

VEHICLE BODY FRAME CONSTRUCTION,

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MORE PARTICULARLY FOR RAILROAD ROLLING STOCK

This invention relates to vehicle body frame constructions, more especially for railroad rolling stock.

In a conventional construction, the body frame of a railroad car, including the car floor frame comprised of 5 hollow box section members and the car sides, is carried on transverse bolsters underneath the floor frame which are situated at locations where they are in turn supported on the wheeled undercarriages or bogie trucks, motorised or unmotorised, constituting the running gear on which the 10 car travels. The design is such that considerable bending moments are generated in the bolsters at their mid regions, necessitating bolsters of deep cross-section, and since the floor of the car must be raised to a level at which there is room for each bolster underneath it, between the floor 15 frame and the top of the running gear, the height of the car is undesirably increased.

It is an object of the present invention to overcome this disadvantage of existing constructions.

According to the invention, there is provided a 20 vehicle body frame construction comprising at least one transverse bolster supporting a vehicle floor frame formed by juxtaposed hollow section members extending longitudinally of the vehicle, said bolster being in turn supported on a wheeled undercarriage or truck, characterized by a 25 reinforcement provided on the upper side of and increasing

the depth of a mid-length portion of the bolster, said reinforcement being let up into an aperture or apertures in the floor frame and having its upper surface substantially flush with the upper surface of said floor frame.

5 Thus, employing bolsters each having end portions of shallower cross-section where the bending moments are low and a mid-length portion of deeper cross-section where the bending moments reach a maximum, and further by creating the increased mid-length cross-section by adding reinforcement along the top
10 of the bolster which reinforcement is let up into an aperture or apertures in the floor frame of the car, the height of the car can be reduced since it is only necessary that there shall be sufficient space between the floor frame and the running gear to accommodate the shallower cross section
15 of the bolsters.

Prior art arrangements and arrangements according to the invention will now be described in more detail with reference to the accompanying drawings, wherein:

Figure 1 is a schematic side view of a conventional
20 railroad car;

Figures 2 and 3 are schematic end views of conventional railroad cars;

Figures 4a and 4b show the bending moment characteristics of a conventional body bolster of a railroad car;

25 Figure 5 is a diagrammatic perspective view of one end of a conventional railroad car frame;

Figure 6 is a diagrammatic part plan view of a conventional railroad car frame having hatches for inspection;

Figure 7 is a view in section on the line A-A in
5 Figure 6;

Figure 8 is a view in section on the line B-B in
Figure 6;

Figure 9 is a diagrammatic plan view of another conventional railroad car frame having hatches for
10 inspection;

Figure 10 is a view in section on the line C-C in
Figure 9;

Figure 11 is a diagrammatic part plan view of a railroad car frame with a body bolster according to a first
15 embodiment of the invention;

Figure 12 is a view in section on the line D-D in
Figure 11;

Figure 13 is a view in section on the line E-E in
Figure 12;

20 Figure 14 is a view similar to Figure 11, but showing a second embodiment;

Figure 15 is a view in section on the line F-F in
Figure 14;

Figure 16 is a view in section on the line G-G in
25 Figure 14;

Figure 17 is a view similar to Figure 14, but showing

a third embodiment;

Figure 18 is a view in section on the line H-H in Figure 17;

Figure 19 is a view in section on the line I-I in Figure 17;

Figure 20 is a view similar to Figure 17, but showing a fourth embodiment; and

Figure 21 is a view in section on the line J-J in Figure 20.

- 10 As shown in Figures 1 to 3, a conventional railroad car has a pair of body bolsters 4 carrying a car frame structure, which includes the floor 1, each bolster extending across under the body 3 of the car and being located at a position where it receives support from a respective bogie truck 2.
- 15 The loads of the passengers and cargo, as well as the weight of the car frame and of units mounted under the floor of the car, are transmitted from the frame structure 5 to the bolsters 4. These loads can be sustained by the trucks 2 on air springs 6, as shown in Figure 2, or on a centre plate 7 and
- 20 side bearings 8, as in Figure 3.

Figure 4a illustrates the moments due to the vertical loads from the car frame structure and the reaction forces of the side bearings 8 or the air springs 6, and Figure 4b the vertical loads from the frame structure and the reaction force

25 of the centre plate 7, from which it can be seen that the bending moment becomes especially large in the vicinity of the centre of the body bolster. Therefore, great structural

strength is required around the centre of the bolster.

When a body bolster is laid under a floor frame 1 which is formed by floor members 9 of large size hollow section of a material such as aluminium alloy, juxtaposed longitudinally of the railroad car as shown in Figure 5, if the floor members 9 have a thickness t_1 and the thickness of the bolster 4 is t_2 , as indicated in Figure 7, the combined thickness t_3 of the floor and bolster is $t_1 + t_2$. It is preferred that the thickness t_3 be kept as small as possible, thereby minimising height. The limitation of the thickness t_3 means that the thickness of the bolsters is also restricted, reducing the cross-sectional area with a consequent limitation in strength.

In Figures 6, 9 and 10, the floor frame 1 has hatches 14 near the bolster, for inspecting the traction motors (not shown) mounted on the trucks, with covers 16 provided for the hatches 14.

In the first embodiment of the invention shown in Figures 11 to 13, a floor frame 11 is formed by floor members 11a of large size hollow section, which are juxtaposed and extend longitudinally of the railroad car. The floor frame 11 is provided with a pair of transverse body bolsters 12 (only one shown) thereunder, at locations where bogie trucks (not shown) support the body of the car. The bolsters 12 extend between a pair of longitudinal side beams 13.

Each bolster 12 has a reinforcement 12a for additional

thickness provided on the upper side of the bolster and extending along a mid-length portion thereof. The reinforcement 12a fits in an opening formed in the floor frame 11, and has a top surface flush with the top surface of floor frame 11.

5 As shown in Figure 13, the floor construction about the opening may be stabilized by resting the ends of floor members 11a on side flanges 12c on the bolster 12. t_1 is the thickness of the floor members 11a, t_2 is the thickness of the end portions of the bolster 12, and t_3 is the total thickness of the
10 floor frame 11 and the bolsters and also the thickness of the centre of each bolster 12 including its reinforcement 12a.

In the second embodiment shown in Figures 14 to 16, the floor frame 11 is formed with a pair of motor inspection
hatches 14 on either side of the reinforcement 12a of a
15 body bolster 12, which is similar to the bolster of the first embodiment. The hatches 14 may be covered with lids (not shown) formed of the floor frame material, or some other material.

In the third embodiment shown in Figures 17 to 19,
20 a body bolster 12 has a pair of reinforcement ribs 12b provided on the upper side of a mid-length portion thereof. The reinforcements 12b, each narrow in comparison with the main body of the bolster, extend longitudinally of the bolster 12 at its opposite sides, and have their top

surfaces flush with the top surface of floor frame 11. The reinforcements 12b have a length corresponding to the size of inspection hatches 14 in the floor frame 11. Provided between the reinforcements 12b are sections of floor members 11b, or other members forming a floor surface.

Each reinforcement 12b has a flange 15 formed along the outer side thereof to support a lid (not shown) for each hatch 14.

In the fourth embodiment shown in Figures 20 and 21, a body bolster 12 has a pair of reinforcements 12b similar to those of the third embodiment. The bolster 12 has upper side margins that project beyond the reinforcements 12b so as to form edge portions 12c of the bolster for supporting the ends of floor members 11a. This stabilizes the construction and facilitates the assembly of the parts.

As described above, the present invention provides a bolster reinforcement for additional thickness along a mid-length of the bolster having a top surface level flush with the top surface of the frame forming the floor of the railroad car. Within the overall limitation of thickness t_3 , the thickness of the bolster is thus increased at the centre region of the bolster so that the cross-section is likewise increased to sustain the bending moment which reaches a maximum at the centre region. Also, the construction is simple.



CLAIMS:

1. A vehicle body frame construction comprising at least one transverse bolster supporting a vehicle floor frame formed by juxtaposed hollow section members extending longitudinally of the vehicle, said bolster being in turn
5 supported on a wheeled undercarriage or truck, characterized by a reinforcement provided on the upper side of and increasing the depth of a mid-length portion of the bolster, said reinforcement being let up into an aperture or apertures in the floor frame and having its upper surface
10 substantially flush with the upper surface of said floor frame.
 2. A construction according to Claim 1, wherein said reinforcement comprises a pair of ribs extending along the top of the bolster adjacent the opposite sides thereof, and a hollow floor frame infill member or members are provided
15 between said ribs.
 3. A construction according to Claim 1 or Claim 2, wherein said floor frame has at least one opening or hatch adjacent the bolster, and said reinforcement has a side flange for supporting a lid for said opening.
 - 20 4. A construction according to Claim 2, wherein the bolster has upper side margins extending outwardly beyond said ribs, so as to form edge portions for supporting members of said floor frame.
 5. A vehicle body frame construction substantially as
25 described with reference to Figures 11 to 13, or Figures 14 to 16, or Figures 17 to 19, or Figures 20 and 21, of the accompanying drawings.
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