The invention relates to an end underframe weldment for railway cars of the passenger train type and to a coupler carrier forming part of such frame. More specifically, the invention relates to the indicated kind of end underframe which represents, practically throughout a fabricated fusion-welded, preferably arc-welded, plate metal construction.

The new construction is distinguished from prior constructions of the same general kind by the simple and easily manufactured form of its component parts, by the arrangement of the welding seams permitting convenient and economical assembly, and by its favorable strength to weight ratio.

The features by which the above and other advantages are achieved, will become apparent from the following description of the embodiment of the invention which is shown in the attached drawing.

In the drawing:

Figure 1 is a fragmentary plan view of the vestibule end of the underbody of a passenger railway car, including the new end underframe weldment, and showing adjoining parts of side walls and end wall partly in section;

Figure 2 is below and above the center line a plan view and a horizontal section along line 2-2 of Figure 4, respectively, of the end underframe weldment and of the adjoining portion of the main center sill;

Figure 3 is a section along line 3-3 of Figure 1 of the underbody showing the center sill structure in side elevation;

Figure 4 is a vertical longitudinal section through the underbody, the section being taken along the center line 4-4 of Figure 1;

Figure 5 is an end elevation of the end sill and coupler carrier of the end underframe shown in Figure 3;

Figure 6 is a fragmentary section through the end sill, along line 6-6 of Figure 1;

Figures 7 through 12 are local sections through the end underframe along the correspondingly numbered lines of Figure 3;

Figure 13 is a local section through the center plate and the connecting region between center sill and bolster beam, the section being taken along line 13-13 of Figure 1;

Figure 14 is a longitudinal section along line 14-14 of Figure 1 through the bolster beam and through the connection between the center sill of the end underframe and the adjoining main center sill;

Figure 15 is a section along line 15-15 of Figures 1 and 14;

Figure 16 is on the left an end elevation of one-half of the bolster beam and on the right a section through the bolster beam, the elevation being viewed from and the section being taken along line 16-16 of Figure 2;

Figure 17 is a fragmentary section along line 17-17 of Figure 1 through the bolster beam and a fragmentary inside elevation of the underframe side sills and the body side wall; and

Figure 18 is a fragmentary section along line 18-18 of Figure 17.

The underbody illustrated in the drawing comprises a plate metal end underframe weldment 20, a sheet metal main center sill 21 and a sheet metal shear panel floor 22. The main center sill 21 has two transversely spaced channel sections 23 which are secured by marginal flanges to a bottom wall 24 and to floor panel 22 (Figure 15). Panel 22 consists of a plurality of angle or Z-sections connected with each other so that one arm forms the shear panel proper, and the other arm or arms constitute transverse, upwardly projecting reinforcing webs. The lateral margins of floor panel 22 are connected each with a side sill 25 (Figures 1, 17 and 18), and the panel is reinforced by hat-section stringers 26 (Figure 1). The side walls comprise bottom sills 27, secured to the sills 25, and hat-section posts 28. The general features described briefly to this point are similar to the features disclosed in co-pending applications, such as application Serial No. 588,686 Underframe for Vehicles Especially Railway Cars, of Walter B. Dean, filed April 17, 1945, now U.S. Patent No. 2,504,113, application Serial No. 588,760 End Underframe Construction for Vehicles Especially Railway Cars, of applicant and Walter B. Dean, filed April 17, 1945, now U.S. Patent No. 2,504,112 and application Serial No. 793,001 End Underframe for Railway Cars, of applicant, filed October 24, 1947, now U.S. Patent No. 2,580,906.

The end underframe weldment 20 comprises a center sill structure 29, an end sill member 30 and a bolster beam 31. Bolster beam 31 intersects center sill 29 on a short distance from the inboard end thereof.

Sill structure 29 is composed mainly of two Z-sections, each having a vertical web 32, an outwardly directed bottom arm 33 and an inwardly directed top arm 34, and each extending from coupler carrier 35 to plane 36 inboard of bolster beam 31 (Figure 2). Bottom arms 33 extend from coupler carrier 35 (Figures 2 and 3) to the outboard side of bolster beam 31 (Figures 2 and 14), and the upper arms 34 extend from
3 plane 3 to the inboard side of end sill 30 (Figures 4, 7 and 8). The upper and lower arms 33, 34 have approximately constant width over their entire lengths and are each arranged in one plane, and webs 32 have in side elevation straight upper and lower edges diverging from bolster beam 31 in outward direction. This straight edged formation facilitates the manufacture of the Z-sections.

The plan view configuration of the Z-sections is as follows: At 3 and adjoining their intersections with bolster beam 31 and the upper arms 34 meet and are welded together (Figures 2, 13 and 15). From bolster beam 31 to a transverse bulkhead 37 interconnecting the webs 32, webs 32 with their arms 33, 34 diverge in outward direction, then again run parallel to each other to plane 38 (Figure 2), whence webs 32 and lower arms 33 change their directions abruptly and diverge from each other to their outer ends at coupler carrier 35.

The upper and lower margins of webs 32 are interconnected by top and bottom plates 38, 40 from the region of the bulkhead 37 to points near bolster beam 31 (Figures 2, 4, 10, 11 and 12). Bulkhead 37 is reinforced by a channel section member 41 and forms the inner stop for draft gear 42 located in the pocket between webs 32. Brackets or plates 43 welded to the webs 32 form the forward stops for the draft gear as well as draft gear guides. Further brackets 44 welded to webs 32 and bulkhead 37 form upper horizontal guides for the draft gear (Figures 2, 4, 9 and 10). Removable plate 45 (Figure 4) closes the draft gear pocket. The details of the draft gear and its accommodation in the end underframes are not illustrated and described in detail; they form the subject matter of applicant's copending application Serial No. 130,161, Draft Gear Arrangement, filed November 30, 1949, now abandoned.

End sill 30 (Figures 2, 3, 4, 6 and 8) is a closed box formed of straight-sided angle sections 46, 51 and end plates 46, which members are arc-welded together along their margins. Section 45 forms the outer and bottom wall, and section 47 forms the top and inner wall of sill 30. End walls 48 are provided with upwardly projecting horns 49 serving for the attachment of the collision posts 50. The collision posts 50 form part of the end wall which also comprises the sheet metal lateral end sill portions 51, corner posts 52 and outer panel 53 (Figure 1). End sill 30 is interiorly reinforced by longitudinal vertical webs 54 and by tubes or sleeves 55 extending through and secured in openings of its vertical walls. The tubes house buffer rods and springs 56 (Figure 8).

The bottom wall of end sill 30 is extended in inboard direction beyond its inner wall. The upper portions of webs 32 are recessed and top arms 34 are cut off for the accommodation of sill 30 and they end at the inner wall of sill 30 to which they are welded. An inverted U-section brace 57 is welded by its side walls to the upper arms 34, along its front margins to the inner wall of sill 30, and at the end margin of its top wall to top plate 35. The depth of the U-section decreases from the end sill in inboard direction (Figures 3, 4, 5, 7, 9 and 10) and a floor board support 58 is welded to the top of member 57 (Figures 4, 9 and 10).

Coupler carrier 35 is welded to the underside of end sill 30 and to the end margins of webs 32 and lower arms 33. This carrier is cut from a metal plate and remains in its flat state, thereby greatly facilitating and cheapening its manufacture and installation. The lower margin of plate 35 is connected by welding with the lower horizontal arm of a transversely extending angle section 58. The second arm of section 58 extends upwardly and is spaced from plane 35. Longitudinally extending, vertical gusset plates 60 are welded to the ends of angle section 58, to the inner surface of plane 35 and to the edges between webs 32 and lower arms 33 of the center sill structure. They project in a direction beyond section 59 (Figures 3, 4 and 7).

All members entering into the construction of the end sill, the collision post supports, the coupler carrier and the adjoining portion of the center sill structure are of very simple configuration. They can be manufactured easily and cheaply because they are straight-sided so that they require either no forming at all or can be formed simply by bending on power brakes. The straight-sided formation also greatly facilitates and cheapens the assembly of the parts through-out by fusion, such as arc-welding. The weld beams are relatively few and short. This simplicity in construction and manufacture is achieved without sacrifice in the strength necessary for withstanding the severe strains to which structures of this type are subjected.

Bolster beams 51 is an L-section having a vertical web 51, a bottom chord 52 and a top chord 53. Chord 53 extends horizontally and is secured by down-turned marginal flanges to the webs of floor panel 22 by plug-welding (Figures 14 and 15). Both chords 52 and 53 extend uninterrupted over the entire width of the under frame (Figures 13 and 18). Bottom chord 62 slopes downwardly from its ends toward the center of the car.

Web 61 of the bolster consists of two halves, one on each side of the center sill portion, which are welded to the webs 32 of the center sill. Plates or gussets 64 aligned with webs 32 are welded to the upper margins thereof, to the upper portion of web 61 and to top chord 63 (Figures 13, 14 and 16). The gap between the two halves of bolster web 61 is bridged by gusset plates 66, 68 inserted between 30. Each of the upper and upper arms 32, 34 of the center sill, to gusset plates 64 and to chords 62, 63 (Figures 2, 4, 13 and 16).

Bottom chord 62 is welded to the recessed lower margins of center sill and webs 32 and to the end margins of center sill arms 33. On the inside side of bolster beam 31, the webs 32 have their lower margin sharply notched at 67 (Figure 14). The outboard margin of this notch is welded to the outboard end of hat-section 60 which has horizontal flanges 69 and tapers in depth in inboard direction (Figures 14 and 15). Flanges 69 extend in outboard direction beyond the U-section portion of member 66 and have their extensions welded to webs 32 and 61 of center sill and bolster beam. Flanges 69 are spaced from the lower margins of the center sill webs 32 extending beyond the U-section of the outboard projecting wall portions along the lower margins of main center sill 21 (Figures 14 and 15). The projecting portions of webs 32 fit between the side walls 23 of the main center sill and are secured in the region of overlap to the 70. Further, welds 70 connect the outboard projecting portions along the lower margins of main center sill 21 to the flanges 69 of member 68.

Secured to the underside of bottom chord 62
of the bolster beam, of bottom arms 33 of the end center sill, and the bottom wall of member 68 is the center plate structure consisting of cylindrical members 71, 72 and an annular plate 73. This fabricated center plate structure is cheaper and lighter than the commonly used castings and is more conveniently and securely attachable to the weldment forming the remainder of the end underframe. The wedge-shaped member 68 contributes to the transmission of the stresses from center plate into the adjoining main center sill 21 without stress concentrations and without abrupt change in direction.

The outer margins of web 61 and chords 62, 63 of the bolster beam are each welded to a longitudinally extending vertical plate 74, and a box-section structure 75 is welded to the outside of plate 74. Structure 75 nests in the channel section portion of side sill 25. Plate 74 serves for the securement of bottom sill 27 and post 28 of the side walls (Figures 1, 2, 16, 17 and 18). The web 61 and chords 63, 63 of bolster beam 31 are inter-braced by gussets 76 at the location of the side bearings 77 (Figures 2 and 16).

The invention is not restricted to the details of the illustrated and described embodiment but is susceptible to modifications and adaptations which will occur to those skilled in the art.

I claim:

1. In an end underframe for railway cars of the passenger train type, in combination: a closed box section end sill having two angle section plates facing towards each other and fusion welded together along their margins, the one section forming the top wall and the one upright wall and the other section forming the bottom wall and the other upright wall of the sill; a center sill between said end sill and the location of a bolster beam; center sill comprising a pair of Z-sections with vertical webs and top and bottom flanges, said webs having straight taper in side elevation from bolster beam to end sill; a coupler carrier comprising a flat plate welded by its top margin to said end sill; an angle section reinforcement welded to the bottom margin of said coupler carrier; the vertical webs of said Z-sections being welded to said coupler carrier and forming part thereof; and gussets interconnecting the bottom flanges of the Z-sections and the coupler carrier.

2. End underframe for passenger train railway cars, presenting practically throughout a fusion welded plate metal structure, said structure comprising in combination: a closed box section end sill having two angle section plates facing towards each other and welded together along their margins, the one section forming the top inner wall and the other section the bottom and outer wall of the sill; an I-section bolster beam welded together of a vertical web and horizontal top and bottom chords; a center sill between said end sill and a point inboard of said bolster beam; said center sill comprising a pair of Z-sections with vertical webs and top and bottom flanges, said webs having straight taper in side elevation from bolster beam to end sill; said Z-sections having the following portions following each other from the end sill toward their inboard ends: portions converging toward each other in inboard directions, parallel portions transversely spaced from each other to form a draft gear pocket, portions converging toward each other in inboard direction so that their top flanges meet near the outboard side of said bolster beam, and portions running parallel to each other and connected by their top flanges; a coupler carrier consisting of a flat plate welded by its top margin to said end sill; the vertical webs of said Z-sections being welded to said coupler carrier and forming part thereof.

3. End underframe for passenger train railway cars, presenting practically throughout a fusion welded plate metal structure, said structure comprising in combination: a closed box section end sill having two angle section plates facing towards each other and welded together along their margins, the one section forming the top inner wall and the other section the bottom and outer wall of the sill; a center sill between said end sill and a point inboard of said bolster beam; said center sill comprising a pair of Z-sections with vertical webs and top and bottom flanges, said webs having straight taper in side elevation from bolster beam to end sill; said Z-sections extending beyond said bolster beam about parallel to each other; a draft gear pocket formed by said webs and a member interconnecting them; a coupler carrier consisting of a flat plate welded by its top margin to said end sill; an angle section reinforcement welded to the bottom margin of said coupler carrier; the vertical webs of the center sill being welded to the coupler carrier and forming part thereof.

4. In an end underframe for passenger type railway cars: a closed box section end sill having two angle section plates facing towards each other and fusion welded together along their margins, the one section forming the top and inner wall and the other section the bottom and outer wall of the sill; an I-section bolster beam having a vertical web and top and bottom chords; a center sill adjoining said end sill and intersecting said bolster beam; said center sill comprising a pair of Z-sections with vertical webs and top and bottom arms; said bottom arms ending at the outboard margin of said bottom chord of said bolster beam; a U-section member connected with the inboard margin of said bottom chord and diminishing in depth in inboard direction; a center plate weldment welded to said bottom chord and the adjoining portions of said bottom arms and said U-section member; plates closing the ends of the box section end sill and provided with upward extensions for the attachment of collision posts; and a coupler carrier welded by its top margin to said end sill.

ALBERT G. DEAN.

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