March 26, 1946. J. CHRISTIANSEN 2,397,335

CAR DOOR CONSTRUCTION

Filed Nov. 26, 1941 2 Sheets-Sheet 1

Fig. 1.

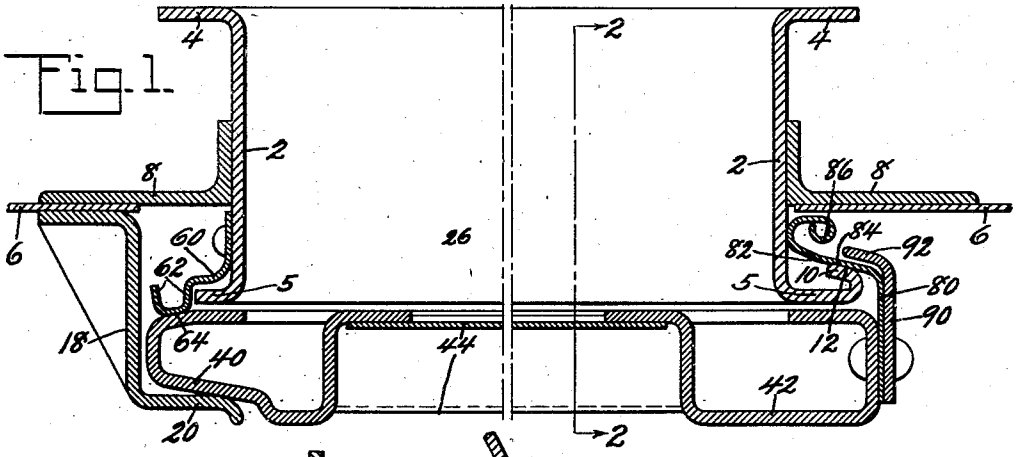
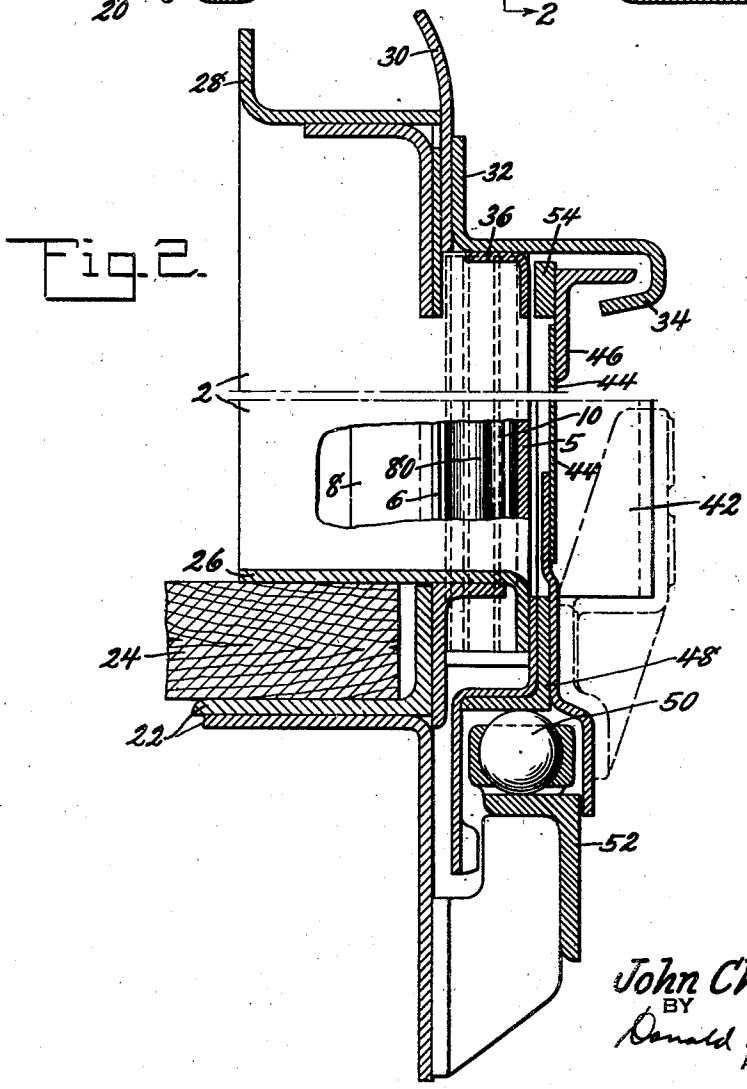


Fig. 2.



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Filed Nov. 26, 1941 2 Sheets-Sheet 2

Fig. 5.

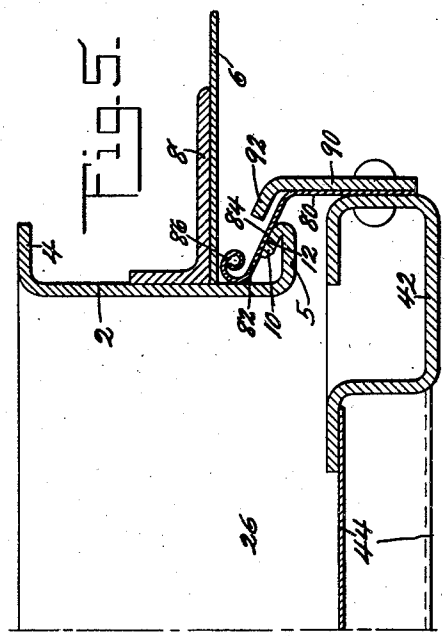


Fig. 4.

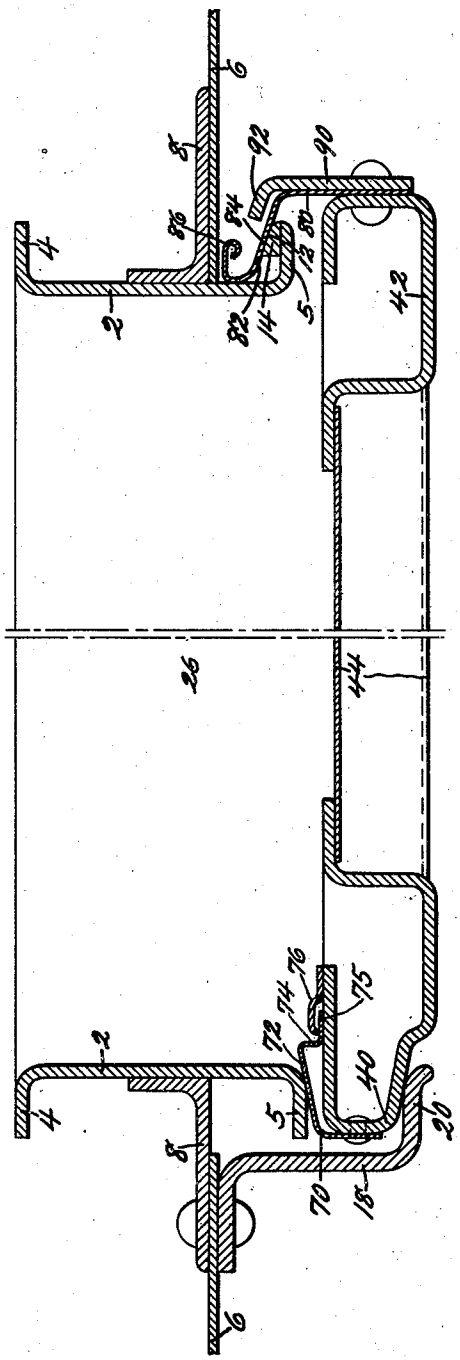
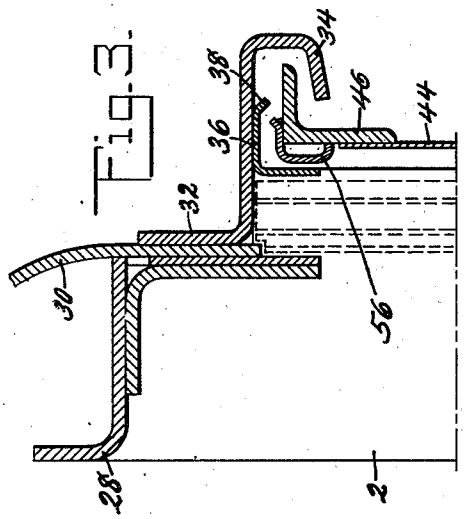


Fig. 3.



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UNITED STATES PATENT OFFICE

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CAR DOOR CONSTRUCTION

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Application November 26, 1941, Serial No. 420,553

9 Claims. (Cl. 20—26)

This invention relates to car door constructions in general and in particular to such car door constructions for railway box cars or house cars.

In railway car construction extreme difficulty has been encountered in attempting to seal the joint between the side doors and the side wall structure. There is always considerable weaving and springing of the car frame structure when the car is loaded and traveling at high speeds, which weaving and springing will strain the door if it is tightly and rigidly locked to the car structure. The springing and weaving of the car structure also tends to open the joints and, if the car is traveling at high speed into a wind, velocities in excess of 100 miles per hour may be encountered tending to drive sparks, cinders, snow or rain into the car interior. Various attempts to seal the joint between the door and car have been made using labyrinth type of seal by establishing various eddy pockets, but all of these attempts rely on success for simultaneous contact between the rigid door and rigid frame members at a plurality of points. The simultaneous contact of rigid members at a plurality of points is impossible to obtain in ordinary railway car construction. Furthermore, even if it is obtained when the car is new the relation is soon lost due to battering of the door edge during opening and closing or due to weaving of the car structure. It is an object, therefore, of the present invention to provide a door construction in which deformation of the edge by pry bars, sledges, etc., does not affect the sealing of the door and door post.

A further object of the invention is the provision of a railway car door construction in which the door is entirely free of racking strains that might be imposed upon it by the car walls.

A still further object of the invention is the provision of a car door construction having resilient strips forming the sole area of contact between the door and the door posts to at all times preserve the seal at the joint while permitting freedom of movement between the door and door posts when the door is in closed position.

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 longitudinal sectional view taken through the improved door and door frame construction;

Fig. 2 is a vertical sectional view taken through the improved door construction substantially on line 2—2 of Fig. 1;

Fig. 3 is a sectional view showing a slight modification of the sealing means used at the upper edge of the door;

Fig. 4 is a longitudinal sectional view similar to Fig. 1 but showing a slight modification, and

Fig. 5 is a sectional view showing a slight modification of the sealing means at the rear edge of the door.

Referring now to the drawings in detail, it will be seen that the door posts are substantially of channel formation having webs 2, inner flanges 4 and outer flanges 5, which flanges are spaced outwardly of the car side walls 6. These car side walls are connected to the door posts by means of angle members 8 forming part of the car structure. As shown in Fig. 1, the door post adjacent the rear edge of the door has the outer flange bent back upon itself to provide an inclined portion 10 which is an integral part of and is to be considered as part of the flange 5. This bending of the flange to produce the portion 10 is done in order to provide the inclined surface 12. The bending may be accomplished by using a relatively small radius, as shown in Fig. 1, or it may be accomplished by an extremely sharp bend, as shown in Fig. 5. In some materials, particularly the high tensile steels, it is impossible to make the sharp bend shown in Figs. 1 and 5 and in these cases the inclined surface 12 may be obtained by spot welding or otherwise attaching a beveled strip 14 to the outer flange of the door post, as shown in Fig. 4. Here again this attached strip becomes an integral part of and is to be considered the same as the flange 5.

The front edge of the door (later to be described) is protected by a Z-shaped post element 18 fastened to the car side wall in spaced relation to the door post and having its outer flange 20 located outwardly of the flange of the front door post, thus providing a pocket to receive the nose or front end of the door. As clearly shown in Fig. 2, the car construction includes any suitable form of side sills 22, floor 24 and threshold plate 26. It also includes a side plate 28 formed in part of a curved sheet 30. The upper edge of the door is protected, as shown in Fig. 2, by an angular member 32 fastened to the side plate structure and having the horizontal leg bent downwardly and inwardly as at 34 to provide a protection and housing for the upper angle member of the door. As shown in Fig. 3, this angular housing member has attached thereto an angle shaped plate 36 having its outer surface substantially in the plane of the outer surface of the door posts and accordingly defining the upper

edge of the door opening. In Fig. 3 this angular plate is modified slightly by having the outer edge thereof turned downwardly as at 38 to prevent traveling of moisture along the protecting plate and into the car.

The door is formed by front and rear stiles 40 and 42, respectively, joined together by the door plate 44 of either plain or corrugated formation, as well as by top rails 46 and bottom rail structure 48. The bottom rail structure, as clearly shown in Fig. 2, forms a downwardly opening channel section adapted to rest on any suitable antifriction device 50 supporting the door upon the track rails 52 carried by the side sills. The top rail, as shown in Fig. 2, has attached thereto a flat plate 54 adapted to cooperate with the angle plate 36 to prevent entrance of moisture at the upper edge of the door. If desired a channel shaped pressing 56 may be attached to this top rail instead of the flat bar end as clearly shown in Fig. 3.

In order to seal the joint at the front edge of the door a spring steel strip 60 (Fig. 1) is secured to the front door post inwardly of the flange 5 and shaped to bend outwardly around and clear of the flange and terminate in a stiffening U-shaped end 62 providing a flat surface 64 adapted to cooperate with or wipe across and bear upon the front stile 40 of the door. It will be seen that this resilient strip 60 is constantly urged toward the door in its closed position and will hold such door free of rigid contact with the door post flange, thus preventing the racking strains being transmitted directly from the door frame to the door. In some cases it may be more desirable to keep the resilient or spring steel strips on the door. In this case a resilient or spring steel strip 70 (Fig. 4) is attached to the leading edge of the door front stile 40. As clearly shown, this resilient strip is bent inwardly in spaced relation to the door stile to present a flat surface 72 adapted to contact the flange 5 of the forward door post. Support and protection is obtained for this resilient strip by bending the same toward the door stile as at 74, then along the stile as at 75 to be capped by a member 76 welded or otherwise attached to the stile but free of attachment to the resilient strip. In this way the resilient strip 70 may flex since it is attached to the door stile only at the leading edge thereof. This resilient strip will, like that shown in Fig. 1, wipe across the door frame and prevent rigid contact between the door and door frame and will resiliently seal and resist transmission of racking strains from the car structure to the door.

The rear edge of the door is preferably sealed by means of a resilient strip 80 having a straight portion attached to the rear edge of the rear door stile and an inclined portion 82 providing a flat surface 84 adapted to engage and contact the flat surface 12 of the rear post flange. The inclined portion is extended inwardly and terminates in a rolled portion 86 adapted to give added strength to the resilient strip and to contact either the web of the rear post or the side of the car or both. This resilient strip may be formed of any material but as indicated is formed of spring steel and will effectively seal the joint between the door stile and the door post. It will also permit relative movement between the closed door and the door post while preventing entrance of moisture or foreign material. Since the resilient strip 80 might be injured by pry bars, sledges, etc., an angular plate 90 is adapted to overlap the resilient strip and protect the same against injury. This angular member will, of course, greatly stiffen the rear door stile and increase the stiffness of the resilient sealing strip. The inturned flange 92 will, of course, also prevent excessive springing of the strip and outward removal of the door in case the car is subjected to excess shocks, such as in wrecks, etc.

Regardless of the exact form of the resilient sealing strip or its location, it will in all cases seal the joint between the door and door posts and will permit relative movement between the posts and closed doors to prevent transmission of racking strains from the car structure to the door. The resilient strips have been shown as made of spring steel since this material will have the greatest life, retain its resiliency longer and resist the abrasive action arising due to the movement between the door and car structure, but it is, of course, obvious that these strips may be made of other material than spring steel.

While the invention has been described more or less in detail, it will be obvious that various modifications other than those shown and described may be made and all such modifications are contemplated as will fall within the scope of the appended claims defining my invention.

What is claimed is:

1. In a door construction for railway cars, the combination of spaced door posts secured to the car and having rigid flanges at their outer portions, a door carried by the car and provided with rigid stiles, resilient sealing means secured to the outer edges of said stiles and bent to overlie the inner faces thereof in spaced relation thereto in order to bear upon said door post flanges when the door is in closed position, said resilient sealing means providing the sole areas of contact between the door and door post flanges.

2. In a door construction for railway cars, the combination of spaced door posts secured to the car and formed with rigid flanges at their outer portions located in outwardly spaced relation to the car side walls, a door carried by the car and provided with rigid stiles adjacent its side edges, spring steel strips secured to the outer edges of said door stiles and bent inwardly toward the center of the door to overlap the inner faces of the stiles in spaced relation thereto, said spring steel strips intermediate their edges engaging said door post flanges when the door is in closed position and providing the sole areas of contact between the door and door post flanges.

3. In a door construction for railway cars, the combination of a door post secured to the car, a door carried by the car and provided with a rigid front stile, a spring steel strip of angular cross section having one edge fastened to the front edge of said stile and the other edge bent backward and inward to overlap and contact the inner surface of the stile but being free of attachment thereto, said spring steel strip intermediate its edges bearing on said door post to resiliently seal the joint between said post and door when the door is in closed position.

4. In a door construction for the walls of railway cars, the combination of a door post secured to the car and formed with a web terminating in a rigid flange, disposed in spaced relation to the car wall, a door carried by the car and provided with a rigid rear stile, resilient sealing means secured to the rear edge of said stile and being bent inwardly and forwardly to overlap said rigid flange, said resilient sealing means contacting flange and web at spaced points to seal the joint between said door and post while permitting rela-

tive movement between the door and post when the door is in closed position.

5. In a door construction for railway cars, the combination of spaced door posts each having a web and a rigid flange located in outwardly spaced relation to the car side wall, one of said posts having its flange provided with a rebent portion constituting a seat, a door carried by the car and provided with rigid stiles at its side edges, resilient sealing means secured to one of said stiles and adapted to bear against said seat and the web of said door post when the door is in closed position, and resilient means sealing the joint between the other stile and the adjacent door post when the door is in closed position.

6. In a door construction for railway cars, the combination of spaced door posts, each having a web and a rigid flange located in outwardly spaced relation to the car side wall, one of said flanges having a rebent portion constituting a seat, a door carried by the car and provided with stiles at its side edges, and sealing means for sealing the joint between each stile and the adjacent door post, at least one of said sealing means comprising a resilient member secured to a door stile and engaging the web of the adjacent door post and the rebent portion of said flange when the door is in closed position.

7. In a door construction for railway cars, in combination, a front door post comprising a pair of closely arranged inner and outer front door post members, and a spaced door post, the pair of front door post members including spaced overlying flanges forming a pocket for the leading edge of the door and the other spaced post forming a stop for the trailing edge of a door, a resilient metallic strip having one fixed edge, and a free resilient offset portion interposed between the leading edge portion of the door and one wall of said pocket and normally urging the leading edge of the door against one face of said pocket when the door is in a closed position to form a seal therebetween, said leading door edge being further sealed by the resilient metallic strip spanning the space between the inner post member and the door, and a resilient metallic sealing strip of angular cross section between the trailing end of said door and other door post, said strip having one fixed edge portion and a free resilient body portion forming a pair of spaced sealing contacts between the door and post when the door is in closed position and normally resiliently urging said door toward said post.

8. A door construction for railway cars comprising, a door post secured to a car wall and formed with a rigid flange overlying said wall, said flange and wall forming a pocket having an intermediate portion and a pair of side walls, a door carried by the car and provided with a rigid stile, resilient metallic sealing means secured to the rear edge portion of said stile and overlapping said flange when the door is in closed position, said metallic sealing means including a body angular in cross section to provide a series of contacting sealing faces, one of the contacting faces normally engaging said rigid flange when the door is in closed position to urge said door against said post, and at least one other face of said sealing means being adapted to engage the intermediate portion of said pocket regardless of relative motion between the door and the post when the door is in closed position.

9. In a door construction for the walls of railway cars, the combination of a door post secured to the car and formed with a web terminating in a rigid flange disposed in spaced relation to the car wall, a door carried by the car and provided with a rigid rear stile, resilient sealing means secured to the rear edge of said stile and being bent inwardly and forwardly to overlap said rigid flange, said resilient sealing means contacting said flange and web at spaced points to seal the joint between said door and post while permitting relative movement between the door and post when the door is in closed position, and protecting means secured to said rear stile and overlapping at least a portion of said resilient sealing means to protect the same against injury.

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