United States Patent

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[54] **CENTER SILL HOUSING MEANS FOR HOPPER CAR**
8 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **105/247,** 105/404, 105/406, 105/416, 105/418, 105/420, 105/424

[51] **Int. Cl.** **B61d 7/00,** B61d 17/00, B61f 1/02

[50] **Field of Search** 105/247, 248, 249, 250, 251, 404, 406, 413, 416, 418, 420, 424

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ABSTRACT: A center sill extends longitudinally through the floor sheet structure of a hopper in a railway car and has a reinforcing plate secured to the bottom portion thereof. Support members are secured to opposite sides of the center sill and a center sill bottom closure member and a longitudinal hood are secured to the support members in spaced relationship to the center sill. A collar fits over the joint between the hood and floor sheet structure and is connected therebetween. A floor sheet bottom closure plate is connected with the undersurface of the center sill bottom closure member and adjacent floor sheet portions.

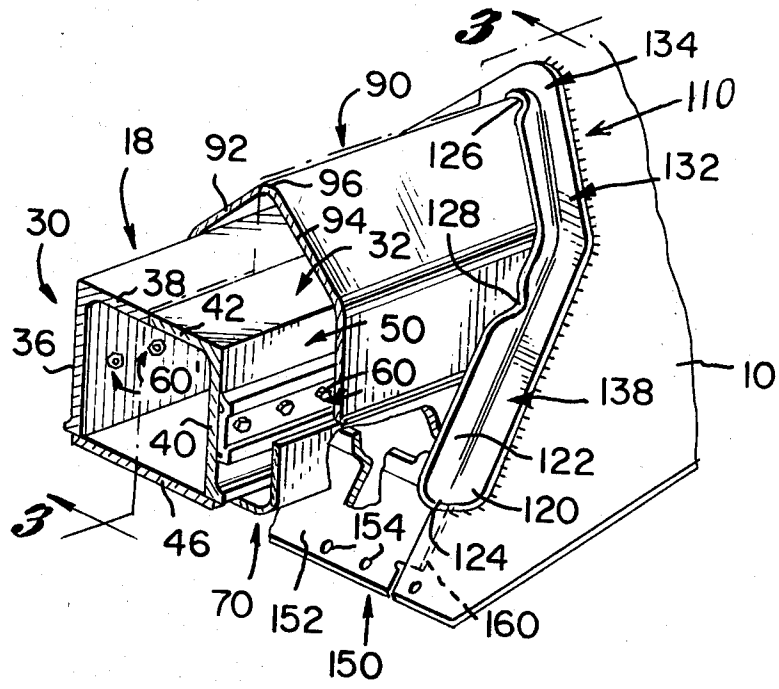


Fig. 2.

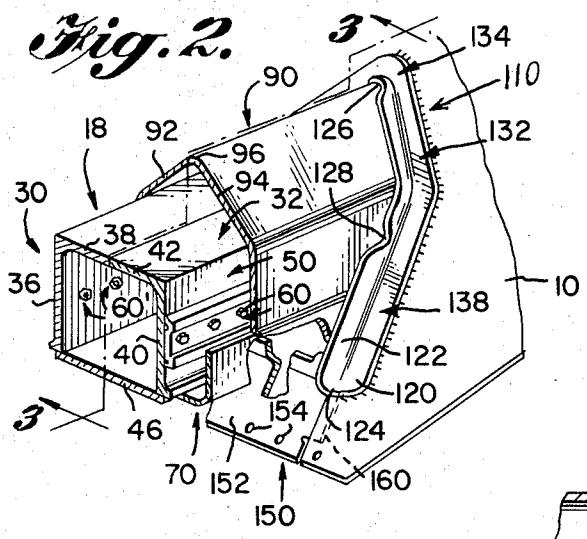


Fig. 4.

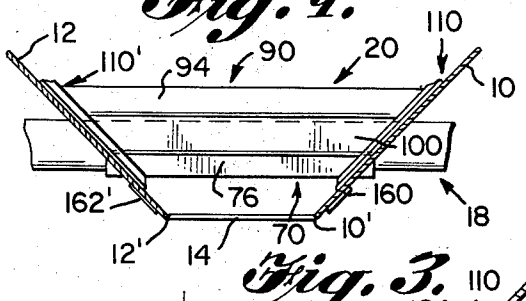


Fig. 3.

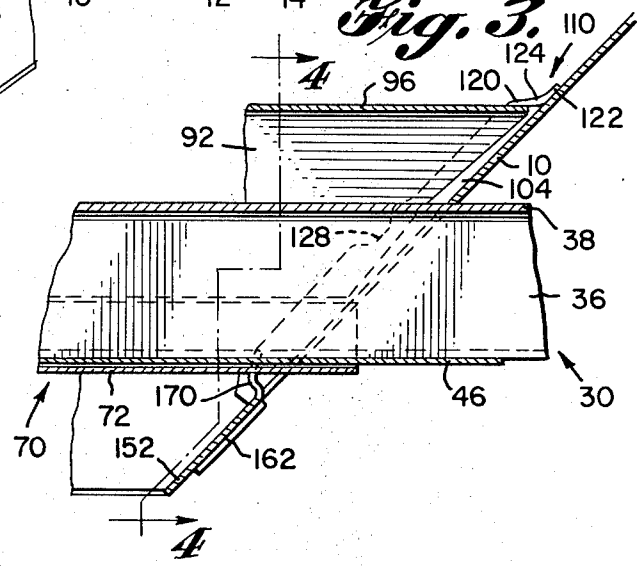


Fig. 6.

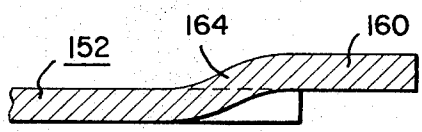


Fig. 4.

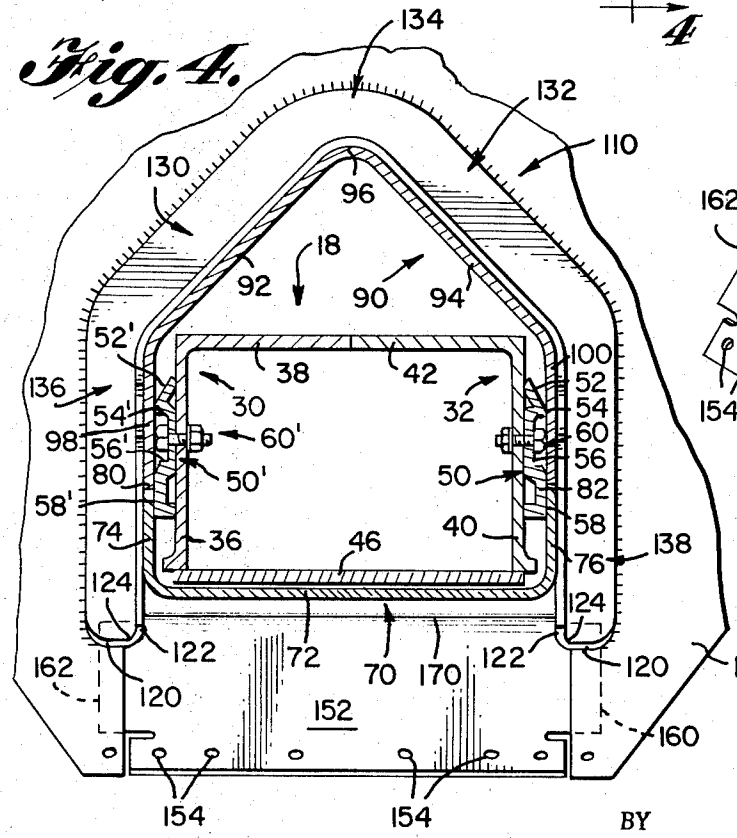
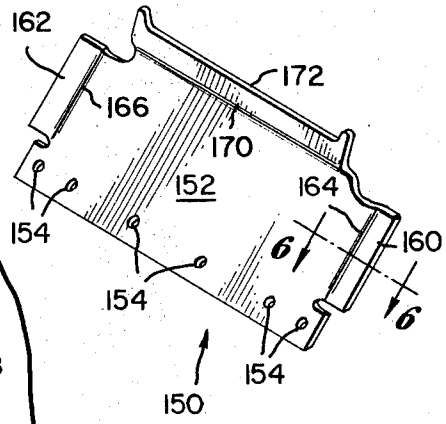


Fig. 5.



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CENTER SILL HOUSING MEANS FOR HOPPER CAR

BACKGROUND OF THE INVENTION

The present invention relates to hopper cars, and more particularly to such cars of aluminum construction with conventional underframe structure and center discharge outlets. In this type of construction, the center sill means passes through the lading containing portion of the hoppers of the car.

The center sill means is of a steel construction, and the problem of contamination arises with certain types of lading which should be isolated from the steel portions of the structure. Accordingly, steel center sill constructions which are open to the hopper are unsatisfactory in many instances, and it is desirable to provide means for isolating the steel center sill construction from the lading containing hopper.

When center sill closure means is provided of such a construction as to prevent the lading in the hopper from coming into contact with the center sill, it is desirable to eliminate depressions and crevices or the like which would interfere with free flow of the lading and tend to retain it in the hopper. At the same time, it is necessary to provide means for rigidly interconnecting the closure means both with the center sill means as well as the adjacent floor sheet structure.

SUMMARY OF THE INVENTION

In the present invention, the center sill closure means is of such a construction that it completely surrounds the center sill means and isolates it from the lading in the associated hopper. The components of the closure means are formed of a suitable material such as aluminum or the like which will substantially eliminate the possibility of contamination with certain types of lading which would be contaminated in the presence of steel.

The design of the center sill closure means of the present invention is such as to insure a maximum degree of free flow of lading through the hopper and a minimum possibility of trapping material within the hopper.

The components of the present invention are so interconnected with the center sill as well as the adjacent floor sheet structure that a very rigid and secure interconnection is provided. At the same time, the components can be readily assembled and do not require critical fitting of the parts thereof. Points of stress concentration are also substantially eliminated where they might be caused at the joints or intersections between the various members.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a longitudinal section through a hopper illustrating the overall arrangement of the present invention;

FIG. 2 is a top perspective view of a portion of the structure showing certain parts broken away for the sake of illustration;

FIG. 3 is an enlarged sectional view taken substantially along line 3–3 of FIG. 2 looking in the direction of the arrows;

FIG. 4 is an enlarged sectional view taken substantially along line 4–4 of FIG. 3 looking in the direction of the arrows;

FIG. 5 is a top perspective view of the floor sheet bottom closure plate of the present invention; and

FIG. 6 is a sectional view taken substantially along line 6–6 of FIG. 5 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, FIG. 1 is a vertical longitudinal section through a hopper of an aluminum hopper car with conventional underframe and including center discharge outlets. Oppositely sloping floor sheet structures **10** and **12** are provided, these floor sheet structures extending transversely of the car in a well known manner. The floor sheet structures terminate at the lower ends at points **10'** and **12'** and define a discharge outlet **14** adapted to be closed by a suitable outlet mechanism (not shown).

A conventional longitudinally extending center sill **18** extends through the central portion of the hopper, it being apparent that the center sill passes through the opposite floor sheet structures **10** and **12** as hereinafter more fully described. The center sill closure means is indicated generally by reference numeral **20**, and the details of the construction thereof are more fully illustrated in FIGS. **2**—**6** inclusive.

As seen most clearly in FIGS. **2** and **4**, the center sill means indicated generally by reference numeral **18** includes a pair of elongated longitudinally extending members **30** and **32** formed of steel. Member **30** includes a vertically extending wall portion **36** which joins with a horizontally extending wall portion **38**. Member **32** includes a vertically extending wall portion **40** which joins with a horizontally extending wall portion **42**. Wall portions **38** and **42** are rigidly secured to one another along the abutting edges thereof as by welding or the like to provide a rigid elongated structure.

A flat generally rectangular reinforcing plate **46** also formed of steel is disposed in transverse spanning relationship to the undersurfaces of the vertical walls **36** and **40** of members **30** and **32** respectively, and is rigidly secured in place as by welding or the like. This reinforcing plate extends longitudinally somewhat beyond the floor sheet structures **10** and **12** and is terminated longitudinally beyond each of the these floor sheet structures, one end of the reinforcing plate being clearly visible in FIG. **3** to the right of the floor sheet structure **10**.

The center sill structure illustrated is typical, and other center sill constructions of different configuration may also be employed if so desired.

A pair of support members **50** and **50'** of identical construction are provided, member **50'** being provided with the same reference numerals primed as applied to member **50**. Each of these support members is formed of a suitable material such as aluminum, and these members may be efficiently formed as an extrusion cut to sufficient length so that the support members will extend slightly beyond the oppositely sloping floor sheet structures **10** and **12**. Each of these support members is provided with a plurality of holes spaced longitudinally therealong for mechanically fastening these support members to opposite sides of the center sill means as hereinafter described.

As seen in FIG. **4**, support member **50** includes an upper sloping surface **52** which slopes downwardly and outwardly as seen in this FIG. and joins with a generally vertically extending flat surface **54** which is parallel with the adjacent wall portion **40** of the center sill means.

A longitudinally extending recessed central portion **56** is defined by the support member, and immediately below this recess portion, the support member defines a flat lateral securing surface **58** which lies substantially in the same plane as the surface **54** previously described.

Suitable mechanical fasteners indicated generally by reference numeral **60** extend through aligned holes formed in the support member and the adjacent wall portion of the center sill means, the enlarged heads of these mechanical fasteners being received within the recessed portion **56** of the support member so that the heads of the fasteners do not extend laterally outwardly of the associated support member beyond the plane of the surfaces **54** and **58**.

Similar mechanical fasteners **60'** are provided in association with the support member **50'** for rigidly connecting this support member to the opposite side of the center sill means.

A center sill bottom closure means is indicated generally by reference numeral **70** and comprises an elongated member of generally U-shaped cross-sectional configuration including a bottom wall portion **72** which has opposite generally normally extending parallel side wall portions **74** and **76** the inner surfaces of which fit snugly against the lateral securing surfaces **58'** and **58** of support members **50'** and **50** respectively. Member **70** may be formed of a suitable material such as an aluminum alloy and is of only slightly less length than the support members, and extends slightly beyond the opposite sloping floor sheet structures **10** and **12**.

The upper edges of the side walls 74 and 76 of member 70 are rigidly secured to the lateral securing surfaces of the support members by longitudinally extending welds indicated by numerals 80 and 82. In this manner, the center sill bottom closure means 70 is supported so as to extend below the center sill means and to be spaced therefrom to avoid contact of dissimilar metals.

A longitudinally extending hood means is indicated generally by reference numeral 90. The cross-sectional configuration of this hood means may be seen most clearly in FIG. 4, the hood means including upwardly and inwardly sloping walls 92 and 94 which are joined by an arcuate apex portion 96. Wall portions 92 and 94 in turn join with downwardly extending substantially parallel side walls 98 and 100 the inner surfaces of which rest against the surfaces 54', 58' of support member 50' and surfaces 54, 58 of support member 50 respectively. The lower edges of side walls 98 and 100 are in turn welded in place so as to complete the substantially flush weld bead indicated by reference numerals 80 and 82. Accordingly, the hood means is supported in spaced relationship to the center sill means to avoid contact of dissimilar metals, the hood means extending above the center sill means.

As seen in FIG. 3, the longitudinal end edge 104 of the hood means slopes downwardly and inwardly of the hopper, it being understood that each of the end edges of the hood means slopes in the same manner as the end edge 104 whereby the end edges of the hood means are adapted to be spaced from the adjacent floor sheet structures 10 and 12 when the hood means is disposed in operative assembled position.

As seen in FIG. 1, a pair of identical collars 110 and 110' are provided to form the interconnection between opposite ends of the hood means and the floor sheet structures 10 and 12 respectively. These collars fit over the joint between the hood means and the floor sheet structures to provide a smooth interconnection therebetween which will not interfere with the free flow of lading within the hopper, and which at the same time will provide a good rigid structural interconnection between the closure means and the floor sheet structure.

As seen most clearly in FIGS. 2, 3 and 4, the collar is of such a cross-sectional configuration so as to define throughout the length thereof a first flange portion 120 which joins with a second flange portion 122 disposed at an angle thereto, these flange portions being interconnected with one another by an intermediate arcuate portion 124. The flange portion 122 is provided as seen in FIG. 2 with a cutout portion 126 at the midpoint thereof, and a pair of spaced cutout portions 128 are provided intermediate the cutout portion 126 and the opposite ends of flange 122, these cutouts being provided to prevent cracking of the collar during its forming operation and to allow some degree of flexibility to permit fitting of the collar to the associated components before final welding thereof in place is completed.

As seen in FIG. 4, the collar 110 includes a pair of upwardly sloping portions 130 and 132 interconnected by an arcuate portion 134 whereby the collar is adapted to conform to the outer configuration of the hood means previously described. A pair of depending side portions 136 and 138 are defined by the collar means and these portions are adapted to conform to and fit along the side wall portions of the hood means and the center sill bottom closure means.

In the completed assembly, the flange portion 120 of the collar is welded along the length of the edge thereof to the adjacent floor sheet structure. The flange means 122 of the collar is welded along the length of the edge thereof to the side wall portions of the center sill bottom closure means and the hood means as well as the remaining wall portions of the hood means. Accordingly, the collar provides a rigid interconnection between the floor sheet structure and the adjacent hood means and center sill bottom closure means, the collar being sealed with respect to these members along the peripheral edges thereof.

It will of course be understood that the collar 110' is in all respects similar to collar 110, and is similarly interconnected between the associated floor sheet structure 12 and the adjacent ends of the hood means and center sill bottom closure means.

When the apparatus is being assembled, the floor sheet structures 10 and 12 along with the hood means and the collars 110 and 110' may be first formed as a body sub-assembly with the floor sheet structures 10 and 12 having slots formed therein for receiving the center sill means.

The center sill means is provided with the support members on opposite sides thereof, and the center sill bottom closure means is welded in place. The aforementioned sub-assembly may then be dropped into place over the center sill means. When the operation is carried out, the sloping upper surfaces 52 and 52' of support members 50 and 50' respectively provide a guide means for properly aligning the sub-assembly as it is dropped into place.

After the sub-assembly has been disposed in the proper operative position, the lower edges of the hood means are welded to the lateral securing surfaces of the support members as previously described.

In order to complete the assembly, it is necessary to close off the lower portions of the slots provided in the floor sheet structures 10 and 12. Referring to FIG. 5, the floor sheet bottom closure means employed is illustrated. A plate 150 includes a flat main body portion 152 having a plurality of spaced holes 154 formed along the bottom edge thereof. These holes are provided for attaching a suitable outlet device to the hopper which may be either welded or mechanically fastened thereto depending on the structural materials used.

A pair of similar integral laterally outwardly extending tabs 160 and 162 are formed at opposite sides of the main body portion 152 of plate 150. Each of these tabs is offset, the tabs being joined with the main body portion 152 by sloping portions 164 and 166. As seen most clearly in FIG. 6, tab 160 is offset from the main body portion 152 by a distance substantially equal to the thickness of the plate whereby the plate is adapted to fit within the spaced edges defining the slot in one of the floor sheet structures, with the tabs disposed adjacent the undersurface of the floor sheet structures and welded thereto.

As seen in FIG. 2, the plate 150 is illustrated in operative position, and it will be understood that the main body portion 152 of the plate lies in the same plane as the floor sheet structure 10, while the tab 160 is disposed in abutting relationship with the undersurface of the floor sheet structure and welded thereto. It will be understood that the opposite tab 162 is similarly disposed flush with the undersurface of the adjacent floor sheet structure of welding thereto.

Referring again to FIG. 5, the plate 150 includes a reduced upper portion 170 of generally S-shaped cross-sectional configuration as seen in FIG. 3. The upper edge 172 of this reduced upper portion of the plate is of such a configuration as to conform with the undersurface of the center sill bottom closure means 70 previously described.

Accordingly, when the floor sheet bottom closure plate 150 is disposed in operative assembled relationship, the upper edge 172 of the plate is secured as by welding to the undersurface of the center sill bottom closure means 70. The S-shaped cross-sectional configuration of the upper portion of the plate 150 acts as a stress relief means for shrinkage of the welding as it cools.

It will of course be understood that a plate similar to plate 150 is provided at the opposite side of the hopper for closing off the bottom of the slot provided in floor sheet structure 12.

It is apparent that the components of the closure means of the present invention are so designed that they may be easily assembled without requiring any critical fit between the various parts thereof, and at the same time points of stress concentration which might otherwise be caused by the intersections of the various members are eliminated. In particular, the collars provide a smooth closure at the joint between the hood means and the sloping floor sheet structures and eliminate points of stress concentration which could be caused by such intersecting joints.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. In a railway hopper car, the combination of a pair of inclined floor sheets each of which has a slot formed therethrough, a center sill means extending through the slot in said floor sheets with the floor sheets extending on opposite side of said center sill means, support means connected to opposite sides of said center sill means and extending substantially throughout the length of the center sill means between said floor sheets, center sill bottom closure means connected to said support means and extending below said center sill means and extending throughout the distance between said floor sheets, hood means connected to said support means and extending above said center sill means and extending through throughout the distance between said floor sheets, said center sill bottom closure means and said hood means cooperating to completely surround said center sill means throughout the distance between said floor sheets, collar means connected to each of said floor sheets and to opposite ends of said hood means to cover the joint between said hood means and said floor sheets, a pair of floor sheet bottom closure means each of which closes off the bottom portion of the slot in one of said floor sheets, each of said floor sheet bottom closure means being secured to said center sill bottom closure means and being attached to the adjacent floor sheet, each support means comprising a support member having a substantially flat lateral securing surface whereby said support means at opposite sides of said center sill means define spaced parallel securing surfaces, upper portions of said center sill bottom closure means being secured to said parallel securing surfaces and lower portions of said hood means also being secured to said parallel securing surfaces.

2. Apparatus as defined in claim 1 wherein upper portions of said center sill bottom closure means are secured to said lateral securing surfaces and lower portions of said hood means are secured to said securing surfaces.

3. Apparatus as defined in claim 1 wherein each of said support members also includes a downwardly and outwardly sloping surface.

4. Apparatus as defined in claim 1 wherein each of said support members includes a longitudinally extending recessed central portion for receiving mechanical fastening means.

5. Apparatus as defined in claim 1 wherein each of said floor sheet bottom closure means includes offset tabs disposed at opposite sides thereof for attachment to the adjacent floor sheet.

6. Apparatus as defined in claim 1 wherein the upper portion of each of said floor sheet bottom closure means has a configuration conforming to the undersurface of said center sill bottom closure means, said upper portion having a curved cross-sectional configuration to provide stress relief.

7. Apparatus as defined in claim 1 wherein each support member has an upper sloping surface, each support member also including a longitudinally extending recessed central portion for receiving mechanical fastening means.

8. Apparatus as defined in claim 7, including reinforcing means connected to the bottom portion of said center sill means and being spaced from said center sill bottom closure means, each of said floor sheet bottom closure means having an upper end portion conforming to and secured to the under surface of said center sill bottom closure means, said floor sheet bottom closure means also including offset tabs disposed at opposite sides thereof for connection to the adjacent floor sheet.