Oct. 8, 1940. M. SEEL 2,217,599

VESTIBULE CONNECTION FOR RAILWAY CARS

Filed March 13, 1940 7 Sheets-Sheet 1

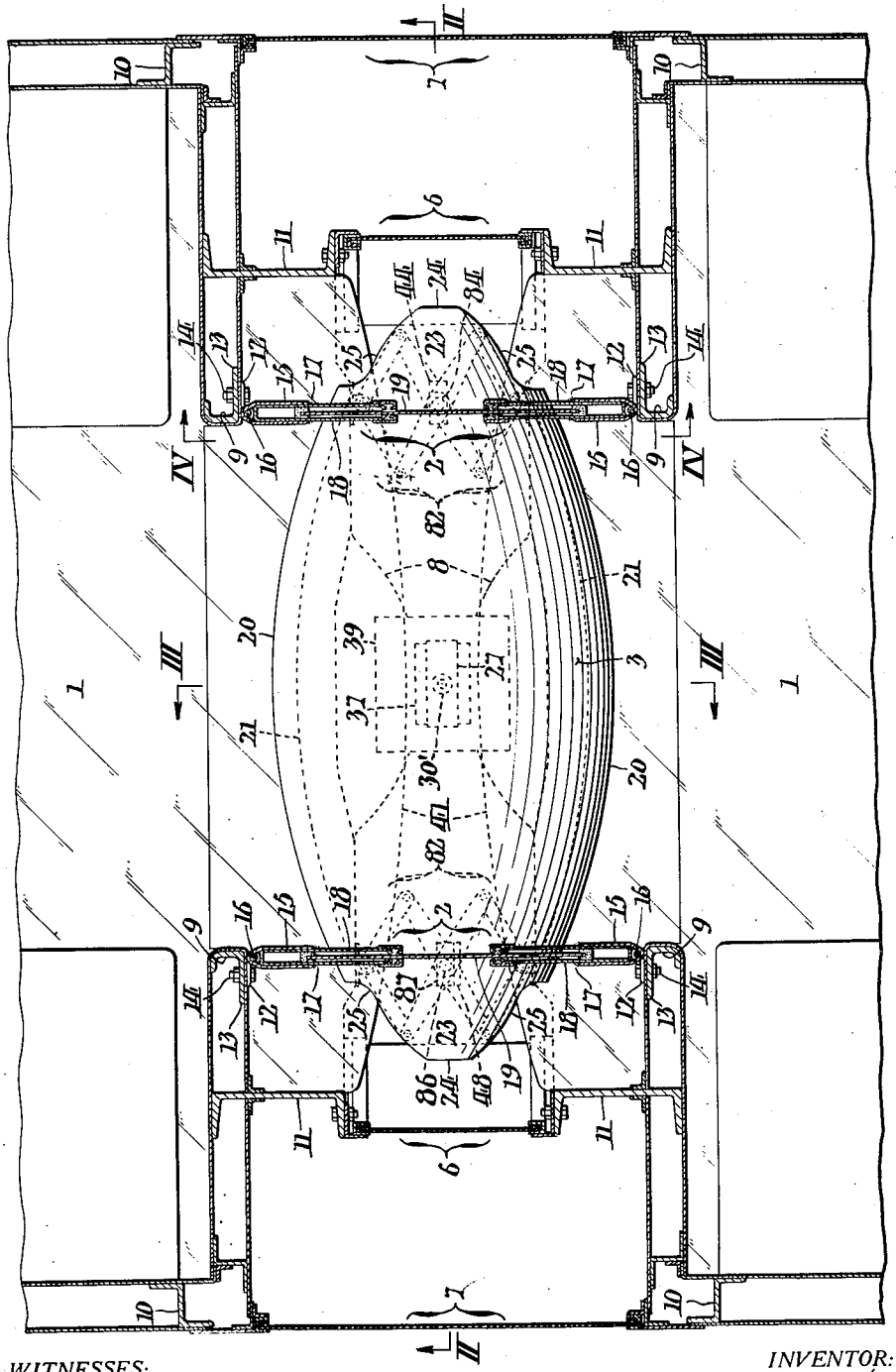


FIG. 1

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Oct. 8, 1940. M. SEEL 2,217,599

VESTIBULE CONNECTION FOR RAILWAY CARS

Filed March 13, 1940 7 Sheets-Sheet 2

FIG. 2.

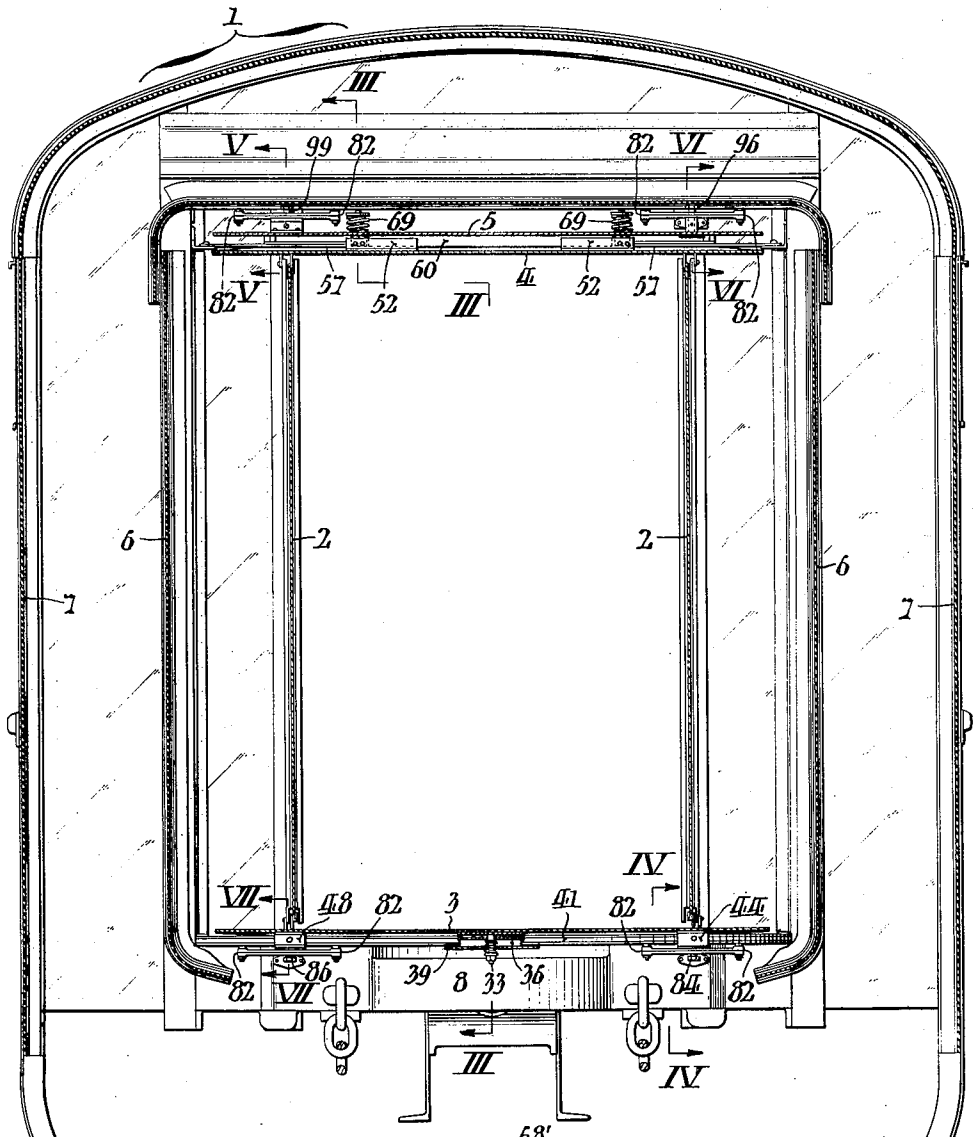
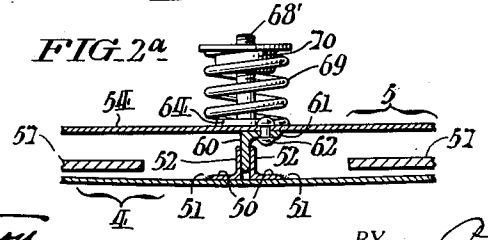


FIG. 2a



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VESTIBULE CONNECTION FOR RAILWAY CARS

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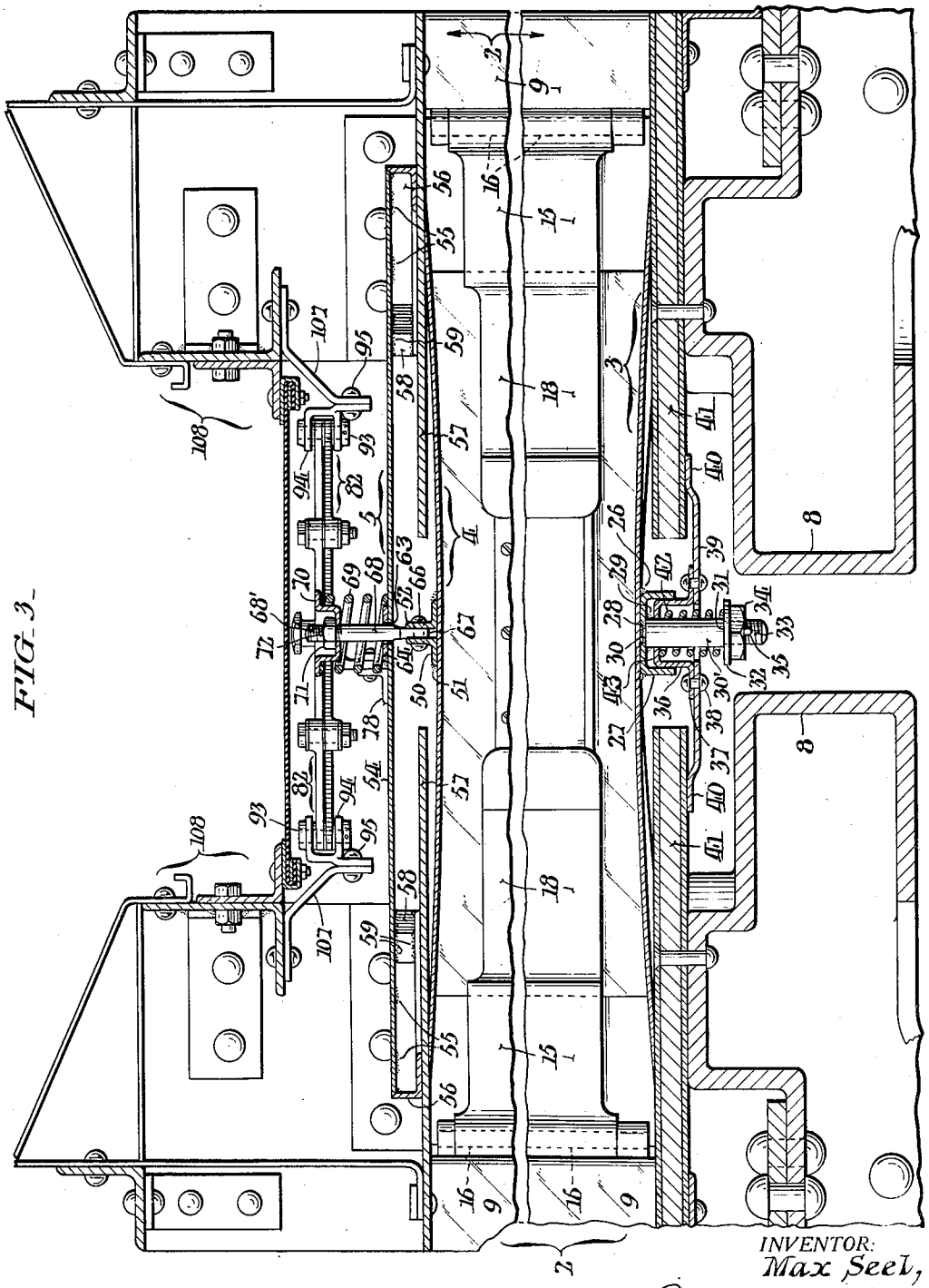


FIG. 3.

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Oct. 8, 1940. M. SEEL 2,217,599

VESTIBULE CONNECTION FOR RAILWAY CARS

Filed March 13, 1940 7 Sheets-Sheet 4

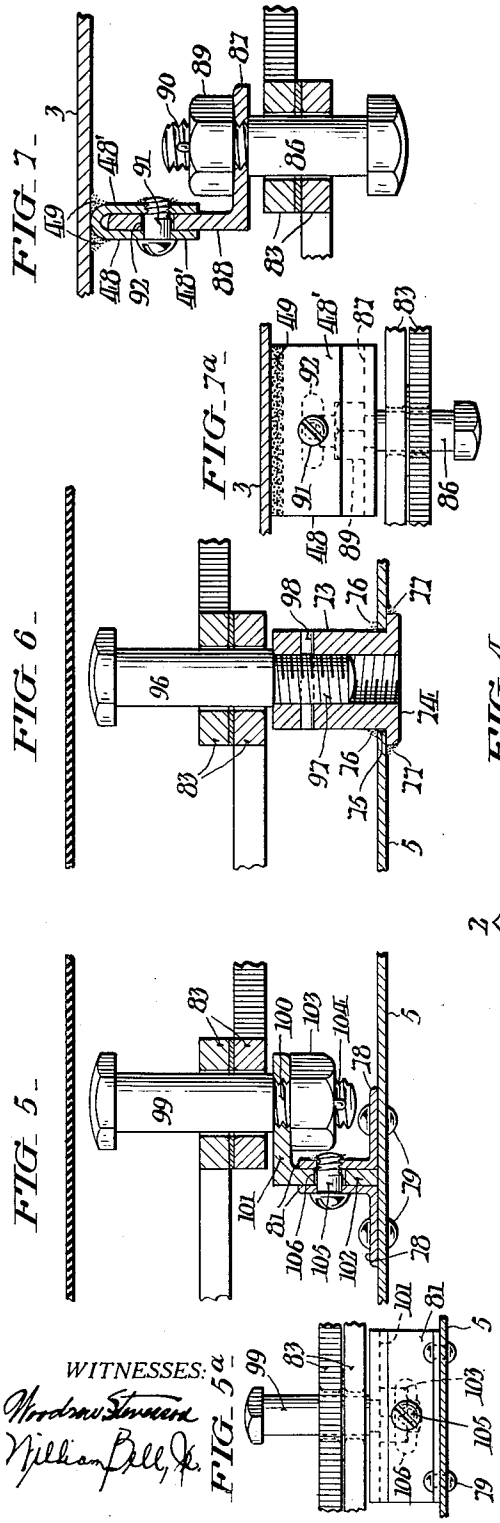


FIG. 7

FIG. 7a

FIG. 6

FIG. 5

FIG. 5a

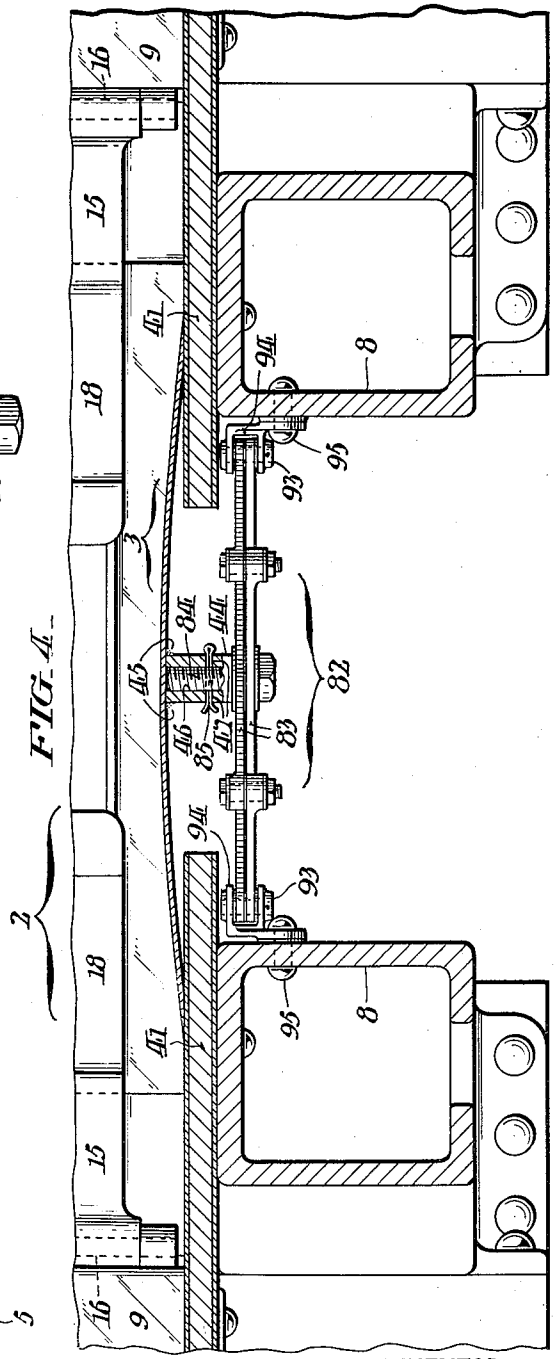


FIG. 4

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Oct. 8, 1940. M. SEEL 2,217,599

VESTIBULE CONNECTION FOR RAILWAY CARS

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FIG. 8.

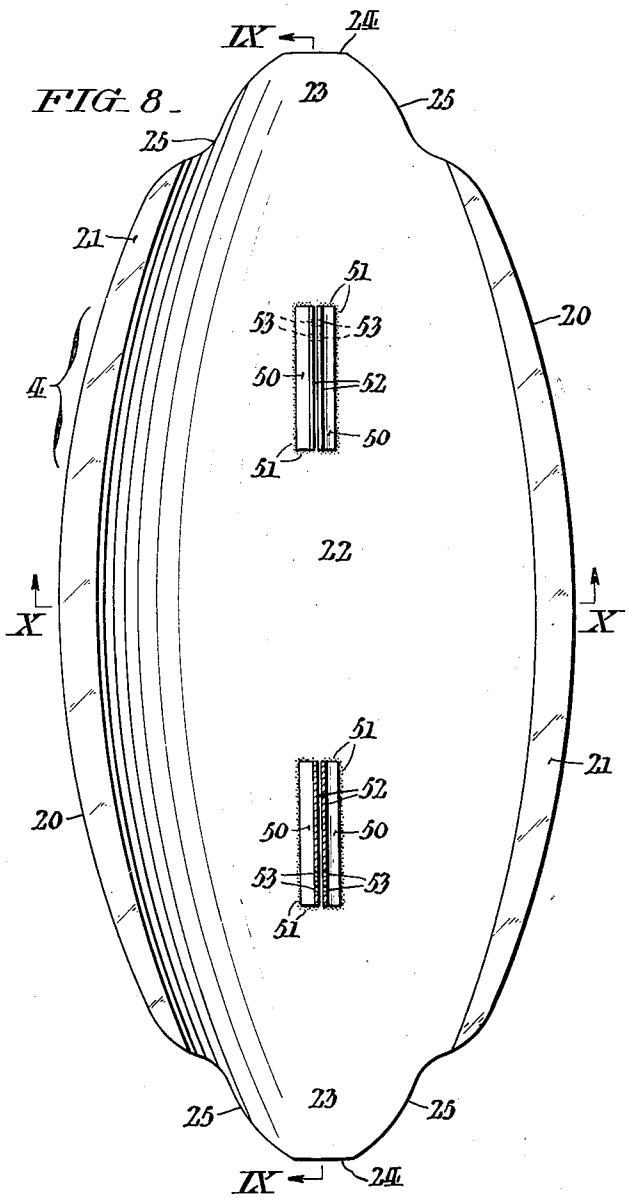


FIG. 9.

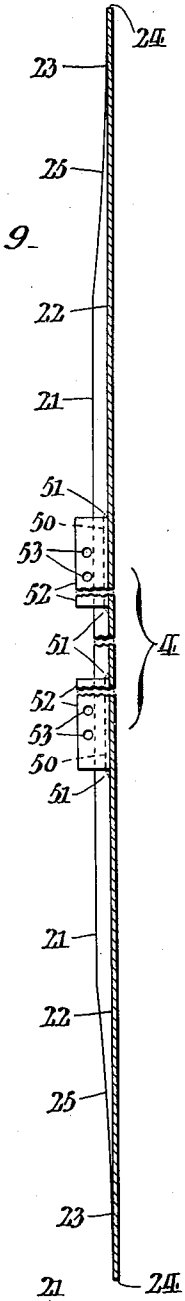
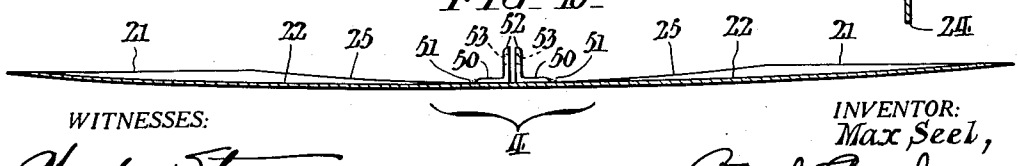


FIG. 10.



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VESTIBULE CONNECTION FOR RAILWAY CARS

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FIG. 11.

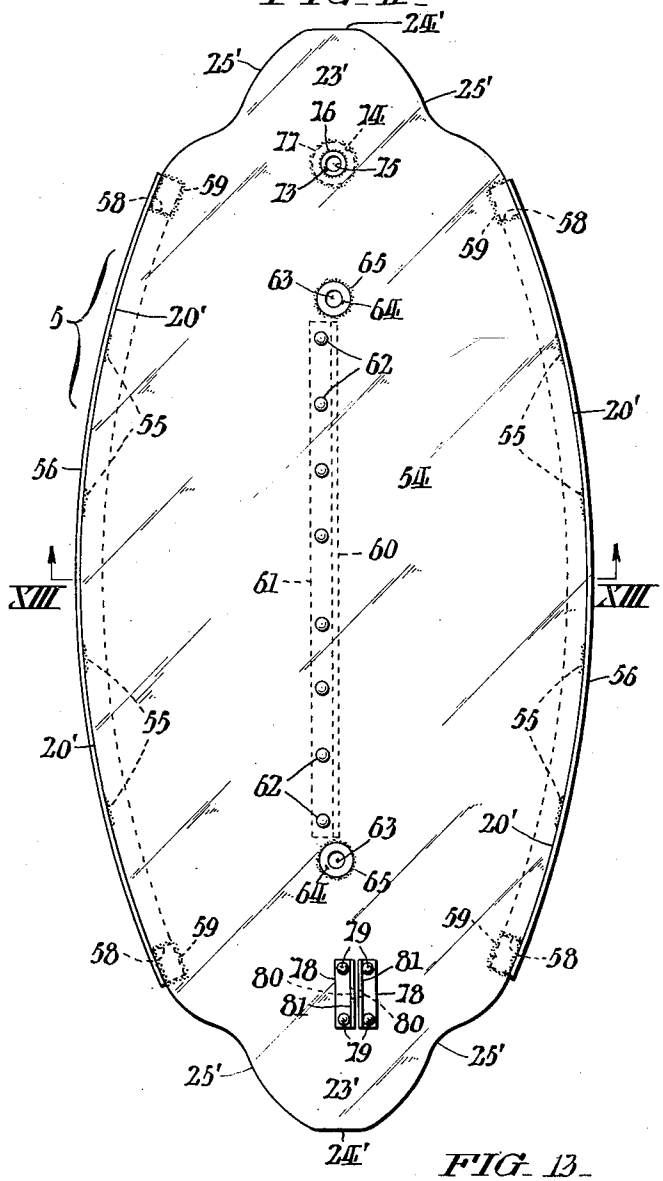


FIG. 12.

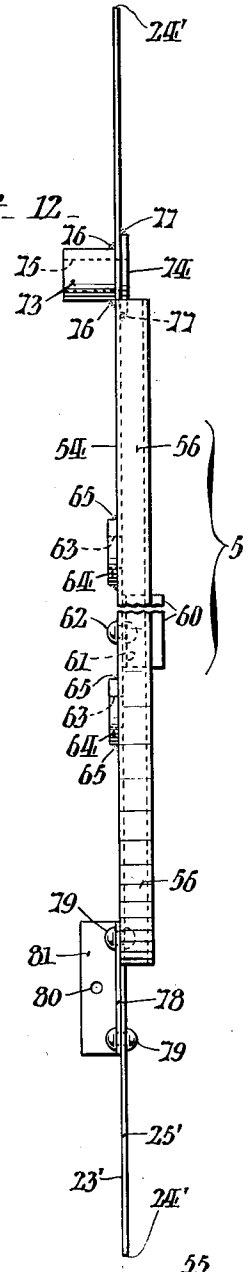
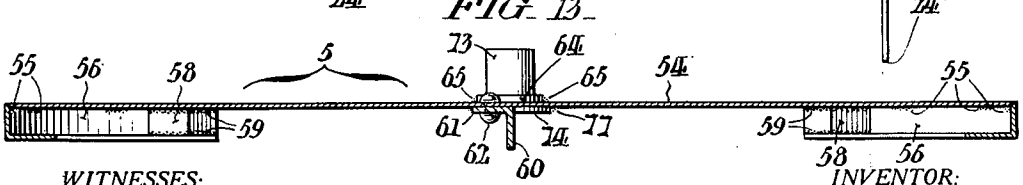


FIG. 13.



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VESTIBULE CONNECTION FOR RAILWAY CARS

Filed March 13, 1940 7 Sheets-Sheet 7

FIG. 14.

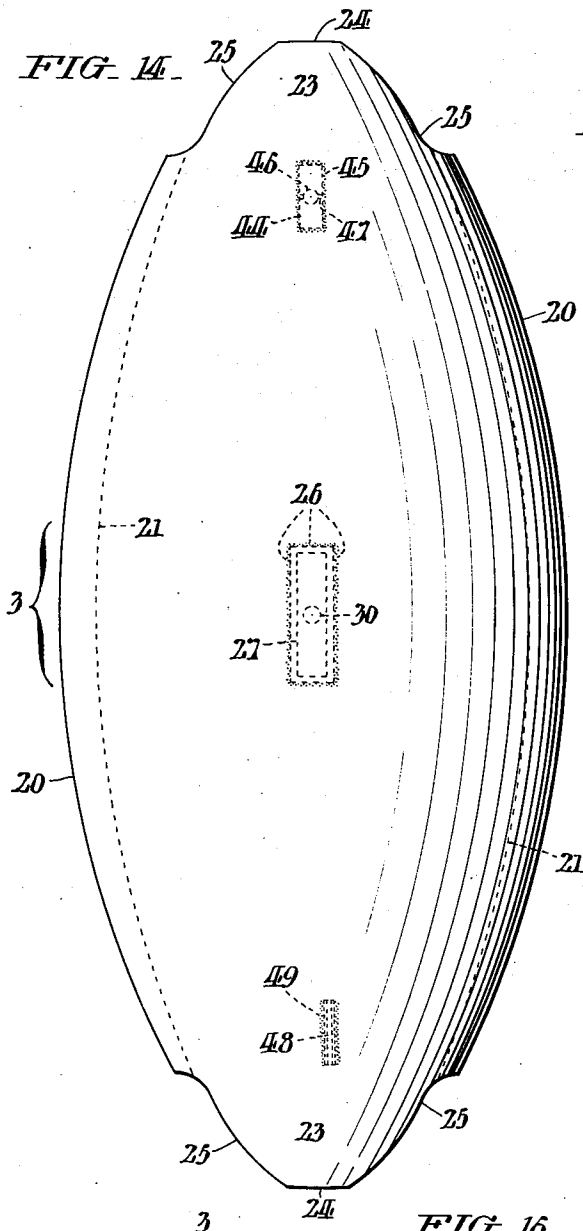


FIG. 15.

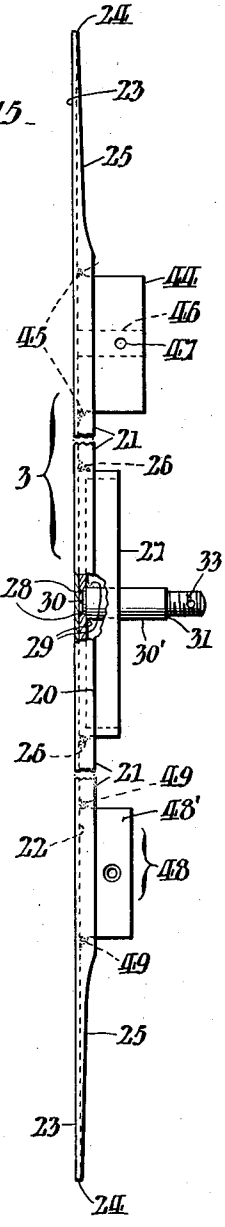
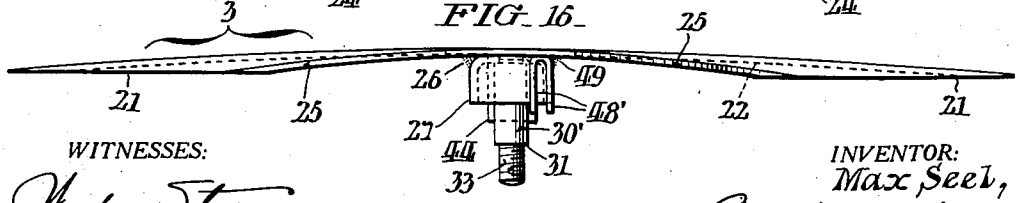


FIG. 16.



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Patented Oct. 8, 1940 2,217,599

UNITED STATES PATENT OFFICE

2,217,599

VESTIBULE CONNECTION FOR RAILWAY CARS

Max Seel, Lansdowne, Pa., assignor to The Pennsylvania Railroad Company, Philadelphia, Pa., a corporation of Pennsylvania

Application March 13, 1940, Serial No. 323,686

16 Claims. (Cl. 105—8)

This invention relates to vestibule structure for railway cars and, more particularly, to the specie for connecting the ends of adjoining cars with provision of a passageway for passengers and others. More specifically, the present improvements have reference to a connection for non-articulated railway cars, with the fundamental object of ensuring a comparatively large walkway, whereby passengers, trainmen and car attendants may pass from one car to another without congesting such walkway.

Another object is to provide a vestibule connection of the indicated character which is devoid of any surrounding or other openings that would permit ingress of drafts, dirt and atmospheric inclemencies. In other words, the various components of a vestibule connection embodying the present invention are so constructed and compensatively arranged that, although relatively movable to accommodate variations in the running of connected cars, a substantially closed structure against surrounding air and other infiltration from the exterior is effectively avoided.

A further object is the provision of a vestibule connection as typified in the preceding paragraph comprising foot and ceiling plates with associated pantographs controlling their relative movements, each such pantograph including fixed and movable fulcra, whereby provision is made for automatic accommodation of the varying angle hypotenuses or vertical deflections incidental to expansive and contractive movements when the connected car ends traverse and "bank" railroad curves in either direction.

Still further objects and ancillary advantages of this invention will hereinafter appear, or be specifically noted, as the nature thereof is more fully explained, said invention consisting substantially in certain novel features of construction, the combination and correlation of parts hereinafter disclosed and typically illustrated by the accompanying sheets of drawings, wherein corresponding reference characters are used to designate similar parts throughout the several views; while the concluding claims more particularly define the features of novelty.

In the drawings:

Fig. 1 is a fragmentary plan section of adjoining railway car ends including a preferred form of vestibule connection in accordance with this invention.

Fig. 2 is a part section and part elevation, taken approximately on the plane II—II in Fig. 1.

Fig. 2—*a* is a fragmentary detail section hereinafter fully explained.

Fig. 3 is a broken vertical section on the plane III—III in Figs. 1 and 2, but drawn to larger scale for the clearer illustration of structural details.

Fig. 4 is a fragmentary sectional view on the plane IV—IV in Figs. 1 and 2, likewise drawn to a larger scale.

Fig. 5 is a fragmentary vertical section, taken as viewed in the direction of the arrows V—V in Fig. 2, and also drawn to larger scale.

Fig. 5—*a* is a reduced scale side view of the preceding figure, and looking as seen from the left-hand thereof.

Fig. 6 is a similar section on the plane VI—VI in Fig. 2.

Fig. 7 is a corresponding section on the plane VII—VII of Fig. 2.

Fig. 7—*a* is a reduced scale elevation of the preceding figure, as viewed from the left-hand thereof.

Fig. 8 is a plan view of an inner ceiling plate hereinafter fully described.

Fig. 9 is a broken longitudinal section on the plane IX—IX in Fig. 8, but drawn to a larger scale for clearer illustration.

Fig. 10 is a similar scale transverse section on the plane X—X in Fig. 8.

Fig. 11 is a plan view of an outer or ceiling-supporting plate, later on fully described.

Fig. 12 is a broken side view of Fig. 11, as seen looking towards the left-hand thereof, and drawn to a larger scale for purposes of clarity.

Fig. 13 is a corresponding scale section on the plane XIII—XIII of Fig. 11.

Fig. 14 is a plan view of a sliding floor plate, hereinafter fully explained.

Fig. 15 is a broken side view of Fig. 14, with a minor portion in section, but drawn to larger scale for purposes of clearer illustration; and,

Fig. 16 is a corresponding scale end view of the same.

In the following detailed description of a constructive embodiment of this invention, as shown by the accompanying seven sheets of drawings, specific terms will be employed for the sake of clarity, but it is to be understood that such terms are used in a descriptive sense and not for purposes of limitation. Each specific term is intended to include all technical equivalents which operate in a similar manner to accomplish an analogous purpose.

Referring more in detail to the drawings, the vestibule connection therein shown as disposed between the ends of adjoining non-articulated car ends 1, briefly comprises inner side walls or collapsible diaphragms 2; a sliding foot-plate 3;

a ceiling plate 4 and associated supporting plate 5; as well as intermediate and outer blinds or diaphragms 6, 7, respectively, which spacedly flank the collapsible diaphragms 2.

The respective car ends 1 are of standard construction needing no further explanation herein, other than to mention that the reference numeral 8 designates the bumper sill, 9 indicates the car end bulb or irregular channel-section vestibule posts, 10 the car end corner posts, and 11 channel-section intermediate or vestibule platform posts; all of which are incorporated in the car ends in accordance with known practice.

Referring now to the diaphragms 2, each said diaphragm, preferably all metal, comprises a stationary hinge component 12 conveniently secured to the wider or outer flange 13 of a vestibule post 9, as by bolts 14. The associated hinge component 15 is of elongated U-shaped cross-section and fulcrumed to the component 12 by a pivot pin 16. Inserted in the hollow of the component 15 and permanently fixed thereto, as by welds 17, is a pocket-like structure 18, that, in conjunction with the opposing structure 18, jointly afford guidance for a floating plate 19 and permit the diaphragms 2 to automatically adjust themselves when connected cars pass around railroad curves, switches or turnouts, as well as to accommodate vertical changes between the cars, due to uneven rails, spring deflections and swaying of the cars.

Associated with the metal collapsible diaphragms 2 are the slidable foot and ceiling plates 3 and 4, respectively, each said plate being of substantially oval contour and dished cross section. In other words, the foot-plate 3, see Figs. 14—16 more particularly, is appropriately shaped to define opposing curved sides 20 along the major dimension with associated flats 21 of outwardly-tapering width, from the mid-region of said plate, and inwardly by the dished longitudinal portion 22; as well as reduced extensions 23 having arcual extremities 24 with flanking mergently-curved edges 25. Secured centrally and lengthwise of the concaved underside of the plate 3, as by a surrounding fillet weld 26 is a rectangular inverted receptacle 27, axially of which is permanently secured by outer and inner welds 28, 29, the shouldered end 30 of a stud 30' having the other end reduced to provide an abutment 31 for a stop washer 32, as well as being screw-threaded at 33 for reception of a lock nut 34, which latter may be additionally prevented from working loose by a diametric cotter pin 35. Slidably fitting the receptacle 27 is an inverted channel-section 36 having the opposing walls angled to define flanking flanges 37, and to which is attached, as by rivets 38, a rectangular center plate 39, having the transverse edges stepped at 40 for sliding engagement against the underside of the adjoining car stationary foot-plates 41, under the influence of a coil spring 42, about the stud 30 intermediate the channel-section web 43 and washer 32. It will thus be readily understood said spring 42 also serves to maintain the flats 21 of the foot-plate 3 bearing down on the upper face of the car stationary foot-plates 41. In addition, the sliding foot-plate 3 is provided proximate one reduced extension 23 with a centrally-located longitudinally-disposed rectangular block 44, secured thereto by a fillet weld 45, said block having an axial screw-threaded bore 46, Fig. 4, and aligned pin holes 47, the purposes of which will be later on clarified, as well as a lengthwise offset and inverted stirrup device 48 adjacent to the other reduced extension 23, said stirrup also being rigidly fixed in position by substantial welds 49, see Figs. 7 and 16 to best advantage.

The slidable ceiling-plate 4, shown in detail by Figs. 8–10, inclusive, insofar as its body structure is concerned, corresponds with that of the foot-plate 3, accordingly like reference characters are applied thereto, in order to obviate unnecessary repetitive explanation. Preferably, although not essentially, equally spaced from the center of the dished inner portion 22 and in parallel with the longitudinal median of the plate 4, are spaced and reversely-disposed angle-sections 50 secured in position by fillet welds 51; said sections thus defining aligned guide-flanges 52 having spaced holes 53 therein, for a purpose hereinafter explained.

Referring now to the supporting plate 5, the same comprises a flat sheet metal component 54 in outline conforming with the contour of the plates 3 and 4; or, in other words, it includes curved sides 20', reduced extensions 23' with arcual extremities 24' and mergently curved edges 25'. Permanently attached, as by welds 55, to the curved sides 20' are correspondingly-shaped angle-sections defining runners 56 for sliding coaction with the adjoining car stationary ceiling sheets 57, Figs. 2 and 3; said runners having spacer blocks 58 at the free ends, which are attached in position and to the underface of the component 54 by surrounding welds 59 to ensure rigidity of the runners 56, while their lower faces are preferably ground planarly flat to ensure smooth sliding movement over the ceiling sheets 57. Longitudinally central of the underside of the plate 5 is disposed the relatively dependent flange or part 60 of an angle, the other flange 61 whereof is conveniently attached to such plate by rivets 62; while the flange 60 in service is engaged between the guide flanges 52 on the ceiling plate 4. In order to maintain the ceiling plate 4 and supporting plate 5 in joint sealing coaction with the car ceiling sheets 57, the plate 5 is provided with apertures 63, reinforced by annular pieces 64 circumferentially welded thereto at 65; while the subjacent ends of the guide flanges 52, on the dished face 22 of the ceiling plate 4, have secured thereto, as by rivets 66, Fig. 3, the flattened ends 67 of suspension bolts 68, which are passed upwardly through the apertures 63, in the supporting plate 5, and have their free ends screw-threaded at 68', seen also to better advantage in Fig. 2—*a*. Concentric with the bolts 68 are coil springs 69 that are conveniently maintained in pressure-influencing position by cupped washers 70, in conjunction with the annular pieces 64, and nuts 71 with lock pins 72. Thus it will be clearly apparent that both the ceiling-plate 4 and the supporting plate 5 are pressure-influenced against the lower and upper faces of the car end ceiling sheets 57, while they are operatively retained in mutual registration by the part 60 and guide flanges 52, Fig. 2—*a*. In addition to the foregoing, the supporting plate 5 is fitted proximate one reduced extension 23' with a centrally located bushing 73 having a flange 74, said bushing being passed upwardly through an aperture 75, Fig. 6, in the plate 5 and permanently fixed by upper and lower circumferential welds 76, 77, respectively. Spaced angle sections 78 are also secured to the other reduced extension 23' of the plate 5, as by rivets 79; said sections being located to one side and parallel with the longitudinal median of the component 54, while they are provided with axially aligned holes 80 in the outwardly projecting flanges 81. It may be here

noted that the coil springs 69 deflect the movements of the adjoining railway cars in relation to each other and thereby hold the sliding ceiling plate 4, with supporting plate 5, tightly against the ceiling sheets 57 to seal up any space between said parts; while the foot-plate spring 42 similarly deflecting with the movements of the cars prevents said foot-plate from jumping-up and rattling, while there is no danger of a person being caught between the cars when walking over the sliding plate 3 from one car to the other.

In order that the respective foot and ceiling plates 3, 4 and 5, shall always be maintained central between the adjoining car ends 1, 1, irrespective of the relative positions of the cars when passing track curves, switches, turnouts, and also when said cars sway due to uneven rails and other operating conditions, use is made of pantographs comprehensively designated in each instance by the reference index 82. Referring first to the pantograph assembly in connection with the foot-plate 3, and by reference to Figs. 1 and 4, it will be readily understood that the center components 83 of one pantograph 82 are pivotally sustained by a screw-stud 84, threadedly engaged in the bore 46 of the block 44, said stud being locked against turning by a split cotter pin 85 engageable in the block holes 47 and a registrable one diametrically through said stud. On the other hand, the center components 83 of the other pantograph 82 are sustained by a shouldered bolt 86, Figs. 7 and 7—*a*, rigidly anchored in one flange 87, of a bearer section 88, by a lock nut 89 and cotter pin 90. The bearer section 88 is of a thickness for slidable engagement between the leg portions 48' of the inverted stirrup 48, hereinbefore explained as rigidly secured below the foot plate 3, and to which it is coupled by a screw stud 91 with capacity for sliding on said screw by aid of a longitudinal slot 92, formed for the purpose in the bearer section 88, whereby provision is made for vertical angular compensative movements between the paralleling pantographs incidental to "banking" of one car relative to the other when rounding curves. In other words, the center components 83 of the one pantograph 82 are constrained to movement relative to a fixed axis—the stud 84—whereas the corresponding components 83 of the other pantograph 82 fulcrum about an automatically movable axis—the bolt 86. The outer ends of the pantograph 82 are respectively fastened by pivot means 93 engaged in fork brackets 94 individually secured to the car bumper sill 8, as by rivets 95 or otherwise.

Somewhat similarly the ceiling and supporting plates 4, 5 have associated pantographs 82, the center component 83 of one being fulcrumed to the shank of a stud bolt 96, Fig. 6, having a reduced end 97 threadedly engaged in and locked by a diametric pin 98 to the supporting plate bushing 73; whereas the other pantograph center components 83 are engaged about the shank of a bolt 99, Figs. 5 and 5—*a*, having a reduced end 100 screwed into a corresponding-threaded hole in one flange 101 of a bearer section 102; said bolt being fitted with a nut 103 and lock pin 104, as before described in connection with the bolt 86. The bearer section 102 is sustained by a screw-stud 105 engaged through the axially aligned holes 80 in the projecting flanges 81, while it is provided with an elongated slot 106, for analogous reasons set forth in connection with the foot-plate bearer section 88. The outer ends of the ceiling pantographs are respectively fastened by pivot means 93 engaged in fork-brackets 94, preferably sustained by brace-hangers 107, from the car ceiling structure generally designated as 108.

From the foregoing, the operation and relative actions of the several components of this invention will be clearly understood by those acquainted with the art, accordingly further elaboration herein is deemed unnecessary. It is, however, to be borne in mind that various changes may be made in the constructive disclosure, set forth herein, without departing from or sacrificing any of the advantages of the invention or any features thereof, and nothing in this specification shall be construed as limitations upon said invention, its concept or structural embodiment, as to the whole or any part thereof, except as defined in the following claims.

Having thus described my invention, I claim:

1. In a vestibule connection for the adjoining ends of cars having passageway defining diaphragms and associated stationary floor and roof elements, the combination of foot and ceiling plates slidably coactive with said elements respectively, spaced reactive means operating in parallel medially pivoted to the slidable plates with provision for axial movement, and said reactive means having the outer ends hinged to rigid structure on the adjoining car ends, whereby the slidable plates are maintained constantly central between the car ends and are moved in unison irrespective of alignment changes effected by roadway deviations.

2. The combination of claim 1 wherein the foot and ceiling plates are dished transverse to their major dimension intermediate flat sides of outwardly-tapering width from the mid-region, and said flats coact with the car end floor and roof elements.

3. The combination of claim 1, wherein the foot and ceiling plates are of substantially corresponding contour and section to define arcual flats for coaction with the car end floor and roof elements, said foot plate having an associated center plate for engagement below the car end floor elements, and means effective to maintain said foot and center plates in mutual coaction with the car end floor elements.

4. The combination of claim 1, wherein the foot and ceiling plates are of substantially corresponding contour and section to define arcual flats for coaction with adjoining car end floor and roof elements, a similarly shaped supporting component for the ceiling plate with arcual runners sustained by the car roof elements, said component being connected to the ceiling plate and movable therewith, and means effective to maintain the ceiling and supporting plates in mutual coaction with said car roof elements.

5. The combination of claim 1, wherein the medial pivot of one of the reactive means is stationary, and the corresponding pivot of the other reactive means is radially movable relative to the first mentioned pivot.

6. In a vestibule connection for the adjoining ends of railway cars having passageway defining diaphragms and associated stationary floor and roof elements, the combination of foot and ceiling plates slidably coactive with said elements respectively, spaced pantographs operating in parallel with their center components pivoted to the slidable plates with provision for axial movement, and said pantographs have their outer components hinged to rigid structure on the adjoining car ends, whereby said pantographs main-

tain the slidable plates constantly central between the car ends irrespective of alignment changes between the cars caused by railway track deviations.

7. The combination of claim 6, wherein the center pivot of one pantograph is stationary with respect to its associated slidable plate and the corresponding pivot of the other pantograph is radially movable relative to the first mentioned pivot.

8. The combination of claim 6, wherein the foot and ceiling plates are of elongate contour and transversely dished in respect to their major dimension; and each said plate embodies oppositely-directed co-planar flats, tapering outwardly from the mid-region in both directions, for coaction with the car end floor and roof elements.

9. The combination of claim 6, wherein the foot and ceiling plates are of substantially oval contour and dished cross-section, each said plate embodying opposedly curved flats of outwardly-tapering width from the mid-region, and reduced extensions having arcual extremities with flanking mergently-curved edges, a center plate associated with the foot plate, a supporting plate associated with the ceiling plate and of corresponding contour, and means effective to maintain all of said plates in mutual coaction with the respectively engaging car end floor and roof elements.

10. In a vestibule connection for the adjoining ends of non-articulated railway cars having passageway-defining diaphragms and rigid floor and roof sheet extensions, the combination of substantially oval contour longitudinally-dished foot and ceiling elements for respective sliding engagement with the floor extension upper face and the ceiling extension lower face; means secured centrally to the underside of the foot element affording support for a center plate having parallel edges adapted for coaction with the underside of the car floor extensions; a similar oval contoured supporting plate for the ceiling element having reversely curved edge runners coactive with the upper face of the car roof extension; guide means intermediate said supporting plate and the ceiling element to maintain them in spaced registration; means effective to maintain the aforesaid foot and ceiling elements, as well as the center and supporting plates, in sliding engagement with the car floor and roof sheet extensions; and spaced pantographs operative in parallel controlling relative movement of the elements and plates aforesaid to maintain them central between the car ends under all operating conditions.

11. The combination of claim 10, wherein the longitudinally-dished foot plate is provided with opposedly-curved flats intermediate reduced ends, said curved flats merging outwards from their mid-region to the reduced ends, an inverted rectangular receptacle with an axial post centrally below said foot plate, an apertured channel section slidably fitting said receptacle and centralized by the axial post, said channel section having the flanges outwardly angled for attachment thereto of the center plate, and spring means intermediate the inner face of the channel section and an opposing abutment rigidly secured to the post outer end part.

12. The combination of claim 10, wherein the longitudinally-dished foot plate is provided with opposedly-curved flats intermediate reduced ends, said curved flats merging outwards from their mid-region to the reduced ends, an inverted rectangular serviceable with an axial post centrally below said foot plate, an apertured channel section slidably fitting said receptacle and centralized by the axial post, a centrally-disposed rectangular block below and proximate one reduced end extension, said block having an axial screw threaded for reception of a shouldered stud bolt serviceable as a pivot for one of the pantograph center components, an inverted stirrup below and proximate the foot plate other reduced extension and having axially-aligned holes for reception of a screw stud, an angle section bearer with one flange coupled to the stirrup by said screw stud with capacity for relative sliding movement, and a shouldered bolt rigidly sustained by the bearer other flange and affording pivotal connection for the other pantograph center components.

13. The combination of claim 10, wherein the respective pantograph outer components are pivotally coupled to fork brackets, and means rigidly securing said brackets to the adjoining car end stationary structure.

14. The combination of claim 10, wherein the ceiling element has spaced and reversely-disposed angle-sections in parallel with the longitudinal median of said element to define guide flanges with apertures therethrough, suspension bolts with flattened ends and mating holes secured between the correspondingly apertured parts of the guide flanges, said bolts having projection through registrable holes in the supporting plate, cupped washers with associated locking means on the free ends of the suspension bolts, and spring means intermediate the cupped washers and top face of the supporting plate operative to always influence the latter and the ceiling element into mutual coaction with the car end roof sheet extensions.

15. The combination of claim 10, wherein the ceiling element has spaced and reversely-disposed angle-sections in parallel with the longitudinal median of said element to define guide flanges, the supporting plate is provided with opposed angle-section runners having spacer blocks at the outer ends, and a longitudinally central dependent flange below said plate engages between the ceiling element angle-sections for maintenance of said element and plate in definite registration.

16. The combination of claim 10, wherein the ceiling support plate is provided proximate one end with a centrally-located bushing with an upwardly-directed interlocked stud serviceable as a pivot for one pantograph central component, and spaced flanges having axially aligned holes for relatively slidable coupling connection of another pivot for the central components of the other pantograph, said flanges being located to one side and parallel with the longitudinal median of the supporting plate.

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