

March 30, 1943.

E. R. GREENER

2,315,118

CAR CONSTRUCTION

Filed May 17, 1941

2 Sheets-Sheet 1

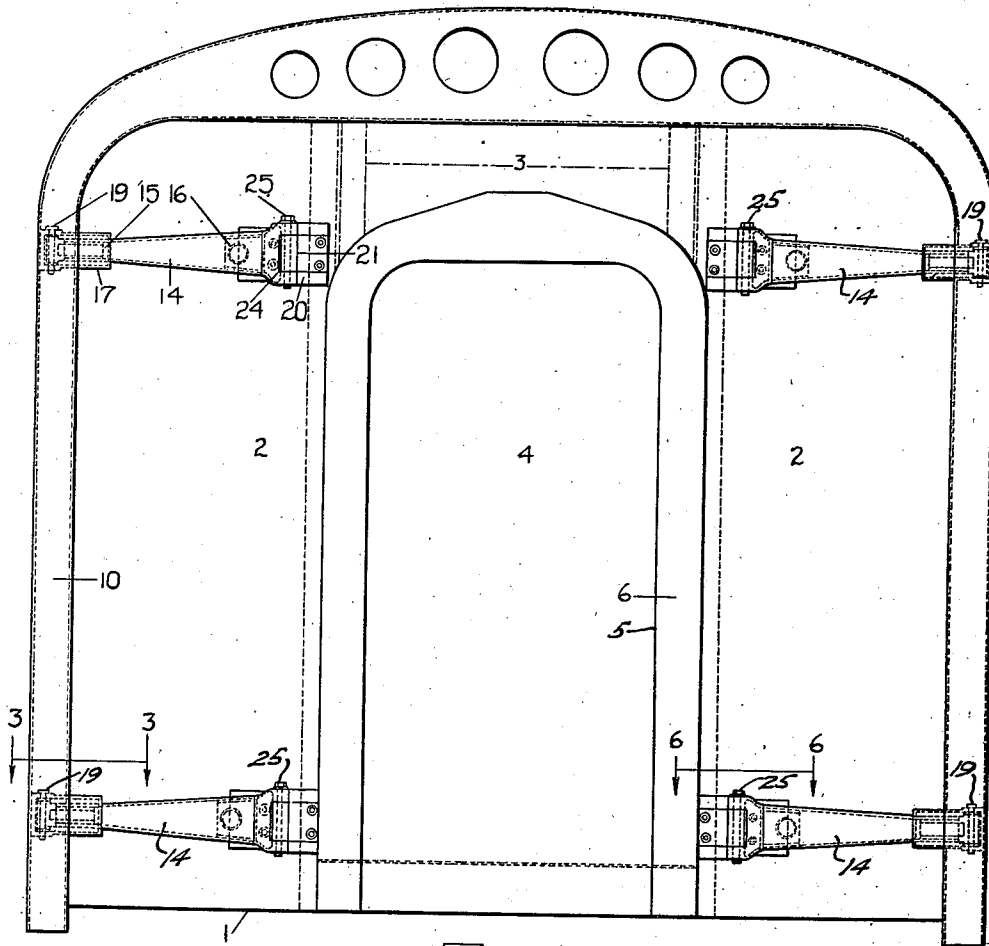


Fig. 1

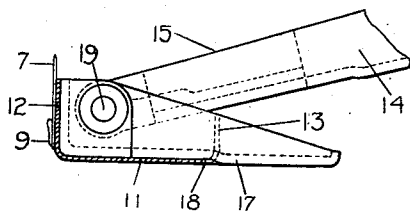


Fig. 3

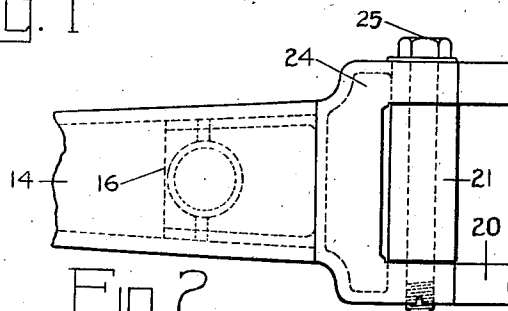


Fig. 2

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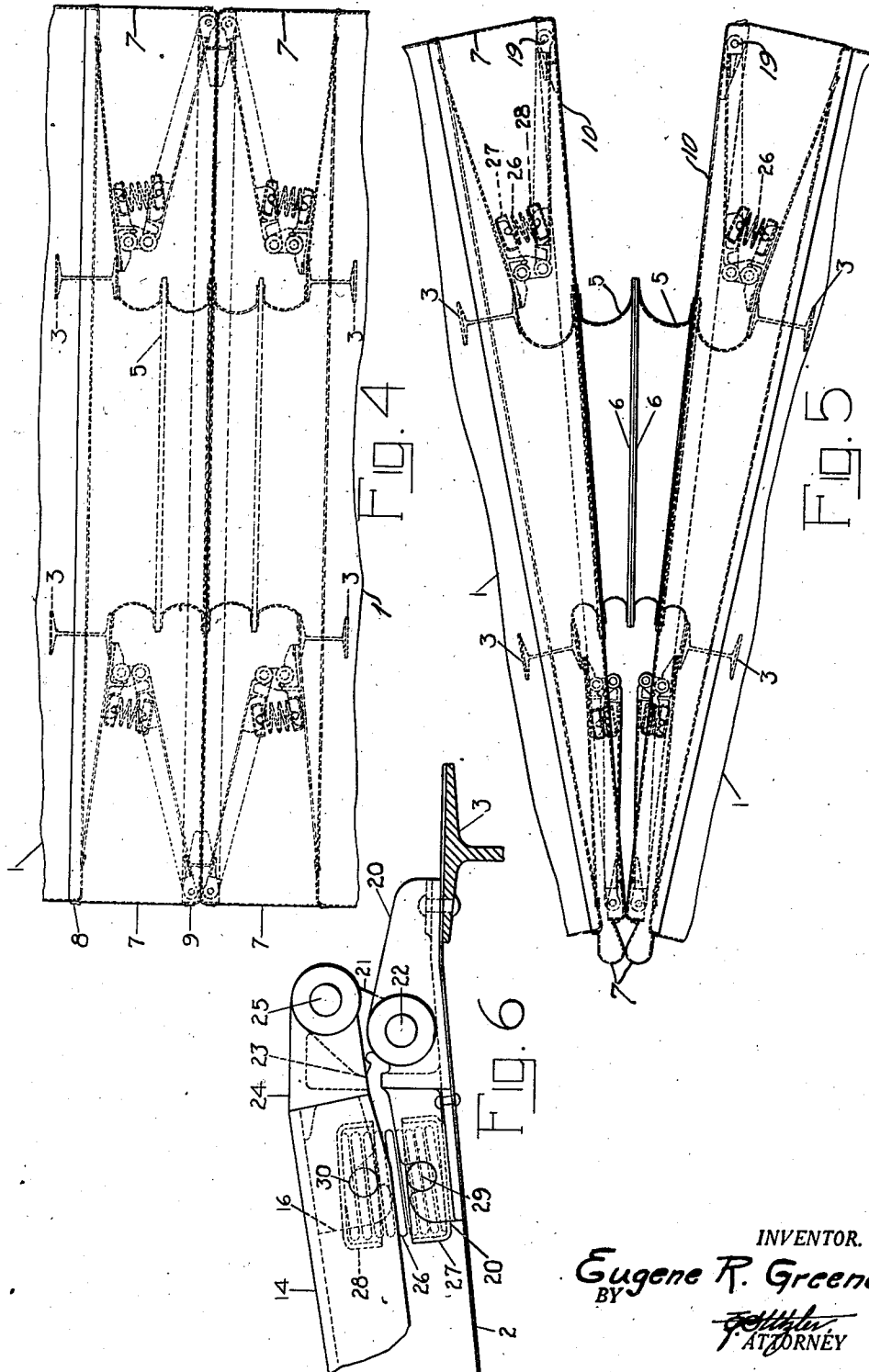
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2 Sheets-Sheet 2



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2,315,118

CAR CONSTRUCTION

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12 Claims. (Cl. 105—15)

My invention pertains to railway passenger cars, and particularly to the diaphragms forming enclosures for the space between adjacent ends of coupled cars.

An object of the present invention is to provide an enclosure comprising inside and outside diaphragms independently suspended from the car end.

Another object of my invention is to provide an outside diaphragm enclosure having an integral face plate, movement of which is actuated by relative movement between the adjacent ends of the adjacent coupled cars.

A further object of my invention is to provide an enclosure for the purpose described, comprising inner diaphragms held in continuous engagement and outer diaphragms independent in operation from the inner diaphragms and having face plates normally in engagement.

These and other objects will become apparent as the description proceeds, in which Fig. 1 shows in elevation the end of a railway car embodying the invention; Fig. 2 shows an enlarged detail of the invention; Fig. 3 shows an enlargement of a section taken along lines 3—3 of Fig. 1; Fig. 4 shows in plan the adjacent ends of two coupled cars equipped with the invention and in position on a straight portion of the track; Fig. 5 shows in plan the relative position of the car bodies and outer diaphragms whilst traversing a curved portion of the track; Fig. 6 shows an enlarged detail of the invention at lines 6—6 on Fig. 1.

Referring now to the drawings where like reference characters refer to like parts, the reference character 1 indicates generally a passenger car body, the outermost end portion only of which is shown. These passenger car bodies in accordance with well-known practice are usually equipped with end platforms, commonly called vestibules, but are sometimes made without the end platform. Hence, it will be understood that in this specification and appended claims wherever the car end is spoken of, it refers to the end of the car vestibule or to the end of the car body which is not equipped with a vestibule.

The closure for the car end comprises inner and outer diaphragms mounted independently of each other upon the car end. The face plate of the inner diaphragm extends outwardly beyond the face plate of the outer diaphragm when the car is in uncoupled position, and when the cars are coupled together in a train, the inner diaphragms are moved inwardly so as to bring the face plate thereof in substantially the vertical

plane of the face plate of the outer diaphragm. Both diaphragms are of the flexible type and may be moved toward and away from the car body as the relative position of the adjacent ends of adjacent cars changes during operation of a train of such cars. Due to initial compression in the inner diaphragms their face plates on adjacent ends of the cars will remain in abutting relation even if the face plates of the outer diaphragms have separated and by making the initial compression in the inner diaphragms greater than the extreme travel of the coupler on the respective car bodies, the inner diaphragm face plates will remain in abutting relation during all positions of the coupled car bodies.

It will be further observed upon reference to Fig. 4 of the drawings that the inner and outer diaphragm face plates are independently supported from the car end and thus may move relative to each other as well as relative to the car ends during operation of the cars in train. Whilst no supporting means has been indicated for the inner diaphragm face plate, it will be understood that any suitable means of a present well-known type of support may be used, it only being necessary to have the inner diaphragms under a substantial initial compression and the outer diaphragms under little or no compression when the cars are in normal coupled position on a straight track. By reason of this construction the outer diaphragm face plate may be of relatively light construction, requiring only sufficient rigidity to maintain its shape.

Referring now in detail to the drawings in which the car bodies generally are indicated by the reference character 1; the car end by the reference character 2; the car end post by the reference character 3; and the usual passenger passageway between the end posts indicated by the reference character 4; the inner diaphragm which may be of any suitable construction is indicated by the reference character 5 and shown as being of the bellows fold type. This inner diaphragm is secured to the car end preferably at the end posts 3 by any suitable means and at its outer end has a suitable face plate 6 attached thereto and resiliently held in spaced relation to the car end. As previously stated, this face plate 6 may be supported from the car end by any suitable means.

The outer diaphragm 7 is secured to the car end by any suitable means 8 and is made of substantially flat flexible material conforming to the contour of the car side walls and roof. This outer diaphragm 7 may be made of elastic ma-

terial if desired, but it is not necessary. Secured to the free end of the outer diaphragm 7 by any suitable means, such as 9, is the outer diaphragm face plate 10. This face plate 10 is generally of inverted U-shape and of channel shape in cross section, comprising a web portion 11, outer flange 12, and inner flange 13. As illustrated in Fig. 1 of the drawings, the web 11 is preferably of substantially greater width at the top of the face plate than in the legs. By so doing the total weight of the face plate can be lessened and sufficient rigidity retained. The weight may be further reduced by placing apertures in the top thereof, as shown. It will be understood, however, that the particular shape of the face plate 10 may be varied in design provided only that it is of sufficient rigidity and of an outer contour conforming to that of the outer diaphragm 7.

This face plate 10 is supported from the car end independently of the inner face plate 6 and is preferably pivotally mounted on the car end for unitary movement relative thereto on substantially horizontally disposed laterally extending supporting members. These supporting members are preferably rigid and may be of any suitable construction. The preferred form illustrated in the drawings comprises an intermediate pressed portion 14 having suitable end portions 15 and 16 secured thereto which are preferably castings. These diaphragm supporting arms 14—15—16 are preferably disposed in pairs on opposite sides of the inner diaphragm. Each depending leg of the outer face plate 10 is provided with vertically spaced members 17 having one end secured to the face plate behind the web 11 and the opposite end portion offset so as to lie in the vertical plane of the outer face of web 11 and extend laterally therefrom toward the inner diaphragm. For this purpose the flange 13 of the face plate 10 is cut away at 18. This extension of member 17 permits reduction in the size of the legs of the face plate 10 and still provides adequate rubbing surfaces when the car bodies shift laterally relative to each other during operation of the cars. The casting 15 of the supporting arm is disposed behind the adjacent member 17 and has its free end portion pivotally connected to the member 17 behind the web 11 of the face plate by means of a suitable pin 19 engaging suitable apertures in the casting 15 and member 17. The relationship between the casting 15 and member 17 is such that the casting 15 may rotate relative to the member 17 on the pin 19 as hereinafter described.

At the opposite end of the diaphragm supporting members 14—15—16, as shown by Fig. 6, are suitable brackets 20 secured to the car end 2 and provided with a link member 21 pivotally connected to the bracket 20 by means of the pin 22. Each link 21 is provided with a suitably shaped portion 23 engaging with the bracket 20 to limit relative movement between the link 21 and bracket 20 in a direction toward the adjacent side of the car. The link portion 23 is freely movable away from the bracket 20 to permit relative rotation between the link 21 and bracket 20 in a direction toward the inner diaphragm. Each casting 16 of the supporting arm 14—15—16 is provided with a bifurcated portion 24 between which is engaged the free end of the link 21 and pivotally connected thereto by means of the pin 25 passing through suitable apertures in the said bifurcated portion 24 and

inserted end of the link 21. Disposed between the supporting arm 14—15—16 and the car end is a helical coil spring 26. This spring 26 is shown with its opposite ends connected to the casting 16 and bracket 20, respectively, and need be only of sufficient strength to maintain the outer diaphragm 7 taut. In order to maintain the spring 26 in compression only during all positions of the arm 14—15—16, I prefer to connect the spring 26 with the bracket 20 and casting 16 by means of spring caps 27 and 28 provided with trunnions 29 mounted in bracket 20 and trunnions 30 mounted in casting 16.

From the foregoing description and a reference to Figs. 1 and 6 of the drawings, it will be apparent that the pairs of arms 14—15—16 connected with the depending leg portions of the face plate 10 will maintain the face plate in fixed lateral relation to the car end, as each pair of arms 14—15—16 attached to each leg of face plate 10 is prevented from moving towards the adjacent side of the car although free to move towards the opposite side of the car; hence, the face plate 10 can pivot on the pins 19 at one side of the face plate 10 or the face plate can move bodily toward and away from the car end. The arms 14—15—16 through pins 19 and 25 also provide vertical support for the face plate 10 as the arms move in a fixed horizontal plane.

Referring now to Figs. 1 and 4 of the drawings, as previously stated, in Fig. 1 inner face plate 6 projects outwardly beyond the vertical plane of the outer face plate 10; and in Fig. 4 of the drawings, wherein adjacent ends of the cars are shown in coupled relation, face plates 6 and 10 of each car abut with corresponding face plates of the adjacent car and the respective face plates 6 and 10 of each car are in substantially the same vertical plane. As previously stated, the initial compression applied to inner diaphragm 5 during coupling of the cars to bring face plate 6 substantially within the vertical plane of face plate 10 moves face plate 6 towards the respective car body a distance greater than the extreme outward travel of the coupler attached to its respective car. That is to say, in coupling the cars the face plate 6 is moved towards its respective car end a distance greater than the total outward movement from normal position of the coupler attached to that car. In this compressed position the face plate 6 and face plate 10 of each car are in outward spaced relation from their respective car ends. Thus when the coupler of each car moves outward from the end of the car, the face plates 6 will remain in abutting relation even though the face plates 10 may separate, and likewise, as the couplers move inwardly of their respective car body, the diaphragms 5 and 7 fold to permit movement of their respective face plates. Thus it will be apparent that in all possible positions of the car bodies the face plates 6 will be maintained in constant abutting relation, thereby providing an enclosed passageway for passenger travel between the respective end of the adjacent car bodies.

Referring now to Figs. 4 and 5: When the adjacent coupled cars are moving from off a straight portion of track, as shown in Fig. 4, on to a curved portion of a track, the car bodies will assume a position as shown in Fig. 5. As illustrated in Fig. 5 during the time the adjacent ends of the car bodies are traversing a curve, the inner diaphragm face plates 6 are maintained in abutting relation, whilst the an-

gular relation between each outer face plate 10 and its associated car body is changing. While the ends of the car bodies 1 move together at the inner side of the curve, the springs 26 are being compressed by the car bodies moving towards the arms 14-15-16 attached to the respective car bodies and to the adjacent end of the associated face plate 10. As this movement continues, arms 14-15-16 rotate on their respective pins 25 thereby tending to bring their ends attached to the face plates 10 inwardly of the associated car body. The face plate 10 being a rigid member and being held in fixed transverse relation to the car body by means of pin 19 at the outer side of the curve will resist this force tending to move the face plates 10 transversely of each car body 1. The link 21 attached by means of pin 25 to the inner end of arm 14-15-16 at the inner side of the car will rotate on pin 22 mounted in the casting 20 secured to each car body 1 and in a direction inwardly of their respective car bodies and away from the sides of the ends of the car bodies at the inner side of the curve. This movement of link 21 compensates for the aforesaid shortening movement of the outer end of its associated arm 14-15-16 so that the said arm pivoting on pin 22 moves bodily inwardly of the car instead of causing plate 10 to move toward the outer side of the curve. Continued movement of said links 21 permit the associated arm 14-15-16 to move bodily toward the adjacent end of the associate car and the attached face plate 10 to pivot on pin 19 adjacent the outer side of the curve. In this manner a greater movement between the face plate 10 and its associate car body at the inner side of the curve is obtained than would be possible were the link 21 rigid with associated member 20.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a railway car diaphragm construction, a rigid inverted U-shaped outer face plate disposed in spaced relation to the car end, a plurality of vertically spaced laterally extending arms pivotally connected with said outer face plate and with the car end for supporting the face plate upon the car, resilient means between each said arms and the car end normally maintaining said outer face plate in horizontally spaced relation to the car end, flexible means forming with the outer face plate and car end an enclosure for the space therebetween, and an inner face plate and diaphragm forming a passageway suspended from the car end independently of the said outer face plate and normally resiliently urged outwardly of the vertical plane of said outer face plate for longitudinal movement relative thereto.

2. In a car diaphragm construction, in combination, an inverted substantially U-shaped flexible diaphragm connected to the car end, a similarly shaped rigid face plate connected to said diaphragm and pivotally suspended from the car end by means of substantially horizontally disposed laterally extending rigid arms pivotally connected with the face plate and the car end, resilient means between each said arm and the car end retaining the face plate in normally spaced relation to the car end, each said connection between the said arms and car end including means preventing bodily lateral movement of said arm towards the adjacent car side wall and providing limited bodily movement of

the said arm towards the opposite side of the face plate.

3. Means for closing the space between the adjacent ends of two coupled car bodies comprising inner flexible diaphragms suspended from the respective car ends for movement relative thereto and provided with abutting face plates, flexible outer diaphragms of substantially inverted U-shape secured to the respective car ends and provided with normally abutting face plates, a plurality of laterally extending rigid members supporting each outer diaphragm face plate from the respective car end and pivotally connected with the car end and the face plate for substantially horizontal pivotal movement relative to the car end, the connection between each said rigid member and car end including a pivotally mounted link member movable only away from the adjacent car side wall.

4. In a railway car diaphragm construction, in combination, a flexible outer diaphragm secured to the car end, an inverted rigid U-shaped face plate secured to the diaphragm, laterally extending means pivotally connected with the car end and with the sides of said face plate providing vertical and lateral support therefor, said means providing for relative longitudinal movement between said car end and face plate and relative pivotal movement between the car end and face plate about one side of the latter.

5. In a railway car diaphragm construction including the usual passageway inner diaphragm and face plate, the combination of a rigid inverted substantially U-shaped outer diaphragm face plate enclosing said passageway inner diaphragm and disposed in horizontal spaced relation to the associated car end, flexible means conforming to the contour of the car end and connecting said outer face plate and the associated car end, vertically spaced shoe members rigidly secured to each of the arms of the inverted U-shaped outer diaphragm face plate and extending therefrom in a direction transversely of the face plate, correspondingly spaced outer diaphragm face plate supporting arms each having their respective opposite ends pivotally connected with the said car end adjacent said inner diaphragm and with the outer diaphragm face plate at the shoes thereon, resilient means disposed between each arm and the car end normally maintaining the outer diaphragm face plate in horizontal spaced relation to the car end.

6. In a railway car diaphragm construction, a flexible diaphragm conforming to the contour of the car side walls and roof and secured thereto, a face plate connected with the diaphragm, a plurality of vertically spaced laterally extending rigid members pivotally connected with each side of the face plate and car end to provide fixed vertical support for and to laterally position the face plate relative to the car end and resilient means between each rigid member and the car end spacing the face plate from the car end.

7. Means for enclosing the space between the adjacent ends of adjacent coupled car bodies, comprising adjacently arranged flexible diaphragms conforming to the contour of the car sides and roof and secured thereto, face plates secured to said diaphragms, a plurality of vertically spaced laterally extending rigid members pivotally connected to each side of each face plate and to the adjacent car end providing

fixed vertical support for said face plates; and resilient means between each of the rigid members and the adjacent car end maintaining the associated face plates in abutting relation and spaced from the car ends.

8. Means for closing the space between adjacent ends of adjacent coupled car bodies, comprising adjacently arranged flexible outer diaphragm members each conforming to the contour of the respective car side walls and roof and secured thereto, each diaphragm being provided with a face plate abutting the adjacent diaphragm face plate, flexible inner diaphragm members provided with abutting face plates and supported from their respective car ends independently of the outer diaphragms and face plates, each inner diaphragm face plate being resiliently spaced from the respective car end to normally lie within the vertical plane of the abutting outer diaphragm face plates and capable of longitudinal movement relative to said vertical plane, vertically spaced shoe members fixedly secured to each side of each outer diaphragm face plate and having portions providing opposing lateral extensions of said face plates, brackets secured to the respective car ends adjacent opposite sides of the respective inner diaphragms, a link member pivotally mounted on each bracket, means on each link and associated bracket preventing rotation of the link from normal position towards the adjacent car side wall, and a rigid member pivotally connected to each bracket link and to the adjacent shoe member for supporting the associated outer diaphragm face plate, and resilient means between each member and the adjacent car end for maintaining the outer diaphragm face plates in abutting relation.

9. Means for closing the space between adjacent ends of adjacent coupled car bodies comprising flexible inner diaphragm members provided with abutting face plates supported from their respective car ends so as to be resiliently spaced therefrom and moveable longitudinally relative thereto, flexible outer diaphragm members enclosing the inner diaphragm members and connected with the car side walls, the outer diaphragm members being provided with face plates which are resiliently held in abutting relation when the cars are in normal coupled relation, and means supporting said outer diaphragm face plates in vertical spaced relation to the respective car ends for movement independent of the inner diaphragm face plates.

10. In a railway car construction, a diaphragm arrangement comprising a substantially flat flexible member secured to the car end and conforming substantially to the contour of the car side walls and roof, an inverted rigid U-shaped face plate secured to said flat member in spaced relation to said car end, a plurality of laterally extending rigid members pivotally connected with each depending leg of the face plate and with the car end providing vertical and lateral pivotal support for the face plate, and resilient means connected with each said supporting member and the car end controlling movement of the face plate longitudinally of the car end.

11. In combination with a railway car, a flexible diaphragm of inverted U-shape secured to the car end and conforming to the contour of the car side walls, a similarly shaped face plate secured to the diaphragm in spaced relation to the car end, laterally extending rigid means pivotally connected to each leg of the face plate and link connected to the adjacent car end providing vertical support for the face plate during relative movement between the face plate and car end, and for pivotal movement about either side of said face plate upon said means, and resilient means associated with each said rigid means and car end for holding the face plate in longitudinal spaced relation to the car end.

12. In a railway car diaphragm construction in combination, a car end wall having a passageway therein, a flexible inner diaphragm secured to the end wall and forming an extension of said passageway, a flexible outer diaphragm secured to the end wall and conforming to the contour of the sides and top thereof, said outer diaphragm enclosing the inner diaphragm and extending outwardly from the car end, a face plate of substantially inverted U-shape secured to the outer diaphragm, a face plate secured to the inner diaphragm and normally resiliently held outwardly of the vertical plane of the outer diaphragm face plate for longitudinal movement relative thereto, means connected to the car end and outer diaphragm face plate providing fixed lateral and vertical support therefore, and providing for longitudinal movement of the face plate relative to the car end wall and pivotal movement relative to the car end wall about one side of the face plate.

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