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Van Der Sluys et al.

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[54] WELDED LIGHT ALLOY CAR CONSTRUCTION

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[52] **U.S. Cl.** **105/401**

[51] **Int. Cl.** **B61d 17/08**

[58] **Field of Search** 105/397, 409, 396, 401, 329, 105/327, 402, 403; 296/28, 29

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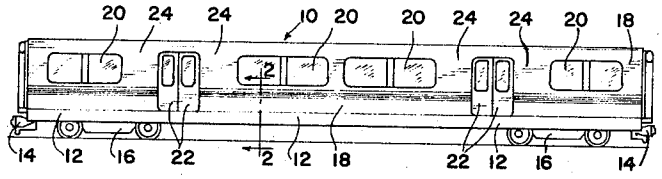
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[57] **ABSTRACT**

A railway passenger vehicle construction including longitudinally extending extruded wall portions having interlocking and abutting portions producing a smooth outer surface having a curvature eccentric with the curvature of the vehicle inner wall to improve the aerodynamic and structural properties of the vehicle walls. Adjacent extruded members are attached as by a weldment on their inside portions in a manner to prevent buckling and provide a finished external surface free of blemishes from weldments or other fastening means.

7 Claims, 4 Drawing Figures



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SHEET 1 OF 2

FIG. 1

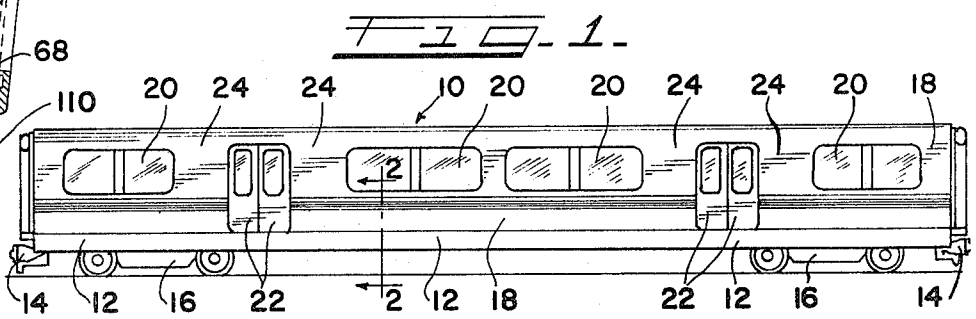
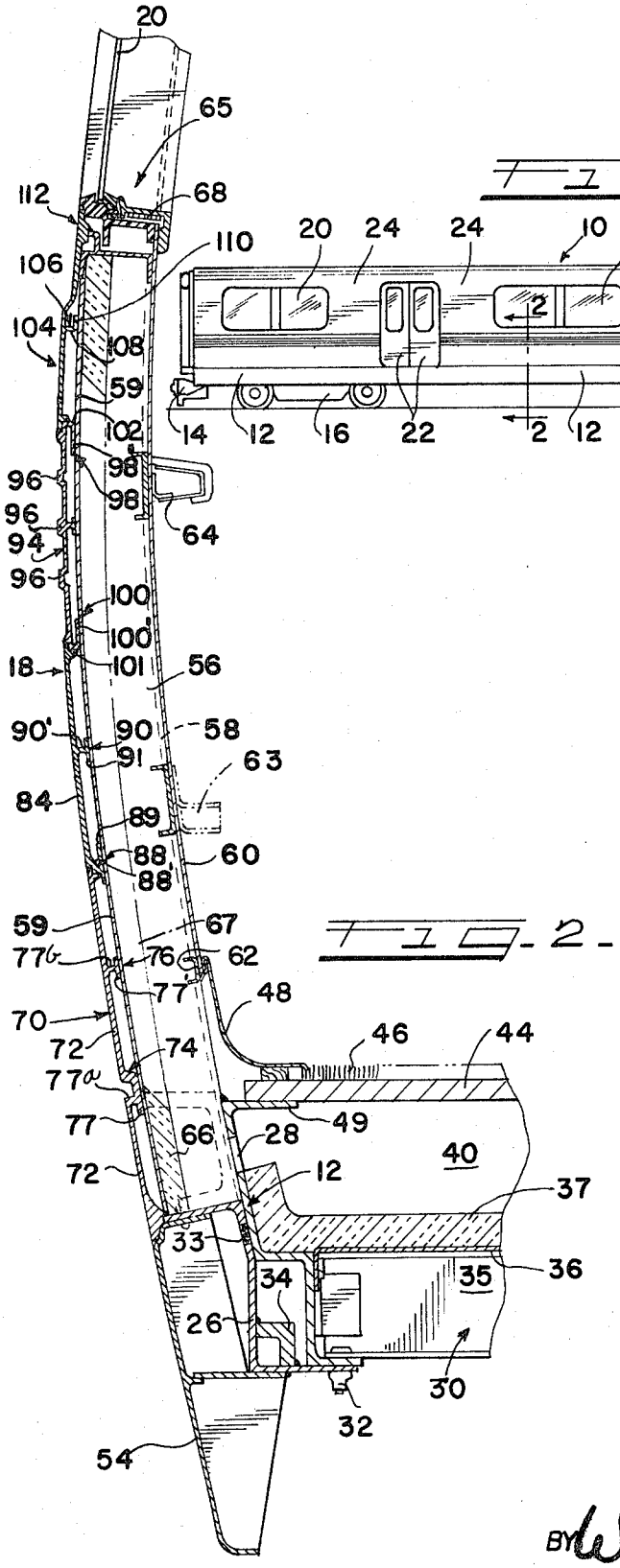


FIG. 2



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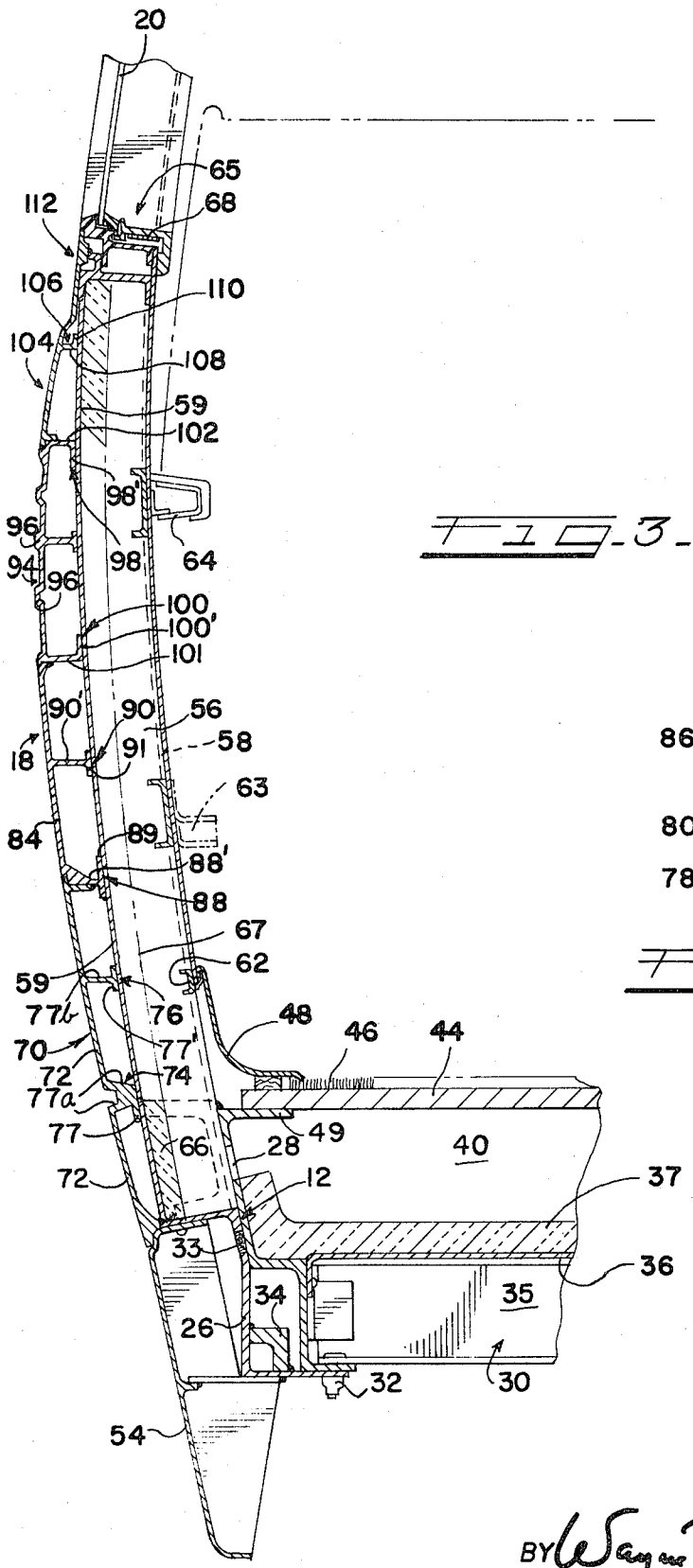


FIG. 3

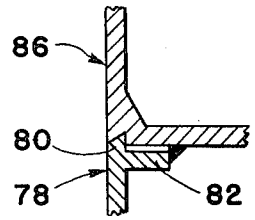


FIG. 4

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WELDED LIGHT ALLOY CAR CONSTRUCTION

SUMMARY

In railway passenger vehicles it is common practice to cover structural members with a relatively thin outside sheet of metal for functional and aerodynamic improvements in the vehicle. In the past the custom has been to attach the enclosure members directly by means of rivets or weldments. A drawback in this practice has been that the rivets or other mechanical fastening means weaken the structure, cause premature corrosion and add weight and therefore are objectionable. If a weldment is used to attach a thin sheet covering means, the sheet may distort and discolor due to the heat caused during the welding operation, thereby failing to eliminate the unsightliness as intended. The present invention has eliminated the thin outer sheets by providing an extruded structural outer member which presents a structurally sound outside surface free of rivets or other fasteners and free from the distortions and discoloration caused by weldments.

The car construction of the present invention may readily be adapted to use on a high speed freight train wherein the interior of the car is generally rectangular with flat sides, roof, and floor yet the exterior must be rounded for aerodynamic reasons. The wall construction herein employed permits the use of standard, easily manufactured framing members while virtually any exterior car profile can be obtained.

The present invention relates to an improved light alloy car construction having interlocking outer wall portions fixedly attached on their inside abutting surfaces as by a fillet weld and including varying depth stiffening and attaching ribs.

A primary purpose or object of the present invention is to provide an improved light alloy railway vehicle having an outer wall assembly which presents a smooth surface free of fasteners and weldments and which portions are easily attached together as by weldment from the inside of the car.

Another object of the present invention is to provide an extruded outer wall for a railway vehicle, said wall having inwardly extending rib portions abutting the vehicle wall post for attachment thereto and thereby forming a spaced portion between the vertical wall posts and the car outer wall, the spaced portion between the outer wall and the vertical wall posts forming an air pocket which provides an improved insulation in the walls of the vehicle. The rib portions extending from the extruded sheet means extend longitudinally the length of each sheet and also provide an attaching surface for insulating sheet means located in the walls of the vehicle.

A further object is to provide an extruded wall member having rib portions extending normal to the main body of the wall member. The rib portions are used to attach the wall member to vehicle framing members and the ribs can be of different dimensions to thereby obtain any desired vehicle exterior configuration or curvature.

These and other objects of the invention will become apparent from reference to the following description, attached drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of a railway passenger vehicle employing the side construction of the present invention;

FIG. **2** is a sectional view taken along line **2—2** of FIG. **1**;

FIG. **3** is a modification of the invention; and

FIG. **4** is an enlarged section view of the wall panel interlock.

DETAILED DESCRIPTION OF INVENTION

Referring now to the drawings, and in particular to FIG. **1**, there is illustrated a lightweight railway passenger vehicle of the construction contained in the present invention. The vehicle **10** includes the usual side sill **12** extending longitudinally the length of the vehicle. Spaced couplers **14** are positioned at the ends of the car and are connected to a stub center sill which extends to the body bolster (not shown) which is located above each truck **16**. The vehicle side wall units **18** include windows **20** and sliding door members **22** which, when opened, are receivable in the side wall portions designated generally at **24**.

Referring now to FIG. **2**, a more complete understanding of the side wall construction will be forthcoming. The side sill **12** consists of a combination of two extruded members joined together, thus forming a unitary side sill having a hollow portion and extending the length of the vehicle. A first Z-shaped member **26** is assembled as part of the side wall unit **18** and thereby imparts rigidity to a somewhat flexible side wall unit. The second side sill member **28** is assembled initially as part of the underframe or floor unit **30** thus, to form the side sill **12**, the members **26** and **28** are brought together and attached as by fasteners **32** and weldments **33**. The first Z-shaped member **26** is rigidified inside door area by the angle member **34** which is welded into an outside corner.

The underframe or the floor unit **30** includes transversely extending and longitudinally spaced cross members **35**. A sub floor sheet **36** is positioned above the cross members **35** and supports insulation **37** positioned in the heating and air conditioning duct **40**. Above the duct **40** is a plymetal floor **44** which comprises a sheet of plywood having aluminum sheets on both sides and thereby forming a lightweight rigid floor structural member. The portion of the underframe or floor unit **30** which is exposed to the interior of the vehicle includes a carpet **46** which is fixedly secured to the plymetal floor **44** by a suitable adhesive. The transverse edge margins of the carpet are held in place by arcuately formed inner wall lower portions **48**. The plymetal floor extends the width of the vehicle and is fixedly attached to the top flange portions **49** of the second side sill member **28**. A side sill skirt portion **54** is attached to the first Z-shaped member **26** to conceal the side sill and provide a smooth outside skin to the side wall unit **18**.

The side wall unit **18** includes vertically extending and longitudinally spaced wall posts **56** having a Z-shaped cross section and including inner flanges **58** and outer flanges **59**. A wall sheet **60** is attached to the inner flange **58** and forms the inner wall surface on the interior of the vehicle. The wall sheets **60** are held in place by suitable fasteners one of which is indicated at **62**. A seat bracket is indicated at **63** and attached to the inner flange **58** to function primarily in fastening the seat rigidly to the vehicle. Arm rest **64** may also be attached on the inner surface of the wall sheets **60**.

The interior of the side wall units is generally hollow and used as air ducts **65** for circulation of heating and cooling air. A fiberglass insulation **66** is fixedly attached adjacent the outer flanges **59** of the side wall posts **56** and has a metallic foil surface as indicated at **67** to protect the insulation from moisture contained in circulating air which flows through the wall section ducts **65**. Air flowing through the duct portion **65** enters the vehicle interior through the perforated plates **68** located at the inside bottom of the windows **20**.

The outside surface of the side wall unit **18** comprises an extruded light alloy construction including interlocking portions secured together at their inner abutting surfaces so as to provide a smooth continuous outside skin free of weldments or other mechanical fastening devices and having sufficient thickness and integral rib portions to enable the extruded members to function when attached to the car structure as structural supporting members.

Referring now to FIG. **2** for a more complete understanding of the outside extruded construction, the extruded wall unit of the present invention includes four interlocking extruded portions but could comprise as few as one, or more than four, individual sections, depending on the height of the wall section being covered and depending on ease of handling and economies involved in manufacturing and assembling individual extruded portions. The bottom or lower wall portion **70** is attached to the first Z-shaped member **26** and to the skirt **54**. The lower portion **70** includes a slightly arcuate outer portion **72** and attaching rib members **74,76**. The ribs **74,76** include inner flange portions **77,77'** and web portions **77*a***, **77*b***. The rib members **74,76** extend the length of the wall portion **70**

and are fixedly attached to the outer flange **59** of the vertical wall posts **56** by weldments. The ribs **74,76** impart additional strength to the wall portion as well as provide a means for attaching the wall portion to the wall post in such manner that heat which results during welding is dissipated through the ribs and does not reach the outer portion **72** and is thereby prevented from distorting or discoloring the outer portion. The lower wall portion **70** terminates at its top edge with an insertable interlocking portion **78** which includes a vertically extending wedge-shaped portion **80** and an inwardly extending tab portion **82** (see FIG. **4**). The tab portion **82** is utilized essentially to facilitate securing adjacent extruded members together. This securement may be obtained by welding, if desired, without defacing the outer surface inasmuch as the weld is made on the inner side and spaced from the outer surface.

A second extruded wall member **84** is positioned adjacent and interlocked with the lower wall member **70** by a locking portion **86** which receives the wedge portion **80** of the lower extruded member **70**. A longitudinally extending mounting rib **88** having web portion **88'** and flange portion **89** and a second rib **90** having web **90'** and flange **91** extend inwardly from the second wall portion **84** and are used to attach the same to the vertical wall post **56** in the same manner used in attaching the lower wall member **70**. Likewise, the rib members **88** and **90** space the wall portion **84** from the vertical wall post **56** and the amount of spacing between the wall portion **84** and the wall post **56** can be varied by regulating the depth of the web **88'** and **90'** of each rib **88,90** (see FIG. **3**). The upper interlocking portion of the second wall member **84** is the same as the interlocking arrangement used between the first or the lower member **72** and the second wall member **84** and is identified by the same numerals.

The third extruded member **94** is interlocked with the second wall member **84** by means of the interlocking arrangement used previously. The third interlocking member **94** includes three stepped or offset portions **96** which impart structural rigidity to the extruded member as well as function for decorative purposes. Top and bottom rib members designated at **98** and **100** include inner flange portions **98'**, **100'** which are used to attach the extruded member to the side wall posts and also include a short web portion designated at **101,102** which function primarily as a spacer and, as with the other extruded members, determines the amount of spacing between the outer flange **59** of the wall post **56** and the outer surface of the extruded panels (see FIG. **3**).

A top extruded portion **104** completes the side wall assembly and interlocks with the third member **94** in the same manner used to interlock previous adjoining panels. The top member **104** includes a spacing rib **106** which is used to attach the member to the side wall post and also includes both a web **108** which spaces the outer wall of the extruded member from the side wall post and a flange **110** used for welding the extruded member to the wall posts **56**. The top portion of member **104** tapers into the window framing assembly **112**.

Thus it is seen that by utilizing the interlocking light alloy extruded panels which extend longitudinally along the side of the railway vehicle and by utilizing the rib members, it is possible to space the extruded portions from the inside insulation and form air pockets which also aid in insulating the interior of the vehicle from the environment. It is to be noticed that the wall posts **56** are arcuate with all surfaces of the side posts being drawn from concentric circles. However, the outside surface of a vehicle, because of aerodynamic or space considerations, may require an arc which is not concentric with the radius used on the outer portions of the vertical wall post **56** to which it is to be attached. This requires either a specially made wall post having non-concentric or eccentric inner and outer radii and, as done in the past, to which a thin outer sheet has been attached. However, this is prohibitive inasmuch as forming a thusly made wall post is objectionable from a manufacturing and fabrication standpoint. Thus, by employing the construction of the present invention, it is possible to retain the conventional vertical wall post and yet obtain an outside surface having any desired outside radius or curvature which maybe desired. The degree of arc obtained is determined by the transverse depth dimension of the web used in the ribs which are utilized for spacing the wall from the side posts **56** thus forming air spaces or voids and for attaching purposes.

With reference now to FIG. **3**, a modification of the present invention where the features mentioned previously are illustrated, it is noticed that the inner and outer radii of the side wall unit are not concentric and it is thus illustrated that a prime feature of the present invention permits the use of different and non-concentric radii in forming a side wall unit.

The foregoing description and drawings merely explain and illustrate the invention and the invention is not limited thereto, except insofar as the appended claims are so limited, as those skilled in the art who have the disclosure before them will be able to make modifications and variations therein without department from the scope of the invention.

What is claimed is:

1. A railway vehicle body of light alloy welded construction supported on spaced trucks and having a skeletal framing structure and spaced side wall units, said vehicle body including:

longitudinally extending wall portions forming an exterior wall of said vehicle,

each wall portion including rib portions extending inwardly of the vehicle toward said skeletal framing structure,

said rib portions forming attaching means for securing the wall portions to the vehicle skeletal structure,

said wall portions being attached to said skeletal structure and said inwardly extending rib portions having web portions spacing the wall portions from the skeletal structure to thereby provide wall sections spaced from the vehicle skeletal framing structure,

said rib portions including a flange portion for attachment of the associated wall portion to said skeletal framing structure of the railway vehicle,

said wall portions being an extruded aluminum alloy.

2. The invention according to claim **1**, and

said exterior wall of the vehicle including a plurality of vertically stacked adjacent wall portions having interlocking portions forming a continuous smooth outside wall surface,

said interlocking portion including a protruding portion on a wall portion insertable in an adjacent wall portion,

said interlocking portion also including an abutting tab member and said adjacent wall portion having an inwardly extending rib connecting with said tab member to thereby provide an attachment point spaced from said smooth outside wall surface.

3. The invention according to claim **1**, and

said web portions being of varying transverse depths about the skeletal structure to produce an outwardly bowed curvature of said wall sections.

4. The invention according to claim **1**, and

said skeletal framing structure including vertically extending arcuate side wall posts having inner and outer concentric flange portions,

said rib portions attached to said outer flange portion as by a weld to thereby produce an outer wall structure having a curvature eccentric with the arcuate side wall posts.

5. A railway passenger vehicle side wall construction including:

longitudinally spaced and vertically extending arcuate wall posts having inner and outer flange portions,

longitudinally extending vertically stacked and adjacent extruded wall portions having interlocking portions and having rib portions extending transversely therefrom toward and communicating with said wall posts,

said rib portions including a flange portion fixedly attached to the outer flange portion of the associated vertical wall posts,

said wall posts and said vertically stacked wall portions being fixedly attached and combining to form a curved hollow beam wall section.

6. The invention according to claim 5, and

said interlocking portions including a protruding portion on a wall portion insertable in a receiving portion of the adjacent wall portion thereby forming a continuous smooth outside wall surface,

said interlocking portion including an abutting tab member and said adjacent wall portion having a rib portion connecting with said tab portion to provide an attachment joint spaced from said outside wall surface.

7. The invention according to claim 5, and

said wall portions being an extruded aluminum alloy.

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