March 18, 1958 W. B. DEAN ET AL 2,826,998

CAR DIAPHRAGM ASSEMBLY

Filed July 13, 1956 4 Sheets-Sheet 1

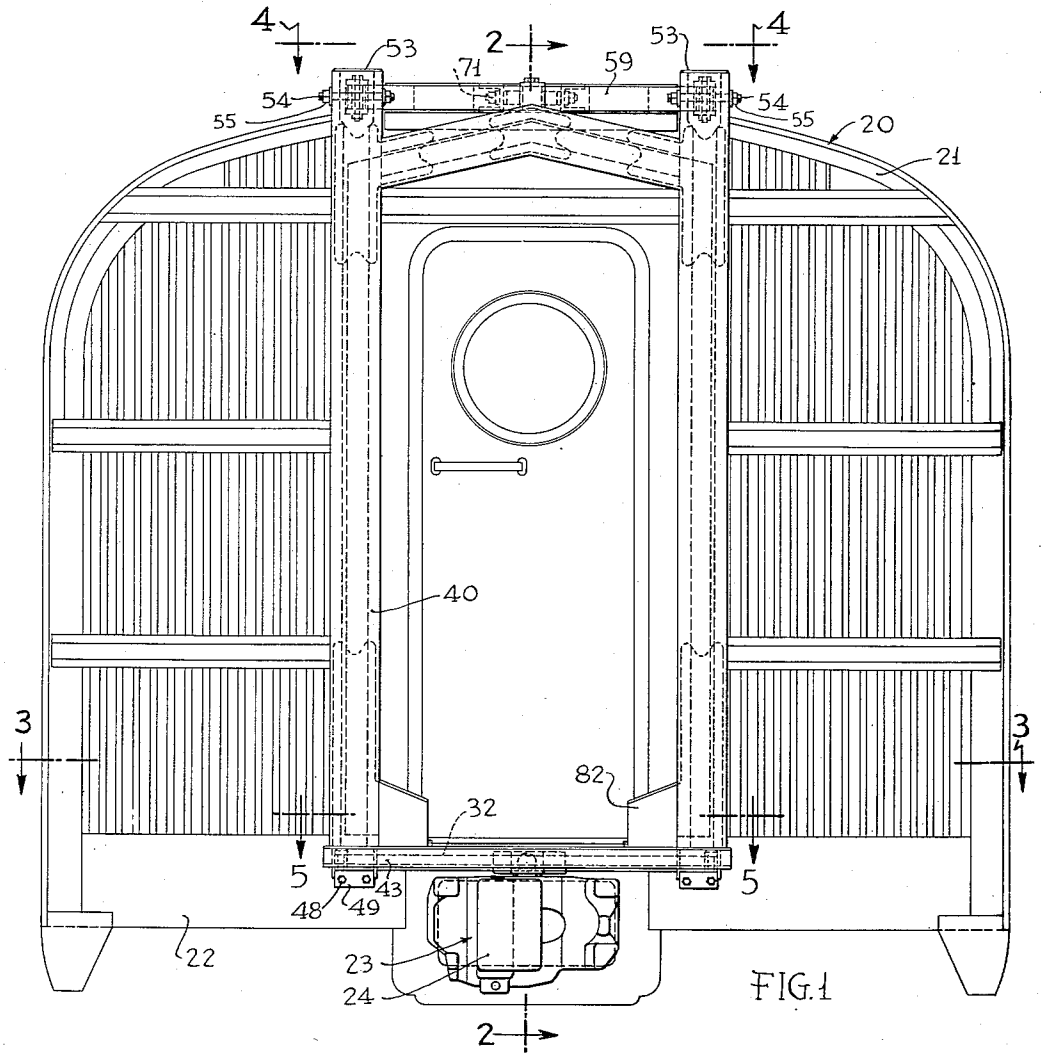

FIG. 1

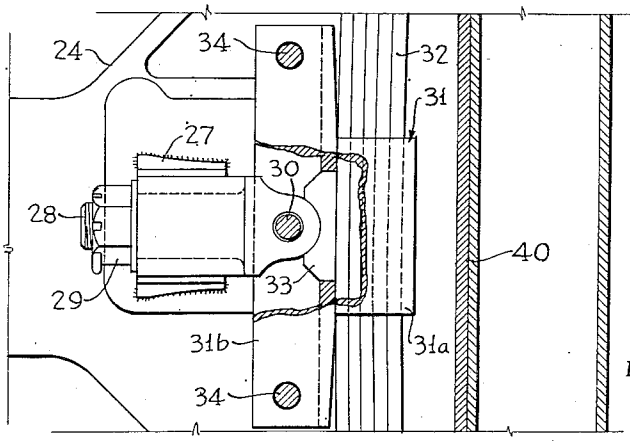

FIG. 9

INVENTORS
Walter B. Dean
Henry W. Wessells III
BY
Wm. R. Glisson
ATTORNEY

March 18, 1958 W. B. DEAN ET AL 2,826,998

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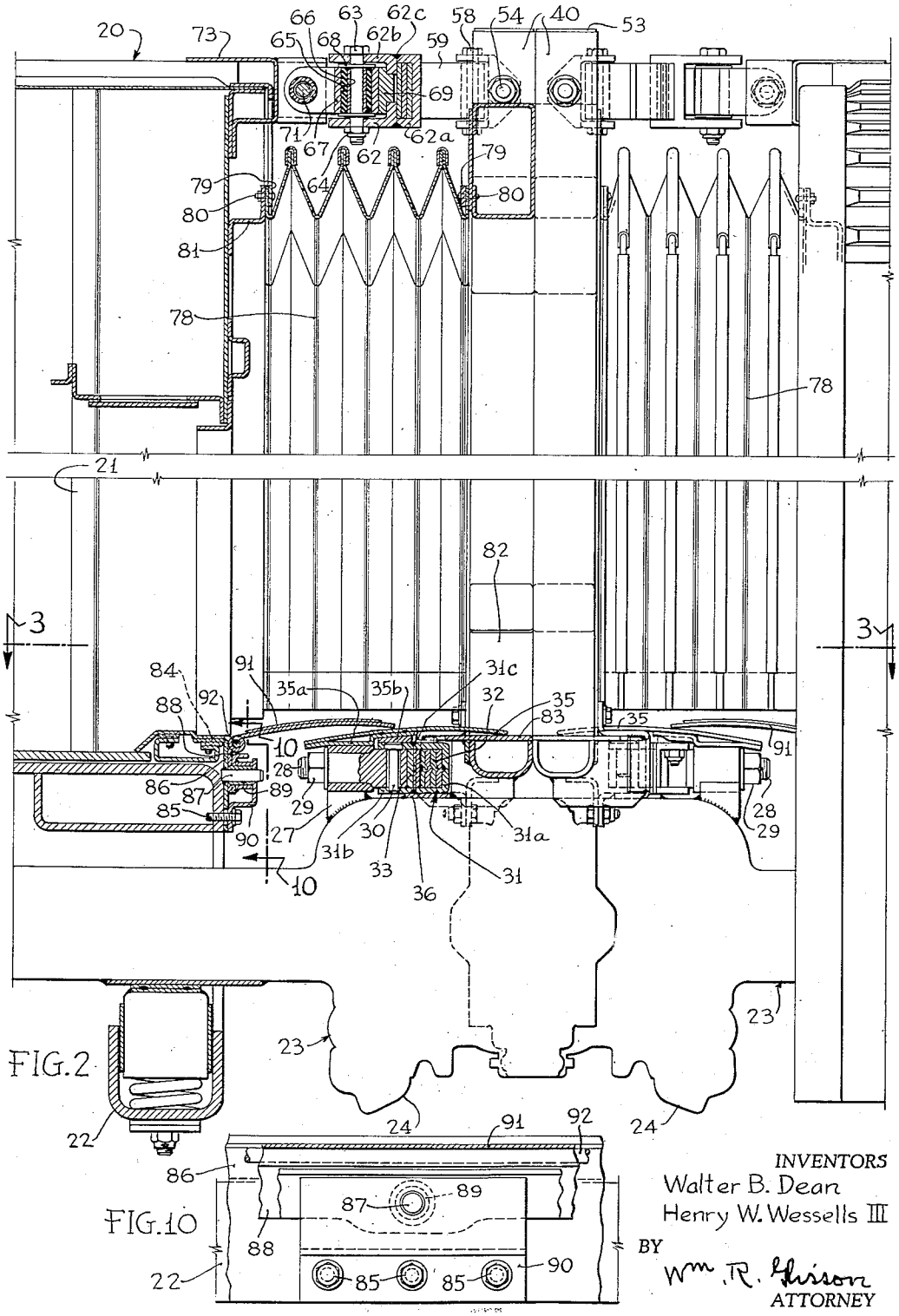

FIG. 2

FIG. 10

INVENTORS
Walter B. Dean
Henry W. Wessells III
BY
Wm. R. Ghrison
ATTORNEY

March 18, 1958 W. B. DEAN ET AL 2,826,998

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FIG. 3

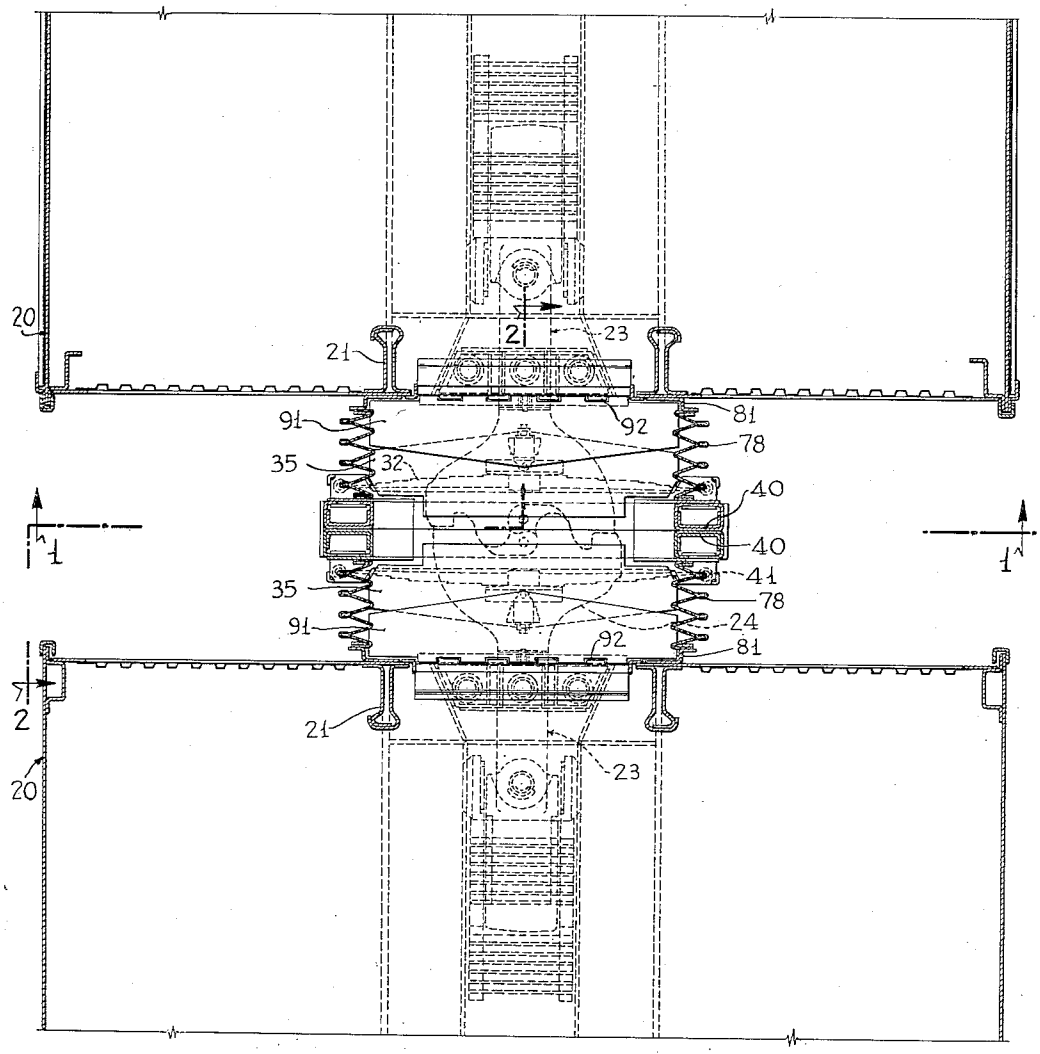
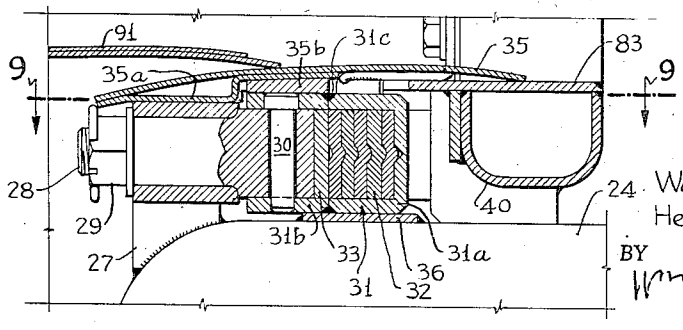


FIG. 8



INVENTORS
Walter B. Dean
Henry W. Wessells III
BY
Wm. R. Glisson
ATTORNEY

March 18, 1958 W. B. DEAN ET AL 2,826,998

CAR DIAPHRAGM ASSEMBLY

Filed July 13, 1956 4 Sheets-Sheet 4

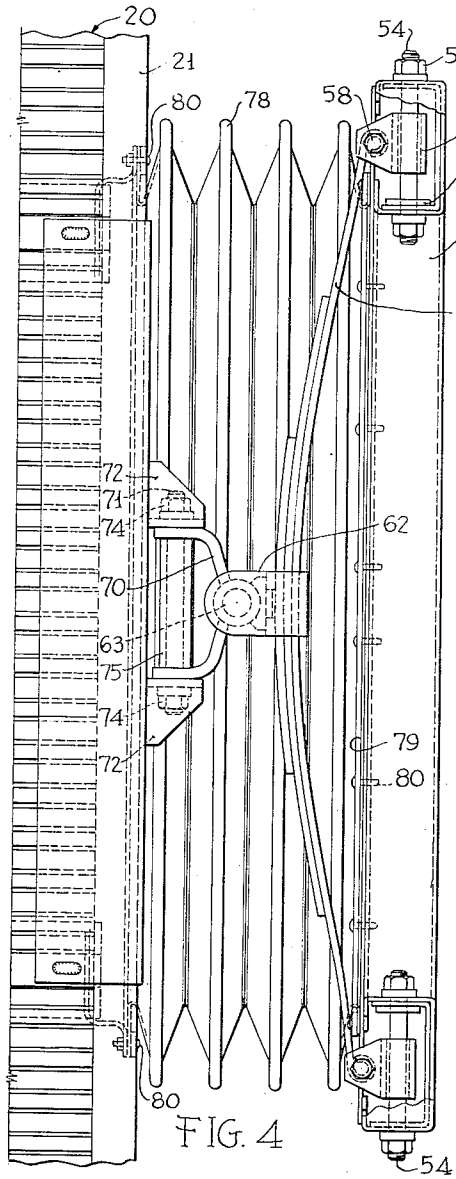


FIG. 4

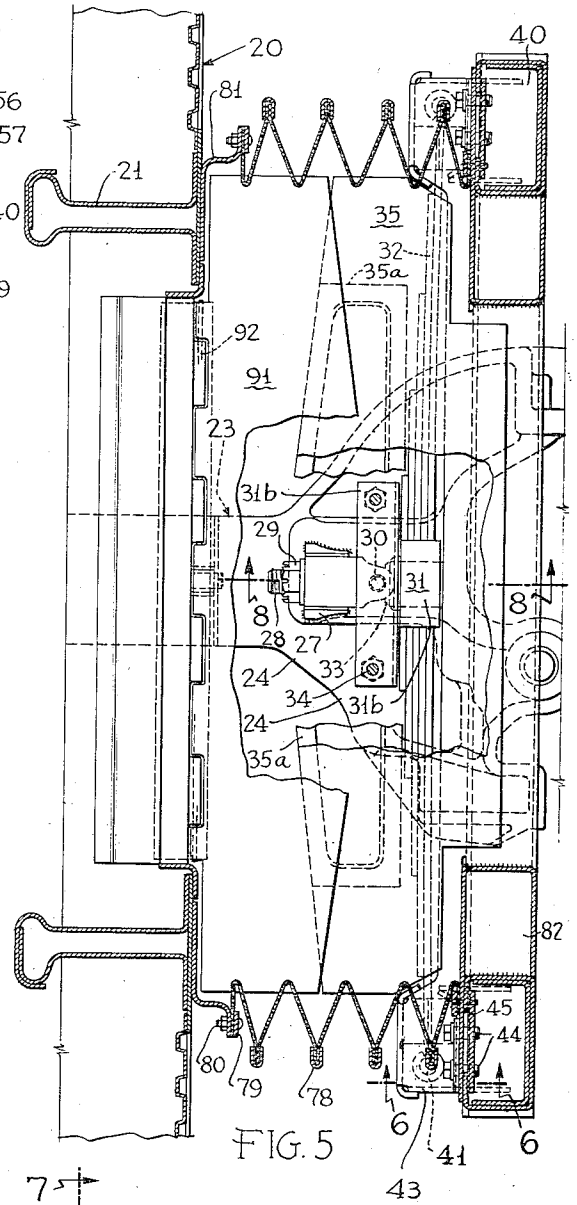


FIG. 5

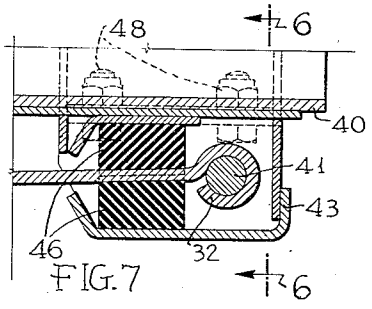


FIG. 7

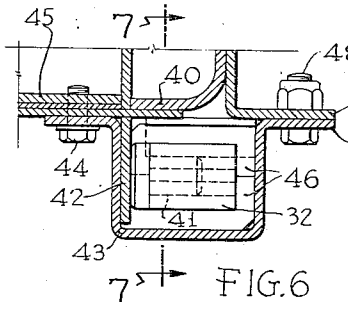


FIG. 6

INVENTORS
Walter B. Dean
Henry W. Wessells III

BY
Wm. R. Glisson
ATTORNEY

United States Patent Office 2,826,998
Patented Mar. 18, 1958

2,826,998

CAR DIAPHRAGM ASSEMBLY

Walter B. Dean, Narberth, and Henry W. Wessells, III, Ardmore, Pa., assignors to The Budd Company, Philadelphia, Pa., a corporation of Pennsylvania

Application July 13, 1956, Serial No. 597,663

15 Claims. (Cl. 105—10)

This invention relates to a car diaphragm assembly and has for an object the provision of improvements in this art.

One of the particular objects of the invention is to provide a diaphragm assembly which permits the use of a low level walkway between cars.

Another object is to provide a diaphragm assembly which has the smallest possible movement between interengaging face plates of adjacent cars whereby wear and noise are reduced and the widest possible passageway is left.

Another object is to provide a diaphragm assembly in which the tread plates adjust properly for car movements so as to maintain a safe unbuckled walkway surface at all times.

Another object is to provide an assembly of simple and inexpensive design which can be easily installed and repaired.

Another object is to provide means for keeping the face plates in operating relationship with each other for extremes of movement, especially when mated with standard diaphragms having a considerably higher bottom elevation, and to avoid the chance of one face plate catching against the other in an abnormal position.

The above and other objects and advantages of the invention will be apparent from the following description of an exemplary embodiment, reference being made to the accompanying drawings thereof, wherein:

Fig. 1 is an end elevation of a car equipped with a diaphragm assembly embodying the present invention, the plane of the view being indicated by the line 1—1 of Fig. 3;

Fig. 2 is an enlarged vertical longitudinal section through the diaphragm assemblies and end structures of two coupled cars, the section being indicated by the line 2—2 of Figs. 1 and 3;

Fig. 3 is a horizontal section taken on the line 3—3 of Figs. 1 and 2, coupled cars being shown;

Fig. 4 is an enlarged partial top plan view of the assembly of one car, the view being taken on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged horizontal section taken on the line 5—5 of Fig. 1;

Fig. 6 is an enlarged partial vertical section taken on the line 6—6 of Fig. 5, the section also being shown on Fig. 7;

Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 6;

Fig. 8 is a partial enlarged vertical longitudinal section taken on the line 8—8 of Fig. 5;

Fig. 9 is a horizontal section taken on the line 9—9 of Fig. 8; and

Fig. 10 is a partial transverse section and elevation taken on the line 10—10 of Fig. 2.

As shown in the drawings, a railway car 20 has an end frame 21 and a bottom frame 22, the bottom frame carrying a coupler 23. The bottom frame structure

for carrying the coupler 23 and the associated buffing gear is disclosed in the copending application of Walter B. Dean and Horace P. Bauer, Serial No. 592,195, filed June 18, 1956, and assigned to the same assignee as the present application, and need not be disclosed herein, it being necessary only to note that the coupler at its outer end portion or head 24 has lateral and vertical movements as the two connected cars turn with horizontal track curvature and move up and down with track unevenness or vertical curvature, all as well known.

In the past, so far as is known, the diaphragm assemblies of coupled cars have always been carried by the end frames of the cars and have been kept at an elevation well above the couplers to avoid interengagement with the couplers. This has meant that the cross-over walkway between cars has been at an objectionably high elevation or that the face plates of the diaphragm assemblies have had very little depth at the bottom. Furthermore, normal cars with high-level floors have more vertical space between the standard coupler level and the floor level than do low-level cars with which the present invention is particularly concerned.

According to the present invention the outer ends of the diaphragm assemblies are supported directly on the heads of the couplers with the advantage that there is no uncontrolled movement between couplers and diaphragm assemblies, and the further advantage that there is very little movement between the two diaphragm assemblies of adjacent cars because the support points are quite close together.

Specifically, in the embodiment shown, that for a mating car of the same kind being identical, the coupler head 24 carries, as by having arc-welded thereon, a support bracket 27 which receives a horizontally disposed anchor pin 28, the pin being secured therein by a nut 29. The head of the pin 28 is provided with a vertically aligned bushed bearing for a vertical pivot pin 30 of a spring clamp 31 carrying a horizontally disposed double-ended leaf spring 32.

The spring clamp 31 includes a U-shaped clip 31*a* and a U-shaped support member 31*b*, the latter being secured at its back, as by arc welding 31*c*, to the open ends of the clip 31*a*. The support member 31*b* has a cut-out or back opening to receive a thrust bearing block 33 which has a concave cylindrical bearing surface fitting against a convex cylindrical journal surface on the head of the pin 28. The support member 31*b* on the sides is provided with openings which fit the head and shank of the pivot pin 30.

To the outer ends of the support member 31*b* there is secured, as by stud bolts 34, a footplate 35 which forms part of a walkway between cars. To the bottom of the footplate 34 there is secured, as by spot welding, a reinforcing plate 35*a* which has a horizontal portion resting on a horizontal surface formed on the top of the bracket 27. A filler plate 35*b* is secured beneath the reinforcing plate 35*a* and rests on the top surface of the upper side of the support member 31*b*.

The spring clamp 31 rests on a wear plate 36 which is secured to the top of the coupler head, as by arc welding. When the footplate assembly is secured in place by the bolts 34 it securely maintains the vertical pivot pin 30 in position.

At its outer ends the spring 32 supports a tubular face plate 40, the spring at each end carrying a headed wear stud 41 upon which rests a wear plate 42 of a box-like fixture 43 which is attached to the back wall of the face plate, as by cap screws 44 which thread into holes of a reinforcing tapping plate 45. Near the ends of the spring there are secured, as by cement, horizontally acting bumper pads 46, as of a rubberlike material such as neoprene,

which will have a long wear life. These bumper pads fit the top and bottom walls as well as the fore and aft walls of the box-like enclosure and will take vertical as well as horizontal shocks and wear. The bottom of the box-like fixture 43 is provided with a bottom flange 47 secured by bolts 48 to an angle piece 49 which is welded to the bottom of the face plate 40.

It will be seen from the description given so far that the leaf spring 32 with its mounting and connections firmly supports the face plate vertically for movement with the coupler head and also carries it horizontally with the coupler head, but allows free turning movement about the vertical axis of the pivot pin 30. The lower end of the face plate also has longitudinal movement as the coupler moves back and forth longitudinally in the draw bar action of the train. The top mounting of the face plate accommodates all of these movements, as will now be explained.

At the top the face plate on each side is provided with an extension 53 which carries a horizontal supporting rod 54 secured by nuts 55. On each side, a slide 56 is movably supported on a rod 54 and is buffered by a fabric washer 57, as of "Fabreeka." Pivot pins 58 carried by the slides 56 support the ends of an upper leaf spring 59.

At the center the spring 59 carries a clamp 62, preferably formed of two U-shaped elements 62*a* and 62*b* welded together at 62*c*, which carries a vertical pivot pin 63 retained by a nut 64. The pin 63 carries a resilient sleeve 65, as of neoprene, which has bonded to it a thin inner metal sleeve 66 and a thick outer metal sleeve 67. There is some free vertical movement on the pin 63 and wear and shock at each end are taken by buffer means, such as "Micarta" washers 68. An arcuate thrust bearing block 69 carried in a socket in the portion 62*b* of the spring clamp bears on the outer metal sleeve 67.

The outer metal sleeve 67 has secured thereto, as by arc welding or by having made integrally therewith, a pair of arms 70 having spaced parallel ends turnably mounted on a horizontal pivot pin 71 carried by spaced brackets 72 secured to an extension member 73 anchored to the car end frame. The pivot pin is retained by nuts 74 and a spacer sleeve 75 is disposed on the pin between the ends of the arms 70.

The bellows-like diaphragm unit proper, referred to by the numeral 78, is secured at the top and sides by clamp plates 79 and screws 80 to the face plate and a frame 81 carried by the car end frame.

At the bottom on each side the face plate is provided with corner extensions 82 which provide a wider range of movement for that portion of the engaging face plates and prevent displacement and catching of one on the other. These extensions are particularly useful when a low-level car is coupled to a high-level car as may be necessary at times for dead-heading or shifting in yards. The extensions also serve to strengthen the face plate.

The top extensions 53 serve to keep the face plate of a normal car in proper alignment where it stands higher than the top transverse part or head of the present diaphragm face plate.

At the bottom the face plate frame carries a top wear plate 83 on which rides one end of the footplate 35.

At the bottom of the door opening the end frame of the car has secured thereto, as by countersunk screws 84 and cap screws 85, a base 86 carrying a longitudinally extending pivot pin 87. A tread plate support 88 is turnably mounted on the pivot pin 87, there being a bushing 89 interposed, and the support 88 is retained on the pivot pin 87 by an angle piece 90 held by the same cap screws 85 which hold the lower edge of the base 86. A tread plate 91 is mounted on the support 88 by a hinge 92 for swinging movement about a horizontal transverse axis.

By mounting the foot or tread plate 35 to turn about a vertical axis on the coupler head and mounting the tread plate 91 to turn about both longitudinal and transverse horizontal axes the two plates maintain a proper relationship to form a normal safe walkway at all times. Both footplates 35 and 87 are convex upward so as to ride only on their ends throughout a wide range of vertical movement.

It is thus seen that the invention provides a diaphragm assembly which is especially suited for use with low-level cars, which provides a low-level walkway between cars, which moves with the coupler to minimize movement between face plates and to avoid interference with coupler movements, which is very simple and inexpensive, which provides a safe walkway regardless of all gyrations of the cars and couplers, and which is a general improvement in the art.

While one embodiment of the invention has been described by way of illustration it is to be understood that there may be various embodiments and modifications within the general scope of the invention.

What is claimed is:

1. A diaphragm assembly for a railway car having an end frame and a coupler with a head connectible with the head of a coupler of another car, comprising in combination, a double-ended leaf spring supported on the coupler head and having turning movement about a vertical axis, a diaphragm face plate provided with supports at each side resting on the ends of said spring, a top connection between said face plate and the end frame of the car providing turning movement of the face plate about a vertical axis and about longitudinally spaced transverse horizontal axes, said top connection including a second double-ended leaf spring and means providing free relative transverse movement between the second leaf spring and the face plate, and a flexible bellows-like diaphragm unit secured between the face plate and the end frame of the car.

2. A diaphragm assembly for a railway car having an end frame and a coupler with a head connectible with the head of a coupler of another car, comprising in combination, a rigid diaphragm face plate, an anchorage supporting the face plate on a coupler head, said anchorage including a support bracket rigidly secured to said head, said bracket having a longitudinal bore therethrough, a headed anchor pin secured in said bore, a double-ended leaf spring assembly supported for turning movement about a vertical axis on the head of said anchor pin, said diaphragm face plate being supported on the outer ends of said spring, means flexibly connecting the upper end of the face plate to the car end frame, and a flexible bellows-like diaphragm unit secured between said face plate and the end frame of the car.

3. A diaphragm assembly for a railway car having an end frame and a coupler with a head connectible with the head of a coupler of another car, comprising in combination, a diaphragm face plate, means supporting the face plate on the coupler head for turning movement about a vertical axis, means connecting the face plate at the top to the car end frame constructed and arranged to provide relative lateral sliding movement and relative turning movement about a vertical axis and relative turning movement about longitudinally spaced transverse horizontal axes, said connecting means including longitudinally spaced horizontal-axis hinge joint connections to provide turning movement about longitudinally spaced horizontal axes, one of said connections being constructed to have free movement along the axis, said connecting means also including a vertical-axis hinge joint to provide turning movement about a vertical axis, and a bellows-like diaphragm unit secured between said face plate and the end frame of the car.

4. A diaphragm assembly for a railway car having an end frame and a coupler connectible with the coupler of an adjacent car and having horizontal and vertical movement relative to the car end frame, comprising in com-

bination, a diaphragm face plate, supporting means for said face plate on said coupler, said supporting means providing relative turning movement of said face plate with respect to said coupler about a vertical axis, said supporting means including a transverse member supporting the face plate at its ends, resilient buffing means between the ends of said transverse member and the face plate, said buffing means being yieldable to permit turning movment between the transverse member and the face plate with resilient resistance about a horizontal transverse axis, and connecting means between the top of the face plate and the car end frame constructed and arranged to provide relative movement in all directions between the face plate and the end frame.

5. A diaphragm assembly for railway cars having an end frame and a coupler connectible with the coupler of an adjacent car, a diaphragm face plate, means supporting said diaphragm face plate on said coupler, means connecting the upper end of the face plate to the end frame of the car, said supporting means and said connecting means being constructed and arranged to provide accommodation of the face plate for all longitudinal, transverse and vertical movements of the coupler and face plate relative to the end frame, said supporting means on the coupler including a vertical-axis hinge connection and a support connection providing turning movement about a transverse horizontal axis, and said connecting means between the upper end of the face plate and the end frame of the car including a vertical-axis hinge connection and longitudinally spaced horizontal-axis hinge connections, one of which has free sliding movement along the axis, and inwardly extending face-enlarging elements on said face plate for increasing its face-engaging surface area at local points for maintaining interengagement with another face plate throughout all movements in use.

6. A diaphragm assembly for railway cars having an end frame, a bottom frame, and a coupler carried by the bottom frame, comprising in combination, a diaphragm face plate, means supporting said face plate on said coupler constructed and arranged to provide relative turning movement between the face plate and coupler about a vertical axis and tilting movement about a transverse horizontal axis, means connecting the upper part of the face plate to the end frame of the car, said connecting means being constructed and arranged to provide relative turning movement about a vertical axis and about two longitudinally spaced transverse axes, and providing relative transverse movement between the face plate and the car end frame, said supporting means on the coupler including a vertical-axis hinge connection and a support connection providing turning movement about a transverse horizontal axis, and said connecting means between the upper end of the face plate and the end frame of the car including a vertical-axis hinge connection and longitudinally spaced horizontal-axis hinge connections, one of which has free sliding movement along the axis, a bellows-like diaphragm unit secured between the car end frame and the back of the diaphragm plate, and resilient means at the top and bottom of said face plate urging it outward away from the end frame for engagement with the face plate of another car.

7. A diaphragm assembly as set forth in claim 6, wherein said upper connection includes transversely spaced horizontal rods carried by the face plate and slides movable laterally along said rods.

8. A diaphragm assembly for a railway car having an end frame and a coupler, comprising in combination, a face plate, means mounting the face plate on the coupler for relative turning movement about a vertical axis, and a foot plate supported upon the coupler and having free edges resting on supporting surfaces of the face plate for turning movement of the foot plate relative to the face plate.

9. A diaphragm assembly as set forth in claim 8, wherein said mounting means includes a headed vertical pivot pin supported on said coupler head and a spring clamp turnably mounted on said pin, and wherein said foot plate is secured to said clamp above the head of the pivot pin to retain the pin.

10. A diaphragm assembly as set forth in claim 9, wherein the turnable mounting of the clamp on the pin includes a thrust block bearing on a journal part concentric with said pin.

11. A diaphragm assembly for a low-height floor railway car having a standard height coupler head to connect the car either to like low-height floor cars or to standard-height floor cars having diaphragm face plates which are at a higher level than the face plates of the low-height car, comprising in combination, a generally rectangular face plate, means supporting the face plate at the end of the low-floor-level car at a low level relative to the coupler head of the low-floor level car as compared to the face plate elevation of a standard car, said face plate supporting means including a vertical hinge connection at the bottom between the face plate and a part carried by the end of the car, and a vertical hinge connection and longitudinally spaced horizontal hinge connections at the top, so the face plate can have the usual movements of face plates to keep face-fitting engagement with the face plate of a coupled car, lateral face extensions on the face plate at the bottom to avoid catching the bottom corners of a high-level face plate, and vertical side extensions at the top of the face plate to cooperate with the top of a high-level face plate so as to prevent misalignment.

12. A diaphragm assembly for a railway car having an end frame and a coupler with a head connectible with the head of a coupler of another car, comprising in combination, a diaphragm face plate, a support mounted on the coupler head, a headed pivot pin mounted on said support with its axis disposed vertically, a member mounted for turning movement on said pin and supporting the face plate, a bearing insert mounted on said member for turning movement with said pin, means carried by said member which confines the head of the pin, and a tread plate carried by said member and having one end riding on the bottom portion of the face plate.

13. A diaphragm assembly as set forth in claim 12, which further includes a hinged tread plate carried by the car and having its free end resting on the first said tread plate.

14. A diaphragm assembly as set forth in claim 12, which further includes a supporting wear plate on said coupler head for said turnable member.

15. A diaphragm assembly for a railway car having an end frame and a coupler with a head connectible with the head of a coupler of another car, comprising in combination, a face plate and tread plate mounted on a coupler on a vertical-axis hinge connection for turning movement about a vertical axis, the coupler head carrying the face plate and its tread plate having the usual longitudinal movement and vertical and horizontal swinging movements relative to the car end frame, and a tread plate mounted on the car end frame on longitudinal-horizontal and transverse-horizontal hinge connections for turning movement about longitudinal and transverse horizontal axes, the tread plates at their free ends being overlapped for relative sliding and turning movements.

References Cited in the file of this patent

UNITED STATES PATENTS

1,164,000	Hochberg et al.	Dec. 14, 1915
1,514,373	Coutant	Nov. 4, 1924
2,392,759	Monger	Jan. 8, 1946