

June 28, 1938.

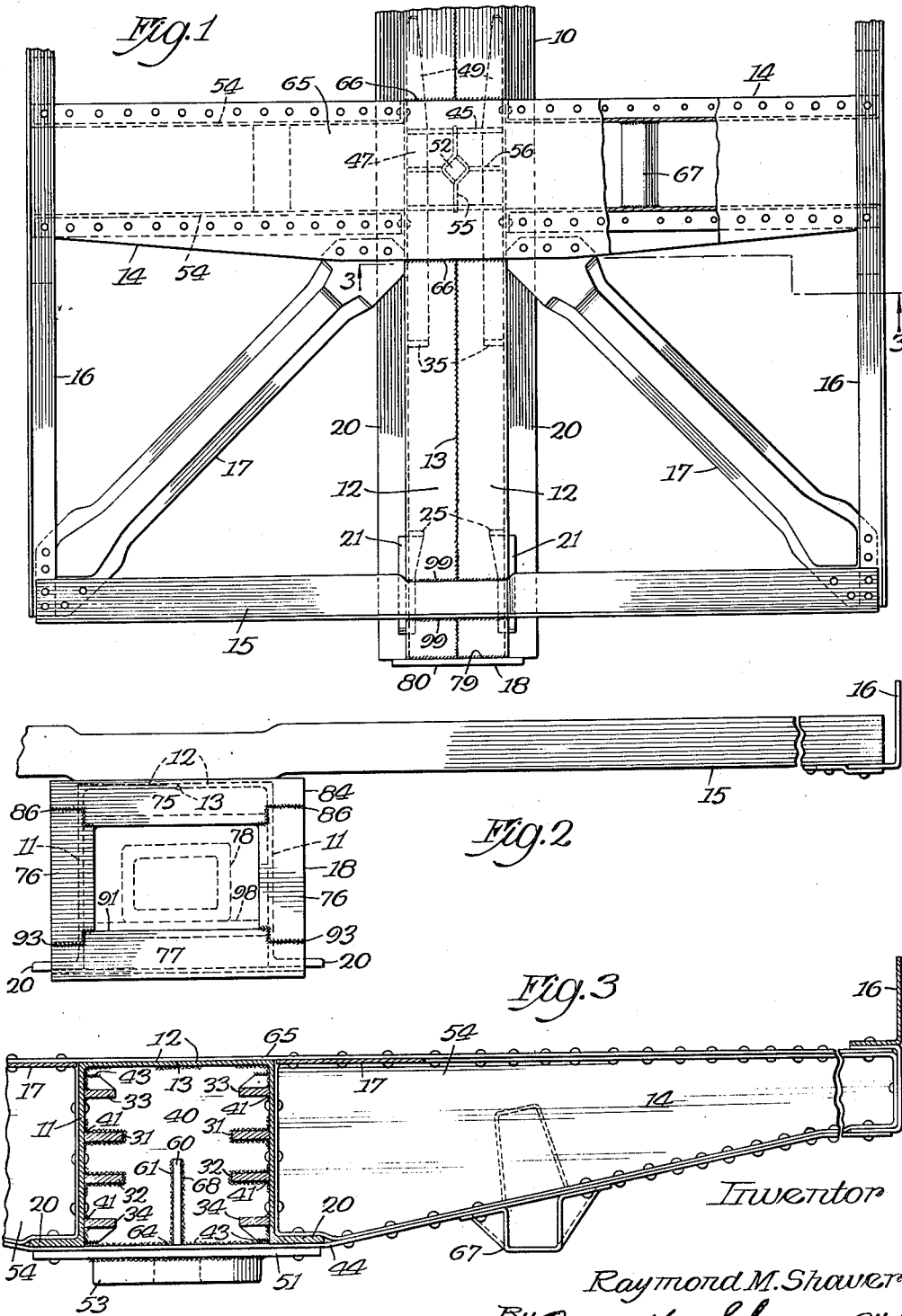
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2,122,159

WELDED DRAFT SILL ASSEMBLY

Filed June 29, 1935

4 Sheets-Sheet 1



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WELDED DRAFT SILL ASSEMBLY

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4 Sheets-Sheet 2

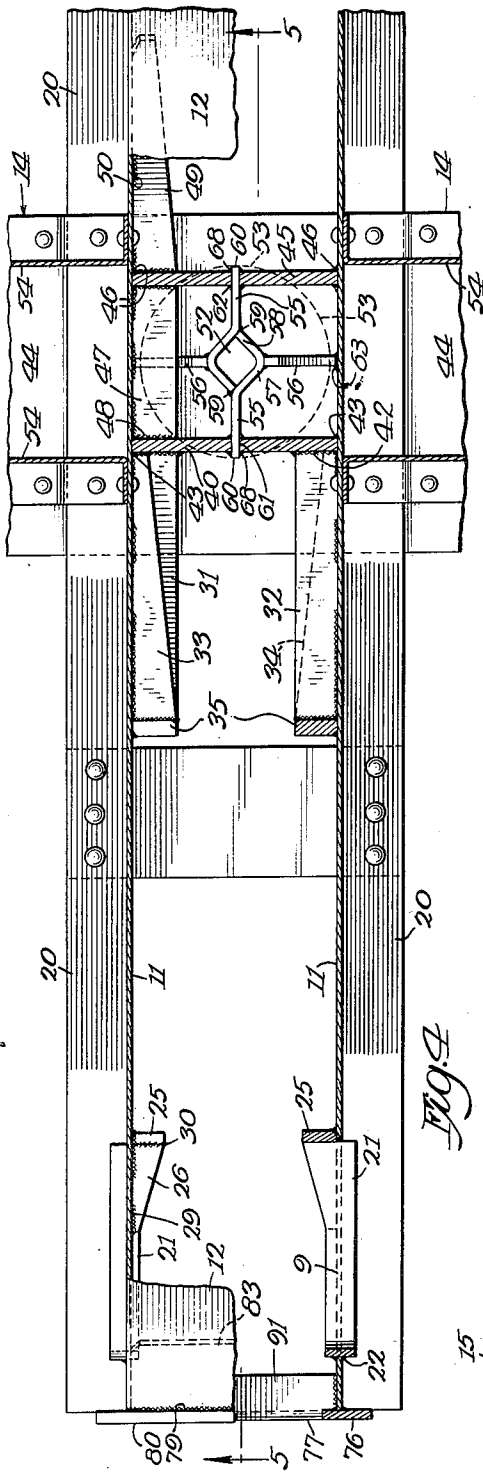


Fig. 4

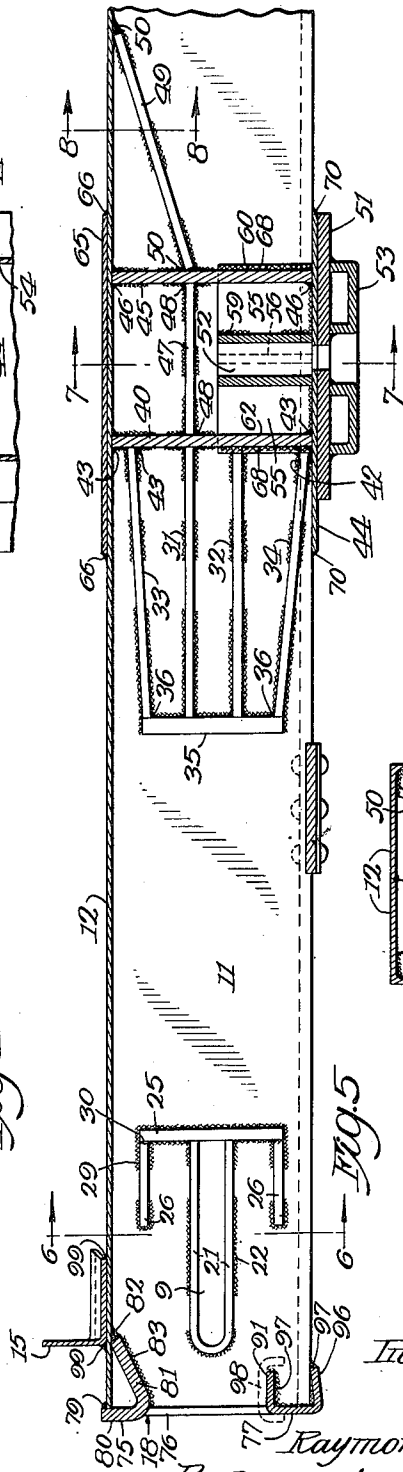


Fig. 5

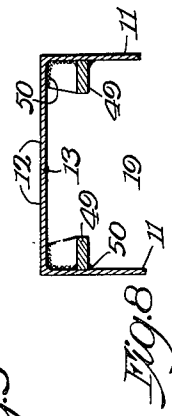


Fig. 6

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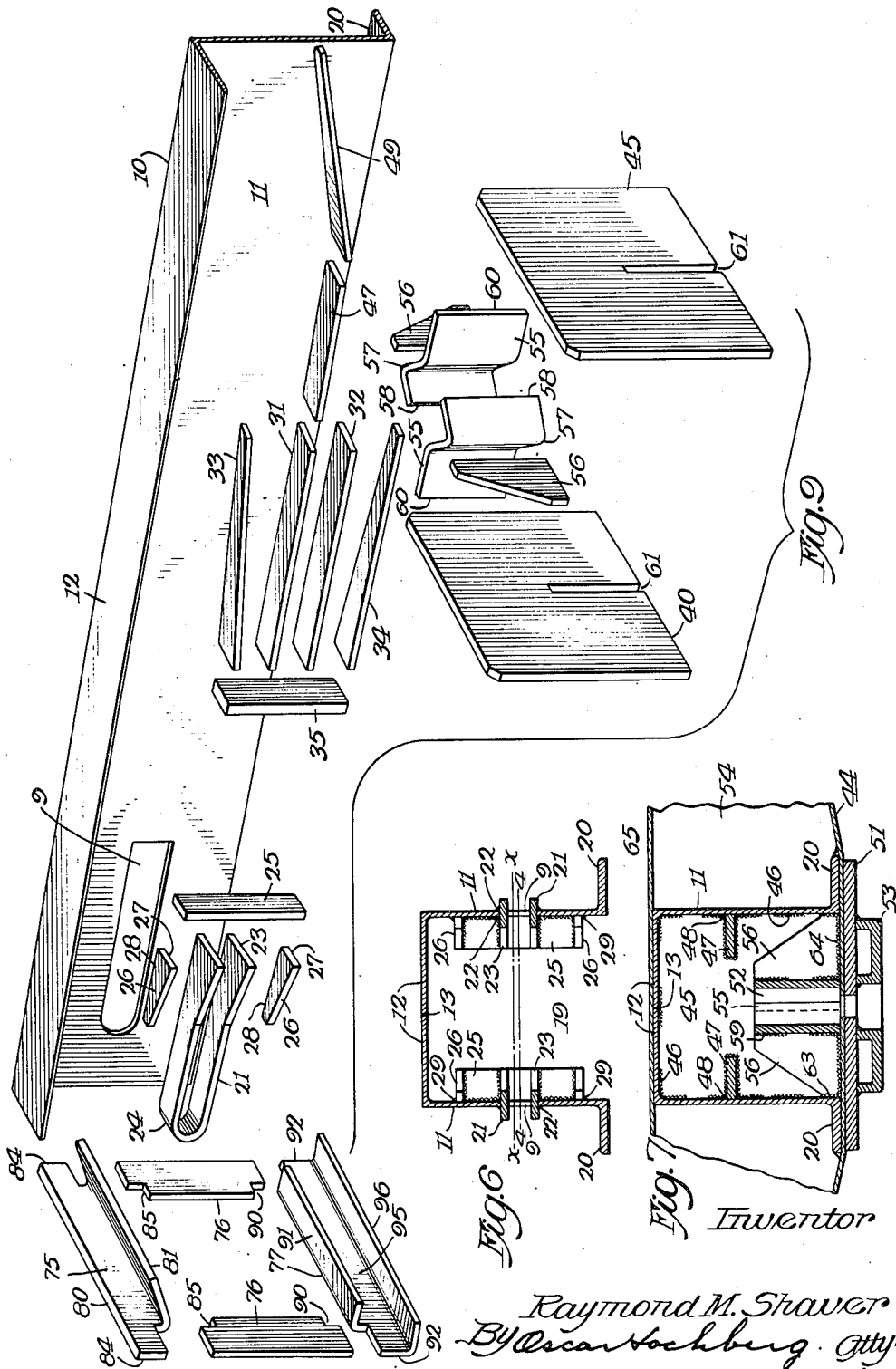
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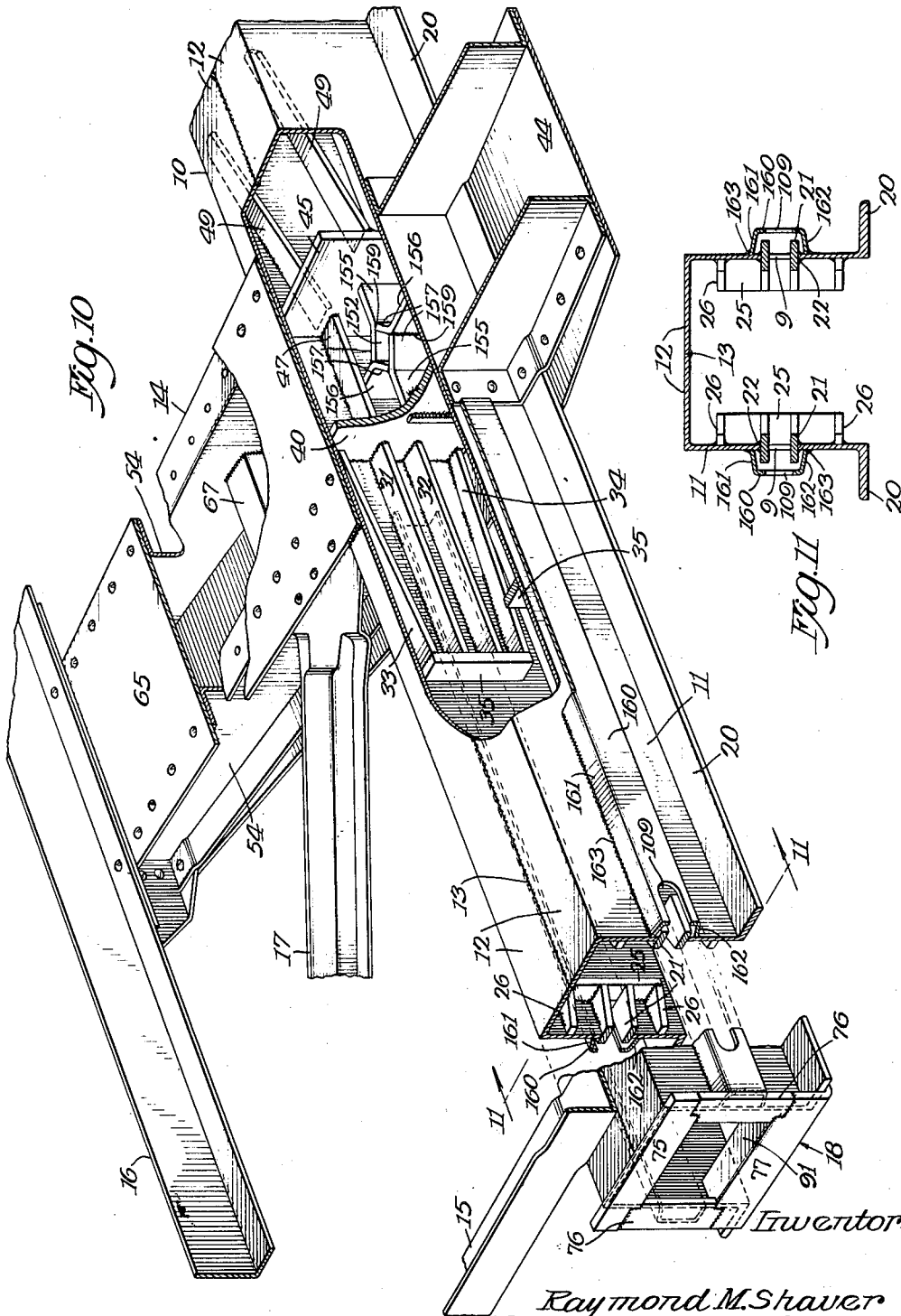
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,122,159

WELDED DRAFT SILL ASSEMBLY

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Application June 29, 1935, Serial No. 29,068

15 Claims. (Cl. 105—420)

The invention relates to underframe construction for railway cars and particularly that portion of it which involves the bolsters and striking plates and the intermediate draft sill sections.

5 The principal object of the invention is to provide a construction utilizing plate metal parts and rolled members connected by welding and assembled to provide draft gear stop, striking plate, and bolster filler elements.

10 Other objects are to integrate the center sill, striking plates and draft gear attachments with bolster fillers of plate metal to insure stability in the structure under load, to facilitate fabrication and assembly of the parts to provide
15 a rugged, light-weight structure economical to manufacture and dispensing with connecting and stress parts of cast or pressed metal.

The foregoing and other objects are attained by the mechanism illustrated in the accompanying drawings, in which—

20 Fig. 1 is a plan view of the underframe showing but one of its ends since both are identical;

Fig. 2 is an end elevational view showing the end sill, center sill, and striking plate assembly;

25 Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1, thru the center and side sills in front of the bolster and thru the draft gear back stop and bolster filler assembly;

30 Fig. 4 is a plan view of the assembly with portions broken away to show the draft gear front and back stop elements, striking plate and bolster filler parts welded to the center sill;

35 Fig. 5 is a vertical longitudinal section thru the assembly between the center sill taken on line 5—5 of Fig. 4, showing the method of connecting the striking plate to the ends of the sill and the disposition of the draft gear front and back stop and bolster filler elements welded to the center sill;

40 Fig. 6 is a vertical transverse section thru the center sill and the draft gear front stop elements taken on line 6—6 of Fig. 5.

45 Fig. 7 is a similar view thru center sill, bolster and bolster filler taken on line 7—7 of Fig. 5 showing reinforcing elements for filler plates and sill members;

Fig. 8 is a similar view taken on line 8—8 of Fig. 5, showing load transmitting sill reinforcement rearwardly of the bolster filler;

50 Fig. 9 is an exploded perspective view showing the draft section of the center sill, striking plate, draft gear front and back stop and bolster filler elements in disassembled relation;

55 Fig. 10 is a perspective view of a modified form of the assembly in which the draft section of the

center sill is further reinforced upon its outer sides by members extending along the line of draft between the striking plate and bolster; and

Fig. 11 is a view similar to Fig. 6 taken on line 5 11—11 of Fig. 10, showing the method of securing the members to the sill webs and indicating the relation between such members and the draft gear front stops.

The invention involves a center sill construction 10 designed to develop uniform resistance to draft and buffing loads and formed of two rolled members preferably of Z-shape with their web portions 11 spaced apart and upper flanges 12 15 inwardly directed and joined together by a welded seam 13 to provide a unitary structure of general channel configuration and opening downwardly.

Thus formed, the center sill 10 is adapted for ready assembling with associated bolsters 14, 20 end sills 15, side sills 16, and diagonal braces 17 as in usual practice and held together at their ends by striking plates, designated generally at 18 and hereinafter to be more particularly described. On opposite sides of the opening 19 25 between the center sill members are the lower flanges 20 projecting outwardly from adjacent margins of the webs 11 and functioning to provide rigidity to the sill against distortion of the sill column laterally of the car.

30 The contour of the sill members 10 permits such distribution of the metal above and below the draft line 4—4 (Fig. 6) that the neutral axis X—X of the connected sill members approximates the line of draft and is disposed above it 35 to prevent drooping of the sill under impact with the result that eccentric loading of the sill column is reduced to a minimum and its stability increased.

To realize fully the advantages inherent in 40 sill members permitting a minimum eccentric loading of the sill column, the customary striking plates, draft gear front and back stops and bolster fillers of cast metal have been eliminated. It has been determined that the relatively heavy 45 mass of metal required in striking plates, draft stop and bolster filler castings of adequate strength cannot be distributed advantageously in sills having the characteristics described because of the objectionable and frequently un- 50 avoidable unbalanced loading of the sill. This objection has been overcome by utilizing sill web areas to provide portions of the striking plates, draft gear stops and bolster filler elements applied in accordance with the invention, since 55

the arrangement dispenses with the relatively heavy and essentially extensive overlapping areas of sill plate and casting metal heretofore considered unavoidable.

As best shown in Figs. 3 to 9 inclusive, the draft gear stops and bolster filler are built up respectively of plate members connected to each other and the sill webs by fillet welding. The sill is provided at the draft gear front stop position with elongated slots 8 about which are fitted transversely arranged bearing plates 21 to provide supports for draft gear keys (not shown). The bearing plates 21 are preferably arranged within the slots 8 as shown with portions thereof projecting from opposite sides of the respective sill webs 11 and fillet-welded in position as indicated at 22.

It will be noted that the rear ends 23 of the bearing plates 21 are wider than the front portions 24 and extend inwardly of the respective sill webs and connected thereto and each other by means of stop face plates 25 extending vertically of the webs 11 with respect to slots 8 and traversing the widened rear ends 23 of the bearing plates 21 inwardly of the sill webs. The face plates 25 extend upwardly and downwardly of bearing plates 21 for attachments to backing plates 26 having end portions 27 coextensive in width with the inwardly projecting end portions 23 of the bearing plates 21 and the width of face plates 25 and fillet-welded thereto at 30. The backing plates 26 at their margins 28 are also welded to face of adjacent sill webs 11 as indicated at 29 in Fig. 6. Thus disposed, the stop plates 21, 25 and 26, are fillet-welded to and held in operative relation by the adjacent sill webs 11 forming bases for the stop structure and transferring directly to the sill the stresses imposed by loads applied to bearing plates 21 during draft movements by impacts on face plates 25.

In the same fashion the draft gear back stop elements are assembled except that the sill webs 11 are not slotted in the assembly shown and none of the plates making up the stop penetrate the sill webs though all of them are fillet-welded to the inner faces of the respective sill webs and project inwardly therefrom to serve also as transmitting extensions of the bolster filler assembly. As in the case of the front stop, the elements making up the back stop are arranged preferably symmetrical about the line of draft and comprise intermediate upper and lower plates 31 and 32 arranged in spaced relation and upper and lower brace plates 33 and 34, respectively, all of said plates being connected to a face plate 35 traversing the forward ends of the plates and fillet-welded thereto at 36, as best shown in Figs. 3, 5 and 9.

The upper brace plates 33 are inclined upwardly from the stop face plate 35 to a point adjacent the respective sill flanges 12, and the lower brace plates 34 slope downwardly from the stop face plate 35 to the plane of the lower flanges 20 of the sill. The brace plates are thus disposed to transmit the forces of impact to sill points adjacent the sill flanges further to enhance the stability of the sill column. The brace plates terminate at their respective rear ends at the front wall plate 40 of the bolster filler assembly to which and respectively adjacent sill webs 11 the brace plates are fillet-welded as indicated at 41 in Fig. 3 and 42 in Fig. 5. The intermediate upper plates 31 and lower plates 32 are similarly secured to face plate 35, filler wall plate 40 and the respective sill webs 11, and, with the brace plates

33 and 34, constitute extensions of the bolster filler assembly to transmit stresses of buffing to the bolster, whereby the tendency of the sill to fulcrum vertically about the bolsters is minimized.

The bolster filler assembly includes the front wall plate 40 fillet-welded to the sill webs 11 at 43 as shown in Fig. 4, to the upper sill flanges 12 and bolster bottom cover plate 44 and the stop assembly plates 31 thru 34 as shown in Figs. 3 and 5. The assembly further includes a rear wall plate 45 similarly welded to the sill webs 11, flanges 12 and bolster bottom cover plate 44 as indicated at 46 in Figs. 4, 5 and 7. Between said front and rear wall plates and in substantial alignment with stop intermediate upper plates 31 are transmission and reinforcing plates 47 fillet-welded to the respective wall plates and sill as shown at 48 in Figs. 4, 5 and 7. The mechanism preferably includes transmission and reinforcing plates 49 disposed with their forward ends at the rear filler wall 45 in substantial alignment with the interposed plates 47 and inclined thence upwardly to the sill flanges 12 to which and the sill webs 11 and filler wall plate 45 they are secured by fillet-welding as indicated at 50 in Figs. 4, 5 and 8. The plates 49 further stabilize the sill 10 by directing the live load thrusts to the center sills at points above the neutral axis thereof, whereby further to resist the tendency of the center sill to fulcrum vertically about the bolster 14.

The bolster filler assembly is completed by the application of the spider brace frame fabricated of plates fillet-welded together and uniting the center sill, bolster filler wall plates and bolster bottom cover plate to rigidify the bolster structure and brace the underlying bolster center bearing plate 51. As shown in Figs. 3, 4, 5 and 9, the frame comprises plates 55 arranged longitudinally of the car and between the center sill 10, and extending from the bolster filler front wall plate 40 to the companion rear wall plate 45, and transversely arranged plates 56 between the filler wall plates 40 and 45 and extending from one center sill web 11 to the other.

The longitudinal plates 55 are proportioned to overlap at points intermediate the filler wall plates and shaped to complement each other to provide a socket 52 to receive the usual center pin (not shown). The socket is formed by arched portions 57 in the plates in the zone of the overlap as best shown in Figs. 4 and 9 in which the free edges 58 of the respective arches are fillet-welded at the points of deflection from said plates, as indicated at 59. The opposite edges 60 of the plates 55 are preferably entered in slots 61 formed in wall plates 40 and 45 to insure continuity in the connection between the wall plates. As best shown in Figs. 3, 4 and 5, the edges 60 protrude from the outer faces of the respective filler wall plates to permit the application of welding metal at outer corners 62 formed by the intersection of the plates and also at the junction of the plates at the respectively adjacent inner faces of the wall plates, as indicated at 62 in Figs. 4 and 5.

The transverse spider plates 56 are fillet-welded at their respective inner ends to the longitudinal spider plates 55 at the crests of the socket forming portions 57 and at their outer ends to the respectively adjacent center sill webs 11 as shown at 63 in Figs. 4 and 7. It will be noted that the spider plates extend upwardly to approximately the draft line providing a bracing frame of substantial depth and affording a light but rugged

reinforcement of ample area above the center bearing when welded to the bottom bolster cover plate 44, as best shown in Figs. 3 and 7 at 64. To provide adequate support for the bolster and center sill assembly at the center bearing position, the filler front and rear wall plates 40 and 45 are disposed within the peripheral limits of bearing portion 53 of the center bearing plate 51, as best shown in Figs. 4 and 5, to insure direct transfer of the body load to the truck center bearing.

The center sill 10 is flanked by pairs of bolster diaphragms 54 spaced apart and substantially in position respectively to transmit load thrusts to the filler wall plates 40 and 45, thru bottom cover plate 44 secured to the lower flanges 20, preferably by welding as indicated at 70 in Fig. 5. The wall plates 40 and 45, together with spider plates 56, all fillet-welded to the bottom cover plate and to the center sill, provide, in effect, a thrust column between the sill to prevent relative displacement of the sill under loads imposed upon the bolsters at the side sills 16 or side bearings 67 and transmitted thence inwardly to the center bearing. The filler wall plates 40 and 45 are relatively thick and proportioned to carry the load concentrated at the bolster to the center bearing 53. The bolster diaphragms 54 are further connected to the center sill 10 by top cover plate 65 secured thereto preferably by welding, as shown at 66 in Fig. 5, to complete the unification of the underframe assembly at the bolsters.

At the ends of the underframe, the center sill terminates in striking plates 18 having abutment against the sill ends and designed to unite the sill members 10 to stiffen the sill column against distortion under impact. As shown in Figs. 1, 2, 4, 5 and 9, the plates comprise top, side and bottom portions 75, 76 and 77, respectively, to provide buffing, guide and carrier elements for the coupler 78. The buffing plate portion 75 is positioned to receive coupler horn impacts and transmit such forces directly to upper flanges 12 and adjacent web portions 11 of the center sill. The portion 75 of the striking plate 18 is preferably angular in section and disposed with its face flange 80 across the ends of the sill and its upper margin projecting above the plane of the sill flanges 12 to form therewith a corner for a fillet-weld connection 79 as indicated in Figs. 1 and 5. The plate 75 is cut away inwardly of its ends and the intermediate portion bent rearwardly of the face of the plate to form the other flange 81 disposed between the sill webs 11 and upwardly for connection to underside of the sill flanges 12, as by fillet-welding 82, and preferably also to the sill webs along adjacent inclined edges of the flange as shown at 83 in Fig. 5.

The coupler side guides 76 of the striking plate 18 are disposed vertically beneath the end portions 84 of the horizontal buffer plate 75 and traverse the webs and upper flanges of respectively adjacent sill members 10 as best shown in Figs. 2 and 4. The upper end portions of the guide plates are recessed at their inner corners as at 85 to receive the flange 81 of the buffer plate 75 and welded thereto and to ends 84 of that plate to provide a stepped joint as indicated at 86. The lower ends of the guide plates 76 are similarly formed with their inner corners recessed as at 90 to accommodate the underlying end portion of flange 91 of coupler carrier plate 77 as best shown in Figs. 2, 4, 5 and 9 and welded thereto and ends 92 of that plate to provide a stepped joint as indicated at 93.

The coupler carrier plate 77 is preferably of channel form and disposed with its web face portion 95 across the ends of the sill webs 11 and lower flanges 20, as shown in Fig. 2, its upper flange 91 extending rearwardly between the sill webs, and its lower flange 96 underlying the lower flanges 20 of the sill, and all united by welding as shown at 97. To avoid wear resulting from coupler movement, the carrier iron portion 77 of the striking plate may be protected by the usual wearing pad 98 supported upon that member and removably secured.

The striking plate assembly 18, welded to the sill as described, provides a unitary structure at the ends of the car for stabilizing the underframe under shocks in excess of coupling impacts. With the end sills 15 welded to the upper side of the sill flanges 12 at positions 99, approximating those of welds 83 beneath the sill flanges for uniting the sill and buffing plate portion 75 of the striking plate, the superstructure at the floor line at the end of the car will be braced against distortion due to cornering impacts in addition to the resistance afforded by the diagonal braces 17 to maintain the rectilinear relation of side and end framing members.

The invention may be modified as indicated in Figs. 10 and 11 involving a change in the form of the spider frame plates reinforcing the sill, front and rear filler walls and the bolster bottom cover plate. In this embodiment, the longitudinal and transverse spider plates 155 and 156 are each of them bent to form flanges 157 disposed at an angle to each other and the respective plates to define the king pin socket 152 and severally connected at points of deflection by fillet-welding as indicated at 159, but, in other respects, the spider frame, as a whole, is the same as in the preferred form.

The modified form embodies, also, a reinforcement for the draft section of the sill extending along the draft line on the outside of the sill members and preferably from the striking plate 18 to the bolster 14. The reinforcement is preferably a pressed plate of substantial channel shape having a web portion 160 spaced outwardly from respective sill webs 11 and connected to the sill by upper flanges 161 and lower flanges 162 fillet-welded along their sill-adjacent margins as indicated at 163 to form with the sill webs hollow columns extending longitudinally of the sill to transmit the thrusts of impact received at the striking plate to the bolster and to rigidify the sill members between the draft gear front and back stop positions. At the front stop position the reinforcing bars are formed with slots 109 to register with similar slots 9 in the sill to receive draft gear keys (not shown) as indicated in Figs. 10 and 11. The bars are also preferably welded to the coupler guide portions 76 of the striking plate against which they find abutment as shown best in Fig. 10.

By means of the system of fabrication indicated, the center sill and bolster cover plates are made integral parts of the striking plates, draft gear front and back stops and bolster center fillers, the elements respectively characterizing the striking plates, stops and bolster fillers being developed upon the sill members and/or bolster cover plates without the use of connecting plates other than those afforded by the sill and bolsters themselves. As herein outlined, the parts are built up of elements secured to the sill and bolster cover plates as connecting bases to avoid the excess of metal in overlapping plate areas hereto-

fore incident to the use of separate pressed or cast metal striking plates, draft lugs and bolster fillers. The elimination of overlapping plate areas permits the retention of the most valuable characteristics of sill of the class described by the more equable distribution of the metal entering into the construction of the parts.

What is claimed is:

1. In a car underframe having a center sill and bolster members upon opposite sides of the sill, bottom cover plates connecting said bolster members and center sill, and fabricated bolster filler frames incorporating portions of said cover plates and sill and comprising each a pair of wall plates spaced longitudinally of the car connecting the adjacent cover plate and sill portions transversely of the car, and pin socket plates between and connecting said wall plates, sill and bolster cover plate.

2. In a car underframe having a center sill having webs spaced apart and upper flanges spanning the distance between them and connected along the longitudinal median line of the car and flanges projecting outwardly from the lower margins of said webs, fabricated striking plates connecting the sill at its ends and comprising each a buffing face plate portion extending upwardly for connection with upper sill flanges and a lower portion bent inwardly between the sill webs and upwardly to the underside of the upper sill flanges for connection to both, coupler side guide plates beneath the buffing face plate traversing the sill webs, and a coupler carrier plate having its end portions traversing the lower flanges and adjacent webs of the sill and underlying the guide plates and with its intermediate upper edge portion bent inwardly between the sill webs to provide a support for the coupler and its lower edge flanged inwardly for attachment to adjacent sill flanges, all of the striking plate elements being secured to each other and the center sill by welding.

3. In a car underframe including a continuous center sill having webs spaced apart, striking plates connecting the ends of said webs, bolster members upon the sill, and draft gear stops fabricated on said sill between a bolster and respectively adjacent striking plate and disposed entirely upon one side of the respective webs thereof, said sill webs forming integral portions of the stops.

4. In a car underframe including a center sill terminating in striking plates at the ends of the car, bolsters upon said sill, and draft gear stops forming integral portions of said sill between a bolster and the respectively adjacent car end disposed entirely upon one side thereof.

5. In a car underframe having a center sill with webs spaced apart, fabricated draft gear front and back stops forming integral portions of the sill webs and comprising each a face plate vertically disposed across the sill webs, and reinforcing plates extending longitudinally above and below the neutral axis of the sill secured by welding to said face plates respectively and to the respective sill webs, said stops and reinforcing plates being disposed entirely upon one side of the respective sill webs.

6. In a car underframe including a center sill having web members spaced apart and continuous from end to end of car and bolster members extending transversely of the sill, striking plates connecting the sill webs at their ends, and channel-shaped members fillet-welded at the flange edges to the outer faces of the sill webs at sub-

stantially the line of draft and straddling the draft key slots adapted to form with said webs hollow columns extending between the bolsters and respectively adjacent striking plates and welded to both.

7. In a car underframe construction including a center sill having upper and lower flanges and webs spaced apart, bolster members extending from opposite sides of the sill, fabricated draft gear front and back stops and bolster filler frames comprising plate members integrally connected at an angle to said webs and to the respective bolsters, and brace plate members integrally secured to and connecting said filler frames and sill rearwardly of said bolsters.

8. In a car underframe construction including a center sill having upper and lower flanges and webs spaced apart, bolster members extending from opposite sides of the sill, fabricated draft gear front and back stops and bolster filler frames comprising plate members integrally connected to said webs and to the respective bolsters, other plate members spaced from said sill webs and integrally connecting the plate members comprising said bolster filler frames, and brace plate members integrally secured to and connecting said filler frames and sill rearwardly of said bolsters.

9. In a car underframe including a center sill having webs spaced apart and bolster members extending from opposite sides of the sill, connecting bolster bottom cover plates secured to and extending respectively beneath the sill, fabricated bolster filler frames between said webs comprising plate elements integrally secured to said webs and bolster cover plates at an angle thereto, plate-like draft gear back stops integrally secured to said sills at an angle thereto forwardly of said filler frames, and other plate members integrally connecting said back stops, sill webs and filler frames.

10. In a car underframe including a center sill having webs spaced apart and bolster members extending from opposite sides of the sill, fabricated bolster filler frames integrally secured between said webs, fabricated draft gear back stops integrally secured to said sills forwardly of said filler frames, and plate members integrally connecting said back stops, sill webs and filler frames and extending rearwardly of said bolsters.

11. In a car underframe including a center sill having webs spaced apart, a bolster traversing the sill and comprising a diaphragm portion upon each opposite side of the sill and a bottom cover plate connecting said diaphragm portions together and to the sill, a fabricated bolster filler frame disposed between the sill webs in the line of the bolster and comprising a pair of spaced parallel plates between and normal to the webs and having their edges welded directly to the webs and bottom cover plate, other plate members disposed vertically, normal to the first named plates and welded to said plates and to the bottom cover plate, and transverse spider plates intermediate the first named plates and welded to said other plate members and to said bottom cover plate.

12. In a car underframe including a center sill of general channel configuration opening downwardly and having webs spaced apart, a bolster traversing the sill and comprising a diaphragm portion upon each opposite side of the sill and a bottom cover plate connecting said diaphragm portions together and to the sill, a fabricated bolster filler frame disposed between the sill webs in the line of the bolster and comprising a pair

of spaced parallel plates between and normal to the webs and having their edges welded directly to the webs and base of the channel and to the bottom cover plate, other plate members disposed vertically, normal to the first named plates and welded to said plates and to the bottom cover plate, and transverse spider plates intermediate the first named plates and welded to said other plate members and to said bottom cover plate.

13. In a car underframe including a center sill having webs spaced apart, a bolster traversing the sill and comprising a diaphragm portion upon each opposite side of the sill and a bottom cover plate connecting said diaphragm portions together and to the sill, a fabricated bolster filler frame disposed between the sill webs in the line of the bolster and comprising a pair of spaced parallel plates between and normal to the webs and having their edges welded directly to the webs and bottom cover plate, each plate having a vertical slot, other plate members normal to the first named plates, having margins entering said slots and welded to said first named plates and to the bottom cover plate, and transverse spider plates intermediate the first named plates and welded to said other plate members and to said bottom cover plate.

14. In a car underframe including a center sill having webs spaced apart, a bolster traversing the sill and comprising a diaphragm portion upon each opposite side of the sill, a bottom plate member extending between and uniting said webs, and a fabricated bolster filler frame disposed above said plate and between said webs and comprising a pair of relatively thick parallel plates spaced apart and normal to the webs and having their edges welded directly to said webs and bottom

plate member in substantial alignment with said bolster diaphragm members, pin socket plate members, thinner than said parallel plates, disposed normal to and intermediate said parallel plates and welded thereto and to the bottom plate, and transverse spider plates, thinner than said parallel plates, normal to said socket plate members and sill webs and rigidly secured to both by means comprising welded connections.

15. In a car underframe including a center sill having webs spaced apart and upper and lower marginal flanges, a bolster traversing the sill and comprising a diaphragm portion upon each opposite side of the sill, a bottom plate member connecting said webs and adjacent sill flanges, a center bearing member secured to and underlying said plate and flanges, and a fabricated bolster filler frame disposed between the sill webs in the line of the bolster and comprising a pair of relatively thick parallel plates spaced apart and normal to said bottom plate, sill webs and upper flanges and having their edges welded directly to said plate, webs and flanges, pin socket plate members, thinner than said parallel plates, disposed normal to and intermediate said parallel plates and welded thereto and to the bottom plate, and transverse spider plates, thinner than said parallel plates, normal to said socket plate members and sill webs and rigidly secured to both by means comprising welded connections, said thick parallel plates being disposed in substantial alignment with said bolster diaphragm members and in position to transmit load thrusts from said diaphragms to points within the peripheral limits of the center bearing members.

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