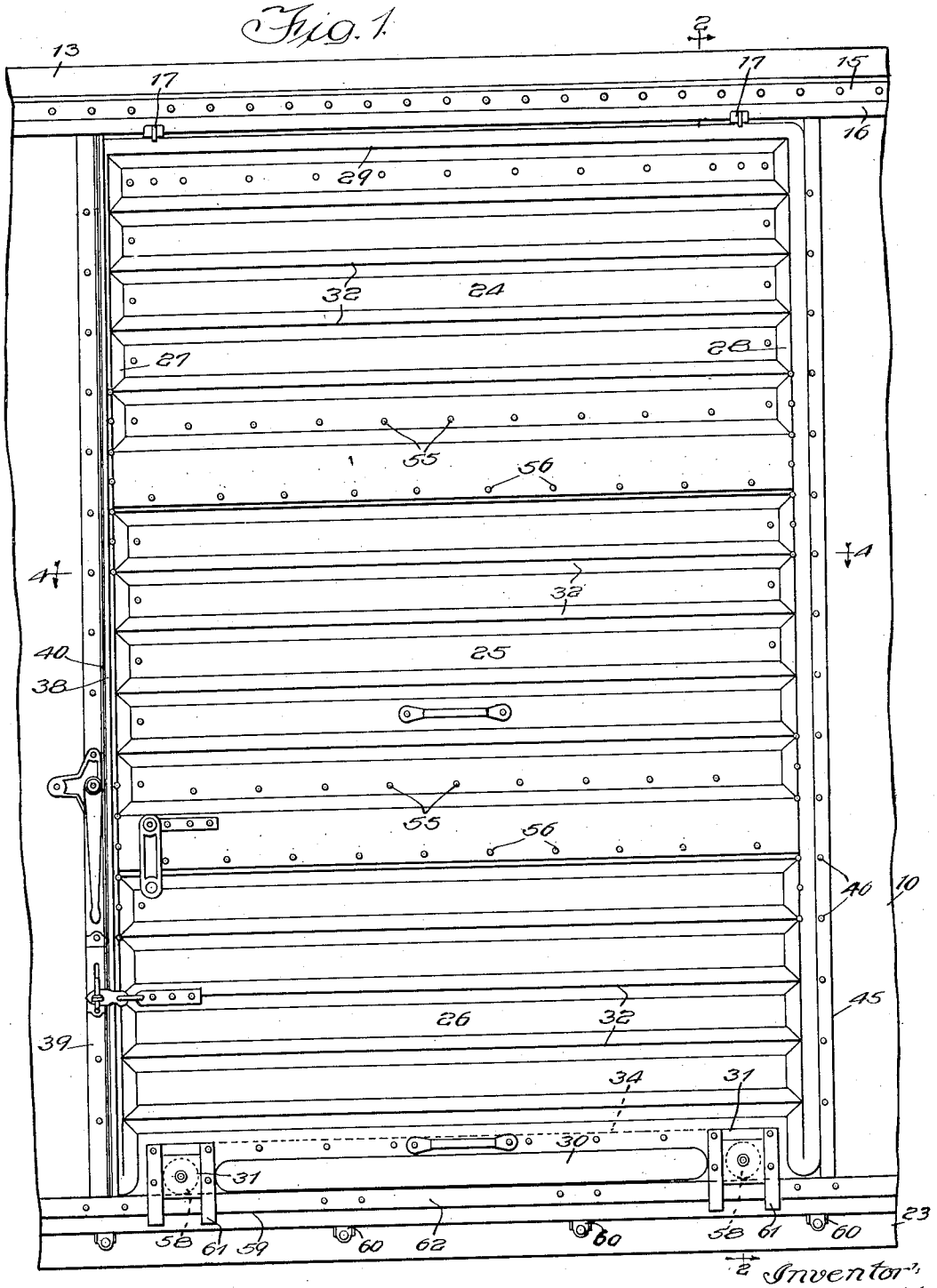
Sept. 5, 1933. F. DITCHFIELD 1,925,655

CAR CONSTRUCTION

Filed June 18, 1930 3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

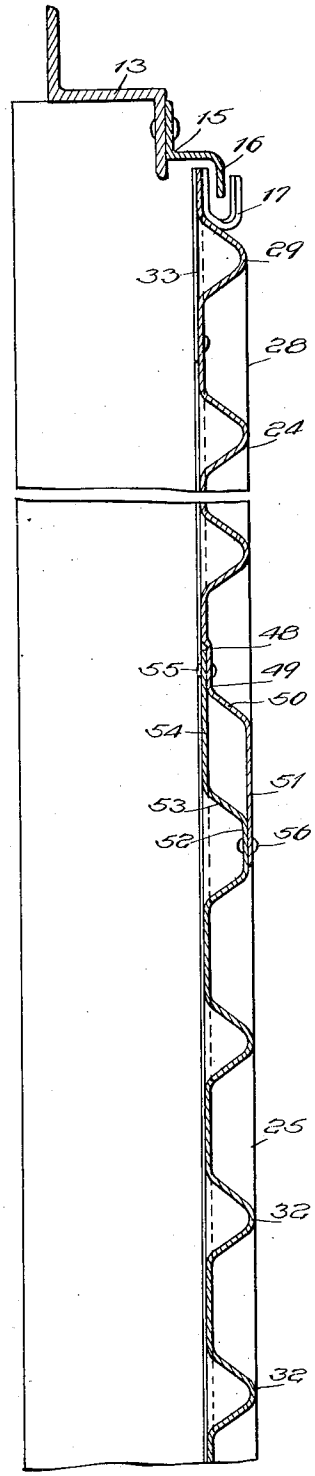
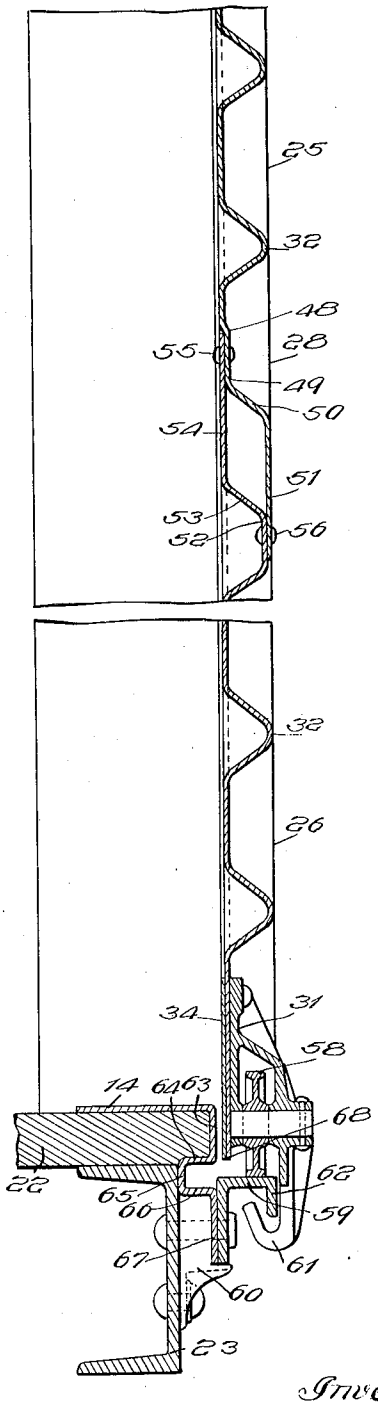


Fig. 3.



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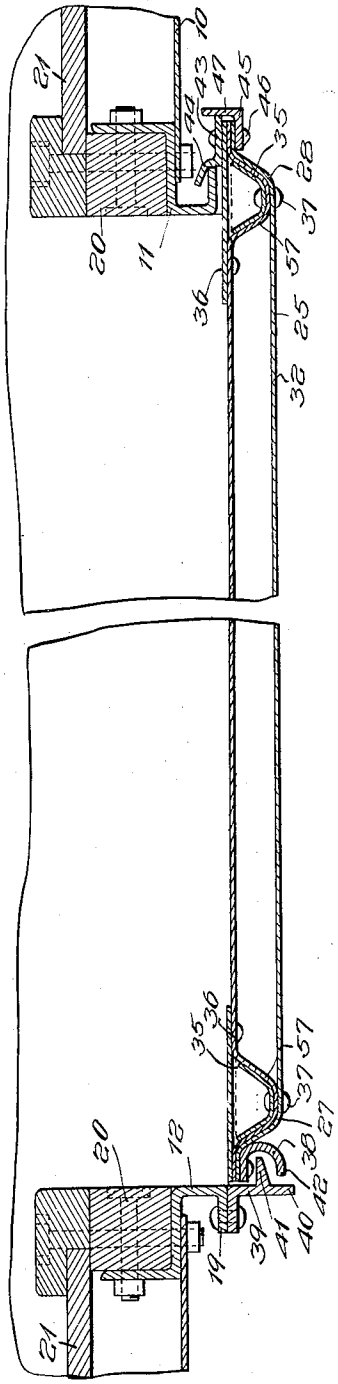


Fig. 4.

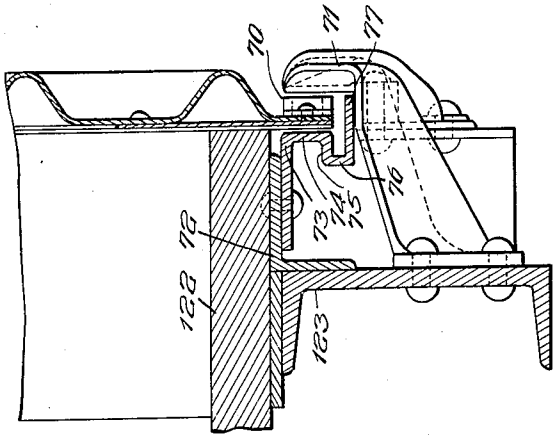


Fig. 5.

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UNITED STATES PATENT OFFICE

1,925,655

CAR CONSTRUCTION

Frank Ditchfield, Cleveland, Ohio, assignor to The Youngstown Steel Door Company, Cleveland, Ohio, a corporation of Ohio

Application June 18, 1930. Serial No. 461,976

6 Claims. (Cl. 189—46)

This invention relates to improvements in car construction.

In the operation of box or house cars, it is the general practice to provide weather and spark seals along the top, front and back edges of the usual side doors but heretofore little effort has been made to provide any practical means to prevent entrance of rain or other foreign matter along the bottom edges of the doors. While I am aware that some attempts have been made to provide bottom edge seals, the same have involved special formations along the bottoms of the doors and corresponding cooperable formations on the car structure, thus making the bottom seal arrangements heretofore proposed unduly expensive, substantially impossible of application to the usual or standard car constructions and, furthermore, have been of such design as to be easily distorted or deformed when the car is in service and thereby seriously interfere with the easy opening and closing movements of the doors.

One object of my invention is to provide a simple, effective weather sealing arrangement for the bottom edges of doors, the arrangement being such that it may be incorporated at very slight additional expense on either new or old cars and without involving any changes in the construction of the bottoms of the doors proper.

Another object of my invention is to provide, in car construction, a simple, effective and relatively inexpensive sealing arrangement for the front edges of the usual side doors of box cars and wherein the sealing element of the door proper serves to reinforce and strengthen the latter to thereby prevent deformation of the front edge of the door.

Another object of my invention is to provide an unusually rigid form of lap joint for the panels of sheet metal doors, such that the total over-all height of the doors may be varied within reasonable limits, to correspond with different heights of door openings, to the end that the strength of the doors at the lap joints may always be maintained.

In the drawings forming a part of this specification, Figure 1 is a front elevational view of a portion of a side of a house car showing my improvements incorporated therein. Figures 2 and 3, taken together, constitute a vertical sectional view, upon an enlarged scale, corresponding to the section line 2—2 of Figure 1. Figure 4 is a horizontal sectional view, upon an enlarged scale, corresponding to the section line 4—4 of Figure 1. In Figures 2, 3 and 4, the parts are broken away in order to better accommodate the views on the sheets. And Figure 5 is a vertical sectional view showing the construction at the lower portion of a door and illustrating a somewhat different embodiment of my improvements relating to the bottom edge seal.

In said drawings, a portion of the side wall sheathing is indicated at 10, and the usual side door opening is shown as defined by side posts 11 and 12, lintel 13, and threshold plate 14. The lintel 13, as shown, constitutes a portion of the usual Z-bar side plate, to the outer depending flange of which is secured an upper guide 15 for the door, said guide 15 having a depending outer flange 16 received within U-shaped clips 17, secured to the top edge of the door, as shown in Figure 2.

Each of the posts 11 and 12 is of generally Z-section, with the outer flange thereof, however, turned back, as indicated at 18 and 19, respectively, the turned back flange 19 constituting one of the elements cooperating to provide the rear edge seal, as hereinafter described. To each of the posts 11 and 12 are secured the usual wood fillers 20—20 and the inner sheathing of the car is indicated at 21. The threshold 14, hereinafter described with particularity, engages the edges of the floor boards 22, which are supported on the usual underframe, of which the channel side sill 23, only, is indicated in Figure 3. The door which I have chosen for illustration, is of the sheet metal type and preferably comprises three panels 24, 25 and 26, arranged horizontally one above the other and united along their horizontal adjacent edges in the manner hereinafter described.

The completed door is preferably formed with vertical edge corrugations 27 and 28, top horizontal corrugation 29 merging with the vertical corrugations, and a bottom horizontal corrugation 30, the latter being terminated inwardly of the vertical corrugations, so as to leave suitable flat spaces for securing of the roller brackets 31—31. Merging with the vertical corrugations 27 and 28 are a plurality of horizontally extending corrugations 32—32, a plurality of such corrugations being incorporated in each of the panels as shown.

The upper horizontal corrugation 29 is braced by a bridging strip 33 secured by riveting or welding to the panel sheet at points both above and below the corrugation, as shown best in Figure 2. The lower horizontal corrugation 30

is similarly braced by a bridging plate 34, as indicated in Figures 1 and 3, said plate being extended beyond the end of the corrugation 30 so as to provide a double ply opposite the roller brackets 31.

The vertical corrugations 27 and 28 are braced or rigidified by stiffeners 35 which fit within the panel corrugations, as best indicated in Figure 4, each of said stiffeners 35 being secured to the main panel sheets by rivets 37.

The front edge sealing arrangement for the door is best shown in Figure 4. Secured to the multiple-ply flat marginal front edge of the door and extending the full height thereof, is a U-shaped sealing element 38, the opening or jaw of which faces toward the front door post. The depth of said element 38 will approximate the over-all thickness or depth of the door proper, as shown. Secured to the backturned flange 19 of the front door post 12 is a vertically extending, co-operable sealing element 39, of generally angular cross section, with one flange 40 thereof extending outwardly or normal to the plane of the car side. On the side of the flange 40 nearest the door and approximately midway thereof, is a vertically extending flange or rib 41 of tapered cross section, so located as to readily enter the mouth of jaw of the door sealing element 38, when the door is in closed position. With this arrangement, it is evident that the element 39 functions as a stop for the front edge of the door and the cooperable elements 38 and 39 provide an effective weather seal. Assuming the car to be traveling toward the left as viewed in Figure 4, the flange 40 will act as a deflector for the rain, snow, or sleet, inasmuch as said flange 40 is extended outwardly beyond the sealing element 38. Should any rain, snow, or sleet enter the joint between the outer edge 42 of the element 38 and the flange 40, whichever direction the car may be traveling, its momentum will be destroyed in the chamber or pocket formed between the tapered rib 41 and the outer portion of the sealing element 38 and then drop down and pass out at the bottom. Should the driving force of the rain or other foreign matter be sufficient to force any of it around the narrow edge of the rib 41, it will be trapped within the second air chamber on pocket formed between the rib 41 and the inner portion of the sealing element 38 and its momentum destroyed so that, practically, no foreign matter can be forced beyond the front multiple edge of the door to the interior of the car. In this connection, it will be observed that the sealing element 38 on the door proper serves to stiffen or rigidify the front edge and thereby prevent distortion or twisting about a vertical axis.

The rear edge seal for the door is provided by the backturned flange 18 of the rear door post and a sealing element 43 secured to the inner face of the multiple-ply rear marginal edge of the door. Said element 43 has a flange 44 which is extended inwardly and forwardly so as to enter behind the flange 18 and form a seal therewith, as will be evident from an inspection of Figure 4. To protect the sealing element 43 from injury and also to additionally strengthen or brace the vertical rear edge of the door, an angle 45 may be employed, the latter being secured to the door proper and element 43 by the same rivets 46 which secure the element 43. Said angle 45 has one of its flanges 47 extended inwardly across the edges of the sheets and beyond the rear edge of the element 43, and is preferably in engagement with the latter so as to act as a buffer when the door is opened against the usual door stops. With this construction, it will be apparent that the rivets 46 are placed under double shear, thereby adding greatly to the strength and preventing tearing out of the rivets or the sheet metal.

Referring next to the lap joints between the panels, as best illustrated in Figures 2 and 3, the upper panel of each pair will be slightly offset as indicated at 48, in an amount corresponding to the thickness or gauge of the sheet metal employed. Below the offset 48, the panel is extended vertically for a distance as indicated at 49 and is then bent outwardly and downwardly as indicated at 50 and finally terminates in a wide flat flange 51 in a plane parallel to the main or original plane of the sheet, said flange 51 being flush with the tops of the several horizontal and vertical corrugations of the door. The upper portion of the lower of each adjacent pair of panels, has the uppermost horizontal corrugation thereof formed with a flat crest, as indicated at 52. The sheet is then bent inwardly and upwardly, as indicated at 53, and terminates in a wide vertical flange 54, in the original plane of the sheet, the upper edge of which is riveted to the offset portion 48—49 of the next upper panel, as by rivets 55—55. The lower edge of the outwardly offset flange 51 of the upper panel is riveted, as indicated at 56 to the flat crest of the corrugation 52. In this connection, it will be understood that, near the vertical edges of the door, the upper portion of each of the panels 25 and 26 will be conformed to fit the vertical corrugations, as indicated at 57—57 in Figure 4.

With the form of lap joint for the panels, above described, it is evident that a box girder construction is obtained of parallelogram vertical cross section, which provides great strength against collapse or bending in any direction. Another important result flowing from the improved box girder construction is that a considerable variation in the over-all height of the three secured panels is obtainable, without change of dies. By varying the width of the flanges 51 and 54 of each lap joint, which can be done without changing the dies that form the corrugations, a wide range of adjustment is obtainable, so as to give varying heights of doors. Due to the box girder formation, variations in the width of the flanges 51 and 54 does not affect the strength of the joint, inasmuch as the box girder formation is retained. Heretofore, with the ordinary type of lap joint, where the panels are merely lapped in the original plane of the sheet, increases in the width of the marginal portions of the panels which are to be lap jointed, obviously increase the distance between the horizontal corrugations above and below the lap joint, thereby weakening the door, if the spacing between horizontal corrugations is increased, whereas, no such result is produced in the present construction, due to the use of the box girder formation.

As shown, the door is of the bottom hung type, each of the rollers 58 riding on a track 59, which is secured, at intervals, to supporting brackets 60 riveted to the side sill 23. To prevent the lower edge of the door swinging out, each of the roller brackets 31 is preferably provided with hook formations 61, engaging beneath the depending outer flange 62 of the track, as best shown in Figure 3.

To provide an effective weather seal for the bottom edge of the door, the following arrangement is employed. The threshold plate 14 (see Figure 3) is extended around the floor boards 22, as indicated at 63 and is then extended horizontally inwardly, as indicated at 64, thence vertically downward, as indicated at 65, thence horizontally outward as indicated at 66 and finally to the depending vertical flange 67, by which it is secured to the bracket 60, preferably by the same rivets which attach the track 59. As will be evident, the longitudinally extending sections 64, 65 and 66 form a horizontally extending channel or groove opening horizontally outwardly, the upper wall 64 of which is disposed flush with the lower edge proper 68 of the door. Said channel provides an air pocket extending the full width of the door when in closed position, so that, when any rain, sleet or other foreign matter is driven transversely or horizontally below the edge of the door into said channel or pocket, the momentum of said rain, snow, sleet or the like will be immediately destroyed and the same will fall down by gravity onto the lower wall 66 of the channel and then drain off, as will be evident.

Referring to the modification shown in Figure 5, the door there shown is of the top hung type and the lower edge of the door is prevented from being swung outwardly by wedges 70 secured to the bottom margin of the door, which engage behind bottom guards 71. In this particular modification, the side sill 123 has an angle 72 secured to the outer face thereof, the upper flange of which is extended horizontally outward beneath the floor boards 122. Secured to the underside of the upper flange of the angle 72 is my improved sealing strip 73 having a vertically extending section 74, an inwardly horizontally extending section 75, a vertical section 76 and an outwardly extending section 77, the latter being extended outwardly beyond the inner or main plane of the door proper. In this construction, it will be observed that a longitudinally extending channel is formed by the section 75, 76 and 77 of the sealing element, which channel has its upper wall flush with the lower edge of the door. As in the construction previously described, rain, sleet or other foreign matter which may be driven in a transverse or horizontal direction into the pocket formed by the channel, will have its momentum destroyed and drain out without being driven up between the door and the door sill.

Referring to Figure 3, it will be noted that the bottom section 66 of the air channel formation is, in effect, extended outwardly beyond the plane of the inner surface of the door by the horizontal section of the door track 59 so that said two sections together 66 and 59 form a horizontal baffle for the full width of the door when in closed position, which prevents upward vertical currents of air with rain or other foreign matter, from entering between the face of the threshold and the door. Similarly in the construction shown in Figure 5, the section 77 by being extended inwardly and outwardly of the vertical plane of the inner surface of the door, functions as a baffle to prevent vertical currents of air with foreign matter from entering between the door and the threshold. In both forms of the invention illustrated, the sealing means along the bottom of the door prevent admission of upward vertical currents and for any horizontal or lateral currents driven into the channel formation, the same have their momentum destroyed so as to prevent admission between the door and the threshold.

I have herein shown and described what I now consider the preferred manner of carrying out my invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In car construction, the combination with a house car having a door opening defined, in part, by a threshold; of a door adapted to close said opening and having a plain bottom marginal edge extended below the upper surface of the threshold; and means providing a weather seal along the bottom of the door when the latter is in closed position, said means including upper and lower horizontal sections and a vertical section defining a generally channel shaped air pocket formation with the mouth of the channel pocket opening outwardly and below the bottom edge of the door, said upper horizontal section terminating inwardly of the plane of said bottom edge of the door and said lower horizontal section extending outwardly beyond the plane of said bottom edge of the door whereby said bottom of the channel formation serves as a baffle to prevent upward vertical currents from entering between the door and threshold and horizontal currents driven laterally into said channel formation will have their momentum destroyed therein.

2. In car construction, the combination with a house car having a door opening defined, in part, by a threshold; of a door adapted to close said opening and having its bottom edge extended below the upper surface of the threshold; and means, extending horizontally lengthwise of, beneath, and spaced from the bottom edge of the door when the latter is in closed position, said means being of generally channel formation and also extending horizontally laterally inwardly and outwardly of the plane of the inner surface of the bottom portion of the door whereby said means function as a baffle to prevent upward vertical currents from entering between the door and the face of the threshold and horizontal currents driven laterally into said channel formation will have their momentum destroyed therein.

3. In car construction, the combination with a house car having a side sill and provided with a door opening defined, in part, by a threshold; of a door adapted to close said opening and having a flat bottom margin with its bottom edge extended below the upper surface of the threshold; and means providing a weather seal along the bottom of the door when the latter is in closed position, said means comprising a channel section element and a separately formed horizontal track both secured to and disposed outwardly of the side sill, the channel section element having the mouth of the channel facing outwardly and the lower flange thereof together with the horizontal track providing a horizontal baffle wall to prevent admission of upward vertical currents between the door and threshold.

4. In car construction, the combination with a house car having a door opening defined, in part, by a threshold; of a door adapted to close said opening and having its bottom edge extended below the upper surface of the threshold; and means providing a weather seal along

the bottom edge of the door when the latter is in closed position, said means comprising an element disposed below the threshold, said element having a longitudinally extending channel formed therein, the open side of the channel being presented outwardly, the upper flange of the channel being disposed substantially horizontally flush with the bottom edge of the door and the lower flange of the channel being spaced below the bottom edge of the door and extended outwardly beyond the vertical plane of the inner surface of the door.

5. In car construction, the combination with a house car having a metal side sill and a door opening defined, in part, by a threshold projecting laterally outwardly of the side sill; of a plurality of brackets secured to said side sill; a horizontally extending door supporting track carried by said brackets, said track having a horizontal section disposed below the bottom plane of said threshold and extending outwardly thereof; a longitudinally arranged element below the door opening, said element having an approximately U-section with the opening thereof facing outwardly, the bottom flange of said section and said horizontal section of the track together providing a baffle disposed below the projecting portion of the threshold to intercept vertical currents; and a bottom hung door supported on said track, the lower margin of the door being flat and the bottom edge thereof being substantially flush with the upper flange of said U-section.

6. In car construction, the combination with a house car having a metal side sill and a door opening defined, in part, by a threshold projecting laterally outwardly of said side sill; of a horizontally extending member arranged along the bottom of said door opening, said member having an inwardly extending upper section, a depending inner vertical section and an outwardly extending lower section, the latter extending outwardly beyond the vertical edge plane of the threshold; and a door adapted to close said opening, the lower edge of said door being substantially horizontally flush with and disposed laterally outside of the first named section of said member and the last named section of said member functioning as a baffle to prevent upward currents of air with foreign matter from entering between the door and the edge face of the threshold.

FRANK DITCHFIELD.