July 29, 1941. J. CHRISTIANSEN ET AL 2,250,523

CAR CONSTRUCTION

Filed Feb. 15, 1939 4 Sheets-Sheet 1

Fig. 1.

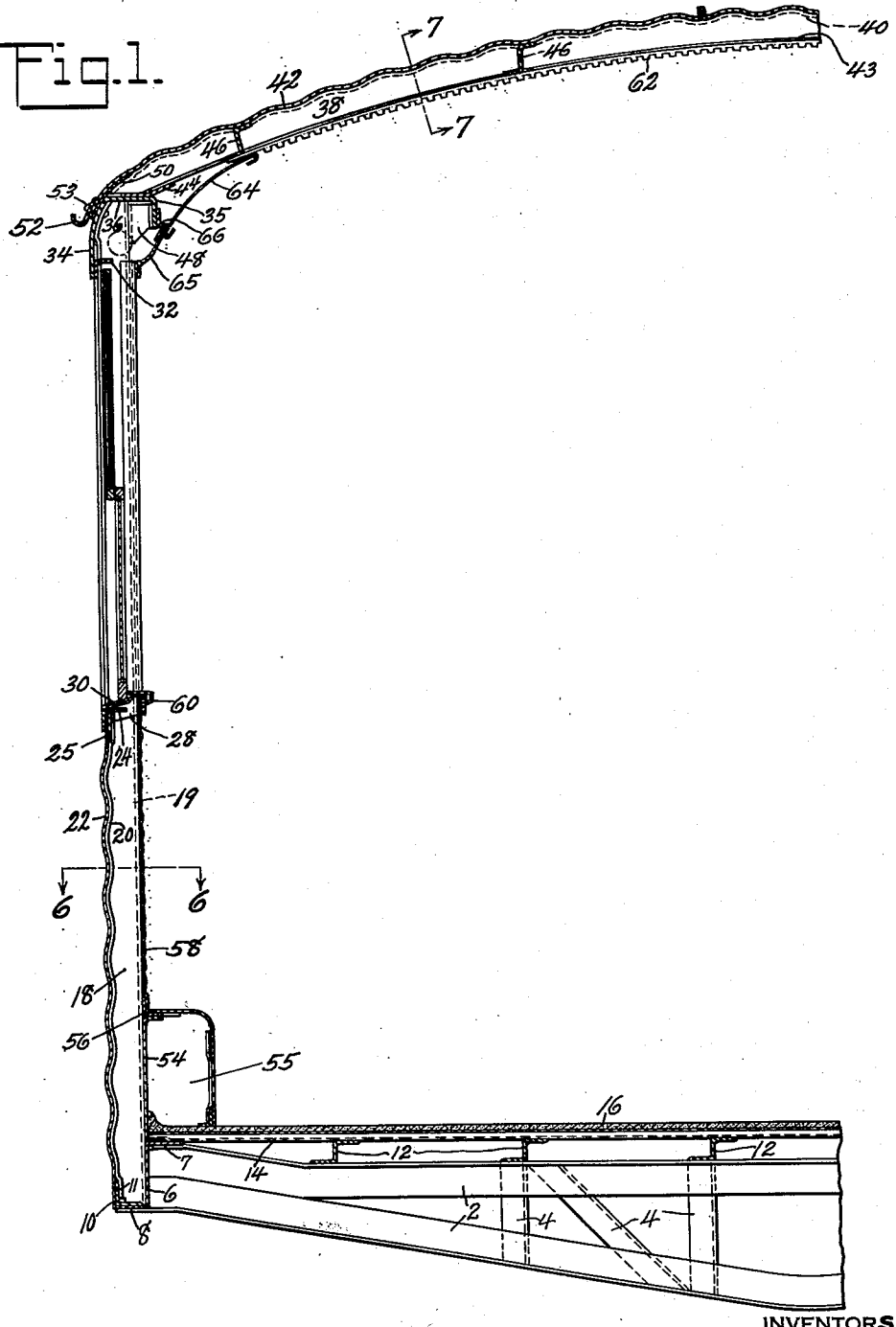

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Fig. 2.

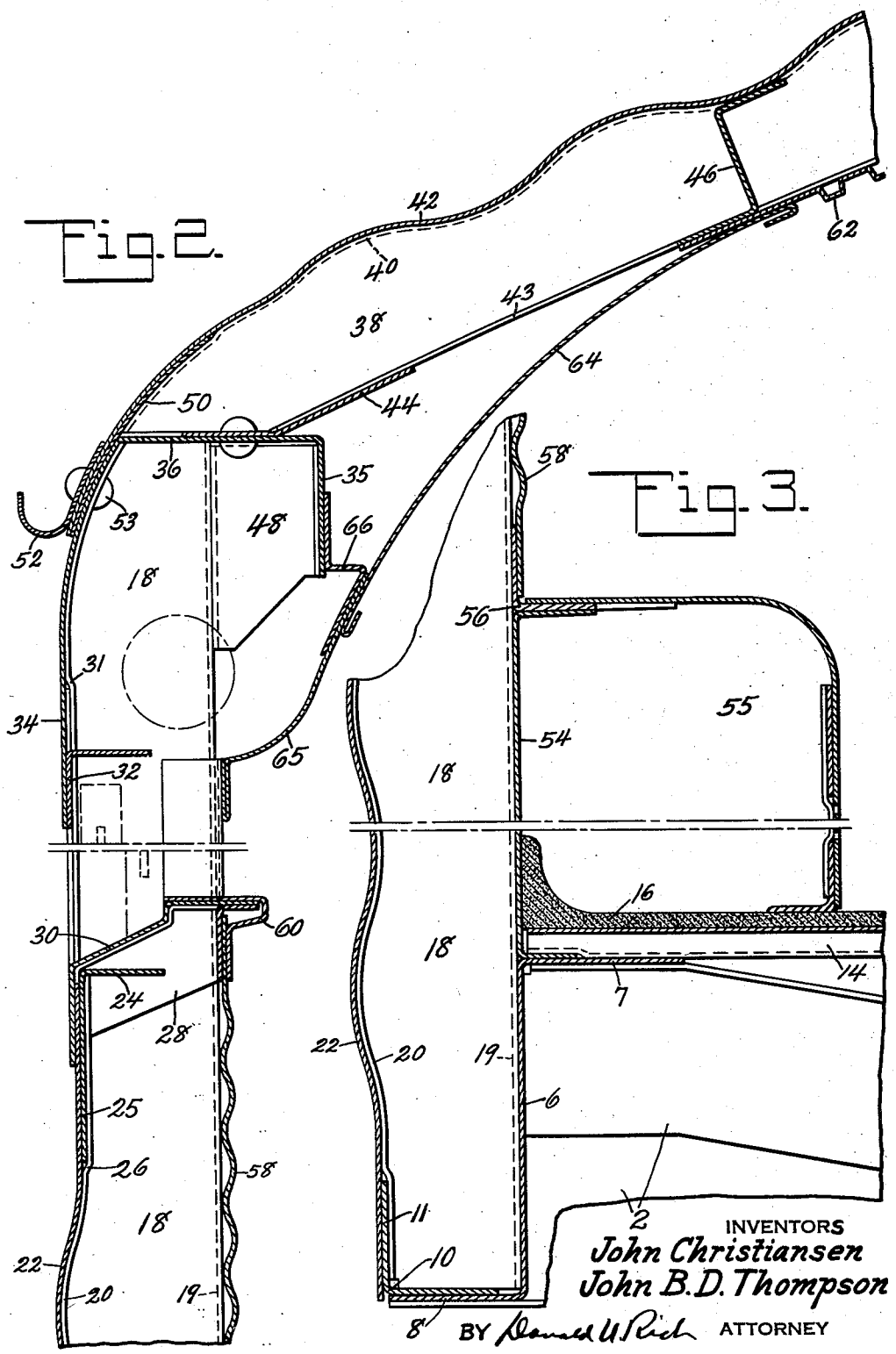

Fig. 3.

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Fig. 4.

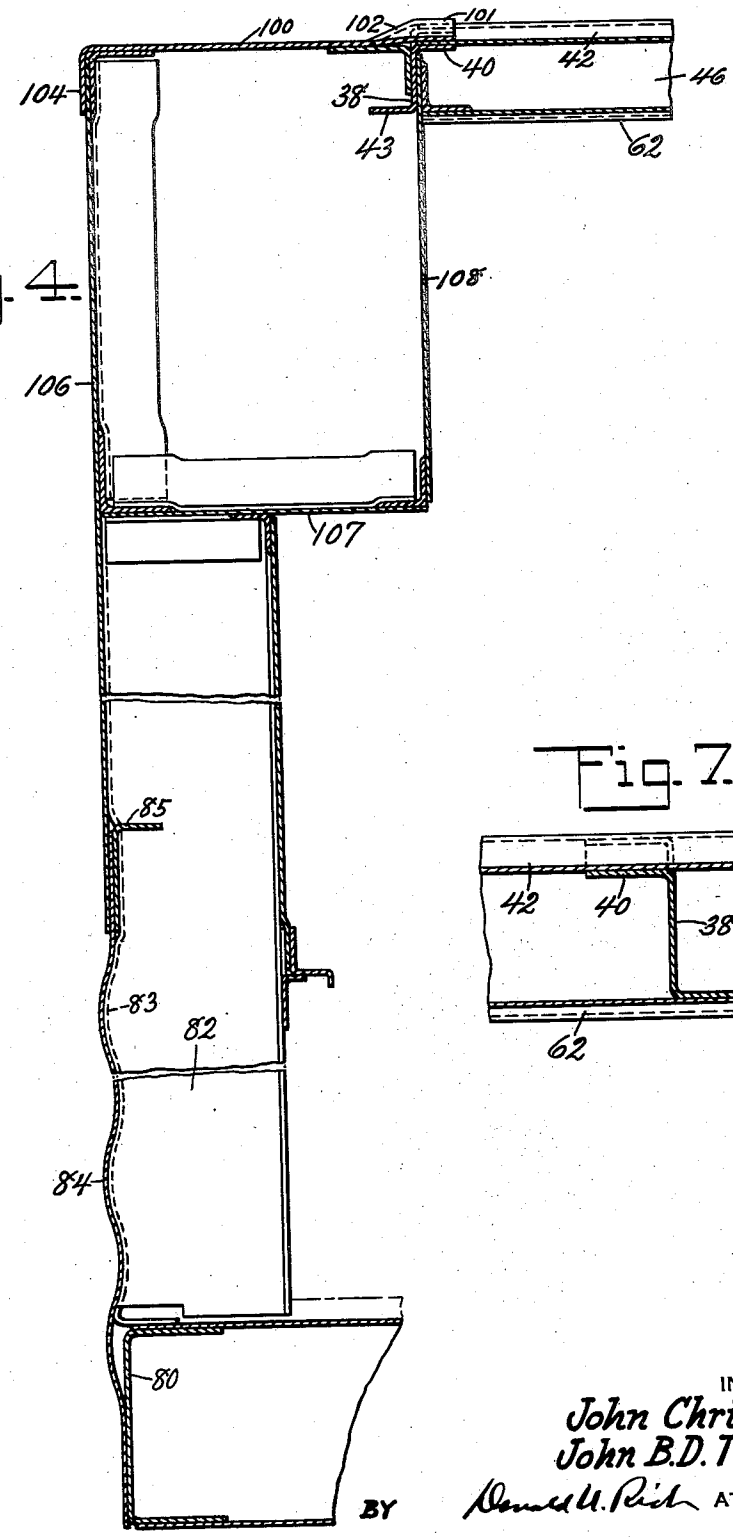
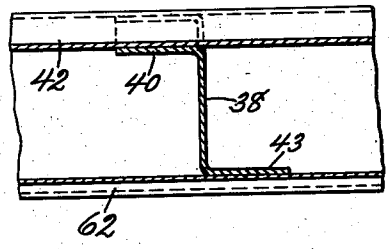


Fig. 7.



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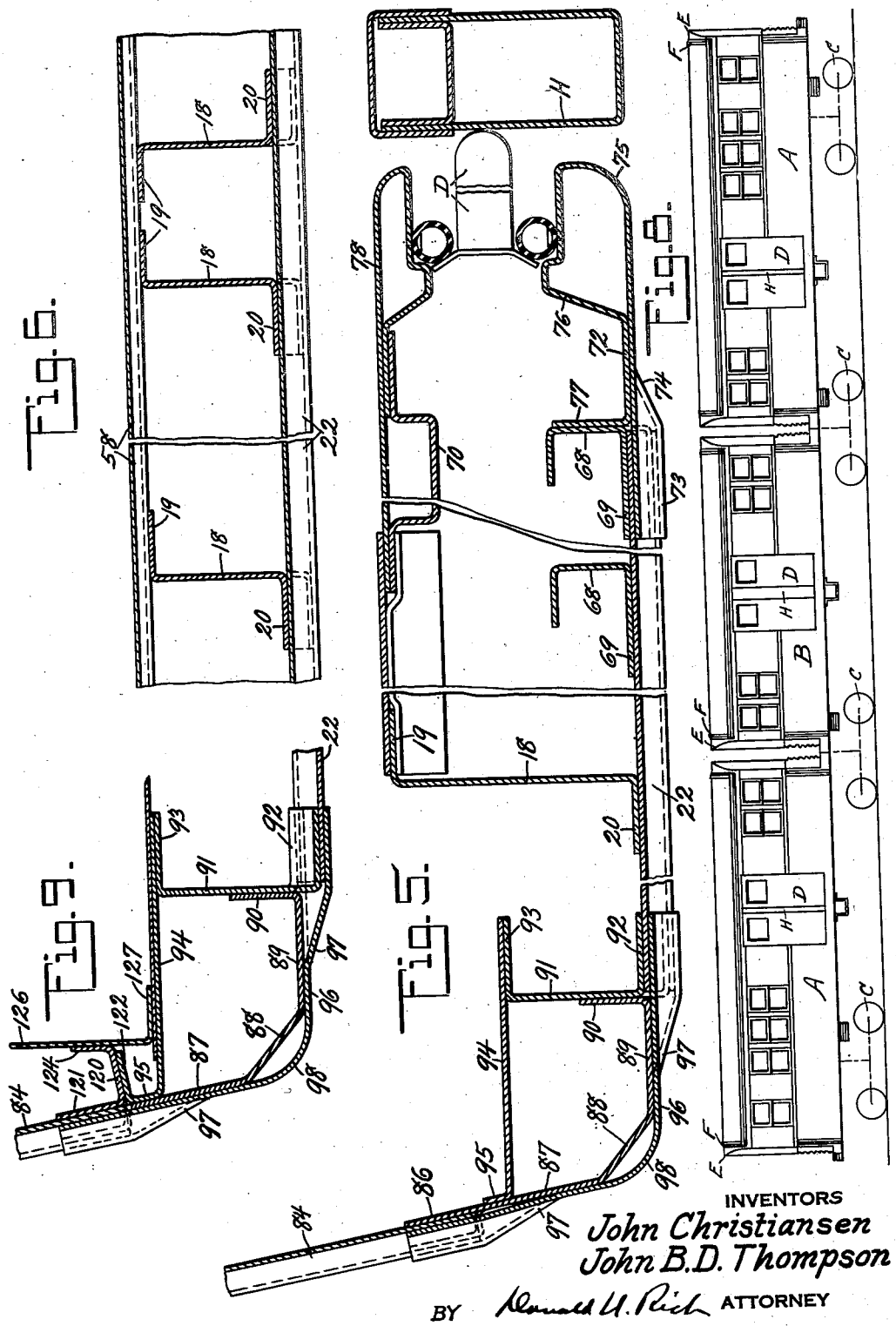

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UNITED STATES PATENT OFFICE

2,250,523

CAR CONSTRUCTION

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Application February 15, 1939, Serial No. 256,554

15 Claims. (Cl. 105—397)

This invention relates to vehicles in general and in particular to light weight railway vehicles intended for the transportation of passengers.

In the past vehicles for the transportation of passengers have been excessively heavy or where attempts have been made to lighten the structure the full strength value has not been obtained from the necessary component car parts. The necessary car parts are the underframe, the skeleton frame and the weatherproof covering. In old constructions the underframe was made sufficiently strong of itself to carry the entire load, with the skeleton frame and covering merely added to complete the car and provide protection for the passengers. Attempts have been made in the last few years to lighten railway vehicles by making the underframe and skeleton frame act in unison to carry the entire load, with the covering being made as thin as possible and serving merely as a protective shell against entrance of the elements. An ideal construction and the lightest possible arrangement will be one in which the underframe, skeleton frame and covering act in unison to carry the load with each part being constructed and arranged as to fully develop the strength of the material. It is an object, therefore, of the present invention to provide a construction for railway vehicles in which the component parts are so constructed and arranged as to develop as fully as possible the full strength of the parts.

A further object of the invention is the provision of a railway vehicle having corrugated self supporting wall and roof sheets, which sheets may be intimately secured to the skeleton frame to fully develop the strength of the sheets and frame.

A still further object of the invention is the provision of an improved construction of skeleton frame for railway vehicles having a corrugated or other irregular covering.

Yet another object of the invention is the provision of an improved sealing means for railway vehicles having a corrugated covering and which means may additionally form a part of the frame, thus acting not only as a sealing means, but also as a strength member.

A still further object of the invention is the provision of a railway vehicle having a corrugated exterior covering and corrugated interior lining in order to give maximum strength with minimum weight.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which

Figure 1 is a sectional view of substantially one-half the improved car;

Fig. 2 is an enlarged sectional view showing the upper portion of the car;

Fig. 3 is an enlarged sectional view showing the lower portion of the car;

Fig. 4 is an enlarged sectional view showing the construction at the end of the car;

Fig. 5 is a sectional view taken through the side and end of the car;

Fig. 6 is a sectional view taken substantially on line 6—6 of Figure 1 and showing details of side walls construction;

Fig. 7 is a sectional view taken substantially on line 7—7 of Figure 1;

Fig. 8 is an elevational view of the improved car when coupled to form an articulated unit; and

Fig. 9 is a sectional view taken through the corner post and disclosing a modification thereof.

Referring now to the drawings in detail, it will be seen that the cars have been designed for use in articulated units having end units A and center units B supported upon a plurality of trucks C in any suitable manner. Such a connection and support of the car bodies will give a minimum weight construction, but it is to be understood that the cars may be supported in the usual manner upon a pair of independent trucks. The car bodies in the present instance are primarily designed for subway or interurban use and to this end are provided with sliding side doors D adapted to slide into pockets formed in the side wall by elimination of the windows adjacent to the door opening and against dividing posts H located in the middle of the door opening. As clearly shown in Fig. 8 the car bodies are formed with rounded ends E, but the roof and side sheets are designed to terminate at points F inwardly from the end, with the remainder of the roof and side sheets being completed by substantially designed caps or coverings which will later be described in detail.

The underframe for the cars, which are of the side carrying type, is made as light as possible without the customary center sills although the underframe may be provided with the usual center sills. Angle shaped cross bearers 2 extend across the underframe and are joined together by truss forming member 4 intermediate the center of the car and the side sills 6. The side sills are of flanged Z formation, having an upper flange 7 resting upon the cross bearers, while

the web extends vertically overlapping the ends of the cross bearers and extends downwardly a considerable distance to terminate in outwardly directed flange 8 to which is secured angle member 10 having one leg 11 directed upwardly. The cross bearers support the customary Z shaped floor stringers 12 which, together with the side sill, will directly support the corrugated metal floor sheets 14, which in turn support the flooring proper 16 which may be placed in position while in plastic condition.

The skeleton side wall is formed by posts 18 which, in the instance shown, are of Z cross section, having an inner flange 19 connected directly to the side sill web, while the outer flange 20 has been corrugated in such a manner as to conform exactly to the contour of the side sheathing 22, which sheathing will be connected to the side sill and corrugated flange of the side posts and to the belt rail 24. The belt rail is of angle form, having one flange 25 directed vertically and preferably made continuous throughout the length of the car, such continuity being permitted by offsetting the corrugated flange of the side posts inwardly as at 26 (Fig. 2). The inwardly directed flange of the belt rail must of necessity be made discontinuous but may be welded to brackets 28 fastened to the posts and so shaped as to provide support for the window stooling 30. The upper ends of the side posts also have the outer flange offset inwardly as at 31 in order that the downwardly directed flange 32 of the window header or letterboard stiffener may be made continuous, thus providing a strong and uninterrupted surface for attachment of the lower edge of the letterboard 34. In the present instance the letterboard is not formed as an independent element but forms an integral part of the side plate due to the fact that the plate is pressed in one piece with an inner vertically directed flange 35, a horizontal web portion 36 and a curved outer flange which forms the letterboard. This combined letterboard and side plate caps and is directly secured to the side posts and also provides a support for the arched carlines 38. The carlines, like the side posts, are of Z cross section bent or in other words arched to conform to the desired car contour. The outer flange 40 of these carlines is corrugated in a manner similar to the side posts in order that the corrugated roof sheets 42 may be intimately and directly secured to the flanges over their entire length. The lower flanges 43 of the carlines are connected to the side plate by distorted angle members 44 and are also connected to the lower flanges of Z form purlines 46 extending between the adjacent carlines. As clearly shown in the drawings Z form pressings 48 are secured to the tops of the side posts and to the side plate, thus permitting increased area of the side plate and increased support for the carlines. The size plate is stiffened by means of curved plate 50 extending continuously from end to end of the car and acting as a stiffener also for the lower edges of the roof sheets which are connected to the side plate, side plate stiffener and gutter strip 52 by a common securing means 53.

The inner flange of the side posts has attached thereto adjacent the floor a base strip 54 forming part of the heater duct 55 and providing a support for angle connection 56 to which the lower edge of a corrugated lower lining sheet 58 is secured, the upper edge being secured to window sill 60 and window stool previously referred to. The central portion of the ceiling is also provided with a corrugated panel 62 supported by the carline flanges and connected at its edges to the outermost purlines as is clearly shown in Figs. 1 and 2. The customary advertising card ceiling strip 64 extends between the corrugated ceiling and the shade housing strip 65, with the two strips connected together and to the side plate by means of a distorted Z shaped member 66.

As clearly shown in Fig. 5 the area between the last side post adjacent the door, which post is made deeper than the other side posts, and the door opening is utilized to form a pocket for the sliding door which of necessity cannot be obstructed; therefore, in this area shallow posts 68 of general channel form are used having their outer flanges 69 corrugated to conform to the corrugated contour of the side sheets. Additional stiffening posts for this area are provided by flanged channel posts 70 secured to the inner lining of the car. In order to seal the ends of the side wall corrugations and also provide a stiffener and edge for the door opening a cap member 72 is provided (Fig. 5). This cap member is formed from a plate with a corrugated end portion 73 adapted to overlap the ends of the side wall corrugations and merge into the plane of the plate as at 74 with the intermediate portion of the plate curved as at 75 inwardly to form an edge of the door opening. From the edge of the door opening the plate is directed rearwardly then outwardly as at 76 to contact the main portion of the plate adjacent the ends of the corrugations and has its end directed inwardly as at 77 in order that the plate may be rigidly secured to the shallow stiffening posts 68 previously referred to. In this way a combined door opening member, tubular post and corrugation cap is provided, thus eliminating a large number of parts and insuring minimum weight with maximum strength at the opening. The inner edge of the door opening will also be formed by a plate member 78 bent similar to that just described with the exception that the free end, instead of being corrugated, will overlap the flanged channel post 70, thus forming in the final assembly two box section posts reinforcing the inner lining adjacent the door opening.

A channel formed end sill 80 (Fig. 4) is carried by the underframe and has connected thereto Z or other form end posts 82 with the outer flange 83 corrugated in conformity to the corrugated end sheets 84, which end sheets are so connected to the end sill and to a header angle 85 extending across the car above the end door or passageway. As clearly shown in Fig. 5 the corrugated end sheets overlap and are directly secured to the corrugated edge flange 86 of an element of the corner post construction, which element is connected to the end sill and is extended from the corrugated edge of the end sheet outwardly toward the side of the car as at 87 merging into an angularly disposed web portion 88, which in turn merges into a portion 89 substantially parallel with the car side wall and terminates in an inwardly directed flange 90 adapted to overlap and be secured to the web of channel post 91. This channel post is secured to the side sill in substantially the same manner as the side posts 18, while the portions 86, 87, 88 and 89 of the corner post element are also secured to the side sill and end sill by brackets (not shown). The outer flange 92 of this channel post is corrugated to conform to the side wall corrugations, while the inner flange 93 is

attached directly to an angle shaped closing plate 94, the short flange 95 of which is connected to the corner post element previously referred to adjacent the corrugated flange. It will thus be seen that the channel post, angle plate and angular element all of which are connected to the underframe elements will combine to form a tubular post of extremely strong construction with its edge portions corrugated to receive and be intimately connected to the corrugated side sheets. Such construction is of itself weatherproof, but in order to obtain a finished appearance corner capping strips 96 are provided having their edges corrugated to overlap the corrugated end and side sheets, with the short corrugations merging into the strip as at 97 and with the intermediate portion curved as at 98 to give a rounded corner overlapping the angularly disposed portion 88 of the post and forming an additional tubular construction materially strengthening the corner post.

As previously stated the roof sheets terminate in a single transverse plane and are connected to the rounded end by capping members 100, which members are formed of plate metal of a constantly changing width, having one edge provided with short corrugations 101 to overlap the roof corrugations and with the short corrugations merging as at 102 into the plane of the cap member. The other edge of the capping member is flanged downwardly as at 104 to overlap and be secured to the plane upper end member 106 extending between the capping member and the header 85. As is clearly shown in Fig. 4 the customary box for signal lights, station indication, etc, is formed by plates 107 and 108 secured respectively to the end sheet and end carline.

In some cases in order to assist the assembly a modified form of corner construction may be desirable and one such modification is shown by Fig. 9. In this figure wherever possible the same reference characters have been used as were used in connection with the description of Fig 5. In this modification in order that the corner cap may intimately contact the corner post element, the flange 86 is eliminated as a portion of this element and instead a channel shaped end post 120 is provided. This post is connected to the end sill in a manner similar to end posts 82 and has its outer flange 121 corrugated to conform to the corrugations of the end sheet, while the web thereof is connected to a reflanged portion 122 formed on the flange 95. The inner flange 124 of the channel end post is directed inwardly toward the center line of the car and provides a support for the end lining 126, which is also connected to the side lining by means of a flange 127. By forming the corner post in this manner the main plane of the end sheet and the leg 87 of the corner post element may be brought into the same plane, thus permitting the corner cap to intimately contact the corner post element throughout its area.

From the preceding description of the car it will be seen that a construction has been provided using corrugated side sheets, end sheets and roof sheets, with the skeleton framing members, namely, the side posts, end posts and carlines, being corrugated in such a manner as to conform to the corrugations of the sheets which are to be attached thereto. In this manner intimate contact between the framing elements and sheathing is obtained permitting direct connection of the sheathing to the framing elements throughout the entire length of the members. By such an arrangement the full strength of the sheathing and framing elements is developed, for distortion of the corrugated sheathing is prevented due to the bracing effect of the corrugated posts and carlines which prevent any distortion or collapse of the corrugations in the sheathing. It should also be noted that by proper use of the capping elements closing the ends of the corrugations, an extremely rigid construction has been provided at the corner posts and door openings, with the capping members aiding materially in strengthening the car structure.

Although the construction of the car has been described more or less in detail, it is obvious that various modifications and rearrangements of parts will be possible and all such modifications and rearrangements of parts are contemplated as will fall within the scope of the following claims.

What is claimed is:

1. In railway car construction the combination of an underframe, side posts on either side of the underframe and connected thereto, end posts and corner posts connected to said underframe, said side and end posts being of angular formation and having an outer corrugated flange, said corner posts being of tubular formation with laterally directed corrugated flanges, corrugated side and end sheets overlapping said corrugated flanges and secured thereto, and corner caps joining said side and end sheets, said caps having portions overlapping the corrugated side and end sheets and corner posts.

2. In railway car construction the combination of an underframe, angular form posts connected to the underframe and each having an outer corrugated flange, sheets corrugated in conformity to said flanges and secured thereto, means connecting certain of said angular form posts together to form a tubular corner post, and cap means connected to said means and having portions corrugated and secured in overlapping relation to said sheets.

3. In railway car construction the combination of an underframe, angular form members connected to the underframe and each having a corrugated flange, sheets corrugated in conformity with said flanges and secured thereto, means connecting certain of said members together to form a tubular corner post, and cap means connected to said post and to said sheets, said cap means having portions thereof corrugated and overlapping said sheets and secured thereto.

4. In railway car construction the combination of an underframe, angular form members connected to the underframe and each having a corrugated flange, sheets corrugated in conformity with said flanges and secured thereto, means connecting certain of said angular form members together to form a substantially upright tubular corner post, and cap means having short corrugations overlapping said sheet corrugations and merging into said cap means thereby sealing the ends of the sheet corrugations, certain of said cap means being secured to and stiffening said corner post.

5. In railway car construction the combination of an underframe, angular form members connected to the underframe and each having a corrugated flange, sheets corrugated in conformity with said flanges and secured thereto, means connecting certain of said members to-