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(54) Bogie rail vehicles

(57) A bogie rail vehicle includes two elongate vehicle bodies (10, 11), adjacent ends of which are connected to a common bogie (12) by coupling arms (22) which extend longitudinally from the vehicle bodies to the bogie and allow vertical and lateral movement between the vehicle bodies and the bogie. The weight of the vehicle bodies is transmitted to the bogie by horizontal bearing surfaces (30, 34) which are separate from the couplings, so that the couplings are not required to transmit significant vertical loads to the bogie. The couplings can therefore be less robust than has previously been required and, as a result, may be less costly and take up less space. The geometry of the couplings may also reduce the overthrow of the vehicle bodies, when traversing curved track.

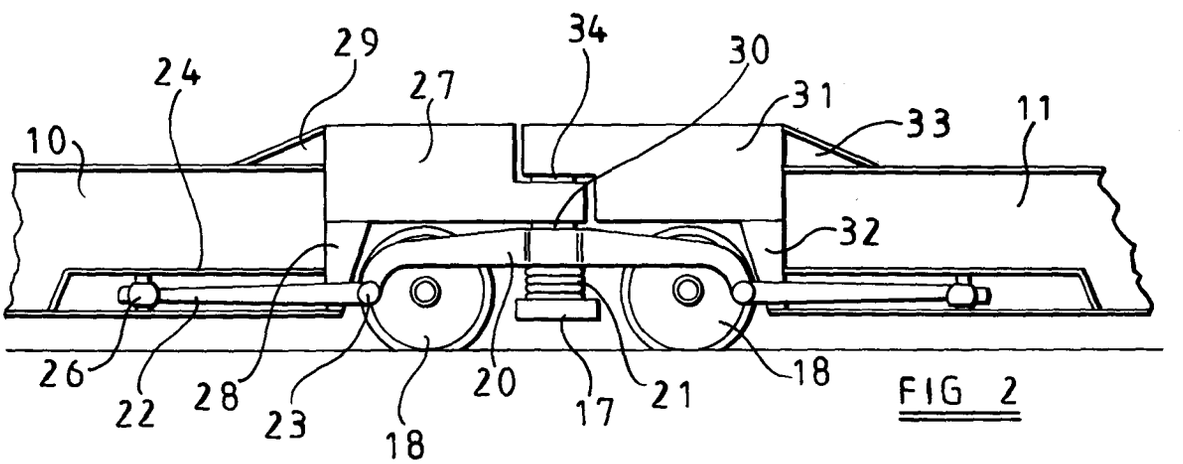

FIG 2

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Description

[0001] The invention relates to bogie rail vehicles of the kind comprising two or more elongate vehicle bodies arranged end-to-end, the adjacent ends of the two vehicle bodies being supported by a common bogie. Such vehicles are commonly used, for example, for the transport by rail of goods containers or the container trailers of large road transport vehicles. In each case the unit carried by each vehicle body is a box-like unit of very substantial length and width.

[0002] In one form of rail vehicle of this kind, each vehicle body is supported at one end by a single bogie, the other end of the vehicle body remote from its bogie being supported by being coupled to the end of a similar vehicle which is also supported on its respective bogie. In an alternative arrangement the adjacent ends of two elongate vehicle bodies are each connected to a common bogie. The present invention particularly relates to vehicles of the latter type.

[0003] When a train of rail vehicles is traversing a track there is normally a limit, imposed by the railway authorities, on the extent to which any part of any vehicle, including the load carried by the vehicle, may project laterally beyond the track. Such limit must be imposed in order to prevent any part of the rail vehicle, or of the load carried by it, colliding with trackside fixtures. The extent to which any rail vehicle projects laterally beyond the track is at a minimum when the track is straight, but increases when the vehicle is traversing a curved portion of the track, due to the length of the vehicle. This increase is known as the "overthrow". The "inner" overthrow is the increase in lateral projection, between bogies, on the inside of the curve, whereas the "outer" overthrow is the increase in lateral projection on the outside of the curve.

[0004] The overthrow generally increases with the length of the vehicle and with reduction in the radius of curvature of the track. Any rail vehicle must therefore be so designed that its maximum lateral projection beyond the track, including the overthrow, is still within the imposed limit even when traversing a portion of track of the smallest radius to be encountered. The extent of the overthrow is at least partly dependent on the location of the pivotal connections between the vehicle body and the bogies on which it is supported.

[0005] In bogie rail vehicles of the kind referred to, where two adjacent vehicle bodies are connected to a common bogie between them, it has hitherto been the practice to connect each vehicle body to the bogie by means of a single pivotal connection on the bogie which is allows pivotal movement about both horizontal and vertical axes. This enables each vehicle body to pivot both vertically and horizontally relative to the bogie so as to accommodate both horizontal and vertical curvature of the track over which the vehicle passes.

[0006] However, prior art arrangements may suffer from two significant disadvantages. Usually the pivotal connection between each vehicle body and the bogie lies within the bogie, so that the connection must be so arranged as to accommodate comparatively large angular deflections between the two parts of the coupling, both horizontally and vertically, in order to accommodate horizontal and vertical curvatures of the track which are likely to be met in use. This may impose considerable constraints on the design of the bogie and vehicle bodies. Furthermore, with the prior art arrangements the weight of each vehicle body is at least partly, and sometimes wholly, transmitted to the bogie through the pivotal coupling, with the result that the components of the coupling must be very substantial in order to handle the heavy loads to which they are likely to be subjected in use. This not only makes the coupling components costly, but the large size of the components may also again impose constraints on the design of the bogie and vehicle bodies.

[0007] Also, since the pivot point between each vehicle body and the bogie is comparatively close to the centre of the bogie, the amount of overthrow experienced when traversing a horizontal curve in the track may be substantial and, similarly, the clearance between the underside of each vehicle body and the track may be substantially reduced when traversing an upwardly curved or "humped" stretch of track.

[0008] The present invention sets out to provide a novel form of bogie vehicle where some or all of these disadvantages may be alleviated or overcome.

[0009] According to the invention there is provided a bogie rail vehicle including two elongate vehicle bodies, adjacent ends of which are each connected to a common bogie by coupling means allowing a degree of vertical and lateral movement between each vehicle body and the bogie, at least the majority of the weight of at least one of the vehicle bodies being transmitted to the bogie by means separate from the coupling means, whereby the coupling means are not required to transmit significant vertical loads to the bogie.

[0010] It will be appreciated that a reference to "at least the majority of the weight" of the vehicle body is referring only to the proportion of the weight of the vehicle body which the bogie is required to support, and is not referring to the whole weight of the vehicle. Obviously, the weight of the whole vehicle is divided between the two bogies at opposite ends thereof.

[0011] Since the weight of the vehicle body is not transmitted to the bogie by the coupling means, as in the prior art arrangements, the coupling means can be less robust than has hitherto been the case, since it is only required to transmit longitudinal and lateral loads from the vehicle body to the bogie. The coupling means may therefore be less costly and take up less space than has been the case hitherto.

[0012] Although the invention may include arrangements where the weight of only one of the vehicle bodies is transmitted to the bogie by other means, preferably at least the majority of the weight of both vehicle bodies

is transmitted to the bogie by means separate from their respective coupling means.

[0013] The coupling means may comprise an elongate coupling arm pivotally connected at opposite ends thereof to the bogie and vehicle body respectively. Preferably the coupling arm extends away from the bogie generally longitudinally of the vehicle body. In this case the pivotal connection between the vehicle body and the coupling arm may be a significant distance from the bogie itself and, depending on the geometry, this may have the effect of significantly reducing the overthrow when the vehicle is travelling on curved track, when compared with the above-described prior art arrangements.

[0014] Preferably one end of the coupling arm, for example the end which is connected to the vehicle body, is arranged to pivot about both vertical and horizontal axes. For example, the end of the coupling arm may be connected to the vehicle body by a ball coupling.

[0015] The other end of the coupling arm, for example the end which is connected to the bogie, may be arranged to pivot only about a horizontal axis.

[0016] The weight of the, or each, vehicle body may be transmitted to the bogie by a downwardly facing bearing surface on the vehicle body which slidably engages an upwardly facing bearing surface on the bogie, or a part in contact therewith.

[0017] For example, the downwardly facing bearing surface on one vehicle body may engage an upwardly facing bearing surface on the bogie, while the downwardly facing bearing surface on the other vehicle body engages an upwardly facing bearing surface on said one vehicle body.

[0018] The following is a more detailed description of an embodiment of the invention, by way of example, reference being made to the accompanying drawings in which:

Figure 1 is a diagrammatic side elevation of a bogie rail vehicle in accordance with the invention,

Figure 2 is a diagrammatic side elevation showing the means of connection between the vehicle bodies and the central bogie,

Figure 3 is a diagrammatic plan view of the components shown in Figure 2, and

Figure 4 is an enlarged view of one of the pivotal couplings.

[0019] Referring to Figure 1: the rail vehicle comprises two vehicle bodies 10 and 11 adjacent ends of which are connected to a common bogie 12. The ends of the vehicle bodies 10, 11 remote from the common bogie 12 are supported in conventional fashion on further individual bogies 13, 14 respectively.

[0020] In the example shown in Figure 1, each vehicle body 10, 11 is of the kind used for transporting an elongate rectangular container-like road vehicle trailer 15. In known manner the wheels 16 of the trailer are received in a pocket or well in the floor of the vehicle body, the main body of the trailer resting on the floor of the vehicle body, above the well. However, the invention is equally applicable to rail vehicles having a flat bed to receive an ordinary rectangular container, as well as rail vehicles for any other purpose. In the present instance, the rail vehicles 10 and 11 may be adapted to transport ordinary rectangular containers by being so designed that the containers may rest on the flat parts of the floor of the vehicle, bridging the well or pocket which would otherwise receive the wheels in the case where the load is a trailer vehicle.

[0021] Figures 2, 3 and 4 show in greater detail the means of connection between the vehicle bodies 10 and 11 and the common bogie 12.

[0022] Referring to Figures 2, 3 and 4: the bogie comprises two laterally spaced side frames (not shown) connected by a transverse bolster 17, to provide a generally H-shaped structure, in conventional manner. Two wheelsets 18, each consisting of an axle and flanged wheels, extend between the side frames and are connected to the side frames by primary suspension means (not shown).

[0023] A bogie adaptor frame 20 extends in a fore-and-aft direction across the bolster 18 and wheelsets 19 and is supported on the bolster 18 by secondary suspension means 21. Alternatively, the frame 20 might be connected to the bolster by a vertically rigid connection.

[0024] The vehicle body 10 is connected to the bogie 12 by coupling means comprising a longitudinally extending coupling arm 22. One end of the coupling arm 22 is pivotally connected to the bogie frame 20 by a knuckle pivotal connection 23 which allows the coupling arm 22 to pivot up and down about a horizontal axis. The coupling arm 22 extends into a channel 24 in the vehicle body and is pivotally connected to a vertical pivot pin 25 within the channel 24 by a ball coupling 26 so that this end of the coupling arm 22 is capable of both vertical and horizontal pivotal movement relative to the vehicle body 10. The ball coupling 26 is shown in greater detail in Figure 4.

[0025] Similar coupling means connects the other vehicle body 11 to the opposite end of the bogie frame 20.

[0026] In order to transmit the weight of the vehicle body 10 to the bogie 12, there is formed on the end of the vehicle body 10 a projecting beam 27 which extends partly over the bogie frame 20 and is supported by lower brackets 28 and upper brackets 29 on the vehicle body 10.

[0027] The underside of the beam 27 is formed with a downwardly facing bearing pad 30 which is slidable over an upwardly facing surface on the bogie frame 20.

[0028] Similarly, the vehicle body 11 is also formed with a beam 31 which extends partly over the bogie frame 20 and is supported on lower brackets 32 and upper brackets 33. As best seen in Figure 2, a part of the extremity of the beam 31 overlaps a portion of the beam 27 on the other vehicle body and is formed with a downwardly facing bearing surface 34 which slidably engag-

es an upwardly facing bearing surface on the beam 27.

[0029] As the rail vehicle traverses the track, vertical undulations in the track are accommodated by vertical swinging movement of each vehicle body relative to the bogie 12, as permitted by the horizontal pivotal axes of the pivotal connections 23 and 26 at the ends of the coupling arms 22. To accommodate horizontal curvature of the track, the vehicle bodies 10 and 11 may pivot relative to the bogie 12 by pivoting about the vertical axes of the pivotal connections 26. Since the vertical axes of pivoting provided by the connections 26 are spaced some distance from the central vertical axis of the bogie 12 the overthrow which results from a given curvature of track is significantly less than would be the case if the vehicle bodies were connected to the bogie 12 by vertical pivot axes located within the bogie 12 itself, and nearer the central vertical axis thereof.

[0030] It will be seen that the weight of both vehicle bodies 10, 11 is transmitted to the bogie 12 wholly through the bearing surfaces 30, 34 and that no significant vertical loads are transmitted to the bogie through the coupling arms 22 and associated pivotal connections 23, 26. Accordingly, the arms 22 and pivotal connections are only required to transmit horizontal traction loads between the vehicle bodies and the bogie and therefore need be much less substantial than is required in prior art arrangements, thereby reducing the cost and space constraints of the prior art arrangements.

[0031] As a result of the coupling means comprising the coupling arms 22 with pivotal connections at each end thereof, the relative angular movement between each coupling arm 22 and the vehicle body is significantly less, for a given curvature of the rail track, than is the case with prior art arrangements, thus requiring less clearance and hence less space to accommodate the coupling means.

[0032] Relative sideways pivotal movement between the vehicles bodies 10 and 11, and between the vehicle bodies and the bogie 12, is accommodated by the relative sliding between the overlapping portions of the beams 27, 31 and between the beam 27 and the bogie frame 20.

Claims

1. A bogie rail vehicle including two elongate vehicle bodies (10, 11), adjacent ends of which are each connected to a common bogie (12) by coupling means (22, 23, 26) allowing a degree of vertical and lateral movement between each vehicle body and the bogie, characterised in that at least the majority of the weight of at least one of the vehicle bodies (10, 11) is transmitted to the bogie (12) by means (27, 30, 31, 34) separate from the coupling means, whereby the coupling means (22, 23, 26) are not required to transmit significant vertical loads to the bogie.

2. A bogie rail vehicle according to Claim 1, wherein at least the majority of the weight of both vehicle bodies (10, 11) is transmitted to the bogie (12) by means (27, 30, 31) separate from their respective coupling means.

3. A bogie rail vehicle according to Claim 1 or Claim 2, wherein the coupling means comprise an elongate coupling arm (22) pivotally connected at opposite ends thereof to the bogie (12) and vehicle body (10, 11) respectively.

4. A bogie rail vehicle according to Claim 3, wherein the coupling arm (22) extends away from the bogie (12) generally longitudinally of the vehicle body.

5. A bogie rail vehicle according to Claim 4, wherein the pivotal connection (26) between the vehicle body and the coupling arm (22) is spaced from the bogie (12).

6. A bogie rail vehicle according to any of Claims 3 to 5, wherein one end of the coupling arm (22) is arranged to pivot about both vertical and horizontal axes.

7. A bogie rail vehicle according to Claim 6, wherein the end of the coupling arm (22) which is connected to the vehicle body (10, 11) is arranged to pivot about both vertical and horizontal axes.

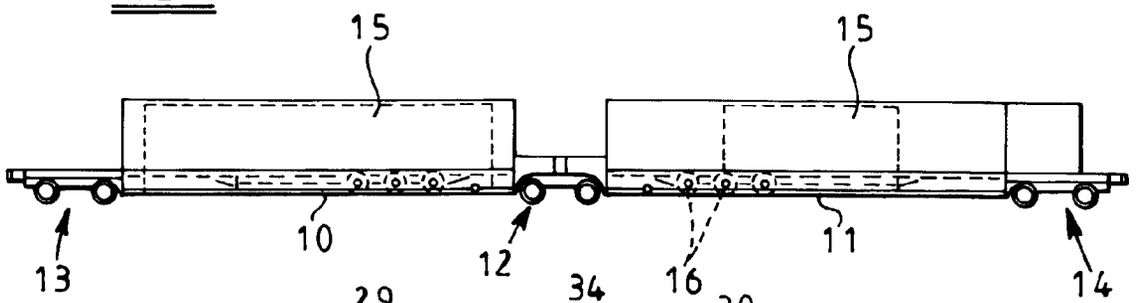
8. A bogie rail vehicle according to Claim 7, wherein the end of the coupling arm (22) is connected to the vehicle body by a ball coupling (25, 26).

9. A bogie rail vehicle according to any of Claims 6 to 8, wherein the other end (23) of the coupling arm (22) is arranged to pivot only about a horizontal axis.

10. A bogie rail vehicle according to any of the preceding claims, wherein the weight of the, or each, vehicle body (10, 11) is transmitted to the bogie (12) by a downwardly facing bearing surface (30) on the vehicle body which slidably engages an upwardly facing bearing surface on the bogie (12), or a part in contact therewith.

11. A bogie rail vehicle according to Claim 10, wherein the downwardly facing bearing surface (30) on one vehicle body (10) engages an upwardly facing bearing surface on the bogie (12), while the downwardly facing bearing surface (34) on the other vehicle body (11) engages an upwardly facing bearing surface on said one vehicle body (10).

FIG 1



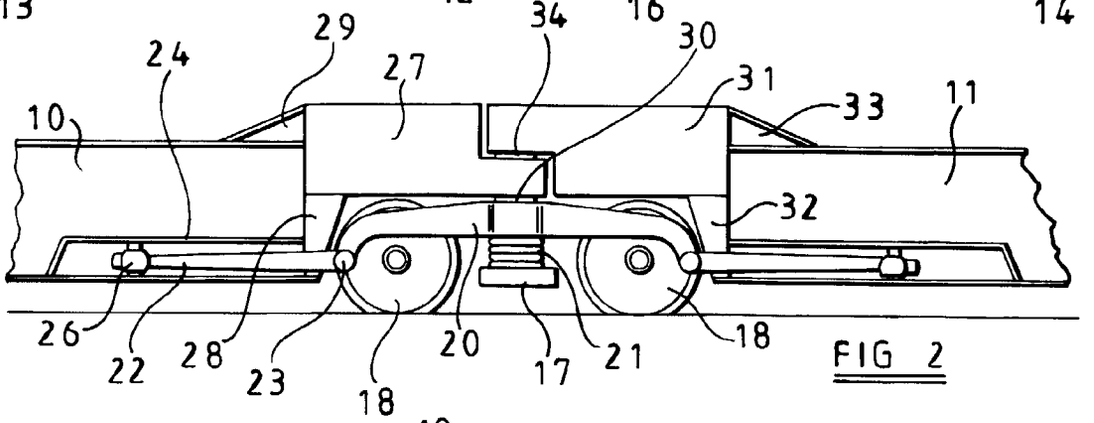


FIG 2

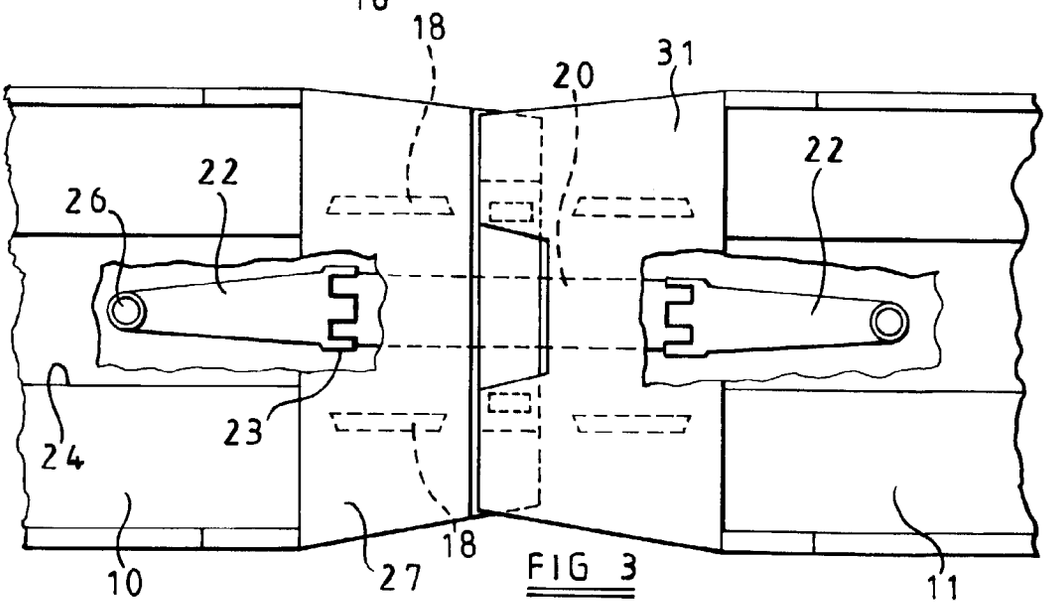


FIG 3

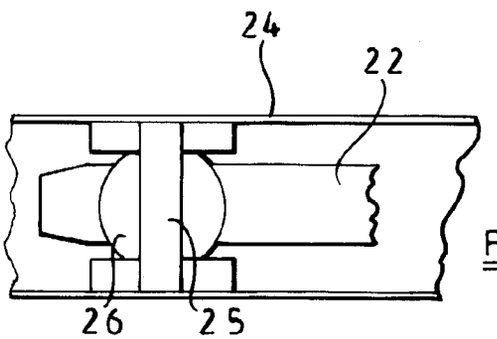


FIG 4

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EUROPEAN SEARCH REPORT

Application Number
EP 99 30 2204

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A	DE 44 04 878 C (TALBOT WAGGONFAB) 16 March 1995 (1995-03-16) * column 2, line 39 - column 3, line 47; figures 1-4 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B61F B61D B61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 August 1999	Chlosta, P

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 30 2204

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