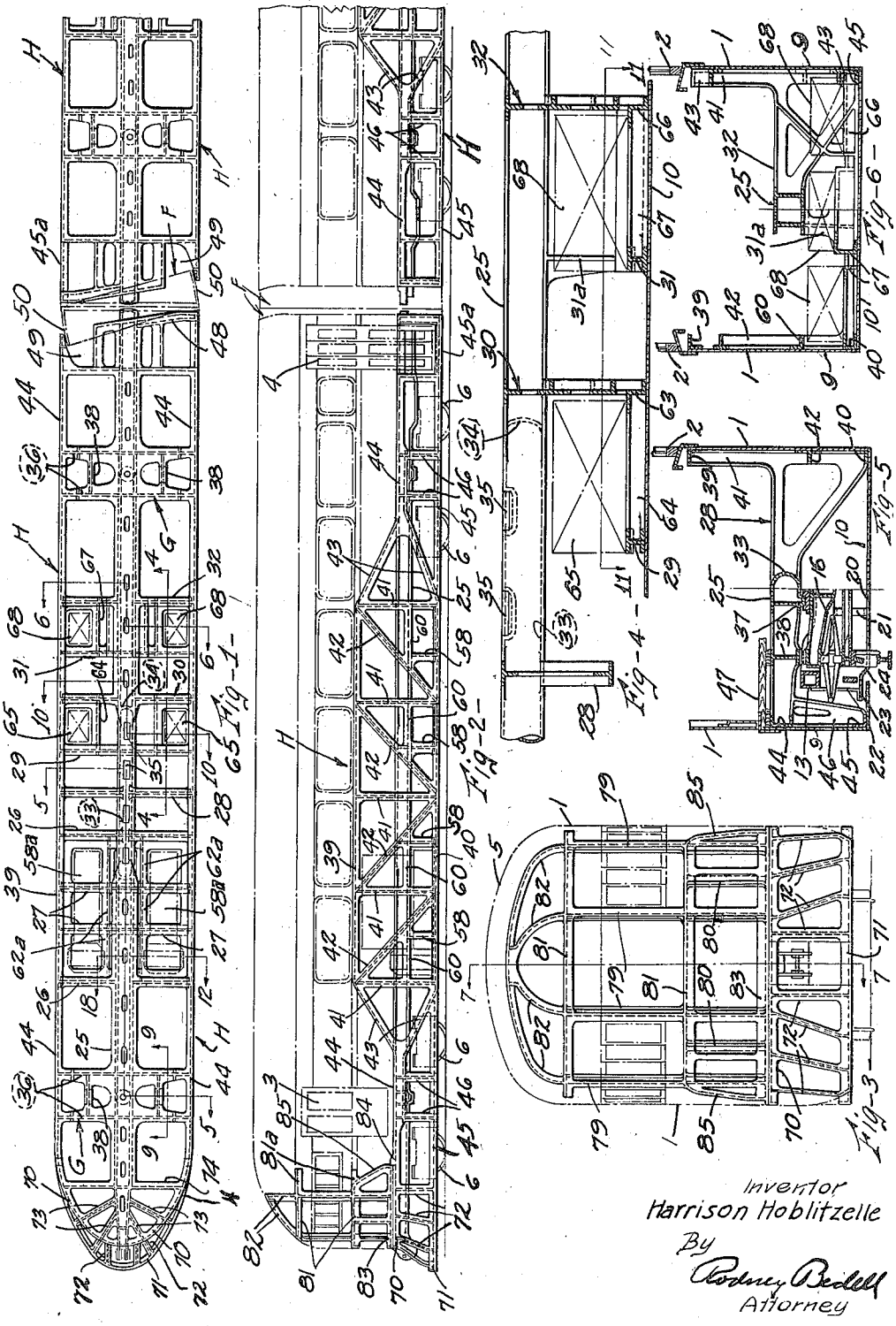
March 1, 1938. H. HOBLITZELLE 2,110,019

RAILWAY VEHICLE STRUCTURE

Filed May 23, 1934 3 Sheets-Sheet 1



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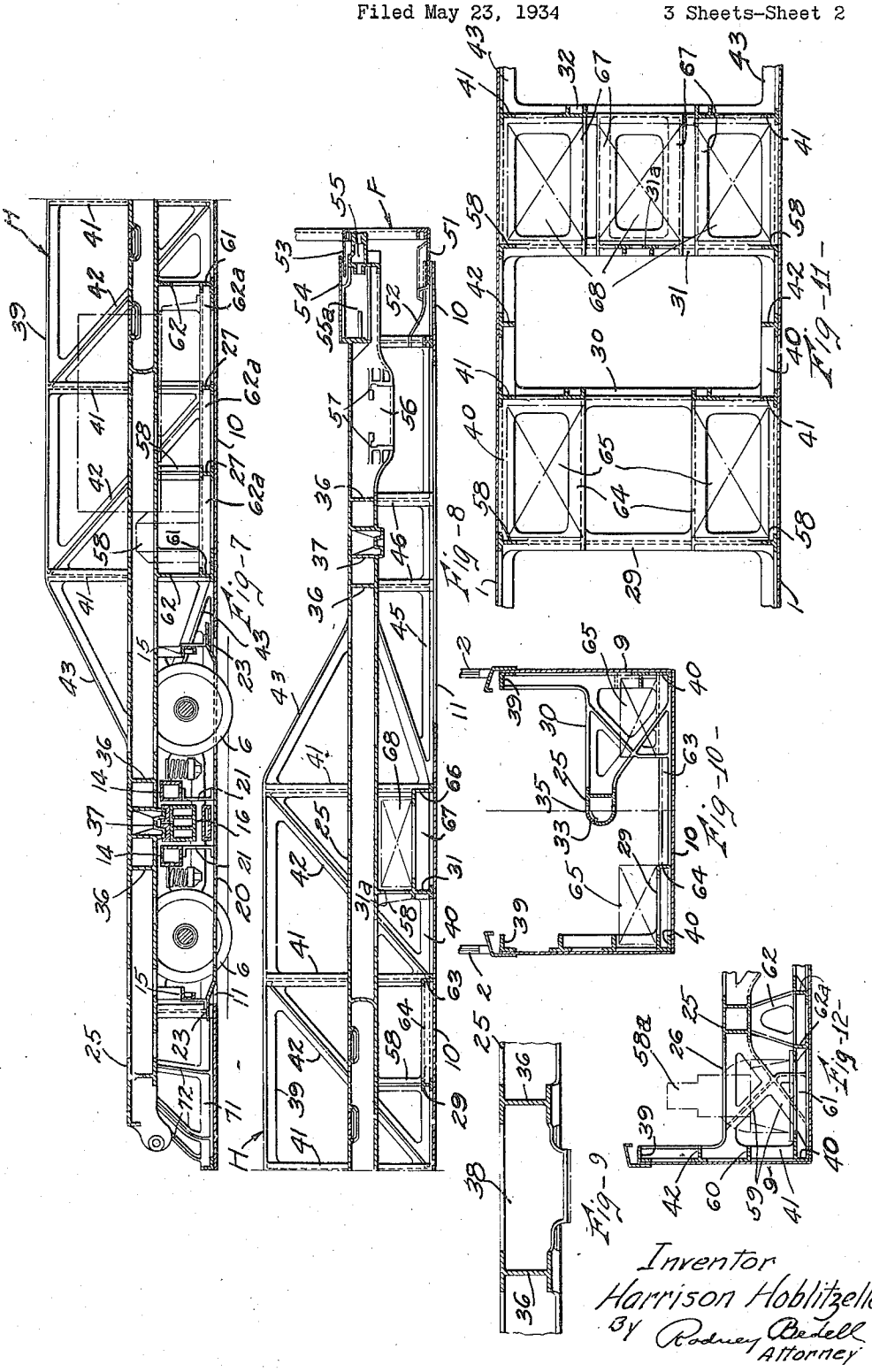

Fig-7

Fig-8

Fig-9

Fig-10

Fig-11

Fig-12

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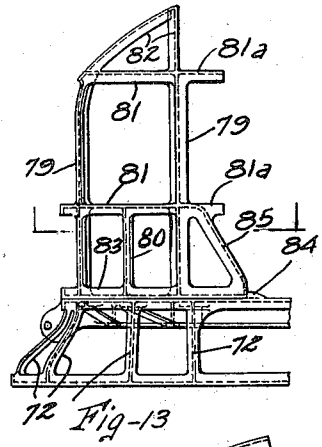

Fig-13

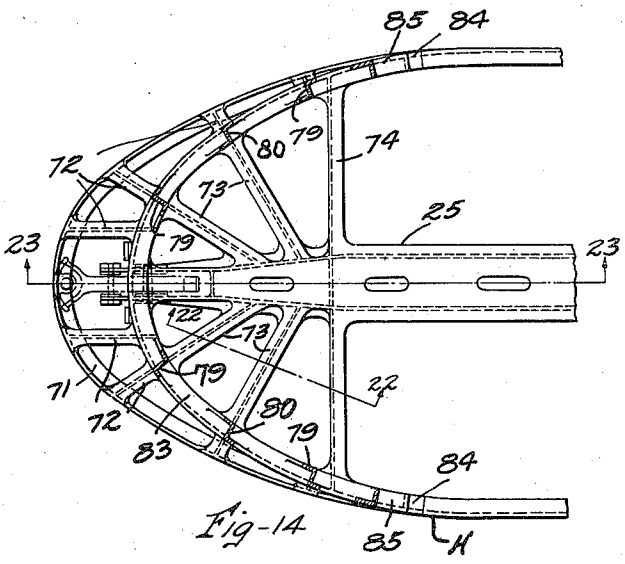

Fig-14

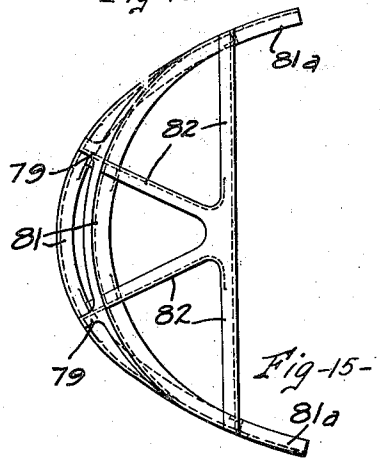

Fig-15-

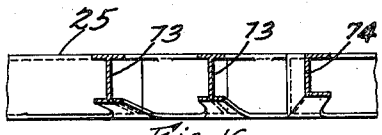

Fig-16

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Patented Mar. 1, 1938 2,110,019

UNITED STATES PATENT OFFICE

2,110,019

RAILWAY VEHICLE STRUCTURE

Harrison Hoblitzelle, Wynnewood, Pa., assignor to General Steel Castings Corporation, Granite City, Ill., a corporation of Delaware

Application May 23, 1934, Serial No. 727,112

10 Claims. (Cl. 105—2)

This invention relates to railway rolling stock and consists in novel construction for streamlining railway vehicles.

The streamlining of the bodies and upper portions of railway cars and locomotives has been suggested heretofore in order to reduce air resistance to movement of the vehicle and attain maximum efficiency and increased speed. But, as far as applicant is aware, the under portions of railway vehicles have not been streamlined heretofore for this purpose.

An important object of the present invention is to provide rigid, durable frame structure for streamline railway vehicles and particularly the under structure thereof.

Another object is to provide means for enclosing and streamlining the irregular underportions of railway vehicles which, if exposed, produce considerable turbulence of the air surrounding the moving vehicle, resulting in substantial air resistance.

Another object is to provide a rigid, durable front end construction particularly for the forward car or locomotive of a streamlined train.

Another object is to provide means for mounting and supporting under equipment such as engine and generators, batteries, and air conditioning equipment.

A more detailed object is to streamline and enclose the underportions of the vehicle, including the equipment referred to above, by extending the vehicle side and end walls downwardly to a level in close proximity to the rails and providing a bottom closure member with openings for accommodating the supporting trucks.

These objects and others hereafter appearing are attained by the structures illustrated in the accompanying drawings in which—

Figure 1 is a top view of the underframe of the leading car or locomotive and the second car of a train embodying the invention.

Figure 2 is a side view of the same showing superstructure in dot and dash lines.

Figure 3 is an end view showing the front end framing of the first car.

Figures 4 and 9 are detail vertical longitudinal sections taken on the corresponding section lines of Figure 1.

Figures 5, 6, 10, and 12 are vertical transverse sections taken on the corresponding section lines of Figure 1.

Figures 7 and 8 are half longitudinal vertical sectional views showing, respectively, the front and rear halves of the underframing portions of the first car of locomotive and taken on the center line thereof.

Figure 11 is a detail longitudinal section taken on the line 11—11 of Figure 4.

Figure 13 is a side view showing the forward portions of the underframing and superstructure framing of the first car.

Figure 14 is a horizontal section taken on the line 14—14 of Figure 13.

Figure 15 is a top view showing the superstructure front end framing only.

Figure 16 is a vertical section taken on the line 16—16 of Figure 14.

Figures 1 and 2 illustrate the leading car or locomotive of a streamlined train with a portion of the second car connected thereto. The connections between the adjacent cars are streamlined by movable end structures F which close the spaces between the cars without affecting the flexibility of the connection. A somewhat similar end construction including movable end members between adjacent cars is disclosed and claimed in a co-pending application Serial No. 703,806, filed December 23, 1933 in the name of Harry M. Pflager. The side walls 1 of the cars, including the windows 2 and doors 3 and 4 and the roof 5, also conform with the streamlined outer surface of the car superstructures.

The vehicle bodies are supported upon trucks of any suitable construction having wheels 6 for engaging the rails 7. The side walls 1 and end walls 17 of the cars extend substantially beneath the floor level 8, as at 9 and 18, to a level in close proximity to the tops of the rails 7 as clearly illustrated in Figures 1 and 2. Extending beneath each car is a bottom member of sheet 10 (see Figures 7 and 8), forming a bottom closure for the underportions of the vehicle and with substantial openings 11 for accommodating the trucks. The lower portions 9 of the car side walls are provided with openings adjacent the truck journal boxes (not shown) for facilitating access thereto and these openings are closed by the doors 12, normally flush with the car side wall. Other openings may be provided in these portions of the side walls, if desired, facilitating access to other under-equipment.

The trucks, one of which is illustrated in Figures 5 and 7, each includes side members or wheel pieces 13, transoms 14, end frame members 15 and a swinging bolster 16 carried from the transoms in a familiar manner by hangers, a spring plank, and elliptic springs. Extending beneath the truck is a bottom sheet 20 supported by the brackets 21 and 22 secured, respectively, to the

transoms 14 and wheel pieces 13. The truck bottom sheet 20 is alined with the bottom closure sheeting 10 extending beneath the car body and the edges thereof are slightly offset vertically and overlap the edges of sheeting 10 as at 23. The sheet 20 is provided with perforations 24 for receiving the truck wheels G. Thus the sheets 10 and 20, which are imperforate and continuous except for the openings for the trucks and truck wheels, cooperate with the depending portions 9 of the car side walls to entirely enclose the car underconstruction, protecting the same against dust and other foreign matter and presenting streamlined outer surfaces.

Each car underframe may be of similar construction except for the end or platform portions, which will preferably be varied as shown, and each includes a center sill 25 extending continuously from end to end, cross bearer structures 26, 27, 28, 29, 30, 31, and 32, and bolster and side structures generally indicated, respectively, at G and H. The entire underframe is conveniently, though not necessarily, formed as shown as an integral casting. The center sill is of box section construction to better withstand vertical and horizontal loads to which it is subjected, except for a portion 33 thereof which is of hollow cylindrical section, as shown in Figures 5 and 10, with ends rounded as at 34 and casting openings 35 closed by plates (not shown) welded in place. The bolsters each include longitudinally spaced vertical webs 36 extending between the side structures H and intersecting the center sill, center bearing structure 37, and members 38 forming side bearings.

The side structures each include an intermediate portion in the form of a truss having top and bottom chords 39 and 40 connected by vertical posts 41 and diagonals 42 and 43. Extending forwardly and rearwardly from this trussed intermediate portion are the longitudinal bar members 44 and 45 connected by ties 46 alined with the vertical web portions 36 of the bolsers. Members 45 are in line with and form continuations of the bottom member 40 of the trussed intermediate portion of the side member, and members 44 are located between the levels of the top and bottom members 39 and 40 of the truss and, as shown in Figure 5, are approximately at the level of the car floor and cooperate with the bolsters, the cross bearers 26, 28, 30, and 32, and the center sill supporting the flooring 47. Diagonals 43 merge with each other and with the upper members 44 for transmitting longitudinal forces between the end and intermediate portions of the side structures.

At the immediately associated ends of adjacent cars in the train, underframe platform structures are provided each including an end member or buffer beam 48 extending transversely of the underframe diagonally of the center sill and terminating substantially short of the side member H at one side to form the pocket 49 for telescopingly receiving the side apron 50 on the movable end member F hinged to the opposite corner of the car. The movable end members F on adjacent cars abut at the center and include top and side aprons conforming with the roofs and side walls of the cars and bottom aprons 51 in lapping relation with the extremity of the car bottom closure sheet 10 whereby the streamlined top, side, and undersurfaces are continued uniformly between adjacent cars. The portions of the sheets 10 extending beneath the end platforms are reinforced by longitudinal ribs 52. A plate 53 secured to the movable end member above the apron 51 slides beneath the platform floor 54 and the plates 53 and 54 cooperate to form passageway flooring between the adjacent vehicles.

At diagonally opposite corners of adjacent end platforms (Figure 2) the upper side members 44 are terminated short of the inclined transverse end members 48 to form step recesses, the end portions 45a of the lower members 45 serving to support the bottom steps. The adjacent ends of the center sills (Figure 8) are provided with pockets 55 and 55a for buffers, and pockets 56 equipped with lugs 57 for draft gear.

Each of the cross bearers between the bolsters extend entirely across the underframe and braces the lower portions 9 of the car side walls. These cross bearers also support the bottom closure sheeting 10 and are adapted for mounting vehicle under-equipment. The cross bearers 27, 29, and 31 extend directly between the lower bars 40 of the side structures and are located entirely beneath and clear the center sill. The cross bearers 26, 30, and 32 include lower parts at the level of the cross bearers 27, 29, and 31 and other parts extending substantially above the same and merging with the center sill 25. The cross bearers 28, 30, and 32 and one each of the cross bearers 26 and 27 are alined with the vertical posts 41 of the trussed intermediate portions of the side members and these posts constitute integral arms on the ends of the cross bearers. Ties 58 extend upwardly from the intersections of the remaining cross bearers with the bottom chords 40 of the side trusses and merge with the diagonals 42. Short horizontal ties 60 further brace the cross bearers.

At the forward end of the first car or locomotive (Figures 7 and 12) the engine and generator motor units 58a are carried beneath the level of the center sill upon the cross bearers 27 and the lower elements 61 of the cross bearers 26, the elements 61 being braced from the center sill by diagonals 59 and brackets 62 and connected together and to cross bearers 27 by longitudinal ties 62a. The leading car or locomotive only will ordinarily be equipped with power units and, accordingly, the transverse frame members of adjacent cars, corresponding to the cross bearers 26 and 27, may be used for other equipment or solely for supporting the side and bottom closure sheeting.

The cross bearer 29 (Figures 1 and 10) and the bottom element 63 of deep cross bearer 30 connected by longitudinal ties 64 carry the storage batteries 65. Cross bearer 31, supported from the center sill by a bracket 31a, together with the lower element 66 of cross bearer 32 and longitudinal ties 67, carry air conditioning equipment 68 (Figures 6 and 8). The corresponding cross bearers of each car in the train may be similarly utilized where each car is provided with individual batteries and air conditioning equipment, or the cross bearers may be utilized for other equipment.

At the front end of the leading car of the locomotive the side structures H converge in smooth curves for supporting the lower part 18 of the streamlined front sheeting 17. The members 44 and 45 continue horizontally around the front end, but forward streamlined member 71 at the bottom extends forwardly beyond the top member 70. The members 70 and 71 are connected and braced by inclined ties 72. Extending between the upper streamlined member 70 and the

forward extremity of the center sill are the diagonals 73 and the end sill 74 at right angles to the center sill, which form a forward platform.

Mounted on the front end platform is the body end framing structure including vertical posts 79 and 80, intermediate horizontal bars 81, and top members 82, all arranged for mounting the streamlined front sheeting 17 of the car superstructure. Projecting a short distance rearwardly of the corner posts 79 in line with the horizontal bars 81 are short arms 81*a* for attachment to suitable body framing elements, indicated in Figure 23. The bottom horizontal member 83 is extended rearwardly beyond the corner posts 79 and abuts the lugs 84 on side bars 44. Diagonal braces 85 extend across the corners between the corner posts and the rear or inner extremities of bottom horizontal members 83.

By means of the construction described, the entire under portions of the locomotive and cars including driving and auxiliary equipment are completely enclosed and protected against dust and moisture and also fully streamlined so as to reduce air resistance to a minimum. The framing construction is simple, durable and rigid throughout and well adapted to withstand hard usage to which high speed streamlined trains are exposed. Obviously, the streamlined train may include any number of cars or a combined locomotive and car only. The leading car of the train may be equipped with an oil engine and a generator so as to constitute this car an oil electric locomotive although obviously any suitable motive power may be provided.

The features of the various cars, aside from the framing structure illustrated in solid lines, do not in themselves constitute the present invention. It may be convenient to form part or all of the side, end, and bottom closure members integral with the supporting framing, as by welding or casting, and all of these parts may be considered as closure structure. The framing structures may be varied as will occur to those skilled in the art and the exclusive use of all such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a railway vehicle, a vehicle body, a supporting truck swiveling on said body, substantially horizontal bottom closure structure rigid with said body and located adjacent the track for streamlining said body and provided with an aperture for receiving said truck, and bottom closure structure rigid with said truck for extending the streamlining under said truck and apertured for the truck wheels.

2. Structure as specified in claim 1 in which said bottom closure structures are at approximately the same level to form a substantially continuous streamlined undersurface for the vehicle irrespective of relative movement of said body and truck.

3. Structure as specified in claim 1 in which said closure structures have horizontally disposed edge portions overlapping to permit relative movement between them when the truck and body move relatively to each other.

4. Structure as specified in claim 1 in which said closure structures have overlapping edge portions spaced apart vertically to permit relative vertical movement between the truck and body.

5. In combination, underframe structure for a railway vehicle including a center sill, side members extending substantially beneath the level of said sill, and transverse framing members extending directly between and bracing the lower portions of said side members independently of said center sill and spaced therefrom, and streamlining casing carried by said side and transverse members.

6. Underframe construction for a railway vehicle including center sill structure, a streamlined end member including elements at a level in close proximity to the rails for supporting closure structure for streamlining the under portions of the vehicle, and members extending diagonally from said end member to said center sill for transmitting longitudinal forces therebetween.

7. In a railway vehicle, a body including a side wall having a rigid extension projecting downwardly to a level in close proximity to the track, and a truck pivoted to said body and including a bottom casing carried by and movable with the truck relative to said body and terminating adjacent to said body extension, said extension and casing having horizontal portions overlapping each other to accommodate relative movement of said body and truck.

8. In a railway vehicle, a body including side and end walls having rigid extensions depending to a level in close proximity to the track, a truck, a substantially horizontal bottom casing carried by and extending between the lower portions of said extensions and apertured adjacent to said truck, and a supplementary casing carried by said truck in substantial alinement with said bottom casing but with edge portions overlapping the edge portions of said first-mentioned casing which defines the aperture therein to accommodate relative movement of the body and truck mounted casings.

9. A railway vehicle underframe side structure comprising end parts each including a sill-like member and a generally parallel framing element spaced substantially below said member, and a relatively deep truss intermediate part extending above and below the level of said members and connected to the inner ends of said members and elements, there being streamlining casing extending downwardly to and continuously between said elements and the lower chord of said truss part.

10. A railway vehicle underframe side structure comprising end parts each including a sill-like member and a generally parallel framing element spaced substantially below said member, and a trussed intermediate part extending above and below the level of said members and with converging ends merging with said members, the lower portion of said intermediate part being on a level with and connected to said elements, there being streamlining casing extending downwardly to and continuously between said elements and the lower chord of said truss part.

HARRISON HOBLITZELLE.