RAILWAY CAR UNDERFRAME CROSS-BEARER ASSEMBLY

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My invention relates broadly to railway car underframes and more particularly to a construction of railway car underframe which is cross braced for dissipating horizontal and vertical loads on the center sill to other underframe members.

One of the objects of my invention is to provide an improved construction of railway car underframe which is provided with laterally disposed crossbearers in position spaced upon opposite sides of the center of the railway car underframe for facilitating the transmission of vertical loads from the center sill to the side walls and dissipating horizontal impacts on the center sill to other underframe members for substantially increasing the over-all strength of the underframe.

Still another object of my invention is to provide an arrangement of crossbearers in the underframe assembly of a railway car formed from plates welded in a box-like structure extending laterally of the center sill and connected with the side sills for bracing the railway car underframe against appreciable deflection or distortion under conditions of application of heavy end impacts.

Another object of my invention is to provide a construction of railway car underframe including crossbearers of rigid tubular construction extending between the center sill and the side sills for bracing the railway car underframe and resisting tendency of distortion of the underframe under conditions of heavy impacts applied to the ends of the underframe.

Still another object of my invention is to provide a construction of crossbearers for railway car underframes formed from rolled sections arranged in symmetrical arrangement to each other between the center sill and the side sills for increasing the section-modulus over that heretofore obtainable and correspondingly increasing the rigidity and strength of the railway car underframe.

Still another object of my invention is to provide an arrangement of crossbearers transversely along the length of a railway car underframe where the crossbearers are of polygonal section and located at positions for vertical loading of the underframe and so connected with other underframe members as to dissipate applied horizontal loads.

Other and further objects of my invention reside in the construction of crossbearer for railway car underframes and the coaction thereof with other underframe members for increasing strength of the underframe as set forth more fully in the specification hereinafter following by reference to the accompanying drawings in which:

Figure 1 is a plan view of a railway car underframe employing the crossbearer construction of my invention and illustrating the assembly of the crossbearer with other frame members of the railway car underframe; Fig. 2 is a side elevational view of the railway car underframe shown in Fig. 1; Fig. 3 is a transverse sectional view taken substantially on line 3—3 of Fig. 1 and showing in enlarged vertical section a side elevation of one of the crossbearer assemblies; Fig. 4 is a view similar to the view shown in Fig. 3 but illustrating the juxta-opposed positions of the parts of the crossbearer in relation to the center sill and the side sill; Fig. 5 is a vertical sectional view taken substantially on line 5—5 of Fig. 3; Fig. 6 is a vertical sectional view taken substantially on line 6—6 of Fig. 3; Fig. 7 is a fragmentary perspective view of a portion of one of the crossbearers in juxta-opposed position with respect to a side sill; Fig. 8 is an enlarged fragmentary plan view of the center portion of the railway car underframe with parts broken away and illustrated in section for indicating the assembly of the floor stringers with respect to the crossbearers, the center sill and the side sills; Fig. 9 is a longitudinal vertical sectional view taken substantially on line 9—9 of Fig. 8; Fig. 10 is a fragmentary plan view of one of the crossbearers and illustrating the relation thereof to the center sill, the side sills and the floor stringers; Fig. 11 is a horizontal sectional view taken substantially on line 11—11 of Fig. 3; Fig. 12 is a transverse sectional view through a modified form of crossbearer formed from rolled sections welded along a substantially horizontal axis, the view being taken substantially on line 12—12 of Fig. 14; Fig. 13 is a view of a further modified form of crossbearer formed from rolled sections welded along a vertical axis; Fig. 14 is a fragmentary transverse sectional view through a crossbearer of the construction illustrated in Fig. 12; Fig. 15 is a view similar to the view shown in Fig. 14 but showing the crossbearer formed from angle sections vertically connected at opposite sides; Fig. 16 is a vertical sectional view taken substantially on line 16—16 of Fig. 15 and illustrating the unequal leg sections of the angles employed in this form of crossbearer construction; Fig. 17 shows a further modified form of crossbearer embodying my invention employing channels inter-connected at their opposite sides by tie plates welded thereto; and Fig. 18 is a fragmentary perspective view of the form of my invention illustrated in Fig. 17.

My invention is directed to an improved construction of railway car underframe having crossbearers constructed to impart substantial rigidity and strength to the underframe for facilitating the transmission of vertical loads from the center sill to the side sills and for dissipating horizontal end loads on the center sill to other underframe members. I obtain the improved results in railway car underframe construction by utilizing crossbearers of various constructions, such as rigid tubular structures; box-like structures fabricated from welded plates; rolled steel sections assembled to provide a structure of relatively high section-modulus; and/or a fabricated polygonal section assembled from angle or channel members. The crossbearers are located on opposite sides of the transverse center of the railway car underframe and serve to mount oversize floor supports as compared to the aligned floor supports in the opposite end sections of the underframe. The crossbearers introduce the required rigidity in the underframe at the area of maximum loading adjacent the side doors of the car with which the underframe is intended to be assembled.

Referring to the drawings in detail, an assembled railway car underframe embodying my invention has been shown in plan view in Fig. 1 wherein reference character 1 designates the center sill illustrated in relation to the side sills 2 and 3 and the end sills 4 and 5. The bolster for the underframe are shown at 6 and 7 and in their relative locations with respect to the other members of the underframe, including the crossties 8, 9, 10 and 11. The floor supports constituted by 2-bars which extend longitudinally of the underframe are illustrated at 12 in the left hand area of the railway car underframe, while the floor supports constituted by 2-bars for the right hand area of the railway car underframe are represented at 14. The
lateral center of the railway car underframe over which the side doors of the railway car assembly are located is represented at 15 and on each side of the lateral center 15 I arrange the crossbearers of my invention, as shown at 16 and 17.

Fig. 3 illustrates in side elevation one of the crossbearers from which it will be seen that the crossbearer assembly is constituted by two coacting portions 17a and 17b projecting from opposite sides of the center sill 1 outwardly to the side sills 2 and 3. Fig. 4, illustrates the crossbearer assemblies in just-in-position with respect to the center sill 1 and side sill 3.

The crossbearers 16 and 17 located on opposite sides of the center lateral axis 15 of the railway car underframe provide mounting means for the oversize floor supports 18 in the form of Z-bars. The Z-bars 18 are larger in section than the Z-bars 12 and 14, as this area of the car is subjected to greater stresses and strains under ingress and egress of loads into and out of the car. To accommodate the different sizes of floor supports 12 and 14 on the one hand and 18 on the other hand, the crossbearers are provided with brackets at opposite sides thereof of different sizes as represented, for example in Fig. 6, at 19 and 20, secured to vertically extending spaced plates 21 and 22 forming the opposite sides of the crossbearer where bracket 19 serves to mount floor supports 14 and bracket 20 serves to mount floor supports 18.

The crossbearer is formed by the vertically extending spaced plates 21 and 22 which are spaced longitudinally of the center beam and are welded to the sides thereof and project outwardly to the side sill 3. The vertically extending plates 21 and 22 are shaped at their inner ends to mount on the top of flanges 1a and 1b of center sill 1 with their upper peripheral edges extending coplanar immediately below the top plane of the center sill. While the lower peripheral edges of the plates taper upwardly from the center sill to the coacting side sill the upper peripheral edges of the plates 21 and 22 serve to support the top cover plate 23 which extends substantially coplanar with the plane of the top of the center sill 1, except for the thickness of the reinforcement strips which have designated at 24 and which provide support for the floor boards of the railway car within the area represented generally at 25 in Fig. 3. Both portions 17a and 17b of the crossbearer are symmetrical, so that I have designated corresponding parts by similar reference characters.

In order to reinforce the two portions of the crossbearer, I provide a tie plate 27 extending laterally across the center sill and establishing welding connection with the bottom cover plate 26 of the symmetrical plates of the crossbearer. All of the plates 21, 22, 23 and 26 forming the polygonal hollow structure constituting the crossbearer are welded at their seams to provide a rigid structure of high section-modulus adapted to transmit vertical loads from the center sill to the side sills and to dissipate horizontal end loads on the center sill to other underframe members.

In lieu of the assembly of the crossbearer from spaced plates forming a box-like structure I may employ the arrangement shown in Fig. 12 where a pair of rolled sections 28 and 29 have their adjoining edges interconnected by a welded seam designated at 30. In this arrangement the rolled section 28 has a horizontally extending top supporting portion and downwardly depending side portions 28a which serve to support the brackets 19 and 20 for mounting the two bars constituting the floor supports 14 and 18. The rolled section 29 has the bottom thereof tapered upwardly from the center sill 1 to the side sills, as represented, for example in Fig. 14, at 3. The edges of the sides 29a terminate along an incline which registers with and corresponds to the inclination of the edges 28a, so that the seam 30 inclines upwardly from the center sill 1 to the side sill 3. The rolled sections 29 of each of the coacting transversely extending portions of the crossbearer are interconnected by the pair of connecting plates 44 and 45. The edges of the sides 31a and 31b extend in a plane inclined upwardly and outwardly from the center sill to the side sills.

As illustrated in Figs. 15 and 16 I may form the crossbearer from a plurality of angle members which I have illustrated at 34, 35, 36 and 37. These angle members may have legs of unequal lengths with the upper legs thereof abutting and interconnected in a center beam, represented at 38. In this arrangement, as more clearly shown in Fig. 16, the side legs of the angle members 34 and 35 extend downwardly and serve as supports for the brackets 19 and 20 for mounting the floor supports. The lower angle members 36 and 37 are correspondingly arranged and have their longer legs welded in a welding seam represented at 39 and their shorter legs extending upwardly in alignment with the legs of the shorter legs of the angle members 34 and 35. These shorter legs of the angle members are interconnected by plates 40 and 41 which are welded to the interior surfaces of the legs of the angle members with the angle members forming a tapered structure as represented in Fig. 15, extending from a maximum depth adjacent the center sill 1 to a minimum depth at the exterior end of the crossbearer where connection is established with sill 3. The spatial relation of the angle members adjacent the center sill is fixed by means of vertically extending flange plates 46 welded to the outside of center sill 1 and providing attachment means for the interior ends of the angle members. Two such spaced flange plates are provided for mounting both sets of angle members. Thus, a corresponding structural rigidity is secured in a crossbearer formed from angle members as has heretofore been explained in the structures fabricated from rolled sections.
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represented more particularly in Fig. 17 for maintaining the tapered relation of the channel-shaped members constituting the crossbearer. The exterior end of the bottom channel 43 is recessed at 43a to establish a keyed connection with the edge of the flange of the side sill 3.

The crossbearer construction of my invention has been found to greatly improve the operating characteristics of railway car underframes and while I have described my invention in certain preferred embodiments, I realize that modifications might be made and I desire that it be understood that no limitations upon my invention are intended except as may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is as follows:

1. A crossbearer construction for railway car underframes having a center sill and side sills, comprising two pairs of angle members of complementary shapes extending transversely of the underframe, each angle member being connected at one end with the center sill and at the other end with one of the side sills, one pair of angle members being located adjacent the upper portion of said center sill and having the top flanges thereof directed toward each other and the side flanges thereof directed downwardly and the other pair of angle members being located adjacent the lower portion of said center sill and having the bottom flanges thereof directed toward each other and the side flanges thereof extending coplanar with the side flanges of the aforesaid pair of angle members and connecting means extending between the side flanges of the angle members adjacent the upper portion of said center sill and the side flanges of the angle members adjacent the lower portion of said center sill for maintaining said angle members in alignment for resisting stresses exerted on said underframe, said angle members adjacent the lower portion of said center sill being inclined upwardly toward said angle members adjacent the upper portion of said center sill to terminating positions at each side sill.

2. A crossbearer construction for railway car underframes as set forth in claim 1 in which one of the angle members of each pair of said angle members are vertically spaced one from the other adjacent the center sill, and means additional to said connecting means extending between the aforesaid individual angle members of each pair of angle members adjacent the center sill for maintaining said individual angle members in predetermined spaced relation.

3. A crossbearer construction for railway car underframes as set forth in claim 1 in which the top flange of each angle member of the first mentioned pair of angle members is interconnected in coplanar relation by welding for maintaining the flanges of said angle members in predetermined spaced relation.

4. A crossbearer construction for railway car underframes as set forth in claim 1 in which said pairs of angle members are vertically spaced from each other adjacent the connection thereof with the center sill, and in which said connecting means comprise vertically extending plate members disposed between the adjacent angle members of each pair of angle members for positively spacing said adjacent angle members one above the other.

5. A crossbearer construction for railway car underframes as set forth in claim 1, in which each angle member has one flange thereof longer than the other flange thereof, the longer flanges of the angle members of each pair of angle members extending coplanar with each other and abutting along a central longitudinal axis through the crossbearer and joined by a welded connection, and in which said connecting means are tapered plates disposed between each member of the inclined pair and the adjacent member of the first mentioned pair of angle members and wherein the shorter flanges of adjacent angles establish connection with said tapered plates for reinforcing the side walls of said crossbearer.

6. A crossbearer construction for railway car underframes as set forth in claim 1, in which each said angle member has one flange thereof longer than the other flange thereof, the longer flanges of the angle members of each pair of angle members extending toward each other in horizontal planes and abutting along a central longitudinal axis through the crossbearer, said last mentioned flanges being welded along an axis normal to the longitudinal axis of the underframe, and wherein said connecting means are constructed by vertically disposed plates and the shorter flanges of said pairs of angle members extending in vertical planes with said vertically disposed plates located therebetween in welded contact with the inner surfaces of the side flanges of the respective angle members.

7. An underframe for railway cars comprising a center sill having a multiplicity of spaced plates welded to opposite sides thereof and projecting in vertical planes normal to the axis of the center sill, side sills spaced from opposite sides of said center sill, crossbearers each comprising upper and lower pairs of angle members, each of the angle members of each of said pairs including normally disposed or side flanges directed toward each other and constituting the external sides of the crossbearers, the inner ends of the interior surfaces of said side flanges of one angle member of both the upper and lower of said pairs being welded to one of said plates and the inner ends of the interior surfaces of said side flanges of the other angle member of both the upper and lower of said pairs being welded to the next adjacent spaced plate on the center sill, the outer ends of said angle members being connected with the coacting side sill, the external faces of the side flanges of each angle member of the upper pair of angle members carrying brackets, with the flanges thereof disposed in parallel relationship, supports welded to said brackets and extending in substantially parallel relation to said center sill and the coacting side sill, plate members welded to the interior faces of the side flanges of said angle members, the upper pair of angle members having their top flanges extending in a substantially horizontal plane and the lower pair of angle members having their bottom flanges directed inwardly thereof and disposed in an inclined plane extending from the center sill to the coacting side sill.

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