April 28, 1953 H. KUMP 2,636,447

STREAMLINE VESTIBULE CONNECTION

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Fig. 1.

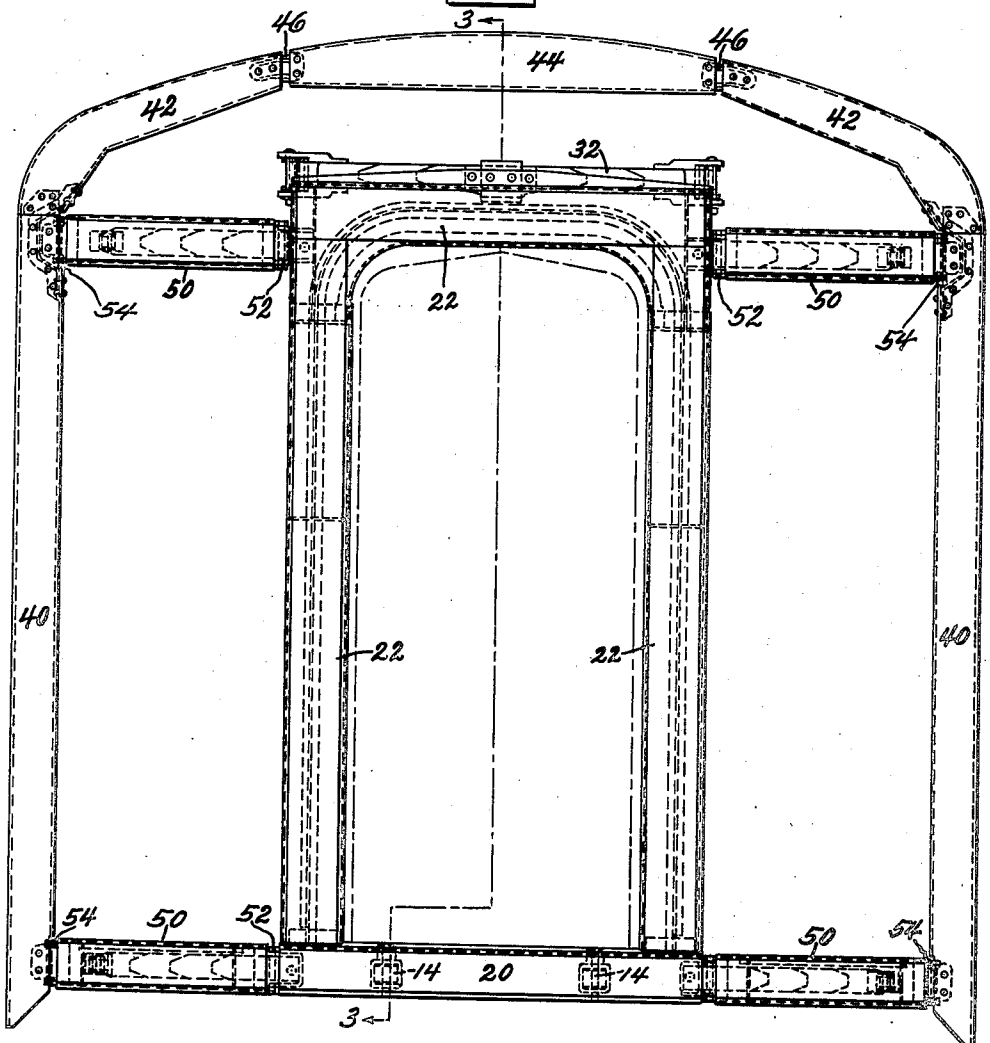

Fig. 7.

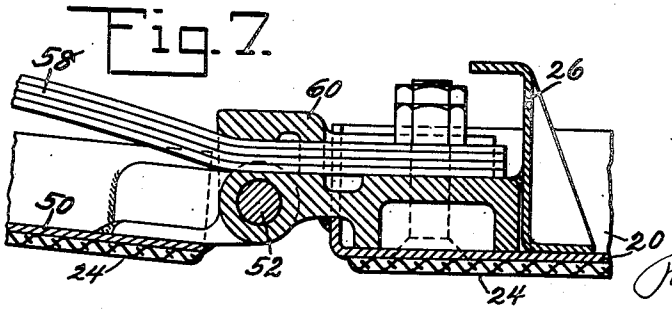

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Fig. 2.

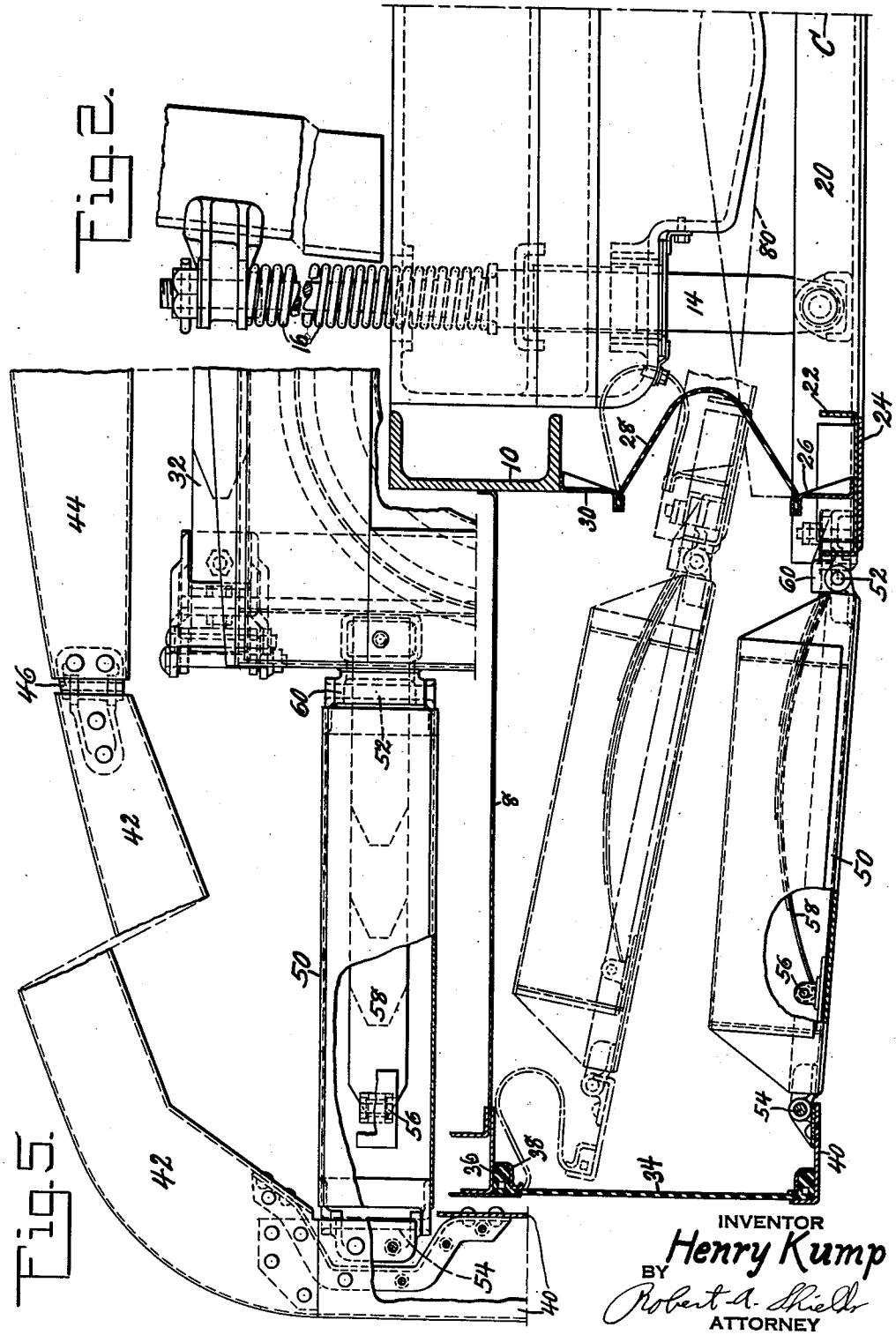

Fig. 5.

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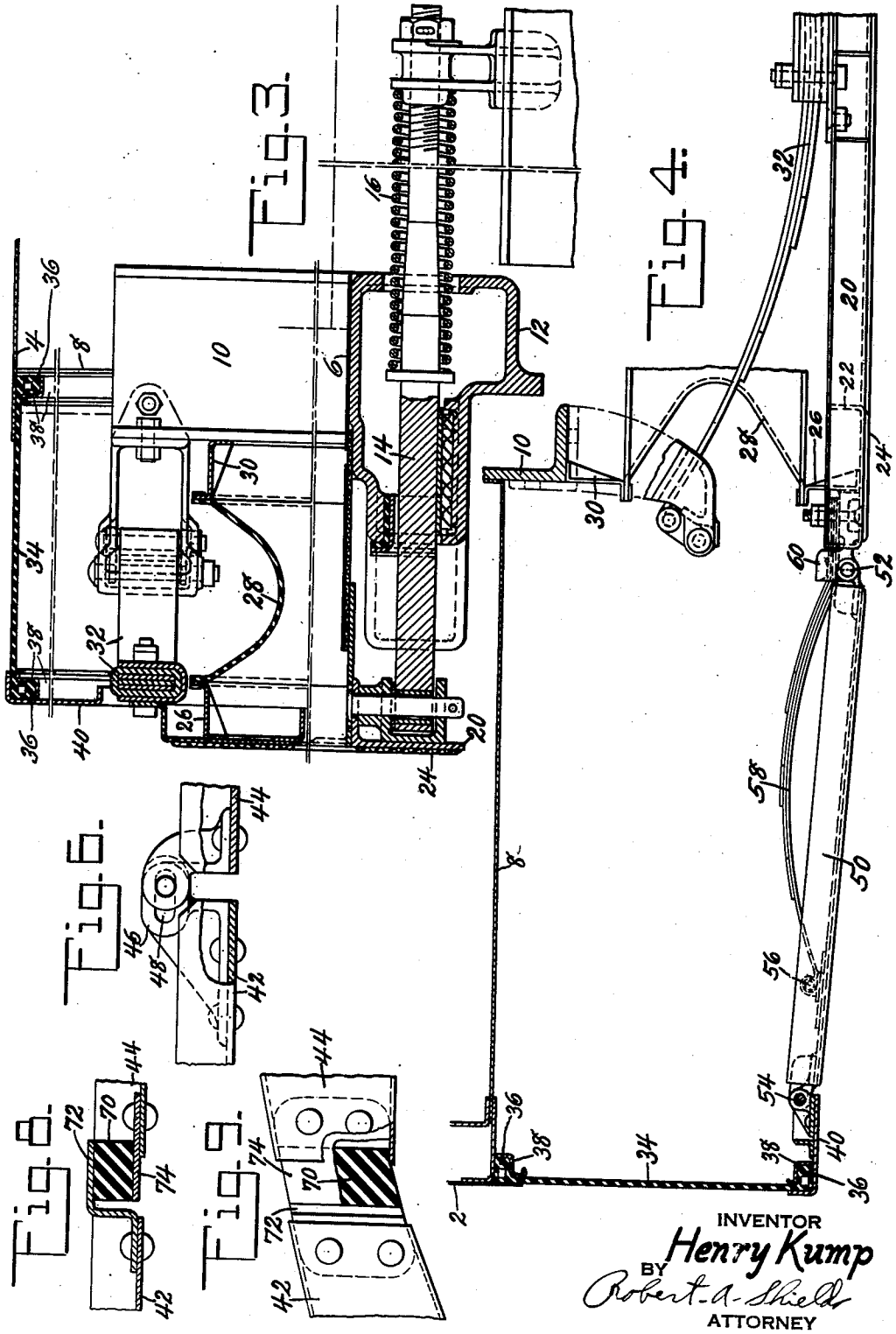

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2,636,447

STREAMLINE VESTIBULE CONNECTION

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Application January 29, 1948, Serial No. 5,153

9 Claims. (Cl. 105—10)

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This invention relates to rail vehicles in general and in particular to passenger vehicles wherein the vestibule connection between cars is streamlined.

For a considerable time various streamline connections between cars have been proposed. Most of these proposed constructions utilized a rigid frame and flexible diaphragm either connected to or pulled back toward the car. With such constructions a gap appeared on curves, which gap extended across the car from the outside to the inside of the curve. In recent years constructions have been proposed and used wherein the outer frame was provided with two wings attached to the central portion or inner passage member. With such a construction in order that the cars could negotiate curves and since the outer diaphragm was operated in conjunction with the inner faceplate, it was necessary to provide a considerable sag or looseness in the upper portion of the outer diaphragm. Since the space adjacent the coupler was open, air currents could operate on this loose diaphragm and cause it to flap, thereby being noisy and resulting in excessive wear and rather rapid destruction of the outer diaphragm. It is an object, therefore, of the present invention to provide a construction in which a sectional outer faceplate is utilized and so carried by the vehicle that the outer diaphragm is maintained taut at substantially all times and over its entire area.

A further object of the invention is the provision of a streamline closure in which the outer diaphragm extends substantially in the same plane as the roof and sides and which diaphragm can be made of constant width from end to end.

A still further object of the invention is the provision of a streamline closure having the outer faceplate assembly made in three parts pivotally and slidably connected together.

A yet further object of the invention is the provision of a streamline or vestibule connection in which the outer faceplate is made in several parts, some of which are carried by cantilever arms pivoted to the outer faceplate and to the vehicle, and other parts are free of any direct or controlling connection with the vehicle.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which

Fig. 1 is an end view of the improved vestibule connection assembly;

Fig. 2 is a horizontal sectional view through substantially one-half the assembly;

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Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 1 but with parts broken away to condense the figure;

Fig. 4 is a sectional view similar to Fig. 2 but taken at a point above the upper buffer spring;

Fig. 5 is an enlarged end view of the upper portion of the assembly with parts broken away to better disclose the construction;

Fig. 6 is an enlarged detail view of the outer faceplate pivot and slide connection;

Fig. 7 is an enlarged detail view of the cantilever pivot and semi-elliptic spring mounting, and

Figs. 8 and 9 are sectional and end views respectively of a modified hinge connection between the parts shown in Fig. 6.

Referring now to the drawings in detail, it will be seen that the improved streamline vestibule connection has been shown as applied to a car having side walls 2, roof 4 and floor 6 joined by an end wall 8. This end wall is pierced to provide a doorway reenforced at its edges by collision posts 10. These collision posts are firmly anchored to the vehicle structure at the top and at the bottom are securely anchored to heavy end casting 12. This end or platform casting has provision to receive side buffer stems 14 and if desired a central or pivoting buffer stem (not shown). Buffer stems 14 are urged outwardly by coil springs 16 and have pivotally mounted on their outer end a buffer member 20. To this buffer member is connected a substantially U-shaped inner faceplate member 22 of channel cross section. As is customary, these faceplate members and buffer members are covered by sound-deadening and wear-resisting material 24. To the inner face of the inner faceplate member 22 is attached Z-members 26 for the purpose of attachment of inner bellows fold diaphragm member 28, the inner edge of which is similarly attached by Z-member 30 to the collision posts 10. Above the passageway an upper buffer spring 32 is mounted on the vehicle and urges the inner faceplate assembly outwardly away from the car. The lower buffer springs 16 and upper buffer spring 32 are customarily chosen so as to place approximately 2000 pounds pressure on the inner faceplate when the cars are coupled, to thereby maintain a tight weatherproof connection at all times.

In order to give a streamline appearance to the vehicles and prevent snow, dirt, etc., from swirling into the space between cars, the outer diaphragm or streamline closure 34 is provided. This member extends continuously across the

roof between the lower edges of the car sides and, due to the construction later to be described, can be made of constant width from end to end, thus reducing its cost. This outer closure member **34**, as shown in Figs. 2, 3 and 4, is provided with enlarged end portions **36** gripped by metal members **38** fastened to the car end wall and retaining the closure member substantially in alignment with the car sides **2** and roof **4**. This manner of attaching the diaphragm is purely representative since it may be attached in some manner such as shown in Figs. 11 and 14 of Patent 2,090,492. The outer edge of diaphragm or streamline closure **34** is connected in a similar suitable manner to an outer multipart-faceplate assembly. This outer multipart faceplate assembly is made up of a pair of side pieces **40** of substantially inverted J-shape with the inturned legs **42** connected by means of a central part **44**. The side parts **40** and central part **44** together form a multipart pivotally connected outer faceplate of inverted U-section. Since the parts **40** must move inwardly, as will later be described, the pivots **46** are provided with elongated slots **48** to accommodate such inward movement between the side portions **42** and central portion **44** of the outer face plate (Fig. 6).

In order to carry the weight of the outer multipart faceplate, cantilever arms **50** are pivoted as at **52** to the inner faceplate and at **54** to the outer faceplate sides **40** inwardly of the closure **34**. The cantilever arms are preferably of channel cross-section and have mounted therein a slide structure **56** to which is attached the outer end of a semi-elliptic spring **58**, the inner end of which is firmly anchored preferably in the hinge casting **60** attached to the inner faceplate assembly, all as most clearly shown in Figs. 2 and 7. As best shown in Fig. 1, four cantilever arms are used, namely, two on either side of the inner faceplate assembly and this will usually be sufficient except where excessively heavy material may require an added cantilever arm on either side. The cantilever arms have been shown as attached to the inner faceplate since such an arrangement gives a slightly reduced cost of construction, however, it is obvious that due to the pivotal connections **52** and **54**, the outer faceplate assembly is movable independently of the inner faceplate assembly. Accordingly, at a slightly increased cost of construction modified hinge castings **60** can be attached to either the collision posts **10** or to the end wall **8**, which would necessarily have to be stiffened for this purpose. Such a construction would likewise call for lengthening of the cantilever arms **50**, but would in no way alter the operation of the construction.

Since the springs **58** are designed to urge the cantilever arms **50** outwardly away from the end wall, they cause an outward pressure to be applied at the pivot structure **54**, but since this pivot is located inwardly of the diaphragm **34** a rotative tendency will be imparted to the sides **40**. This rotative tendency will cause the inturned portions **42** to be urged outwardly. However, due to the constant width and direct attachment of diaphragm **34** to the car sides and roof and to the outer faceplate assembly, the face portions of **40** and inturned arms **42** will be held substantially parallel to the end wall at all times. Since the central portion **44** is pivotally and slidably connected to arms **42** it likewise will be urged outwardly away from the car end wall and be held parallel thereto. Any in or out movement of the inner faceplate assembly will not effect the parallelism of the outer faceplate assembly with the car end wall, although it will slightly modify the pressure applied by springs **58**. Inward or outward movement of the inner faceplate from the uncoupled position of Figs. 2, 3 and 4 will cause the arms **42** and central portion **44** to separate slightly, but this movement is permitted by slot **48** as shown in Fig. 6. During curving of the cars, arm **42** will again have to move with respect to central portion **44**, but again such movement is accommodated by slot **48**.

The relative motion between the side parts **40** and central part **44** can be accommodated by means of a rubber block **70** vulcanized or otherwise attached to a Z-shaped plate **72** attached to arm **42** and also vulcanized or otherwise secured to a plate **74** fastened to central part **44**, all as clearly shown in Figs. 8 and 9. With such a construction the relative sliding movement between arms **42** and central part **44** will be accommodated by the rubber acting in shear. Also, the slight pivotal motion between the parts will be accommodated by the yielding of the rubber in both tension and compression.

The parts as shown in Figs. 2, 3 and 4 are in the uncoupled position of the car, that is, the inner faceplate assembly is located longitudinally outwardly of the plane of the outer faceplate. When the cars are coupled, however, the inner faceplate assembly will have its face substantially in the plane of the outer faceplate assembly. Extension of the draft gear will, of course, cause the inner faceplate to move toward the position shown in Figs. 2, 3 and 4, but such movement will not effect in any way the tautness of the outer diaphragm **34**. Inward movement on buff will, of course, cause wrinkles to appear in diaphragm **34**, but such a condition is of short duration. When the cars or vehicles go around a curve the inner faceplate assembly will in effect rotate about a center such as C, which center may, of course, move inwardly or outwardly along the longitudinal center of the car under draft or buff conditions. Relative rotation of the vehicles going around a curve will cause the inner faceplate assembly to rotate about such center C bringing the parts to the line and dash position of Fig. 2. The diaphragm **34** on the inside of the curve will accordingly be wrinkled since the adjacent outer faceplate will be in contact and forced out of parallelism with the car end wall, but will remain substantially parallel with the face of the inner faceplate assembly. The edge of the inner faceplate opposite that shown in Fig. 2 will be swung outwardly of its full line position, but since the connection between the inner faceplate and outer faceplate is only through the pivoted cantilever arms, the outer faceplate on the outside of the curve will remain in the position such as shown by full line in Fig. 4, that is, it will remain parallel to the end wall of the car. The central member **44** will extend from its pivotal connection with one arm **42** to its pivotal connection with the other arm, that is, it will lie in a plane such as shown by line and dash **80** of Fig. 2. In other words, this member will be moved out of parallelism with the end wall but will be at a lesser angle thereto than the outer faceplate located at the inner side of the curve. It will thus be seen that irrespective of the in or out or curving movements of the cars relative to each other, at least one of the outer faceplate members will always remain parallel to the car end wall. It will likewise be seen that since the central

member 44 is wholly independent of any connection with the inner faceplate, the powerful springs 16 and 32 can not effect the diaphragm 34 and this diaphragm can be stretched taut with the tension therein controlled by the springs 58 wholly independent of the pressure of springs 16 and 32. As stated previously, the pivot castings 60 can be attached to either the car end wall or collision posts, thus completely physically separating the inner and outer faceplates and permitting a reduction in the length of slot 48 of the pivotal connection between the side and central portions of the outer faceplate. The operation of the construction with casting 60 attached to the vehicle directly will be the same as that previously described in connection with the form shown.

Although the invention has been shown and described with particular reference to the figures, it will be apparent to persons skilled in the art that modifications other than those shown and described may be made and all such modifications are contemplated as will fall within the scope of the following claims defining my invention.

What is claimed is:

1. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge secured to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, a multi-part faceplate assembly secured to the outer edge of the diaphragm, cantilever arms supporting said assembly and being pivotally connected to said faceplate assembly adjacent their outer ends and to a portion of the vehicle adjacent their inner ends, and resilient means urging said cantilever arms and multi-part assembly outwardly away from said end wall, said multi-part faceplate assembly comprising side pieces and a central piece pivoted to the upper portions of said side pieces and supported solely thereby.

2. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge secured to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, a multi-part faceplate assembly secured to the outer edge of the diaphragm and comprising a pair of side pieces, a central piece flexibly connecting the side pieces adjacent their upper ends and supported thereby, cantilever arms pivotally connected adjacent their inner ends to said vehicle structure and at their outer ends to said side pieces inwardly of the diaphragm, and resilient means urging said cantilever arms outwardly away from said end wall whereby said diaphragm will be maintained taut and substantially in alignment with the roof and sides of the vehicle.

3. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge secured to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, a multi-part faceplate assembly secured to the outer edge of the diaphragm and including a pair of independent side pieces, cantilever arms pivotally connected at one end to a portion of the vehicle and at the other end to said side pieces inwardly of the diaphragm, resilient means urging said cantilever arms and side pieces outwardly away from said end wall, said multi-part assembly also including a central piece flexibly connecting the upper ends of said side pieces and urged outwardly thereby.

4. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge secured to the vehicle and forming substantially

a continuation of the sides and roof beyond the end wall, a multi-part faceplate assembly secured to the outer edge of the diaphragm and including a pair of independent side pieces, cantilever arms pivotally connected at one end to a portion of the vehicle and at the other end to said side pieces inwardly of the diaphragm, resilient means urging said cantilever arms and side pieces outwardly away from said end wall, said multi-part assembly also including a central piece pivotally and slidably connected to the upper end portions of said side pieces and urged outwardly thereby.

5. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge connected to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, an outer faceplate assembly secured to the outer edge of the diaphragm and comprising a pair of side pieces and a central piece pivotally connecting the upper end portions of said side pieces, an inner faceplate assembly free of direct connection to said central piece, cantilever arms pivotally connected to said inner faceplate and to said side pieces, and semi-elliptic springs anchored on said inner faceplate assembly and bearing on said cantilever arms to urge the same outwardly from the vehicle end wall.

6. A vehicle having sides and a curved roof joined by an end wall, a diaphragm having the inner edge connected to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, an outer faceplate assembly secured to the outer edge of the diaphragm and comprising a pair of side pieces and a central piece conforming to the roof curvature and pivotally connecting the upper ends of said side pieces, an inner faceplate assembly, cantilever arms pivotally connected to said inner faceplate and to said side pieces and forming the sole connection between said outer and inner faceplate assemblies.

7. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge connected to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, an outer faceplate assembly secured to the outer edge of the diaphragm and comprising a pair of side pieces and a central piece pivotally connecting the upper end portions of said side pieces, an inner faceplate assembly, and cantilever arms providing the sole connection between said outer and inner faceplate assemblies, said cantilever arms being pivotally connected to said assemblies whereby said inner faceplate assembly may move longitudinally of the vehicle independently of said outer faceplate assembly.

8. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge connected to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, an outer faceplate assembly secured to the outer edge of the diaphragm and comprising a pair of side pieces and a central piece connected to the upper end portions of said side pieces by rubber shear units whereby said pieces may pivot and slide relative to each other by the tension compression and shearing action of the rubber, and cantilever arms pivotally connected at one end to said vehicle structure and at the other end to said side pieces inwardly of the diaphragm.

9. A vehicle having sides and a roof joined by an end wall, a diaphragm having the inner edge connected to the vehicle and forming substantially a continuation of the sides and roof beyond the end wall, an outer faceplate assembly secured

to the outer edge of the diaphragm and comprising a pair of side pieces and a central piece pivotally connecting the upper end portions of said side pieces inwardly of the diaphragm, and cantilever arms pivotally connected at one end to a portion of said vehicle and at the other end to said side pieces inwardly of said diaphragm, the pivotal connections between said central piece and side pieces and between said cantilever arms and side pieces being so constructed and arranged as to maintain the outer surface of at least one side piece parallel to the vehicle end wall at all times.

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