F. M. GUNN & L. J. BERG.

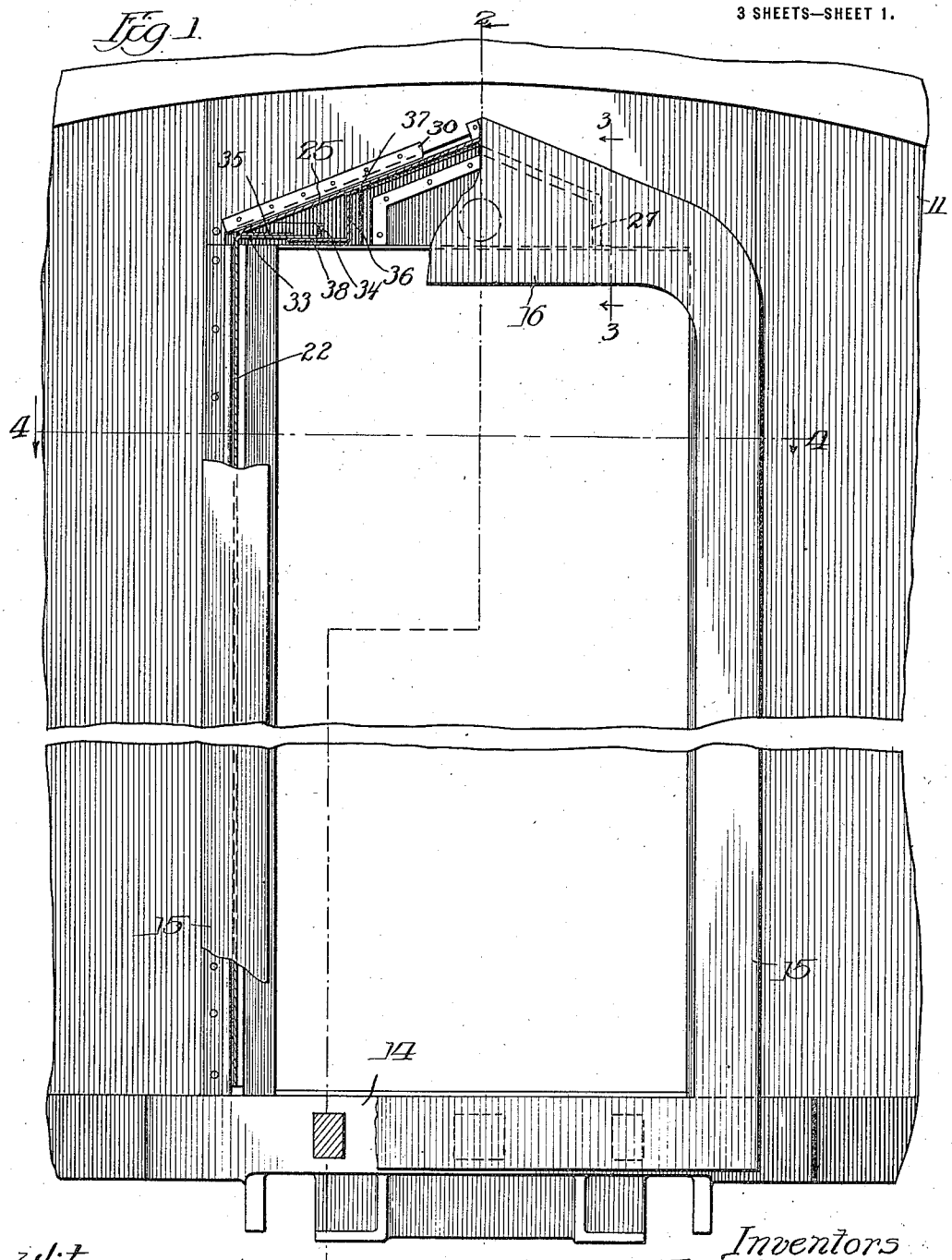
METALLIC CAR DIAPHRAGM.

APPLICATION FILED SEPT. 10, 1914. RENEWED APR. 11, 1916.

1,243,932. **Patented Oct. 23, 1917.**

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2

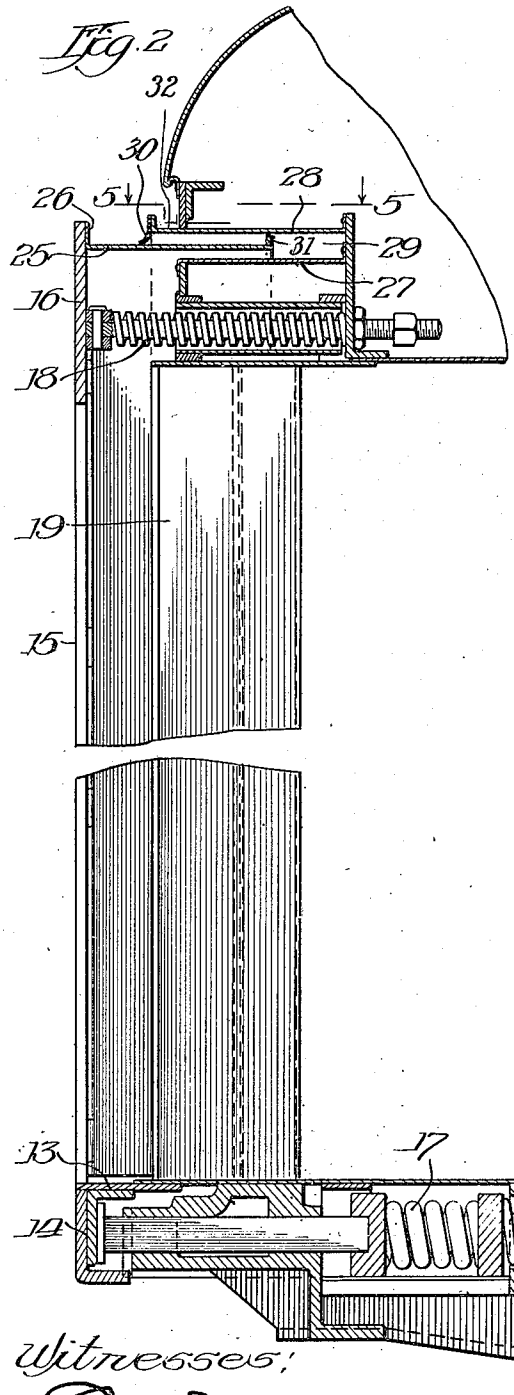
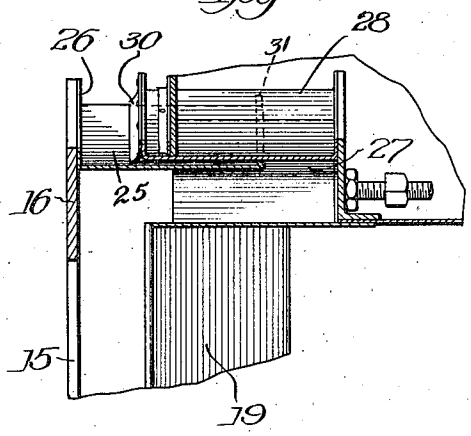


Fig. 3



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3 SHEETS—SHEET 3.

Fig 4.

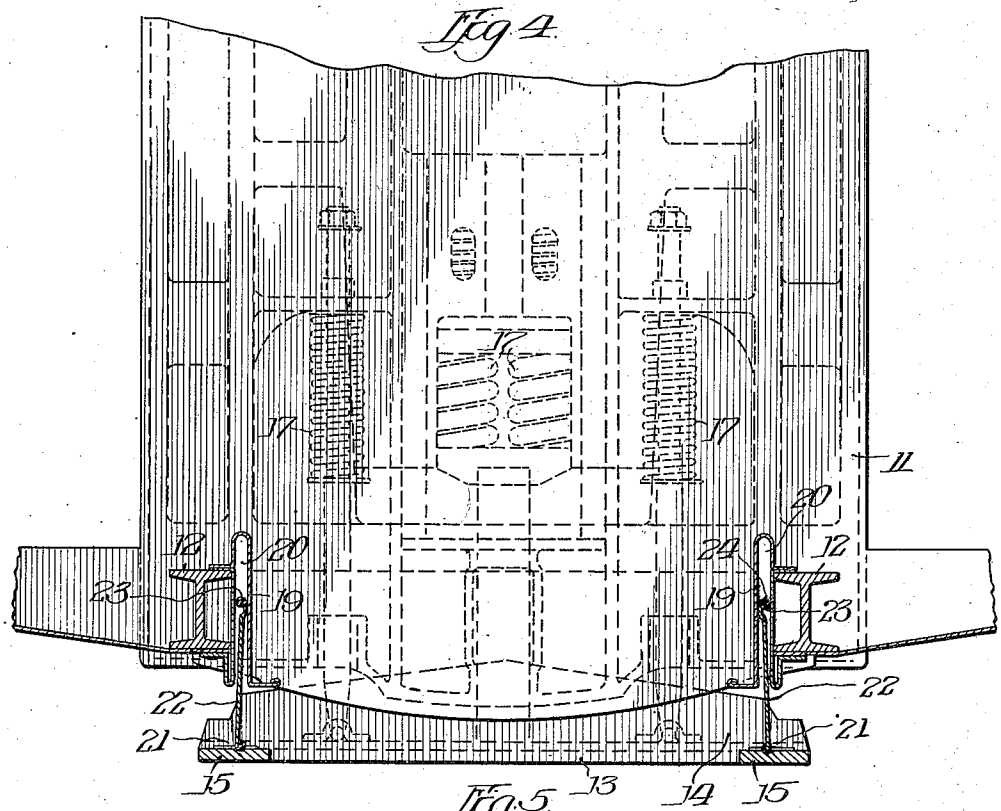
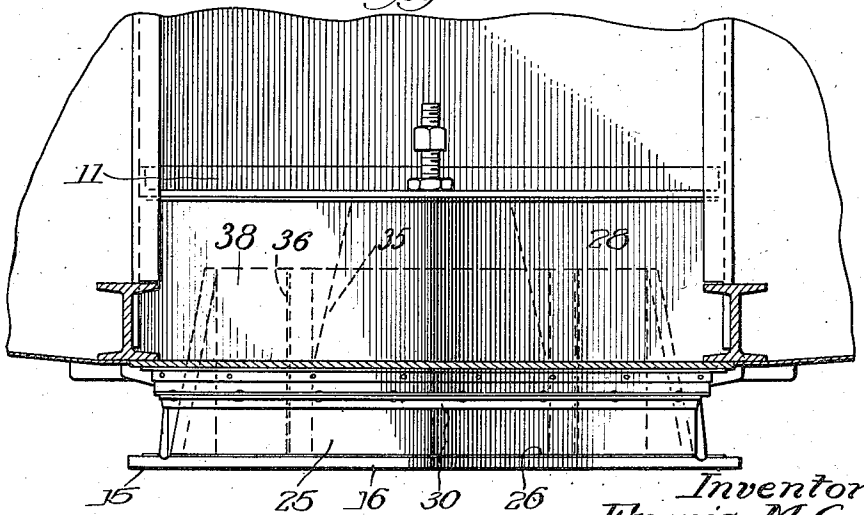


Fig 5.



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UNITED STATES PATENT OFFICE.

FRANCIS M. GUNN AND LARS J. BERG, OF CHICAGO, ILLINOIS.

METALLIC CAR-DIAPHRAGM.

1,243,932. Specification of Letters Patent. Patented Oct. 23, 1917.

Application filed September 10, 1914, Serial No. 860,981. Renewed April 11, 1916. Serial No. 90,520.

To all whom it may concern:

Be it known that we, FRANCIS M. GUNN and LARS J. BERG, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and and useful Improvements in Metallic Car-Diaphragms, of which the following is a specification.

In the construction of passenger cars requiring to be coupled together when operated in trains consisting of two or more cars it is desirable that communicating passages covered or inclosed be provided between the cars in order that the passengers in passing from one car to another may be safeguarded from falling and protected from inclement weather. It is also necessary that the inclosing means be made adjustable to provide for the angular displacement due to cars rounding curves and further necessary that the covering be extensible and contractible to conform to the compression or extension of the spring-connected coupling attachments of the car.

The invention relates to such flexible or adjustable portion of the passageway covering ordinarily known as vestibule diaphragm construction and the object of the invention is to provide a flexible and adjustable diaphragm of metallic construction to replace the canvas or rubber covering which has heretofore been usually employed for similar purpose and which latter, to permit the extension and contraction as well as the displacement due to rounding curves has ordinarily been accordion plaited, rigidly attached to the side post of the end opening and to a movable buffing member or face plate.

The canvas or rubber diaphragms heretofore employed as a covering for connected passageways between ends of cars has not been satisfactory in that hot cinders would burn holes through the canvas, the canvas would tear and rot out, and its efficiency as a protection means thereby be destroyed. With a metallic diaphragm and covering in accordance wtih this invention, all of the objectionable features in the old construction are overcome.

It is the further object of this invention to provide a practically indestructible metallic diaphragm construction, which, although made of a comparatively unyielding material in an efficient manner provides for all the adjustments incident to the movement of the cars around curves and the contraction or extension of the connecting means between the cars.

In order that the invention and the manner of its application may be readily understood by those skilled in the art a preferred embodiment of the same is set forth in the accompanying drawings and in the detailed description predicated thereon. As, however, the invention is susceptible of embodiment in other and varied constructional forms the drawing and description are to be taken in an illustrative and not in an unnecessarily limiting sense. In the drawing—

Figure 1 is a front elevation partly in section of a car vestibule including the invention;

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section on the line 3—3 of Fig. 1;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 1; and

Fig. 5 is a similar section on the line 5—5 of Fig. 2.

As illustrated the car, represented at 11, is provided with end posts 12, 12, the usual buffer plate being shown at 13 and the buffer at 14, having upstanding therefrom vestibule face plates 15, 15 which are movable relative to the car with the buffer in the usual manner. The face plates 15 are connected above by the lintel 16 which is of the apex form. The buffer springs 17, arranged at the rear of the buffer 14, and a single buffer spring 18 arranged at the rear of the lintel 16, serve to yieldingly support the face plate, holding the same in contact with the face plate of the adjacent car when coupled and permitting the same to yield under buffing strains.

Attached to the end posts 12 in rigid fixed relation at each side of the vestibule passage and in rearward alinement with the vertical face plates 15, 15 are a pair of diaphragm sheet metal members 19, 19 bent in U shape to provide pockets 20, 20. Hinged to each of the vertical face plates 15, 15 at 21 is a diaphragm sheet metal plate 22 the free marginal portion of which is flanged at 23 and provided with a packing strip 24. Each of the plates 22 is mounted within the corresponding pocket 20 for slidable recipro-

cating movement. The width of the pocket is sufficiently greater than the thickness of the metal plate 22 to provide for considerable angular displacement of the plane of the sheet relative to the axis of the pocket, and the flange of the sheet together with its packing 23 fits snugly within said pocket so as to preclude the passage of air, dust, water or other of the elements around the edge of the sheet and through the pocket to the interior of the vestibule. The hinging of the sheets 22 to the face plate 15 and the play allowed for between said sheets and the walls of the pockets provide for the angular displacement of the buffer and face plate in the rounding of curves while the packing carried by the sheets maintains a snug fit of the sheets within the pockets notwithstanding the play of the sheets between the pocket walls.

Above the vestibule a metallic diaphragm cover sheet 25, shown as of inverted V-shape, is rigidly secured by a flange 26 to the rear face of the lintel 16 although it may be hingedly secured as in the case of the side plates 19. Between the end posts 12, 12 above the vestibule passageway is arranged a pair of plates 27, 28 and spaced apart vertically to form a pocket 29 of a shape corresponding to that of the cover plate 25, the distance between the walls 27 and 28 of this pocket 29 being sufficiently greater than the thickness of the cover plate 25 to provide for considerable play of the latter therein in a lateral and angular direction. While the cover plate 25 and the pocket 29 are shown as of inverted V-shape it is understood that they may be curved in the form of an arch so as to form an equivalent apex construction or the plate and pocket may both be substantially horizontal or inclined in but one direction.

To exclude the elements from the pocket and thus prevent their entrance to the diaphragm the upper wall 28 of the pocket has applied thereto suitable packing as for instance a yielding weather strip 30 which bears upon the cover plate 25.

The free margin of the cover plate 25 is also upwardly flanged at 31 to intercept any water or dust which may get past the weather strip 30 and cause the same to descend the sloping sides of the plate to the space outside the side plates 22. It will be noted also that the outer margin of the plate 28 to which the weather strip 30 is attached is also upwardly flanged not only to facilitate the attachment of the weather strip, but also to provide a gutter 32 for the collection and carrying away of cinders, rain and the like instead of permitting them to fall in such large measure upon the upper face of the cover plate 25.

To effect a weather-proof and extremely flexible joint between the side plates 22 and the cover plate 25, the former, as will be seen from Fig. 1 are horizontally bent inwardly at 33 and upwardly flanged at 34, while the cover sheet has its side portions horizontally bent inwardly at 35 to overlie the bent portions 33 of the side plates in sliding contact. A housing sheet 36 affixed to the cover sheet 25 at 37 has a horizontal free portion 38 which underlies the portion 33 of the side sheets 25 whereby the latter is slidably confined between the sheet portions 35 and 38 in such manner as to effect an extremely flexible and weather-proof joint between the cover and side members of the diaphragm.

It will be observed that with this construction the face plate of the vestibule is free to move in a direction parallel to the axis of the vestibule or to assume a position at an oblique angle thereto without interfering with its sliding movement within the pockets at the two sides of and above the vestibule passage; that notwithstanding the provision of sufficient lateral play to permit of this angular displacement the interior of the vestibule is guarded against the entrance of air currents, rain and the like, by the provision of packing which precludes their passage around the diaphragm sheets and through the pockets. The construction is a very simple one, inexpensive to manufacture and install and because of its simplicity not liable to get out of adjustment or to require repairs or renewals.

We claim:

1. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of pockets formed on one of said members at the sides of the vestibule passageway, and metallic sheets connected to the other of said members at the sides of the passageway and slidable in the pockets, the width of the pockets being greater than the thickness of the sheets to permit angular displacement, the margins of the sheets provided with means bridging the space between the pocket walls.

2. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of pockets formed on one of said members at the sides of the vestibule passageway, and metallic sheets connected to the other of said members at the sides of the passageway and slidable in the pockets, the width of the pockets being greater than the thickness of the sheets to permit angular displacement, and packing material arranged in the space between the sheets and the pocket walls.

3. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of pockets formed on the car end at the sides of the vestibule passageway, and metallic sheets connected to the face plate at the sides of the passage-

way and slidable in the pockets, the width of the pockets being greater than the thickness of the sheets to permit angular displacement, the margins of the sheets provided with means bridging the space between the walls of the pockets.

4. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, pockets fixedly mounted on one of said members at the sides of the vestibule passageway, and metallic sheets hingedly connected to the other of said members at the sides of the passageway and slidable in the pockets, the width of the pockets being greater than the thickness of the sheets to permit of angular displacement.

5. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of pockets fixedly mounted on the car end at the sides of the vestibule passageway, and metallic sheets hingedly connected to the face plate at the sides of the passageway and slidable in the pockets.

6. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of pockets fixedly mounted on the car end at the sides of the vestibule passageway, metallic sheets hingedly connected to the face plate at the sides of the passageway and slidable in the pockets, the width of the pockets being substantially greater than the thickness of the sheets to permit of angular displacement, and packing material arranged in the spaces between the sheets and the pocket walls.

7. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, metallic diaphragm side sheets attached to the car end and to the face plate respectively and adapted for sliding and also for angular movement with relation to each other at their free edges, of a metallic cover sheet above the vestibule passageway between the car end and face plate and secured to one of the said members, and a correspondingly shaped pocket formed on the other of said members to slidably receive the cover sheet for movement along substantially horizontal lines.

8. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, metallic diaphragm side sheets attached to the car end and to the face plate respectively and adapted for sliding and also for angular movement with relation to each other at their free edges, of a metallic cover sheet above the vestibule passageway between the car end and face plate and secured to one of the said members, a correspondingly shaped pocket on the other of said members to slidably receive the cover sheet, the pocket being of sufficient width to loosely receive the cover sheet and allow of angular displacement.

9. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of a metallic cover sheet above the vestibule passageway and secured to one of the said members, a correspondingly shaped pocket on the other of said members to slidably receive the cover sheet, the pocket being of sufficient width to loosely receive the cover sheet and allow of angular displacement, and flexible packing material arranged between the cover sheet and the pocket walls.

10. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, metallic diaphragm side sheets attached to the car end and to the face plate respectively and adapted for sliding and also for angular movement with relation to each other at their free edges, of a metallic cover sheet above the vestibule passageway and secured to the face plate, and a correspondingly shaped pocket carried by the car end and adapted to slidably receive the cover sheet.

11. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of a metallic cover sheet above the vestibule passageway and secured to the face plate, and a correspondingly shaped pocket carried by the car end and adapted to slidably receive the cover sheet, the pocket being of sufficient width to loosely receive the cover sheet and to allow of angular displacement, and flexible packing material arranged between the cover sheet and the pocket walls.

12. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of metallic sheets secured to one of said members and forming outwardly opening U-shaped pockets extending vertically at each side of the vestibule passageway, vertically extending metallic sheets hingedly connected to the other of said members and adapted for reciprocation within the vertical pockets, a sheet metal pocket carried by one of the members and extending in a general horizontal direction above the passageway, and a metallic cover sheet secured to the face plate above the passageway and adapted for reciprocation within the last named pocket.

13. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of metallic sheets secured to one of said members and forming outwardly opening U-shaped pockets extending vertically at each side of the vestibule passageway, vertically extending metallic sheets hingedly connected to the other of said members and adapted for reciprocation within the vertical pockets, a sheet metal pocket carried by one of the

members and extending in a general horizontal direction above the passageway, and a metallic cover sheet secured to the face plate above the passageway and adapted for reciprocation within the last named pocket, the walls of the pockets spaced apart a distance substantially greater than the width of the sheets adapted to enter the same, and packing material arranged between the sheet and the pocket walls.

14. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of metallic sheets rigidly secured to the car end forming outwardly opening U-shaped pockets extending vertically at each side of the vestibule passageway, vertically extending metallic sheets hingedly connected to the face plate and adapted for reciprocation within the pockets, a substantially U-shaped sheet metal pocket arranged above the passageway and carried by the car end, a metallic cover sheet secured to the face plate and extending above the passageway, the cover sheet adapted for reciprocation within the last named pocket.

15. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of metallic sheets rigidly secured to the car end forming outwardly opening U-shaped pockets extending vertically at each side of the vestibule passageway, vertically extending metallic sheets hingedly connected to the face plate and adapted for reciprocation within the pockets, a substantially U-shaped sheet metal pocket arranged above the passageway and carried by the car end, a metallic cover sheet secured to the face plate and extending above the passageway, the cover sheet adapted for reciprocation within the last named pocket, the cover sheet being separate from the side sheets and the pockets being of sufficient width to loosely receive the sheets and to permit of angular displacement.

16. In a car vestibule diaphragm construction, the combination with the car end and the vestibule face plate, of metallic sheets rigidly secured to the car end forming outwardly opening U-shaped pockets extending vertically at each side of the vestibule passageway, vertically extending metallic sheets hingedly connected to the face plate and adapted for reciprocation within the pockets, a substantially U-shaped sheet metal pocket arranged above the passageway and carried by the car end, a metallic cover sheet secured to the face plate and extending above the passageway, the cover sheet adapted for reciprocation within the last named pocket, the pockets being of sufficient width to loosely receive the sheets, and packing material arranged between the sheets and the pocket walls.

17. In a diaphragm construction for vestibule cars having movable face plates, vertically disposed metallic diaphragm side members connected respectively to the car end and face plates, one of such connections being hinged, said members being arranged for relative movement in adjacent substantially parallel planes, in combination with telescopically arranged cover sheets connected respectively to the car end and face plate above the vestibule passageway and providing for lateral play relative to the side members.

18. In a car vestibule construction, the combination with the car end, and the vestibule face plate, of coöperating metallic diaphragm sheets, one fixed to one of said members and the other flexibly connected to the other of said members with their free portions in overlapping relation and spaced apart to provide for slidable and angular relative movement, and means substantially bridging the space between the opposed faces of the members to close off the passage therebetween without interfering with the angular movement thereof.

19. In a car vestibule construction, the combination with the car end, and the vestibule face plate, of coöperating metallic diaphragm sheets, one fixed to one of said members and the other hinged to the other of said members with their free portions in overlapping normally parallel relation and spaced apart to provide for slidable and angular relative movement, and means substantially bridging the space between the opposed faces of the members to close off the passage therebetween without interfering with the angular movement thereof.

20. In a car vestibule construction, the combination with the car end, and the vestibule face plate, of coöperating metallic diaphragm members respectively fixed to the car end and hinged to the face plate with their free portions in overlapping relation and spaced apart to provide for slidable and angular relative movement, and means substantially bridging the space between the opposed faces of the members adjacent the margins thereof to close off the passage therebetween without interfering with the angular movement thereof.

21. In a car vestibule diaphragm construction, the combination with the car end, and the vestibule face plate, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and face plate, the said sheets being spaced apart to permit slidable and angular movement, and flexible means carried by one of said cover sheets and bridging the space between the opposed faces of said sheets to close off the passage therebetween without interfering with the angular movement thereof.

22. In a car vestibule diaphragm construction, the combination with the car end, and the vestibule face plate, metallic diaphragm side sheets attached to the car end and to the face plate respectively and adapted for sliding and also for angular movement with relation to each other at their free edges, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and face plate, the said sheets being in normally substantially parallel relation and spaced apart to permit slidable and angular movement, and means carried by one of said cover sheets and bridging the space between the opposed faces of said sheets to close off the passage therebetween without interfering with the angular movement thereof.

23. In diaphragm construction for vestibule cars having a movable face plate, the combination with metallic diaphragm side sheets attached to the car end and to the face plate respectively and adapted for sliding movement and also for angular movement with relation to each other at their free edges, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and to the face plate, the cover sheets being spaced apart to permit slidable and angular movement, certain of the side sheets terminating upwardly in angularly bent wing portions and the coöperating cover sheet having at its sides angularly bent wing portions overlapping in sliding contact the wings of the side sheets.

24. In diaphragm construction for vestibule cars having movable face plates, the combination with metallic diaphragm sheets fixed to the car end and hinged to the face plates respectively and adapted for sliding movement and also for angular movement with relation to each other at their free edges, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and face plate, the cover sheets being spaced apart to permit slidable and angular movement, the side sheets secured to the face plate terminating upwardly in inturned wing portions and the cover sheet secured to the face plate having at its sides inturned wing portions overlapping in sliding contact the wings of the side sheets.

25. In diaphragm construction for vestibule cars having movable face plates, the combination with metallic diaphragm sheets fixed to the car end and hinged to the face plates respectively and adapted for sliding movement and also for angular movement with relation to each other at their free edges, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and face plate, the cover sheets being spaced apart to permit slidable and angular movement, the side sheets secured to the face plate terminating upwardly in inturned substantially horizontal wing portions with marginal upstanding flanges and the cover sheet secured to the face plate having at its sides inturned wing portions overlapping in sliding contact the wings of the side sheets within the space bounded by the marginal flange.

26. In a diaphragm construction for vestibule cars having movable face plates, the combination with metallic diaphragm sheets fixed to the car end and hinged to the face plates respectively and adapted for sliding movement and also for angular movement with relation to each other at their free edges, of metallic cover sheets above the vestibule passageway and secured respectively to the car end and face plate, the cover sheets being spaced apart to permit slidable and angular movement, the side sheets secured to the face plate terminating upwardly in inturned horizontal wing portions and the cover sheet secured to the face plate having at its sides inturned wing portions overlapping in sliding contact the wings of the side sheets, and a housing carried by the cover sheet and inclosing the overlapping wing portions of the side and cover sheets.

27. In a diaphragm construction for vestibule cars having movable face plates, vertically disposed metallic diaphragm side members connected respectively to the car end and face plates, one of such connections being hinged, said sheet being arranged for relative movement in adjacent substantially parallel planes, and means for maintaining the transverse relation of the diaphragm sheets at the free end of the hinged sheet, in combination with telescopically arranged cover sheets connected respectively with the car end and face plate above the vestibule passageway and providing lateral play relative to the side members.

28. In a diaphragm construction for vestibule cars having movable face plates, metallic diaphragm side sheets fixed to the car end and hinged to the face plate respectively and adapted for sliding movement and also for angular movement with relation to each other at their free edges, and means for maintaining a substantially tight joint between said members to prevent the passage of the elements therebetween, in combination with telescopically arranged cover sheets connected respectively to the car end and face plate above the vestibule passageway and providing for lateral play relative to the side sheets.

29. A telescoping metallic car diaphragm comprising members adjustably associated one to another in contact relation and telescoping within compartments provided therefor on the car body.

30. A car diaphragm of the class described comprising top and side wall mem-

bers, said top member adjustably associated with said side wall members in contact relation to permit relative movement therebetween, and mechanism associated with the car body adapted to receive said top and side wall members telescoped therewithin.

31. In a vestibule diaphragm of the class described, stationary channel side walls, a channel roof member rigidly associated therewith, and adjustably associated side walls and roof member adapted to telescope within said channel side walls and roof member.

In testimony whereof we have hereunto signed our names in the presence of two subscribing witnesses.

FRANCIS M. GUNN.
LARS J. BERG.

Witnesses:
W. McLAREN,
W. J. DICKINSON.