RAILWAY BOGES

Filed Nov. 20, 1967, Ser. No. 684,122
Claims priority, application Great Britain, Nov. 19, 1966, 51,895/66
Int. Cl. B61H 5/00
U.S. Cl. 188—59 9 Claims

ABSTRACT OF THE DISCLOSURE

A railway bogie having a brake gear mounting comprising a torque reaction member supported between a transverse member or bolster of the bogie and a fulcrum structure to each of which it is pivotally attached. The fulcrum structure is mounted on an axle of the bogie by way of a journal bearing.

This invention relates to railway bogies, and in particular to the mounting of the brake gear of a railway bogie. Although applicable to more conventional brake block arrangements, the invention is of particular application to disc brake arrangements which are coming into prominence for use with high-speed freight vehicles.

One object of the invention is to provide a bogie with the brake gear suspended within the bogie itself, as opposed to the practice of hanging the brake on the superstructure of a vehicle. A further object is to provide a bogie in which the brake gear is not supported by beams housed in the bogie side frames, which tend to bind in operation as the side frames rise and fall under track undulation. Existing brake layouts utilizing such beams also possess the disadvantage of being considerably more complicated than simple arrangements in accordance with the invention.

According to the invention a railway bogie has a brake gear mounting comprising a torque reaction member supported between a transverse member or bolster of the bogie and a fulcrum structure to each of which it is pivotally attached, the fulcrum structure being mounted on an axle of the bogie by way of a journal bearing.

The fulcrum structure is preferably mounted on the axle by means of a roller bearing or bearings, and it is conveniently disposed directly above the axle with the two pivotal attachments of the reaction member at more or less the same level. Thus the reaction member may be in the form of a generally horizontal link.

The brake gear may be suspended from the reaction member between the bolster and axle with the fulcrum structure in the form of a simple link, with an eye by which it is mounted on the axle, and this is particularly advantageous with a disc brake arrangement. Alternatively the reaction member may be a single straight link with the brake gear associated with the fulcrum structure, in which case an air brake cylinder may be built into that structure between the axle and the pivotal attachment of the reaction member.

Two parallel reaction members may be employed, and two fulcrum structures separately mounted on the axle may have pivotal attachments for the reaction members. Alternatively two spaced links forming the reaction members may be employed and pivotally connected to a "cannon box" casing which surrounds the axle. With a motorised bogie such a casing can be a gear-box casing, containing a hypoid bevel driving gear, or the mounting of an air or engine gear. Such a gear-box or motor mounting requires its own torque reaction arm, and the reaction member or members of the invention may fulfill the dual purpose of providing the torque reaction for the gearbox or motor and also the torque reaction for the brake gear.

The invention will now be further described with reference to the accompanying drawings which illustrate, by way of example, three embodiments of the invention and modification thereof. In the drawings:

FIGURE 1 is a generally diagrammatic perspective view of a railway bogie employing a brake gear mounting in accordance with the invention.

FIGURE 2 is a detail view to a larger scale of part of the brake gear of the bogie shown in FIGURE 1.

FIGURE 3 is a vertical section through one axle of the same bogie and illustrative of said modification.

FIGURE 4 is a fragmentary and generally diagrammatic view illustrative of another of the brake gear mountings, and

FIGURES 5 and 6 are respectively diagrammatic plan and side views of the remaining embodiment.

Referring to FIGURE 1, in which the general bogie outline is shown in broken lines and only the parts associated with one set of brake gear are shown in full, the bogie embodies two cast steel side frames 1 provided at the ends with axle boxes 2 containing bearings for two wheel and axle sets 3 and 4 respectively.

The drawings show only the brake gear associated with the wheel and axle set 3, this being duplicated in reverse for the wheel and axle set 4, and in fact show only the braking elements specific to one wheel 5. Similar braking elements are provided for the other wheels 6 of the set 3. In the usual manner the superstructure of a railway vehicle, which can be of any desired form and is not illustrated in the drawings, is supported on a transverse bolster 7 which extends laterally between and interconnects the side frames 1. The ends of the bolster 7 move in side guides in the frames 1 and are supported therein by resilient suspension means in known manner, so that independent relative twisting movement of the side frames 1 occurs as the latter follow track undulations.

The air-operated brake gear for each wheel and axle set 3 and 4 is mounted within the bogie itself between the side frames 1 as shown in FIGURE 1. The form of the brake gear mounting 8 is such that the brake gear is not adversely affected in operation by movement of the side frames 1. This is particularly important for high-speed freight operation on undulating track, and the mounting comprises two parallel links 9 forming torque reaction members between and below which there is suspended a beam 10 on which two brake cylinders respectively operative to brake the wheels 5 and 6 are mounted. In FIGURE 2 only one cylinder 11, associated with the wheel 5, is shown.

The cylinder 11 operates on a brake caliper comprising two arms 12 and 13 each of which at one end carries a brake pad 14 between which the wheel 5 is gripped when the brakes are applied. The caliper arms 12 and 13 are pivotally secured between an upper plate 15 and a lower plate 16, and the end of the arm 13 remote from the corresponding brake pad 14 is pivotally attached at 17 to the beam 10. The corresponding end of the caliper arm 12 is pivotally attached at 18 to an operating link 19.

Another horizontal brake actuating movement of which is obtained through a bell crank link 20. One end of the bell crank link 20 is pivotally attached at 21 to the link 19 and the other end is pivotally attached at 22 to the vertical actuating rod 11a of the cylinder 11. The lever 20 turns about a fixed pivot at 23 on the beam 10. The caliper arms 11 and 12 are separately supported from the corresponding reaction member 9 by hangers 24 in FIGURES 2 and 3. An alternate showing of FIGURE 1 includes a hanger bracket 24a which is common to the two caliper arms 12 and 13 and replaces the separate hangers 24.

The brake pads 14 are able to accommodate them-
selves to the side surfaces of the wheel 5, and the caliper arms 12 and 13 with the pads 14 able to move laterally with respect to the wheel 5, by virtue of vertical pivot mountings of the pads with respect to the caliper arms 12 and 13 at 25 and horizontal pivot attachments at 26 and 27 respectively for the upper and lower ends of the hangers 24. Thus downward braking movement at the cylinder 11 results in the caliper arms 12 and 13 and the brake pads 14 closing together to grip the wheel 15 between them in the usual manner, and the described brake gear is duplicated at each of the wheels of the bogie. Each reaction member 9 is disposed horizontally and pivotally attached at 28 to the bolster 7 and at the other end at 29 to the corresponding one of the fulcrum structures 30. The fulcrum structures 30 are each in the form of a simple upright link mounted on the wheel axle by means of a roller bearing 31 mounted in an eye 32 at the lower end of that link.

In the modification illustrated in FIGURE 3 the separate fulcrum link 30 are replaced by a fulcrum structure which is common to both reaction members 9 and is in the form of a cannon box casing 33 surrounding the corresponding axle. The casing 33 extends at the ends close up to the wheels 5 and 6 and is supported on the axle by roller bearings 34. In the region of these bearings the casing 33 has integral and radially projecting arms 35 which are pivotally connected to the reaction members 9 in order to perform the same function as the separate links 30 already described.

Figure 4 illustrate one manner in which a basically similar fulcrum structure can be applied to a conventional braking system where the "clasp brake" type employing brake blocks which engage the outer periphery or tyre of the wheel. In this figure only one wheel 41 and the associated brake blocks 42 are shown, two such brake blocks respectively associated with each wheel of each set being mounted at the ends of two parallel suspended brake beams 43. Thus each wheel is clasped between two diametrically opposite brake blocks, and the brake gear for each wheel and axle set again comprises two air brake cylinders, the brake gear mounting having for each cylinder a horizontal link 46 providing a torque reaction member of the fulcrum structure 47 directly mounted on the wheel axle 48 through a roller bearing 49. In this case the fulcrum structure 47 is formed with a platform 50 on which the brake cylinder 51 is mounted, and the reaction link 46 is pivotally connected at its ends to the bogie bolster 52 and the casing and the cylinder 51 respectively, the pivot connections being shown at 53 and 54. Each cylinder 51 has brake actuating rods 55 which move outwardly from the two ends of the cylinder 51 to actuate the brakes, the rods 55 being pivotally attached to the upper ends of levers shown diagrammatically at 56 and which are connected, at their lower ends, to the brake beams 43 through pivotal links 57. The brake beams 43 are suspended in the usual manner from the bogie frame by hangers which are not illustrated in the drawings.

FIGURE 5 and FIGURE 6 illustrate a motor driven bogie with a driving unit 60, including the driving motor and hypoid bevel driving gear, mounted in a casing through which passes the axle 61 of the driven wheel and axle set 62. At the end remote from the axle 61 the unit 60 is suspended from the bolster 63 by a hanger 64, and two cranked links 65 adjacent the wheels provide torque reaction members for the motor unit 60 and also for the brake gear which is illustrated generally at 66 and is suspended below the links 65. Thus the links 65 fulfill a dual function, and so far as the brake gear is concerned they operate in a manner analogous to that of the links 9 in FIGURES 1 and 2 and the brake gear 66 is again of disc brake type and basically similar to that shown in FIGURES 1 and 2, with brake pads 67 mounted at the ends of caliper arms 68.

I claim:
1. A railway bogie fitted with disc brakes, wherein a brake gear mounting comprises a torque reaction member and a fulcrum structure mounted on an axle of the bogie by way of a journal bearing, the reaction member being supported between and pivotally attached to a transverse member or bolster of the bogie and the fulcrum structure, and the brake gear comprises a brake cylinder and associated brake-operating linkage supported to the reaction member, and a brake caliper the arms of which carry brake pads and are suspended from the reaction member.
2. A railway bogie according to claim 1, wherein the fulcrum structure is disposed directly above the axle with the two pivotal attachments of the reaction member, to the transverse member or bolster and the fulcrum structure respectively, disposed at more or less the same level.
3. A railway bogie according to claim 2, wherein the brake gear is suspended from the reaction member between the bolster and the axe with the fulcrum structure in the form of a link with an eye by which it is mounted on the axle.
4. A railway bogie according to claim 1, wherein said reaction member is one of two parallel reaction members which at corresponding ends are pivotally connected to said fulcrum structure and to both reaction members and is in the form of a casing which surrounds the axle and is mounted thereon by way of roller bearings.
5. A railway bogie according to claim 4, wherein the fulcrum structure is provided by a cannon box casing with radially projecting arms to which the reaction members are pivotally attached.
6. A railway bogie according to claim 4, wherein the bogie is motorised and the common fulcrum structure is provided by a gearbox casing or a driving motor mounting which surrounds the axle.
7. A railway bogie according to claim 6, wherein the reaction member or members provide the torque reaction for the gearbox or motor as well as the torque reaction for the brake gear.
8. A railway bogie according to claim 1, wherein the brake caliper arms are independently suspended from the reaction member by way of individual hangers.
9. A railway bogie according to claim 1, wherein brakes are fitted both wheels of said axle and said brake gear is duplicated for the two wheels, said reaction member being one of two such members spaced laterally of the vehicle and from which the respective brake calipers are suspended, and the brake gear mounting further comprises a brake beam extending laterally of the vehicle and suspended below both reaction members, the brake cylinders which separately operate the two calipers being mounted on the brake beam.

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