Jan. 27, 1959 G. E. BOCK ET AL 2,870,723

RAILWAY CAR SIDE WALL

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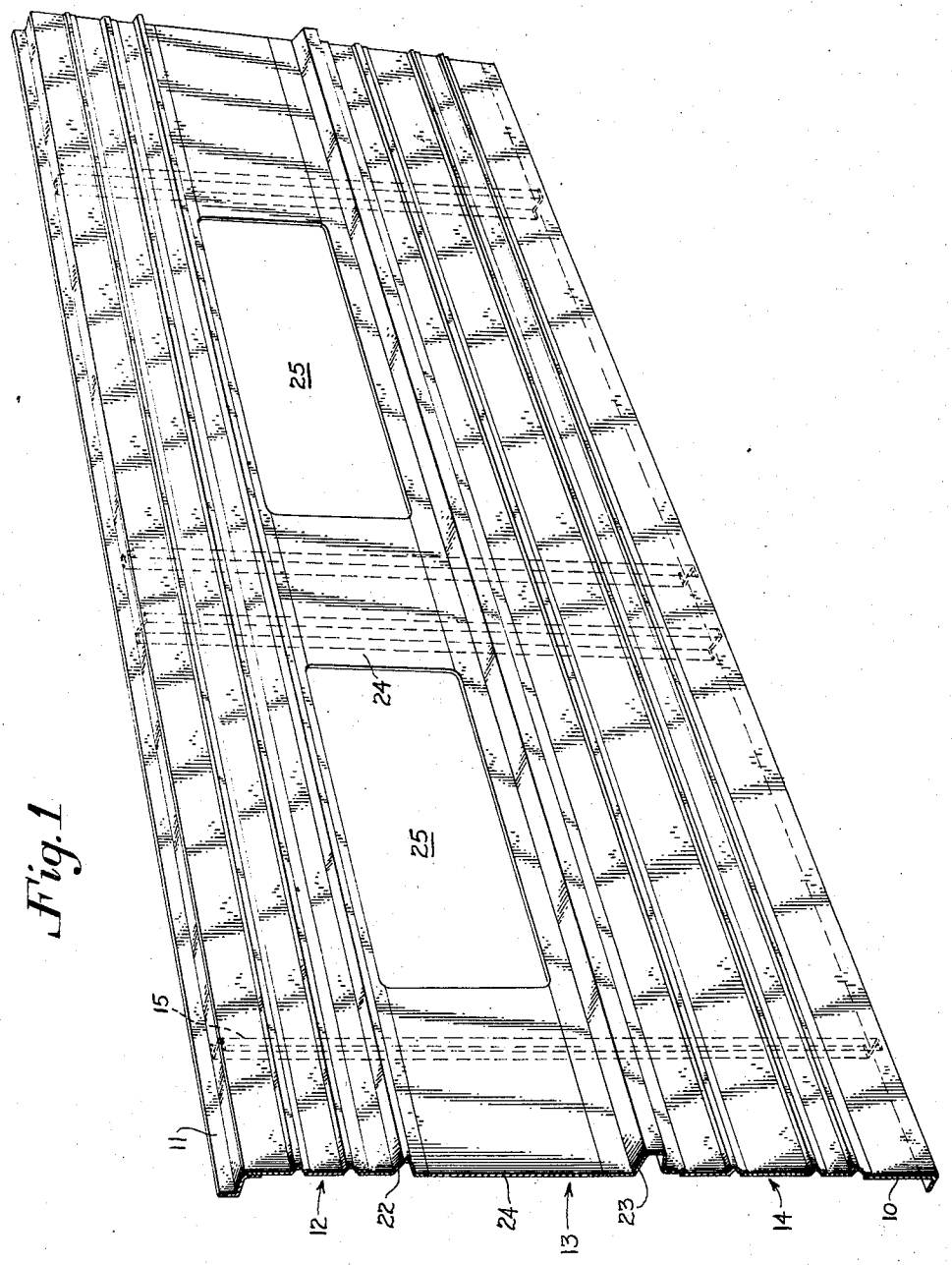


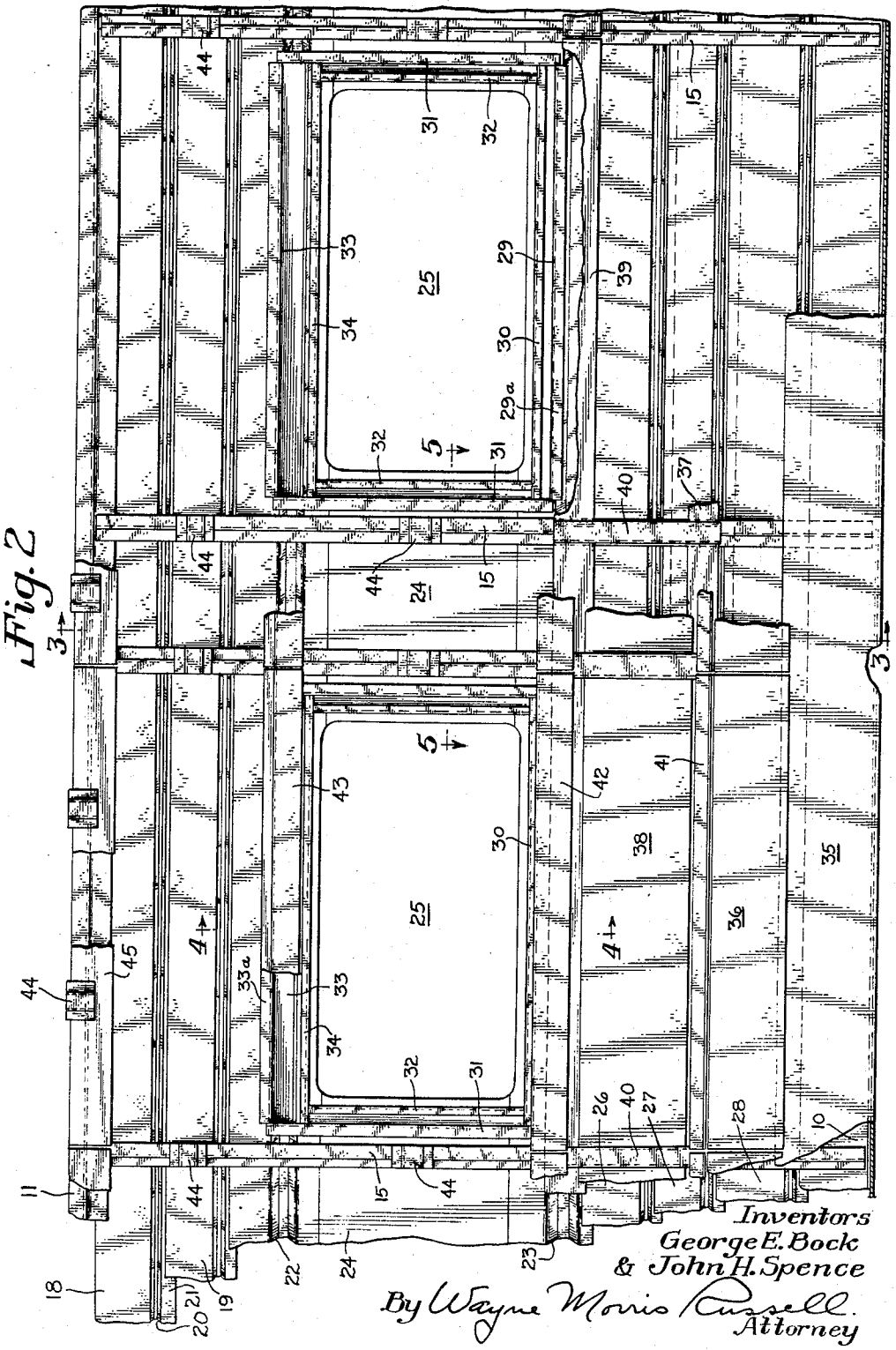
Fig. 1

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Fig. 3

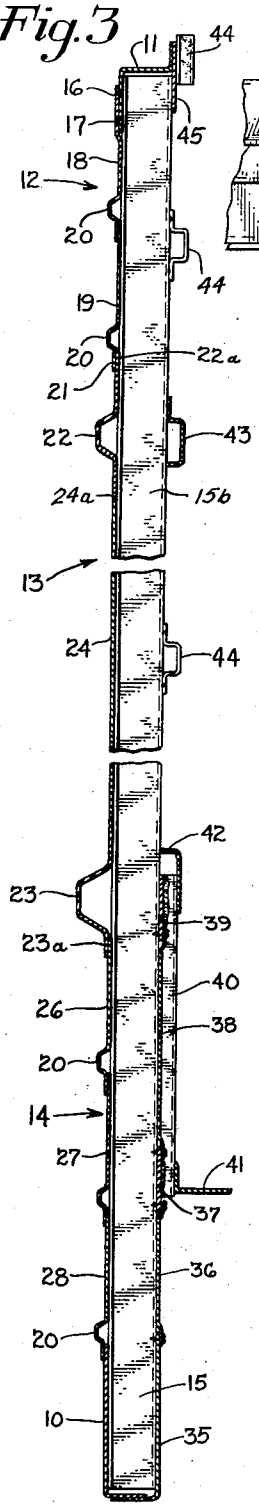


Fig. 5

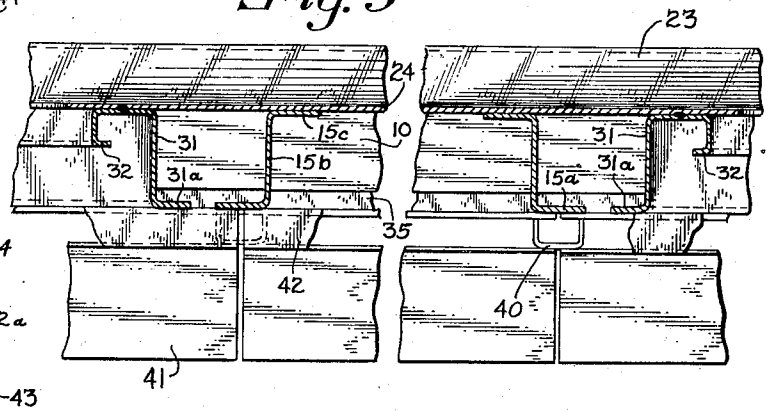
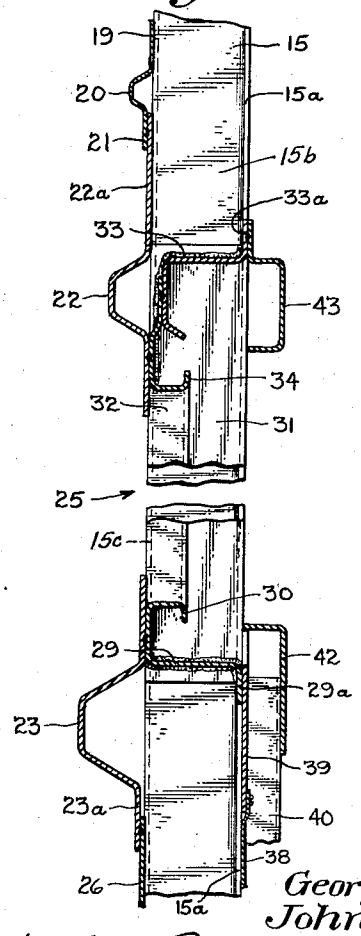


Fig. 4



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RAILWAY CAR SIDE WALL

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3 Claims. (Cl. 105—401)

This invention relates to side wall constructions in general and in particular to railway passenger car side walls of the light weight type.

The practice of constructing an outer side wall of relatively thin corrugated metal strips which are spot welded to each other and to vertical side posts for the purpose of enabling this outer sheathing to cooperate with the other parts of the car frame to support a load is now well established. Although innumerable attempts have been made to eliminate inefficient and unsightly buckling of this thin outer sheathing, only partial success has resulted. In addition to the buckling problem, another problem has been the age-old connection between the window framing units and the vertical side posts, necessitating the posts being secured immediately adjacent the windows wherever they happen to be placed, according to the design of the car, an uneconomical and inefficient necessity from a structural analysis. Wherever windows are used, the frames are usually not only connected to the side posts themselves, but are also connected to an upper window header member and a lower belt rail member, each of which also is connected to adjacent side posts.

It has been found that by having the side posts of continuous form instead of interrupted, the original cost is less. It has also been found that by having a continuous post, the number of welded connections to the outer sheathing is lessened making the fabrication of the continuous posts and outer sheathing more economical; and by having less undesirable welds there are less stresses set up in the thin outer sheathing. As mentioned before, many attempts have been made to eliminate the transmission of stress and strain from the internal framing members, such as posts, belt rails and headers, to the outer sheathing which causes buckling and wrinkling therein. It has been found that the tendency to buckle will always be prevalent wherever the side structural framing unit is of such rigidity that the outer sheathing is forced to conform to the particular configuration of the side framing. Thus, as the present methods of forming railway car side framing elements do not result in highly precisioned elements, there may be instances after the assembly of these parts when they are not perfectly aligned, resulting in the outer sheathing having a tendency to buckle or bend when assembled thereto. It is to be emphasized that only a slight misalignment of a side framing may cause the outer sheathing to buckle. Therefore, to improve such a situation whereby the outer sheathing is made stiffer and the side vertical framing elements are made less rigid so the outer sheathing can influence sufficient movement in the elements in order to obtain the desired alignment, thus preventing buckling of the side sheathing, and to retain the light weight advantages and the beauty of the stainless steel sheathing, are the main objects of this invention. To accomplish this object, a side framing and sheathing has been conceived wherein a continuous post frame having no internal web structural connections such as window frames, belt rails and window headers, is secured to an outer sheathing of such rigidity that the now more flexible vertical side posts will conform to the bending stiffness of the outer sheathing.

In addition thereto, it has been ascertained that by divorcing the window structures from the webs of the vertical posts in all structural respects, a still greater rigidity of the outer sheathing is obtained, complemented by retaining the flexible freedom of the continuous posts. For these reasons, another object of this invention is to provide a side wall structure wherein continuous posts may be placed at any desired location, irrespective of window framing units which are in no way structurally connected to the posts except by the outer specially corrugated sheathing wall to which the window framing units are secured. It is obvious in this instance, that to connect a window frame to the webs of the adjacent side posts would partially defeat the objective of the invention, as the connection would rigidify the inner side wall structure. Therefore, it is believed necessary in order to achieve a higher degree of stiffness and resiliency than that obtained by the continuous post and outer sheathing combination, to include therein a window framing unit as particularly exemplified herein.

The aforementioned and other objects will become more apparent by reference to the following description and accompanying drawings, in which:

Fig. 1 is a perspective view of an outer side wall sheathing section of a railway car embodying the present invention;

Fig. 2 is an elevational view of the section of a railway car side wall structure depicted in Fig. 1, looking from the inside of the car;

Fig. 3 is an enlarged broken vertical sectional view of the side wall structure, taken along the line 3—3 of Fig. 2;

Fig. 4 is an enlarged vertical sectional view of the window frame and adjoining parts, taken along the line 4—4 of Fig. 2; and

Fig. 5 is an enlarged horizontal sectional view of the window frames in relation to the vertical side posts and adjoining posts, taken along the line 5—5 of Fig. 2.

Referring to the drawings, a section of a side wall structure of a railway car is depicted wherein a side sill **10** and a side plate **11** are joined by a longitudinally extending letterboard panel **12**, intermediate panel **13** and girder panel **14** therebelow (Fig. 1). Also joining the side sill and the side plate are a plurality of continuout vertical side posts **15**. The vertical side posts do not contact the horizontal portions of the sill and plate, thereby increasing the flexibility of the transverse web portion **15***b* of each post. By referring to Fig. 3, it may be noted that the letterboard panel is spot welded at **16** and **17** to the side plate **11**, and, as the entire structure is composed of stainless steel sheet material, all other securing connections are similar spot welds, with the exception of the arc welded butt joints **24***a* where the outer window header **22** and the outer belt rail **23** each join the pier panels **24**.

The horizontally disposed belt rail and window header units have been eliminated from their usual location, that being secured to and extending between each transverse web **15***b* of each post **15**. The usual location resulted in each post being rigidified to such a degree that if a post was placed during assembly in a manner that an outer flange **15***c* was not in the same longitudinal plane as the outer flanges of other posts, the slightly stiffened outer sheathing would be forced to adhere to the outer flange due to the rigidity of the web **15***b*. Thus, by transferring the rigidity caused by the rail and header units from the webs of the vertical posts to the outer sheathing, as will be explained hereinafter, whereby the in-

creased bending stiffness of the outer sheathing is removed apart from the now increased torsional flexing capacity of the vertical posts **15**, the sheathing has an increased influence over the movement of the posts thus allowing the sheathing to overcome any slight misalignment of outer flanges **15***c*.

The letterboard panel **12** is comprised of two panel strips **18** and **19**, each strip having a hat-shaped corrugation **20** for stiffening purposes, an extending flange **21** of which overlies an adjacent strip. In order to compensate for the elimination of the usual inner window header element and belt rail element, and to provide the necessary rigidity to the outer sheathing wall, the intermediate panel is comprised of an upper hat-shaped corrugated strip, which shall be called an outer window header **22** and which has an upper flange **22***a* secured to the flange **21** of strip **19**, and a lower hat-shaped corrugated strip, which shall be called an outer belt rail **23**, it being noted that these corrugations are substantially larger and of thicker stock than the corrugations **20** of adjacent panels for arc welding purposes. The belt rail **23** and header **22** are joined intermediate thereof and at a predetermined spacing by pier panels **24** which form therewith window openings **25**.

The girder panel **14** is comparable to the letterboard panel **12**, except that it has three panel strips **26**, **27** and **28**, the upper strip **26** being joined to the lower flange **23***a* of the outer belt rail **23** and the lower strip **28** being joined to the side sill **10**.

By this structure, an otuer sheathing wall is formed having a greater structural influence over the vertical side posts, also the usual inner belt rail and window header units are eliminated, the present structure being one of more economical fabrication and enabling the outer sheathing to receive any stress or strain without buckling or twisting and without the aid of any additional devices between the sheathing and the posts, the unencumbered side posts being more flexible, thereby enabling them to conform to the movement of the outer sheathing.

Although the efficiency and objectives of the aforementioned structure are still possible where other reasons dictate the use of window framing units necessarily connected to the web portions of the side posts for structural purposes, it is necessary to the further efficiency of this particular structure that window units as disclosed herein be used. The window framing comprises a novel box frame of four S-shaped units: the lower horizontal unit including an integral window frame angle portion **29** and sash angle portion **30**, the angle portion **30** being joined to the outer belt rail **23** (Fig. 4); the two side units including an integral window frame vertical stile **31** and side sash angle portion **32**, the angle portion **32** being secured to the outer sheathing (Fig. 5); and the upper unit being formed of two parts, one including a window frame angle portion **33** connected to an upper sash angle portion **34** of the other part, the latter being secured to the outer window header **22** (Fig. 4). Each frame angle has an inner flange **29***a*, **31***a* and **33***a* vertically disposed and in the same plane as the inner flange **15***a* of each post **15**. It is to be noted by referring to Fig. 2 that there is no direct structural connection between any of the window elements and the vertical side posts **15**, the elements being connected only to the outer sheathing, thereby rigidifying the outer sheathing and leaving the posts unencumbered.

An inner side sill **35** is joined at the base of the posts **15** to the outer side sill **10** and has joined thereto at the top an inner heater back panel **36**. A heater support plate **37**, another heater back panel **38**, and a furring channel support **39** extend along the inner wall above panel **36**, having placed thereover at each post a vertically disposed furring channel **40**. A longitudinally extending heater pipe angle **41** is placed adjacent the base of the furring channel **40** (Fig. 3) and a window sill

support **42** of angle section is secured to the channels **40** and the channel support **39**. By the channel support **39** being secured to the window frame angle flange **29***a* and the vertical post flange **15***a*, elements which are also connected to the outer belt rail **23**, the support **39** and the transversely adjacent belt rail **23** form a longitudinal structural element having a greater section modulus and thus a greater resistance to transverse bending than the present day belt rail structures.

For enclosing a curtain roll (not shown) a curtain box cover **43** is secured to the posts **15** so as to face the curtain roll recess formed by the upper window frame angle **33**. Wall clips **44** for interior finish are secured at any desired location along the posts **15** and along the reinforcement plate **45** secured to the side plate **11**. By the cover **43** being secured to the window frame angle flange **33***a* and the vertical post flange **15***a*, elements which are also connected to the outer header **22**, the cover **43** and the transversely adjacent window header **22** form a longitudinal structural element having a greater section modulus and thus a greater resistance to transverse bending than the present day window header structures.

Thus it may be seen that a railway car wall structure comprising an outer stiffened sheathing in combination with continuous posts, the latter having no structural connections between the webs thereof is provided wherein the posts are rendered more flexible so as to prevent buckling and twisting in the outer sheathing. In addition thereto, it may be seen that by providing window frame units attached only to and thereby further rigidifying the outer sheathing, not only will the posts be left unencumbered but they are free to be located wherever desirable.

What is claimed is:

1. In a vehicle side frame having a side plate and a side sill, a plurality of vertical members, and outer sheathing having window openings therein, said vertical members being structurally secured to said sill, plate and sheathing, and window framing means structurally secured directly only to said outer sheathing thereby stiffening said outer sheathing to such an extent as to cause said vertical members to conform to said sheathing, the window framing means comprising a box frame having four units, each unit including a window frame element connected to a sash element, each sash element being secured to said outer sheathing.

2. In a vehicle side frame having a side plate and a side sill, a plurality of flanged vertical members, and outer sheathing having a window openings therein, said vertical members being structurally secured to said sill, plate and sheathing, and window framing means structurally secured directly only to said outer sheathing thereby stiffening said outer sheathing to such an extent as to cause said vertical members to conform to said sheathing the window framing means comprising a box frame of horizontal and vertical units, each horizontal unit including a sash angle secured to an outer sheathing and being connected to a window frame angle having an inner vertical flange disposed in the same plane as an inner flange of each vertical member.

3. In a vehicle side frame having a side sill and a side plate, a plurality of vertical members each secured to the side sill and side plate, and outer sheathing having window openings therein, said sheathing comprising a plurality of panel strips below said window openings arranged one above the other and bearing against the vertical members and the lowermost one of the strips being secured to the side sill and all of the strips being secured to the vertical members, a belt rail bearing against the vertical members and secured to the uppermost one of the strips and secured to the vertical members, another plurality of panel strips above said window openings arranged one above the other and bearing against the vertical members and the uppermost one of the strips being secured to the side plate and all of the strips being secured to the vertical members, a

window header bearing against the vertical members and secured to the lowermost one of the last named strips and to the vertical members, and spaced pier panels extending between the belt rail and window header and bearing against the adjacent vertical members and secured to the belt rail and the window header and the vertical members.

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