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CORRUGATED PANEL STRUCTURE

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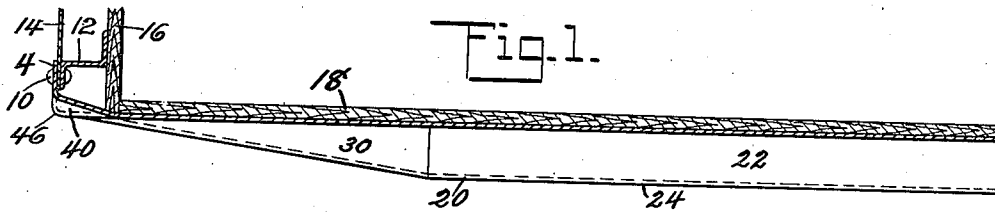


Fig. 1.

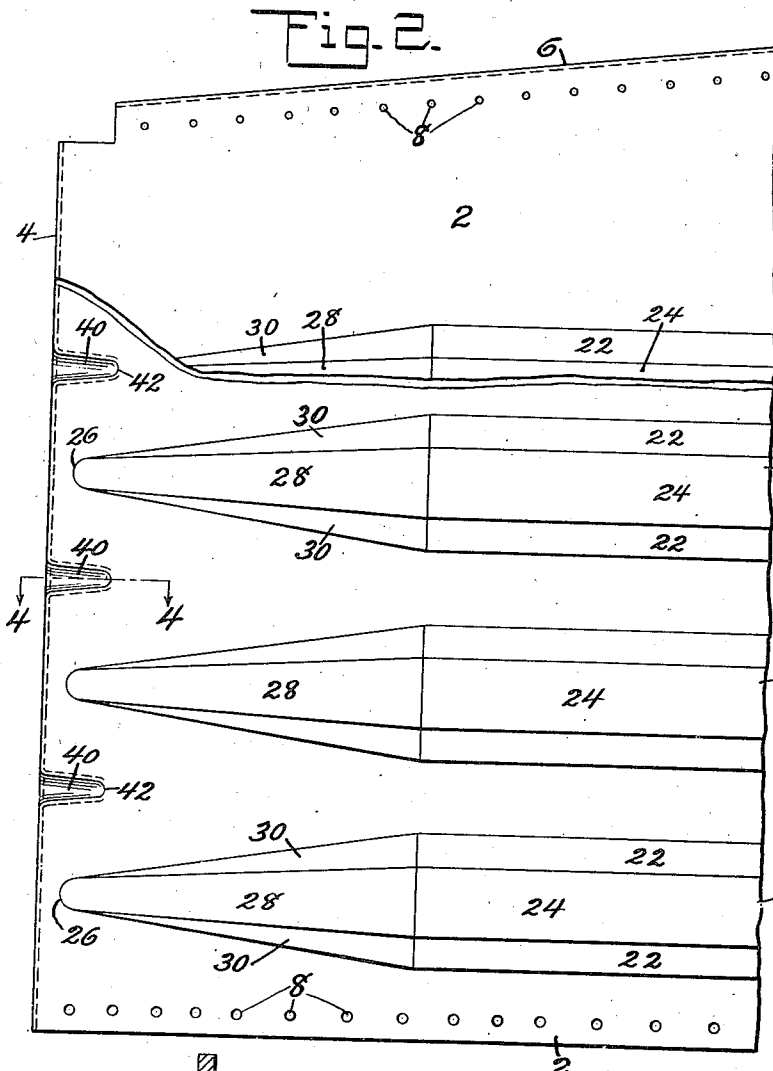


Fig. 2.

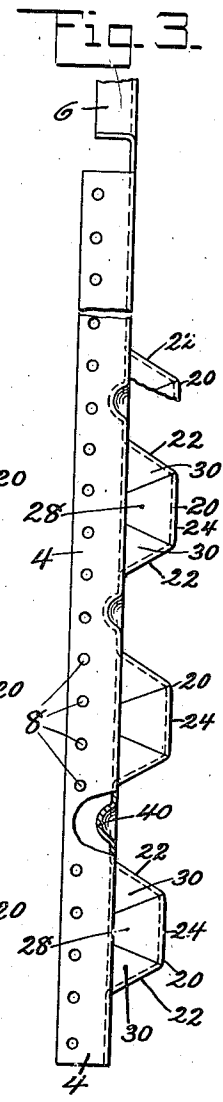


Fig. 3.

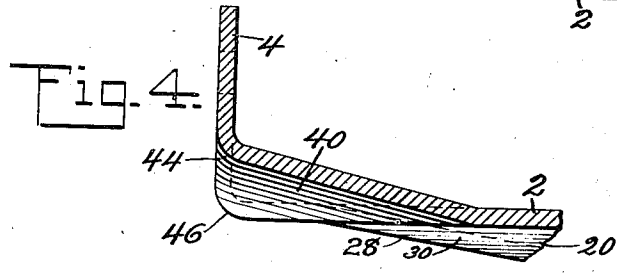


Fig. 4.

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## CORRUGATED PANEL STRUCTURE

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10 Claims. (Cl. 105—410)

This invention relates to corrugated panel structures in general and in particular to corrugated panels intended for use on railway cars. Panels intended for use on railway cars must of necessity be made as light as possible in order to hold down the dead weight of the car but must at the same time be as rigid as possible in order to withstand shocks incident to coupling and emergency brake applications. The panels of railway cars and vehicles whether on the sides or ends thereof are subjected to heavy bulging forces and accordingly must be reinforced to hold their position in the car structure and to efficiently transfer the strains of the main load or stress carrying elements of the car.

In the past certain side wall panels have been reinforced to resist bulging strains and act more or less as shock absorbers to take up impacts due to shifting lading but in all these structures no provision was made to carry the stresses properly from the reinforced panel to the edge flange and the remainder of the car structure. It is an object, therefore, of the present invention to provide an improved corrugated panel in which the stresses will be efficiently transferred from the panel to the main stress carrying members of the vehicle to which the panel is applied.

A further object of the invention is the provision of a corrugated panel having stiffening flanges formed at right angles to the body portion of the panel and which flanges are maintained in such right angular relation by bracing corrugations.

A yet further object of the invention is the provision of a panel having a substantially right angular flange formed on the edge thereof, which flange is maintained in such substantially right angular relation by means of buttressing corrugations pressed in the body of the panel and flange.

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 drawing, in which

Figure 1 is a sectional view through a car showing substantially one-half of the improved panel when applied as an end to the car structure;

Fig. 2 is an elevational view of substantially one-half the improved panel;

Fig. 3 is an end view of the panel shown in Fig. 2, and

Fig. 4 is an enlarged sectional view taken substantially on line 4—4 of Fig. 2 and showing in detail the buttressing corrugations.

Referring now to the drawing in detail, it will

be seen that the panel has been illustrated as pressed and designed for application to the car structure as an end wall but it is obvious that the panel is of equal value as a side panel where the flanges thereof would be attached directly to each other or in any position where it is desirable and necessary to maintain the proper angular relation between the panel and its side flange. The panel in the present instance is formed of a single sheet of metal having the main portion 2 thereof located substantially in a single plane with at least its side edges bent over to provide flanges 4 substantially at right angles to the main portion of the panel and also with stiffening and attaching flanges 6 at other edges, such as adjacent the top for application of roof sheets. The upper and lower edges of the main portion and the side flanges are provided with punched openings 8 through which rivets or other securing means may be inserted in order that the panel may be attached to the car structure. In the present instance the flanges 4 are shown as attached by rivets 10 to Z bar end posts 12 with the side sheets 14 interposed therebetween. As is customary in most cars the side posts have secured thereto by any suitable means a side wall lining 16, while the end panel is covered by an end lining wall 18.

The main portion of the panel may be pressed or otherwise formed with a plurality of corrugations the contour of which is immaterial. In the present instance the main corrugations 20 are of generally truncated triangular form having side portions 22 extending outwardly at an angle to the main portion of the panel and directed toward each other to be joined by a top portion 24 which is substantially parallel to the main portion of the panel adjacent the center thereof. The ends of the main corrugations merge into the panel in areas as at 26 adjacent the side flanges and this is accomplished by constantly decreasing the width of the top portion toward the ends of the main corrugations while at the same time deflecting the top portion inward toward the panel, thus forming a substantially truncated triangular portion 28 at the ends of the top portion. These sloping truncated triangular portions are joined to the main panel along their edges by means of triangular shaped portions 30 having their apices in the panel adjacent the ends of the corrugation and their bases coincident with the sloping portions 22 previously referred to. It is, of course, obvious that the tapering of the corrugations may be started at any desired point along their length, such as at the center or substantially at the ends thereof but in the present instance they have been

shown as starting at a point located inwardly from the ends approximately one-quarter the length of the corrugation.

With the panel provided only with the main corrugations, it is obvious that any forces applied to the panel will tend to bulge the same and such bulging action will result in a deflection of the flange causing the substantially right angular relation between the flange and panel to be destroyed. In order to overcome this tendency and to properly transfer the strains from the corrugations to the flange, one or more buttressing corrugations 40 are located intermediate the main corrugations. These buttressing corrugations may be of any desired cross-section but in the present instances are shown as substantially semi-circular in cross-section and have their inner ends 42 merging into the panel inward of the side flanges at a distance greater than the distance between the ends of the main corrugations and the side flanges; that is, in effect, the main and buttressing corrugations overlap each other. The buttressing corrugations increase in width constantly from their point of emergence with the panel to their point of emergence 44 with the side flanges, thus providing, in effect, what might be termed a truncated semi-circular conical buttressing corrugation, which will act in tension to transfer bulging strains caused by the lading in the car from the panel to the flanges and car posts. It is thus seen (Fig. 4) that each buttressing corrugation firmly ties the main panel and side flange together to maintain the substantially right angular relation therebetween and that at least the lower portion of the buttressing corrugation is in effect a continuation of the sloping portion 28 of the main corrugation, being substantially parallel thereto. In other words the ridge or outermost part of the buttressing corrugations and the ridge or outermost part of the adjacent end portion of the main corrugation are located substantially in a common plane or substantially in parallel planes as is clearly shown in Figures 1 and 4. It is, of course, obvious that the depth of the buttressing corrugations at the side flanges will be made as great as possible permitting clearance with the car structure and in order that it may be located inwardly as far as possible with respect to the bend 46 (Figs. 1 and 4) made during turning of the side flange.

While the main corrugations have been shown as disposed outwardly of the panel with the sloping end portions substantially parallel with elements of the buttressing corrugations, it is obvious that various other positions and arrangements of the main and buttressing corrugations may be made, such as pressing the main corrugations inward of the panel with the buttressing corrugations remaining substantially as shown. The above indicated modification, as well as others, and various rearrangements of the corrugations will be apparent to persons skilled in the art and all such modifications and rearrangements are contemplated as fall within the scope of the following claims.

What is claimed is:

1. In combination with frame members of a railway car, car sides attached to the frame members, a metal plate pressed to provide an end having a panel portion and laterally directed side flanges, said flanges being secured to the said car sides and frame members to complete the car end, main corrugations pressed in the panel to stiffen the same against bulging strains, said corrugations having their ends merging into the panel

adjacent said flanges, auxiliary corrugations pressed in the said panel and flanges, said auxiliary corrugations extending across the corner between the panel and flanges and merging into the panel at points removed from the flanges and having the ridges thereof substantially parallel to the ridges of the adjacent end portions of the main corrugations and acting in tension to transfer the bulging strains to the car sides and frame members.

2. In combination with frame members of a railway car, car sides attached to the frame members, a metal plate pressed to provide an end having a panel portion and laterally directed side flanges, said flanges being secured to the said car sides and frame members to complete the car end, main corrugations pressed in the panel to stiffen the same against bulging strains, said corrugations being pressed outwardly from the panel and having their ends merging into the panel adjacent the flanges, auxiliary corrugations pressed in said panel and flanges, said auxiliary corrugations being pressed inwardly from the panel and extending across the corner between the panel and flanges to join the same whereby the bulging strains will be resisted and transferred to the car sides and frame members.

3. In combination with frame members of a railway car, car sides attached to the frame members, a metal plate pressed to provide an end having a panel portion and laterally directed side flanges, said flanges being secured to the said car sides and frame members to complete the car end, main corrugations pressed in the panel to stiffen the same against bulging strains, said corrugations being of truncated triangular cross-section and pressed outwardly from the panel with their ends merging into the panel adjacent the flanges, and auxiliary corrugations pressed in said panel and flanges, said auxiliary corrugations being of arcuate cross-section and pressed inwardly from the panel and extending across the corners between the panel and flanges and merging into the panel at points removed from the flanges whereby the bulging strains will be more efficiently transferred from the main corrugations to the car sides and frame members.

4. A strengthened metallic plate member comprising a metal panel, flanges formed in the side edges of the panel, main corrugations pressed in the panel having tapered ends with the ridges thereof merging into the panel adjacent said flanges, and auxiliary corrugations pressed in the panel and in the flanges to stiffen the latter against deformation and having the ridges thereof substantially parallel to said first named ridges.

5. A strengthened metallic plate member comprising, a metal panel, laterally directed flanges extending along the side edges of the panel, main corrugations pressed in the panel and having their end portions merging into the panel adjacent said flanges, said end portions having the outermost parts thereof located in a plane angularly disposed to the plane of said panel, and short auxiliary corrugations pressed in the panel and adjacent flange to brace the latter against deformation, said auxiliary corrugations having the outermost parts thereof located in a vertical plane substantially parallel with said first named plane.

6. A strengthened metallic plate member comprising, a metal panel, laterally directed flanges extending along the side edges of the panel, main corrugations pressed outwardly from the side of the panel opposite to the flanges, and auxiliary

corrugations pressed outwardly from the side of the panel adjacent the flanges, said auxiliary corrugations merging into the flanges to brace the same.

5 7. A strengthened metallic plate member comprising, a metal panel, flanges directed laterally outward from one side of the panel, main corrugations pressed outwardly from the opposite side of the panel and having the ends thereof terminating in the panel adjacent said flanges, and auxiliary corrugations pressed outwardly from said first  
10 named side of the panel and merging at their outer ends into said flanges to brace the same.

15 8. A strengthened metallic plate member comprising, a metal panel, flanges directed laterally outward from one side of the panel, main corrugations pressed outwardly from the opposite side of the panel and having the ends thereof terminating in the panel adjacent said flanges, and auxiliary corrugations pressed outwardly from said  
20 first named side of the panel and merging at their outer ends into said flanges to brace the same, said auxiliary corrugations being interposed intermediate the main corrugations to additionally  
25 stiffen the panel area therebetween.

9. A strengthened metallic plate member comprising, a metal panel, flanges directed laterally outward from one side of the panel, main corrugations pressed outwardly from the opposite side of the panel and having the ends thereof terminating in the panel adjacent said flanges, and auxiliary corrugations pressed outwardly from said  
5 first named side of the panel and merging at their outer ends into said flanges to brace the same, said auxiliary corrugations being interposed intermediate the main corrugations and having their  
10 inner ends merging into the panel.

10. A strengthened metallic plate member comprising, a metal panel, a flange directed laterally outward from one side of the panel, main corrugations pressed outwardly from the opposite side  
15 of the panel, and auxiliary corrugations pressed in the panel, said auxiliary corrugations being pressed outwardly from the panel on same side as the flange and extending across the corner between the flange and panel to prevent distorting  
20 movement therebetween.

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