and axle set is mounted at each open end of the bogie and supported in two axleboxes, one at the end of each solebar or side frame.

The connections between the bolster and solebars are not rigid and spring means are provided at this connection. A common form of springing is a pair of rubber chevron springs and this provides the only springing for low speed use. For high speed use primary suspension may be provided between each axlebox and the solebar and then the solebar to bolster suspension is the secondary suspension for the bogie. The primary suspension is of short travel and most suspension deflection is allowed in the secondary suspension.

In both arrangements to accommodate track irregularities one wheel must be allowed to rise and fall with respect to the other three and the flexibility at the bolster to solebar suspension must be arranged to allow this or in the case of the high speed bogie some of this movement. (The primary, or axlebox suspension cannot provide sufficient deflection and at the same time provide satisfactory suspension properties for the large differences between laden and unladen conditions of a freight vehicle).

Hitherto three-piece bogies in which the suspension allows such articulation of the solebars in the vertical plane have been prone to "lozenging" and loss of alignment between the solebars due to a lack of rigidity in the horizontal plane caused by the spring means between the bolster and solebars or side frames. When the bogie enters or leaves a curved section of track the turning movement applied by the track and flange causes the parallelogram formed by the axles and solebars to deflect or "lozenge" and the resultant mistracking of the two wheel and axle sets causes excessive track and tread wear.

It is an object of the present invention to provide a three-piece bogie in which is provided solebar articulation in the vertical plane and resistance to "lozenging."

According to one aspect of the present invention a railway vehicle bogie comprises a bolster, two solebars or side frames and resilient connecting means between each solebar and the bolster wherein each connecting means comprises spring support means for vertical loads and at least two spaced-apart interengaging pairs of resilient elements, one element of each pair mounted on the bolster and the other element mounted on the solebar wherein one element may move with respect to the other element only in a substantially vertical direction, horizontal movement being resisted.

In a preferred arrangement the resilient connecting means between the solebar and bolster comprises a compression spring comprising blocks of elastomeric material bonded between metal plates and two spaced-apart elastomeric material bushes, the bushes having an

internal and external steel tube bonded thereto. The internal steel tubes are attached to the solebar and the external steel tubes are attached to the bolster thus taking some of the tare load in shear. The resultant assembly provides the required characteristics in the manner described below.

Other features of the invention will be apparent from the following description of one embodiment of the invention in conjunction with the accompanying informal diagrammatic drawings in which:

FIG. 1 is a plan view of a bogie assembly;

FIG. 2 is a part-sectional side view of the bolster-to-solebar connecting means and,

FIG. 3 is a part-sectional plan view of the detail shown in FIG. 1.

In FIG. 1 the two wheels, 1, 2 on one side of a bogie are supported in axleboxes mounted at either end of a solebar or side frame 3. The solebar or side frame 3 is of generally rectangular section and the depth of the section is greater at the central portion as shown in FIG. 1. A rectangular aperture 4 is provided through the solebar or side frame 3 in a horizontal direction with regard to the bogie assembly.

The solebar or side frame arrangement at the other side of the bogie is the same as described above and the two apertures 4, one in each solebar or side frame, are used for connection to a bolster 5 extending across the bogie assembly.

The connection from bolster 5 to solebar or side frame 3 is obtained by means of a substantially flat central end portion 6 on each end of the bolster which is arranged to project through a rectangular solebar or side frame aperture 4. Between the lower surface of the end portion 6 and the lower surface of the rectangular aperture 4 is placed a rubber compression spring 7. The spring 7 comprises two disc-shaped metal end plates 8 and 9 and a pair of disc-shaped rubber blocks 10 interleaved by a similarly-shaped metal plate 11. Each metal to rubber interface is bonded to provide the integral spring 7. Either side of the flat central end portion 6 of the bolster is an extension 12 and through each extension a hole 13 is bored in the vertical direction with respect to the bogie assembly.

Two bonded metal-to-rubber bushes 14, 14A are force-fitted one into each hole. Each bush has an inner and outer steel tube 15, 16 mounted concentrically and the space between the steel tubes is filled by rubber 17. The inner steel tube 15 is force-fitted onto a steel cylinder 18 which is bolted to an upstanding boss 19 on the lower surface of the rectangular aperture 4.

The connection between the bolster 5 and the solebar or side frame 3 acts as follows:

In a vertical plane with respect to the bogie each solebar 3 is resiliently supported from the bolster 5 by means of the rubber spring 7 which is under compression. Again in the vertical plane the wheel 1 may move upwardly with respect to the wheel 2 by pivoting the solebar 3 about the center of the spring 7. This movement causes both rubber bushes 14, 14A to be deflected axially by movement of the inner tube within the outer tube and as the bushes have little resistance to this movement the movement is allowed. In some cases the resistance of the bushes to axial deflection may be used also to contribute to the support of the vertical load. Alternatively, if a large deflection is to be allowed the bushes may be pre-deformed in the unladen condition so that in the change to laden condition

the bushes are moved through their natural unstressed condition.

In the horizontal plane with respect to the bogie assembly the bolster 5 is normally at right angles to the solebar 3. Track to wheel forces act to deform the bogie structure by changing this relationship by pivoting the solebars with respect to the bolster about the center A (see FIG. 3) which is the center of the rubber spring 7. This is the "lozenging" movement earlier referred to and is resisted by the spaced-apart rubber bushes 14 and 14A which have a high resistance to deflection in any direction in the plane perpendicular to their longitudinal center-lines.

While the embodiment described utilizes rubber for the springs 7 and bushes 14, 14A any elastomeric material having the requisite strength and fatigue properties may be used.

Furthermore, the springs 7 may be replaced by non-elastomeric spring means, for example coil springs.

The bushes 14, 14A may also be replaced by sliding metal-to-metal guides but in this case some resilient mounting at either the attachment to the bolster 5 or to the solebar or side frame 3 is needed so that the required movements are allowed.

More than two rubber bushes may be employed at each bolster to solebar or side frame connection and the bushes may be used, by the use of a suitable elastomer, to contribute to the support of the load from the main springs 7 and/or to contribute to damping of solebar or side frame articulation in the vertical plane.

The advantages allowed by the suspension described may be summarised as follows:

- 1. The radially loaded bushes resist "lozenging."
- 2. Sideframe articulation is provided to allow all the wheels to remain in contact with the track despite track irregularities.
- 3. Load equalization between the wheels of a vehicle is allowed by the articulation for all load conditions.
- 4. The bogie construction retains the simplicity, lightness and cheapness of the simplest three-piece bogie.

I claim:

- 1. A railway vehicle bogie comprising a bolster, two

solebars and resilient connecting means between each solebar and the bolster wherein each connecting means comprises elastomeric spring support means for vertical loads and at least two spaced-apart interengaging pairs of resilient elements, each interengaging pair of elements comprising parallel internal and external steel tube, concentrically arranged and interconnected by means of a bush of elastomeric material bonded between the steel tubes, one element of each pair being mounted on the bolster and the other element being mounted on the solebar so that one element may move with respect to the other element only in a substantially vertical direction, horizontal movement being resisted.

2. A railway bogie according to claim 1 wherein the spring support means comprises a compression spring comprising a block of elastomeric material bonded between metal plates.

3. A railway bogie according to claim 2 wherein at least two blocks of elastomeric material comprise each spring and a metal interleaving plate is provided between adjacent blocks and bonded thereto.

4. A railway bogie according to claim 1 wherein the external steel tube of each pair of elements is mounted on the bolster and the inner steel tube of each pair of elements is mounted on the solebar.

5. A railway vehicle bogie comprising a bolster, two solebars and resilient connecting means between each solebar and the bolster, each connecting means comprising:

- a. spring support means for vertical loads having at least one elastomeric element having its center substantially aligned with the center of the bolster;
- b. means to permit substantially vertical movement and resist horizontal movement of a solebar in relation to the bolster comprising at least two spaced-apart interengaging pairs of resilient elements each element having parallel internal and external concentric cylindrical steel tube extending parallel to each other and interconnected by a bush of elastomeric material bonded between the steel tubes.

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