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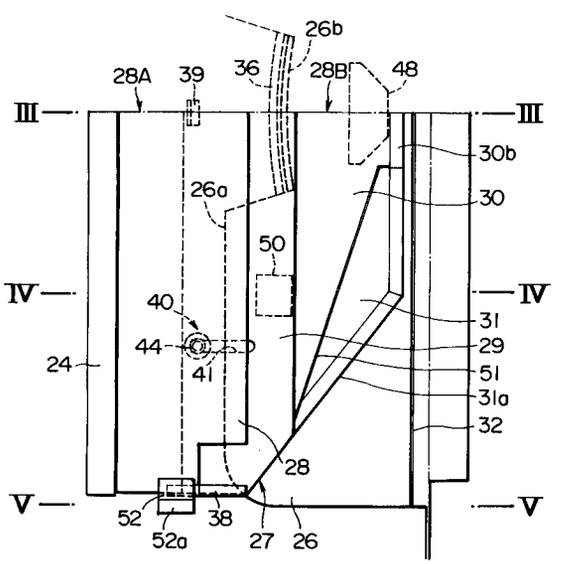
## (54) Footplate apparatus for connecting pathway between vehicles.

(57) A footplate apparatus for a connecting pathway between railroad vehicles has the following structure to prevent a footplate from thrusting into the interior of a vehicle upon collision of the vehicles and causing secondary accidents to passengers: A first footplate 26 is provided on a first vehicle 20, and a second footplate 27 is provided on a second vehicle 21 or a free-end frame. The second footplate 27 is divided in the railroad direction into a base plate 28A and an extension plate 28B which are connected by connector means 40 in such a manner that the connection can be released by a force of not less than a predetermined value. The extension plate 28B includes an engaging member 39, and the first footplate 26 includes a pressing member 36, so that when the distance between the vehicles is abnormally decreased, the pressing member 36 presses against the engaging member 39 to release the connection formed by the connector means 40 and to move the extension plate 28B toward the base plate 28A.

FIG. 2

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## BACKGROUND OF THE INVENTION

The present invention relates to a footplate apparatus for a connecting pathway between vehicles.

A conventional footplate apparatus for a connecting pathway between vehicles of a train is shown in Figs. 14 and 15. This footplate apparatus is divided into two sections in a direction of the railroad. These two footplates 1 and 2 are vertically movably supported by hinges 3 and 4, respectively, but are restricted not to move downwardly from their horizontal positions, and a distal portion of the upper footplate 2 is mounted on the upper surface of a distal portion of the lower footplate 1 which is formed of a single plate. The upper footplate 2 comprises a main plate 5 and auxiliary plates 6 and 7. The main plate 5 is formed of a single plate including opposite slant portions which extend from the vicinity of a distal-end center portion 5a in a direction of the vehicles toward opposite sides. The auxiliary plates 6 and 7 are vertically movably attached to edges of the above-mentioned opposite slant portions through hinges 8 and 9, respectively.

Figs. 14 and 15 show the case where a connecting hood which constitutes the connecting pathway is divided into two sections in the direction of the railroad, and these two hood sections 10 and 11 are detachably connected by free-end frames 12 and 13. The lower footplate 1 is provided on the side of the vehicle 14 while the upper footplate 2 is provided on the free-end frame 12. Also, substantially the same footplates as described above are mounted between the free-end frame 13 and the vehicle 14' on the other side, and substantially the same components as described above are denoted by common reference numerals with primes so that their explanations will be omitted.

Further, the free-end frames 12 and 13 are pressed against each other by pressing means 15 and 16 which are mounted between these frames and the vehicles 14 and 14'.

In the above-described conventional footplate apparatus, when gaps are formed between the two footplates 1 and 2 on both sides at the time of rolling of the vehicles, the auxiliary plates 6 and 7 are moved downwardly around the hinges 8 and 9, thereby closing the gaps between side portions of the footplates 1 and 2. However, no consideration is given on the case where pitching of the vehicles occurs or the distance between the opposed vehicles is abnormally decreased at the same time as pitching.

More specifically, the main plate 5 of the upper footplate 2 is formed of a single plate from a portion adjacent to the hinge 4 to the distal-end central portion 5a. Consequently, when the pitching amount is zero, the footplate apparatus is in a state shown in Fig. 16A, but when pitching of the vehicles occurs as shown in Fig. 16B, the hinges 3 and 4 of the footplates 1 and 2 are located at different levels. In such a case, the upper footplate 2 is pressed upwardly by the lower footplate 1 at a distal-end center portion 1a, and the distal-end central portion 5a of the main plate 5 of the upper footplate 2 moves apart from the upper surface of the lower footplate 1, thus forming a large gap $D_1$ therebetween.

When the above-mentioned gap $D_1$ is abruptly formed due to pitching of the vehicles while a passenger or the like is walking on a connecting pathway during traveling of the vehicles, there is caused some danger of the passenger or the like stumbling over the distal end of the raised footplate and falling down, or putting his or her foot in the opened gap $D_1$ and catching it between the two footplates 1 and 2.

Further, when the distance between the vehicles or between the vehicle and the free-end frame is abnormally decreased upon collision of the vehicles in a non-pitching state, as shown in Fig. 16C, there arises a problem that the distal-end center portion 5a of the upper main plate 5 largely thrusts into a passenger room R of the vehicle 14 and hits passengers in the room, thereby making secondary accidents resulting in injury or death more serious.

Moreover, when the foregoing pitching state occurs at the same time as such a decrease of the distance between the vehicles or the like upon collision of the vehicles, the main plate 5 of the upper footplate 2 largely thrusts into the passenger room of the vehicle 14, and also, a large opening is formed between the footplates, as described before, thus causing even more serious danger.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a footplate apparatus for a connecting pathway which solves the problems of danger which have not been solved by the conventional structure described above.

In order to solve the problems, according to the invention, there is provided a footplate apparatus for a connecting pathway, comprising a first footplate provided on a first vehicle and a second footplate provided on a second vehicle or a free-end frame, the second footplate having a base plate supported on the second vehicle or free-end frame and an extension plate slidably extending from a distal portion of the base plate in a direction of the railroad, the base plate and the extension plate being connected to each other by connector means in such a manner that the connection can

be released by a predetermined outside force, the extension late having a distal portion mounted on the first footplate and including an engaging member, the first footplate including a pressing member opposite to the engaging member, the engaging member and the pressing member having such a relationship that when the distance between the vehicles or between the vehicle and the free-end frame is abnormally decreased, the pressing member presses and moves the engaging member toward the second vehicle or free-end frame.

Further, the extension plate of the second footplate may be divided into a plurality of portions in the direction of the railroad, and the divided portions may be connected vertically movably.

With the above-described structure, when the distance between the vehicles or between the vehicle and the free-end frame is abnormally decreased in a collision accident of the vehicles, the pressing member of the first footplate presses the engaging member provided on the extension plate of the second footplate. When the pressing force is not less than the predetermined value, the connection by the connector means is released, and the extension plate is pressed and moved toward the base plate. Thus, the entire length of the second footplate in the direction of the railroad is decreased to prevent the distal end of the second footplate from largely thrusting into a passenger room of the vehicle. Such thrusting prevention is effected irrespective of occurrence of pitching between the vehicles upon collision.

Moreover, with the extension plate of the second footplate divided into a plurality of portions, when pitching occurs between the vehicles in the foregoing collision accident, a second extension section which is a distal divided portion of the extension plate is inclined due to its own weight so that the distal end of the second extension section moves downwardly, thereby closing a gap between the distal end of the second extension section and the upper surface of the first footplate.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a horizontal cross-sectional view of connecting pathway portion, showing one embodiment according to the present invention;

Fig. 2 is an enlarged plan view showing an essential portion of the same;

Fig. 3 is a cross-sectional view taken along the line III-III of Fig. 2;

Fig. 4 is a cross-sectional view taken along the line IV-IV of Fig. 2;

Fig. 5 is an end view taken along the line V-V of Fig. 2;

Fig. 6 is a horizontal cross-sectional view showing connected portions of a base plate and an extension plate of the embodiment in Fig. 1;

Fig. 7 is a cross-sectional view taken along the line VII-VII of Fig. 6;

Fig. 8 is a cross-sectional view showing a guide of the embodiment in Fig. 1;

Fig. 9 is a cross-sectional view showing a stopper portion of the embodiment in Fig. 1;

Fig. 10 is a vertical cross-sectional view showing a condition of a footplate of the embodiment in Fig. 1 when pitching occurs at the same time as contraction within a normal range;

Fig. 11 is a vertical cross-sectional view showing a condition of the footplate of the embodiment in Fig. 1 upon collision of vehicles while no pitching is caused;

Fig. 12 is a vertical cross-sectional view taken along the center of the footplate, showing a condition of the footplate of the embodiment in Fig. 1 when pitching occurs upon collision of the vehicles;

Fig. 13 is a vertical cross-sectional view showing a condition of the footplate of the embodiment in Fig. 1 when pitching occurs upon collision of the vehicles;

Fig. 14 is a vertical cross-sectional view of a connecting pathway portion, showing conventional footplates;

Fig. 15 is a horizontal cross-sectional view of Fig. 14; and

Figs. 16A, 16B and 16C are vertical cross-sectional views showing the conventional footplates in operating states, in which Fig. 16A shows the normal case where the pitching amount is 0 mm, Fig. 16B shows the case where the distance between vehicles is decreased when pitching occurs, and Fig. 16C shows the case where no pitching is caused upon collision of the vehicles.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments according to the present invention will be hereinafter described with reference to Figs. 1 to 13.

Fig. 1 is a horizontal cross-sectional view showing footplate apparatus of the type in which a connecting pathway between coupled vehicles 20 and 21 is covered with a connecting hood divided into two sections 22 and 23. Reference numerals 24 and 25 denote free-end frames of the two hood sections 22 and 23, respectively.

An explanation will be given on a right footplate apparatus mounted between the vehicle 20 and the free-end frame 24 shown in Fig. 1.

Reference numeral 26 denotes a first footplate which is provided on the first vehicle 20, and 27 denotes a second footplate which is provided on

the free-end frame 24. The second footplate 27 is divided into a base plate 28A and an extension plate 28B in a direction of the railroad, and further, the extension plate 28B is divided into a first extension section 29 and a second extension section 30. Moreover, the second extension section 30 includes auxiliary plates 31 vertically movably connected to opposite sides of the distal end of the second extension section 30.

Since a footplate apparatus mounted between the second vehicle 21 and the free-end frame 25 has substantially the same structure as the foregoing right footplate apparatus, substantially the same components as described above are denoted by common reference numerals with primes so that their explanations will be omitted.

The structure of the foregoing right footplate apparatus will now be described more specifically.

A longer proximal side of the first footplate 26 is located along an end surface of the first vehicle 20 and connected thereto vertically movably by a horizontal hinge 32 which is provided on the end surface of the vehicle 20, so that the first footplate 26 will vertically move around the hinge 32. The first footplate 26 further includes a stopper member 33 secured thereto which contacts with stoppers 34 provided on the vehicle 20 so as to allow the first footplate 26 to move upwardly from the position with the front side inclined slightly downwardly, as shown in Fig. 5, but to prevent it from moving downwardly. The stoppers 34 are formed of bolts screwed in internal thread members 34a which are fixed on the vehicle 20. By revolving the bolts, their heads are moved back and forth and also fixed by lock nuts, so that an angle of inclination of the posture of the footplate 26 can be controlled. Reference numeral 35 denotes a contact plate securely welded on the lower surface of the stopper member 33. The contact plate 35 is also arranged to contact with the bolt heads of the stoppers 34, thereby increasing the contact area of the stopper member with the stoppers.

Incidentally, the stopper member 33 is formed of a metal plate which can be deformed when it receives an abnormal outside force.

The distal portion of the first footplate 26 comprises distal ends 26a of opposite side portions in a direction perpendicular to the direction of the railroad, and a cut-out portion 26b which is a central distal portion cut from the distal ends 26a toward the vehicle 20. From this cut-out portion 26b, as shown in Fig. 3, a pressing member 36 having side faces of an inverted L-shape is projected upwardly.

The second footplate 27 is divided into the base plate 28A and the extension plate 28B in the direction of the railroad, and further, the extension plate 28B is divided into two sections, i.e., the first extension section 29 and the second extension section 30 in the direction of the railroad. A proximal side of the base plate 28A is pivotally connected to the free-end frame 24 by a hinge 37 which extends horizontally and perpendicular to the direction of the railroad so that the base plate 28A will vertically move around the hinge 37.

The first extension section 29 is located below the base plate 28A, and a rear portion 29a of the first extension section 29 is slidably overlapped with the lower surface of a front portion 28a of the base plate 28A. In this overlapping portion, as shown in Figs. 5 and 8, guides 38 having a U-shaped cross-section are fixed on both sides of the base plate 28A, and opposite side ends of the first extension section 29 are slidably fitted in the guides 38.

Further, an engaging member 39 having L-shape side faces and located in a central portion of the connecting pathway is securely hung from the lower surface of the rear end of the first extension section 29. This engaging member 39 normally faces the above-mentioned pressing member 36 at a distance.

Moreover, the base plate 28A and the first extension section 29 are connected by connector means 40 located on opposite sides, as shown in Fig. 1. The connector means 40 will now be described with reference to Figs. 6 and 7.

A slot 41 in the direction of the railroad is bored through the first extension section 29, and a retaining hole 42 of a circular shape having a slight larger diameter than the width of the slot 41 is formed continuous from the end of the slot 41 on the far side from the first vehicle 20. A bolt 43 located in the center of the retaining hole 42 is secured to the base plate 28A and projects therefrom downwardly. A retaining plate 44 is secured to the bolt 43. The retaining plate 44, which is formed of a disk having substantially the same diameter as the retaining hole 42, is closely fitted in the retaining hole 42, so that the outer peripheral surface of the retaining plate 44 abuts against an inlet end 41a of the slot 41. The retaining plate 44 is made of a material which is broken or deformed when it receives a strong impact of not less than a predetermined value, such as a synthetic resin plate or an aluminum plate. A support plate 45 is fitted around the bolt 43, and a nut 46 is screwed on the bolt 43, thereby sustaining the retaining plate 44 by the support plate 45.

With such a structure, the two plates 28A and 29 are normally maintained in the state shown in Figs. 6 and 7. When a strong impact force of not less than the predetermined value is applied to the plates 28A and 29 in a direction indicated by the solid-line arrow A in Fig. 6, the impact force breaks or deforms the retaining plate 44 so that the plates 28A and 29 can relatively move in the direction of

the solid line arrow A and in a direction indicated by the chain double-dashed line arrow A.

A proximal end 30a of the second extension section 30 (see Fig. 3) is located along the distal end surface 29b of the first extension section 29, and the second extension section 30 is vertically movably connected to the distal portion of the first extension section 29 by a hinge 47 which extends horizontally and perpendicular to the direction of the railroad. As shown in Fig. 1, a distal portion of the second extension section 30 has a plane shape which have opposite slant portions extending from the vicinity of a distal-end center portion 30b toward opposite sides of the proximal end portion.

As shown in Fig. 3, the hinges 32 and 37 are arranged at different levels such that when the pitching amount is 0 mm, the base plate 28A, the first and second extension sections 29 and 30 will be horizontally placed on the first footplate 26 with the front side inclined slightly downwardly. Also, as shown in Fig. 4, sliding plates 48 and 50 to be described below are different in thickness.

Reference numeral 48 denotes a sliding plate secured on the lower surface of the first extension section 29 through a bracket 49, and slidably mounted on the first footplate 26. By providing such a sliding plate 48, a slight gap is formed between the second extension section 30 and the first footplate 26. Consequently, the distal-end center portion 30b of the second extension section 30 is bent slightly downwardly to decrease the gap between the distal-end center portion 30b and the first footplate 26.

Further, as shown in Fig. 4, sliding plates 50 are secured on the lower surface of the first extension section 29 and slidably mounted on the first footplate 26.

As shown in Figs. 1 and 2, the auxiliary plates 31 are vertically pivotally connected to the opposite slant portions of the second extension section 30 by hinges 51. Outer sides 31a of the auxiliary plates 31 are shaped as slant side portions which extend from the vicinity of the center toward opposite sides of the proximal end portion.

In Figs. 5 and 9, reference numeral 52 denotes a stopper. Stoppers 52 are fixed on both sides of the base plate 28A and have stopper portions 52a which contact with the lower surfaces 53a of side panels 53 located on both sides of the footplate. More specifically, when the base plate 28A is moved upwardly around the hinge 37 to a predetermined inclined position (posture), the stopper portions 52a abut against the lower surfaces 53a of the side panels 53, thereby restricting further upward movement of the base plate 28A.

Incidentally, the free-end frames 24 and 25 are pressed by pressing means (not shown) which are similar to the pressing means 15 and 16 shown in Fig. 14 of the conventional apparatus.

The function of this embodiment will now be described.

During normal traveling of the vehicles, when the distance between the opposed vehicles or between the vehicle and the opposed free-end frame is with a normal range and the pitching amount is zero, as shown in Figs. 3 to 5, the first and second extension sections 29 and 30 of the second horizontal footplate 27 extend from the base plate 28A, and all these plates 28A, 29 and 30 are horizontally placed on the first footplate 26. Therefore, the distal-end center portion 30b of the second extension section 30 is located close to the upper surface of the first footplate 26. Also, the distal ends of the auxiliary plates 31 are located close to the upper surface of the first footplate 26.

When the pitching amount between the vehicles or between the vehicle and the free-end frame is large, for example, as shown in Fig. 10, when the hinge 32 of the first footplate 26 moves upwardly to a level higher than the hinge 37 of the second footplate 27, the distal portion of the first extension section 29 of the second footplate 27 is pressed upwardly by the distal portion of the first footplate 26, and the base plate 28A and the first extension section 29 are moved upwardly around the hinge 37. At this time, the second extension section 30 is inclined around the hinge 47 due to its own weight so that the distal portion is moved downwardly, thereby maintaining the sliding plate 48 close to the first footplate 26. Consequently, the distal-end center portion 30b maintains the gap-closed condition in which it is located close to the upper surface of the first footplate 26 or the floor surface. Also, the auxiliary plates 31 are inclined downwardly, and their distal ends are located close to the upper surface of the first footplate 26 so as to close the gaps therebetween.

Therefore, a large gap is not formed between the upper surface of the first footplate 26 or the floor surface and the distal end portion of the second footplate 27, so as to prevent a passenger or the like from stumbling over the footplate or catching his or her foot between the footplates.

When such pitching occurs and the distance between the vehicle 20 and the free-end frame 24 is decreased within a normal range, an amount of upward movement (a rising amount ) of the first extension section 29 of the second footplate 27 can be made smaller than when the first footplate 26 extends horizontally because the first footplate 26 is inclined slightly downwardly on the front side. In consequence, a passenger or the like can be prevented from stumbling over the raised footplate or having difficulty in walking on the footplates.

Next, abnormal decrease of the distance between the vehicles or between the vehicle 20 and

the free-end frame 24 upon collision of the vehicles will be described.

For example, when the collision happens while no such pitching as described before is not caused, i.e., while the footplate is in the horizontal state, as shown in Fig. 3, the pressing member 36 of the first footplate 26 collides against the engaging member 39 of the first extension section 29 of the second footplate 27, thus pressing the first extension section 29 toward the free-end frame 24 rapidly and strongly.

By this pressing force, the retaining plate 44 provided on the base plate 28A, as shown in Figs. 6 and 7, collides against the inlet end 41a of the slot 41 and is broken or deformed so that both the base plate 28A and the first extension section 29 can be relatively moved in the directions of the arrows A. Then, the pressing member 36 further presses the engaging member 39, and as shown in Fig. 11, the first extension section 29 is moved along the guides 38 toward the free-end frame 24. Also, the second extension section 30 connected to the distal portion of the first extension section 29 is moved back toward the free-end frame 24, thereby decreasing the entire length of the second footplate 27 in the direction of the railroad.

Therefore, as shown in Fig. 11, even if the distance between the vehicle 20 and the free-end frame 24 is abnormally decreased, the distal end portion 30b of the second footplate 27 can be prevented from largely entering into the passenger room R of the vehicle 20.

Next, an explanation will be given on the case where pitching between the vehicles or between the vehicle 20 and the free-end frame 24 occurs at the same time as the above-described abnormal decrease of the distance upon collision of the vehicles, as shown in Fig. 12.

Concerning the abnormal decrease of the distance, the first extension section 29 of the second footplate 27 is moved in the same manner as described above. At this time, even if pitching occurs after the pressing member 36 engages with the engaging member 39, a projecting portion 36a of the pressing member 36 engages with a projecting portion 39a of the engaging member 39, and the engagement between the members 36 and 39 is maintained so that the first extension section 29 will be reliably pressed and moved.

When the pitching amount is so large that the pressing member 36 abuts against the lower surface of the first extension section 29, and a force of the pressing member 36 to press the first extension section 29 upwardly is abnormally high, the stoppers 52 provided on the base plate 28A of the second footplate 27 abut against the lower surfaces 53a of the side panels 53, thus preventing further upward movements of these plates 28A and 29. Also, the contact plate 35 of the stopper member 33 of the first footplate 26 and the end surface of the vehicle body 20 are deformed, as shown in Fig. 12, or all or some of the stopper member 33, the contact plate 35 and the end surface of the vehicle body 20 are deformed. As a result, the posture of the first footplate 26 shown in Figs. 3 to 5 collapses, and the first footplate 26 is moved downwardly, as shown in Fig. 12.

Therefore, the distal portion of the second footplate 27 is prevented from reaching an abnormally high position from the surface F of the passenger room R of the vehicle 20 or the pathway, thus preventing secondary danger to the passengers.

Moreover, since the second extension section 30 of the second footplate 27 is connected through the hinge 47, the distal end of the second extension section 30 is constantly inclined downwardly by its own weight, to thereby prevent an increase of the gap between the distal end portion 30b of the second extension section 30 and the surface F of the passenger room R or the pathway.

The pressing member 36 of the first footplate 26 is provided in the recess of the cut-out portion 26b formed in a central portion of the footplate 26 because even at the time of collision when the distal end 26a of the first footplate 26 abuts against the free-end frame 24, as shown in Fig. 13, the pressing member 36 maintains the engagement with the engaging member 39, as shown in Fig. 12.

Moreover, as described before, the engaging member 39 is provided on the lower surface of the first extension section 29, and the pressing member 36 is provided on the distal portion of the first footplate 26, so that these members 39 and 36 are hidden under the footplate, thereby causing no trouble in the passengers' walk or the like.

The above-mentioned connector means 40 may be replaced with bolts or pins which connect the two plates 28A and 29 so that when a shearing force of not less than a predetermined value is exerted on the bolts or pins, the bolts or pins will be sheared and broken.

In another embodiment corresponding to the invention disclosed in Claim 1 than the above-described embodiment, the first and second extension sections 29 and 30 in the foregoing embodiment are not separate from each other but the extension plate 28B may be formed of a single plate. Further, in one embodiment corresponding to the invention disclosed in Claim 2, the first extension section 29 or the second extension section 30 may be further divided into a plurality of portions in the direction of the railroad, and the divided portions may be connected vertically movably, so that the extension plate 28B will be formed of three or more plates.

According to the present invention, as has been described heretofore, it is possible to prevent secondary accidents upon collision of the vehicles, such as the distal end of the footplate largely thrusting into the passenger room of the vehicle and hitting the legs of passengers. Further, by dividing the extension plate of the second footplate into a plurality of sections, not only the foregoing effect of preventing the footplate from thrusting into the room can be produced, but also the gap between the first footplate and the distal end of the second footplate can be maintained at an extremely small size even if the pitching amount of the vehicles is increased upon their collision. Thus, the distal end of the footplate can be kept from making a large opening to cause a serious accident to passengers. Also, it is possible to prevent more effectively secondary accidents such as a passenger or the like stumbling over the distal end of the footplate and falling down, or catching his or her foot between the footplates.

## Claims

1. A footplate apparatus for a connecting pathway between vehicles, comprising a first footplate (26) provided on a first vehicle (20) and a second footplate (27) provided on a second vehicle (21) or a free-end frame, said second footplate (27) having a base plate (28A) supported on the second vehicle or free-end frame and an extension plate (28B) slidably extending from a distal portion of the base plate in the travelling direction of the vehicles, said base plate (28A) and said extension plate (28B) being interconnected by connector means (40) in such a manner that the connection can be released by a predetermined outside force, said extension plate (28B) having a distal portion mounted on the first footplate (26) and including an engaging member (39), said first footplate including a pressing member (36) opposite to said engaging member, said engaging member (39) and said pressing member (36) having such a relationship that when the distance between the vehicles or between the vehicle and the free-end frame is abnormally decreased, said pressing member (36) presses against said engaging member (39), and moves it toward said second vehicle or free-end frame.

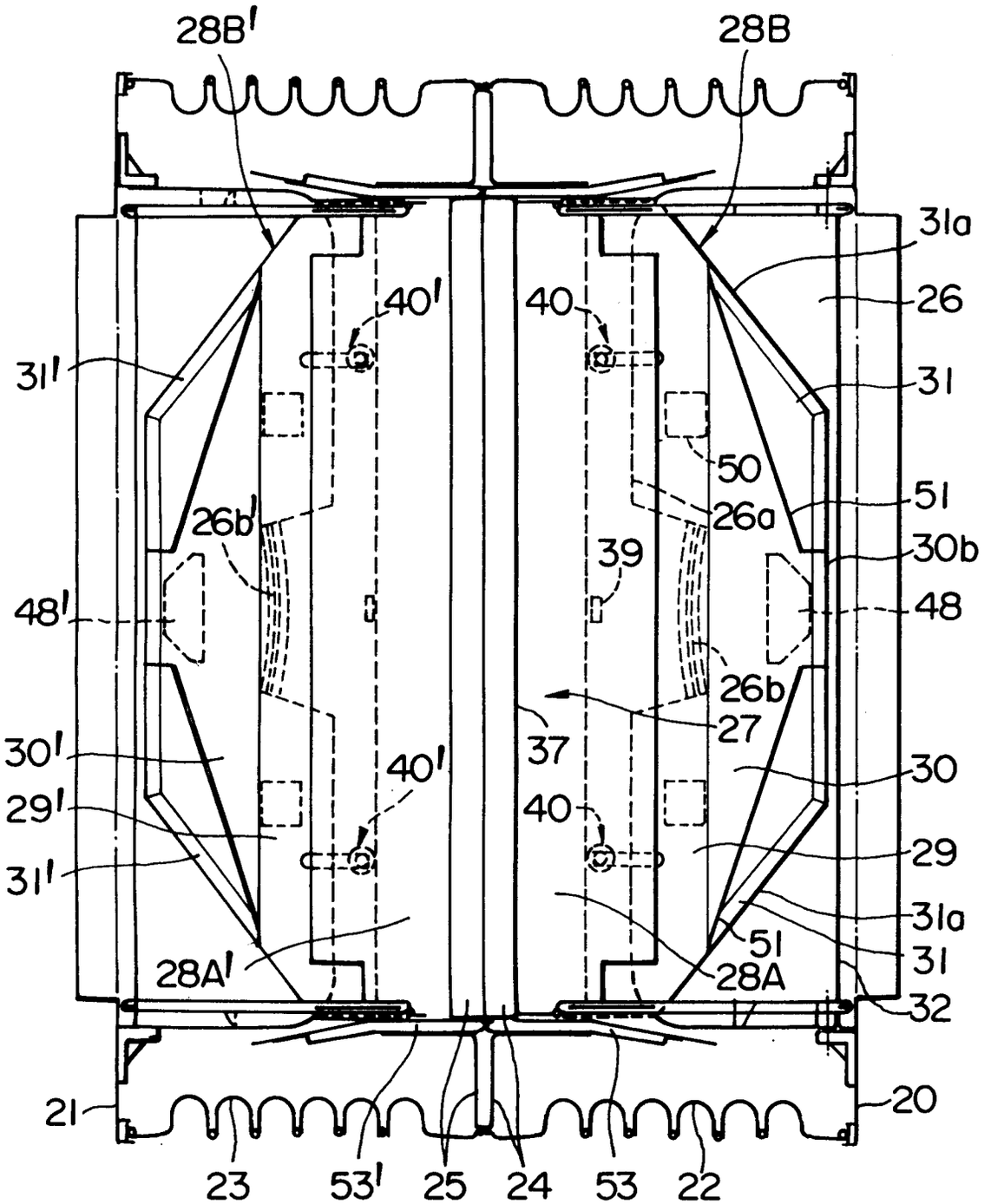
2. The apparatus of Claim 1, wherein said connector means (40) include a slot (41) bored through said extension plate (28B) and extending in the travelling direction of the vehicles, a retaining hole (42) of a circular shape having a diameter larger than the width of the slot (41), the hole being formed continuous with the slot on the far side from the first vehicle, a bolt (43) located in the center of the retaining hole (42) secured to the base plate (28A) and projecting downwardly therefrom, a retaining plate (44) secured to the bolt (43), and being formed of a disk which has substantially the same diameter as the retaining hole (42) and is closely fitted therein, said retaining plate (44) being made of a material which is broken or deformed when subjected to an impact of not less than a predetermined value, and a support plate (45) and a nut (46) for supporting the retaining plate (44) against the bolt (43).

3. The apparatus of claim 2, wherein said retaining plate (44) is made of a synthetic resin or of aluminium.

4. The apparatus of claim 1, wherein said connector means (40) include bolts or pins which connect said extension plate (28B) to said base plate (28A), said bolts or pins being made of a material which is sheared and broken when subjected to a shearing force of not less than a predetermined value.

5. The apparatus of any preceding claim, wherein said extension plate (28B) of said second footplate (27) is divided into a plurality of portions (29, 30) in the direction of the railroad, and the divided portions are connected in vertically movable fashion.

FIG. 1


28B'
28B
31a
40'
40
26
31'
31
50
51
26b'
26a
39
30b
48'
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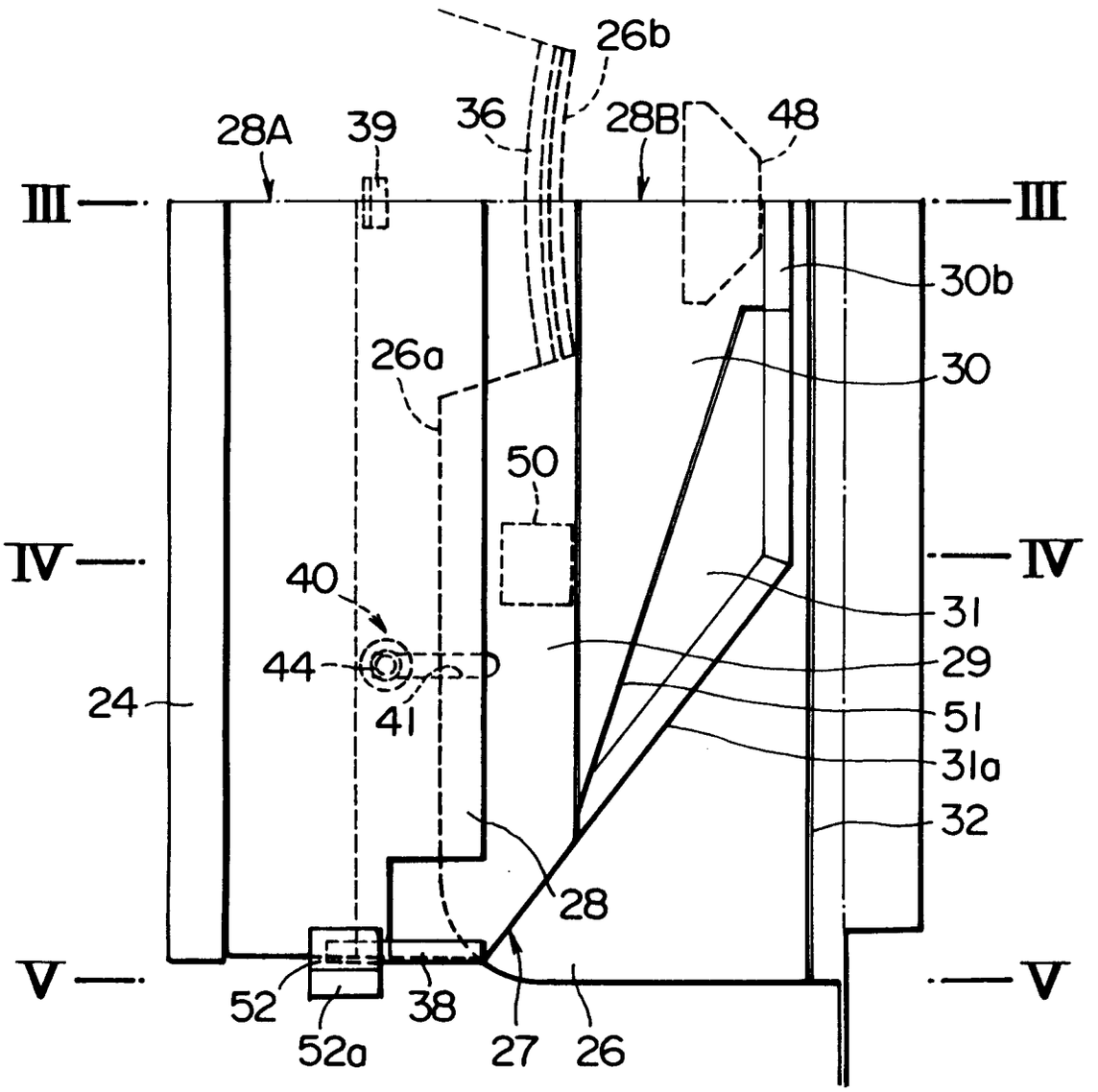
26b
27
37
30'
40'
30
29'
40
29
31'
31a
51
28A'
28A
31
32
21
20
23
53'
25
24
53
22

FIG. 2


26b
28A
39
36
28B
48
III
III
30b
26a
30
50
IV
IV
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41
51
31a
32
28
V
V
52
38
52a
27
26

FIG. 3

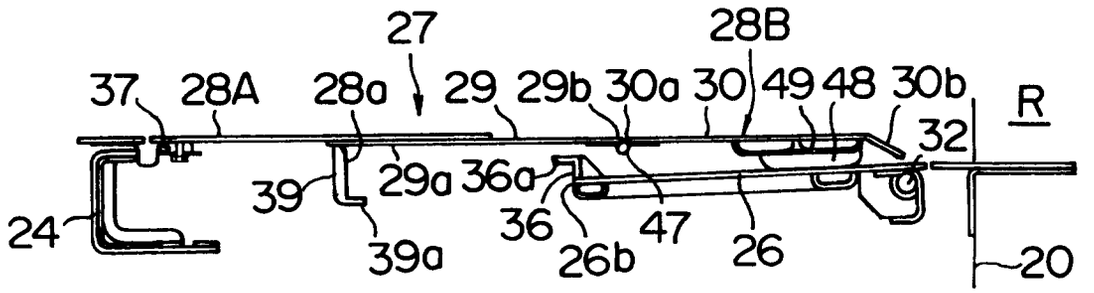



FIG. 4

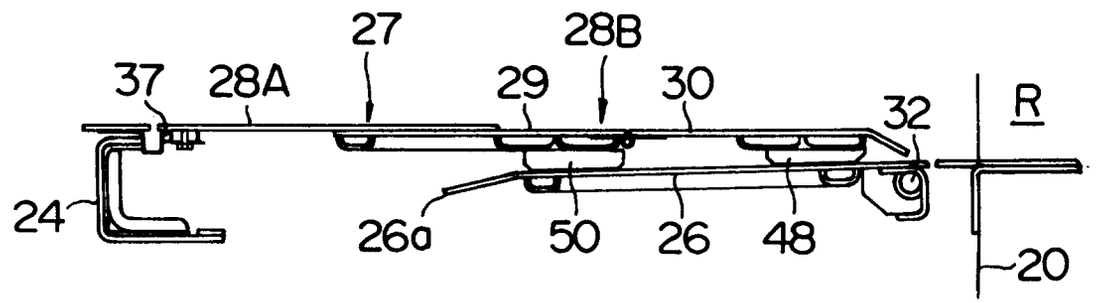



FIG. 5

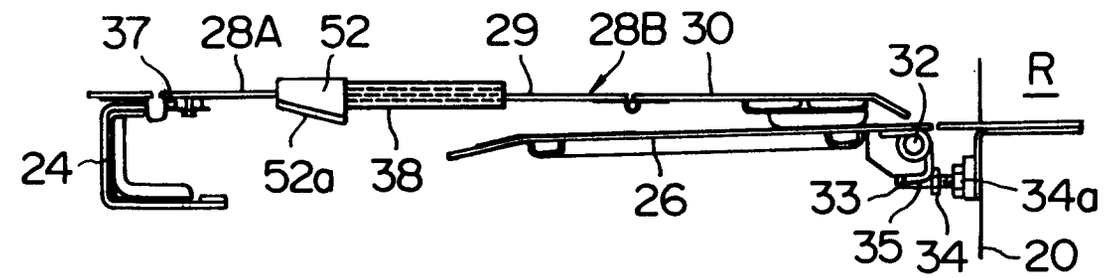


FIG. 6

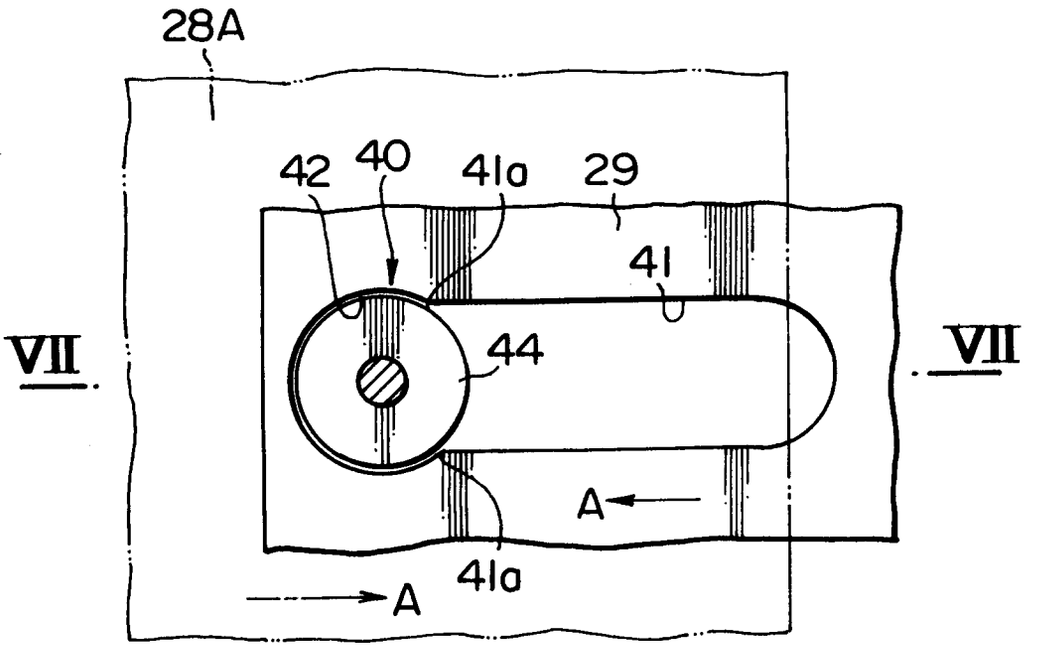



FIG. 7

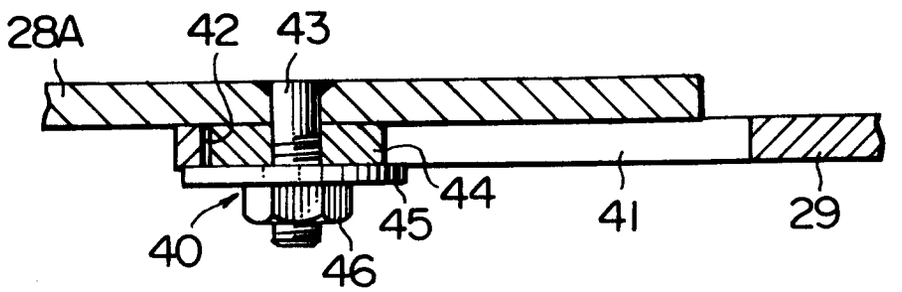



FIG. 8

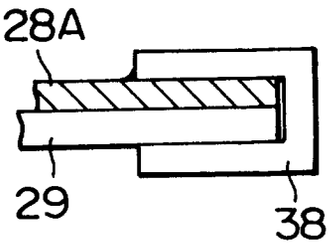


FIG. 9

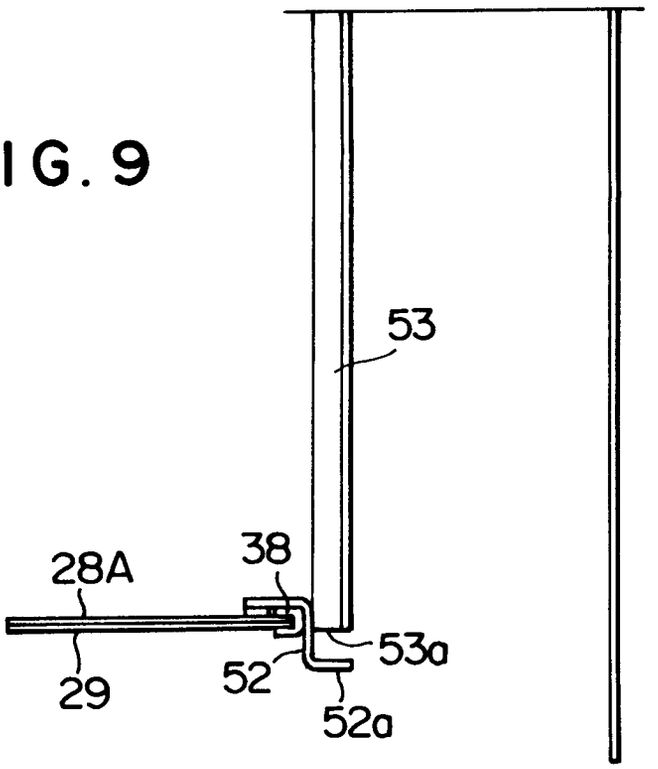



FIG. 10

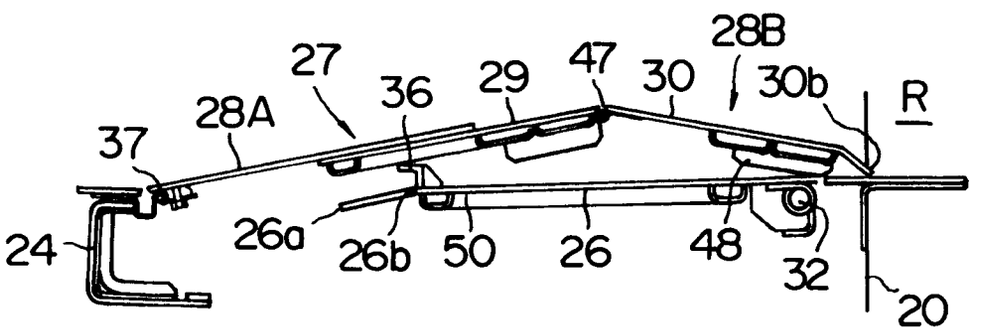



FIG. 11

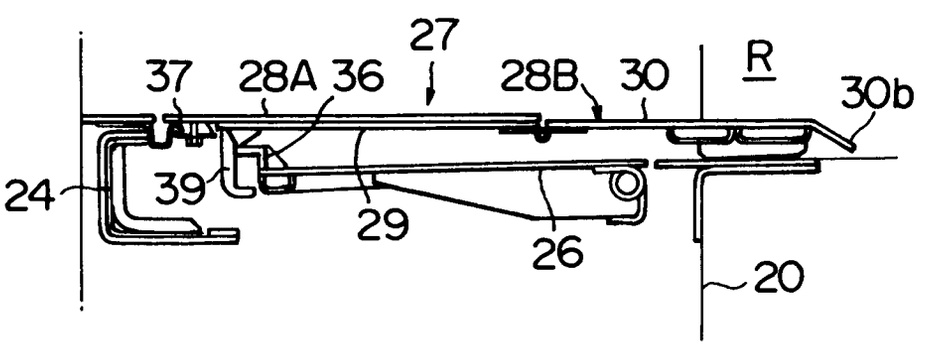


FIG. 12

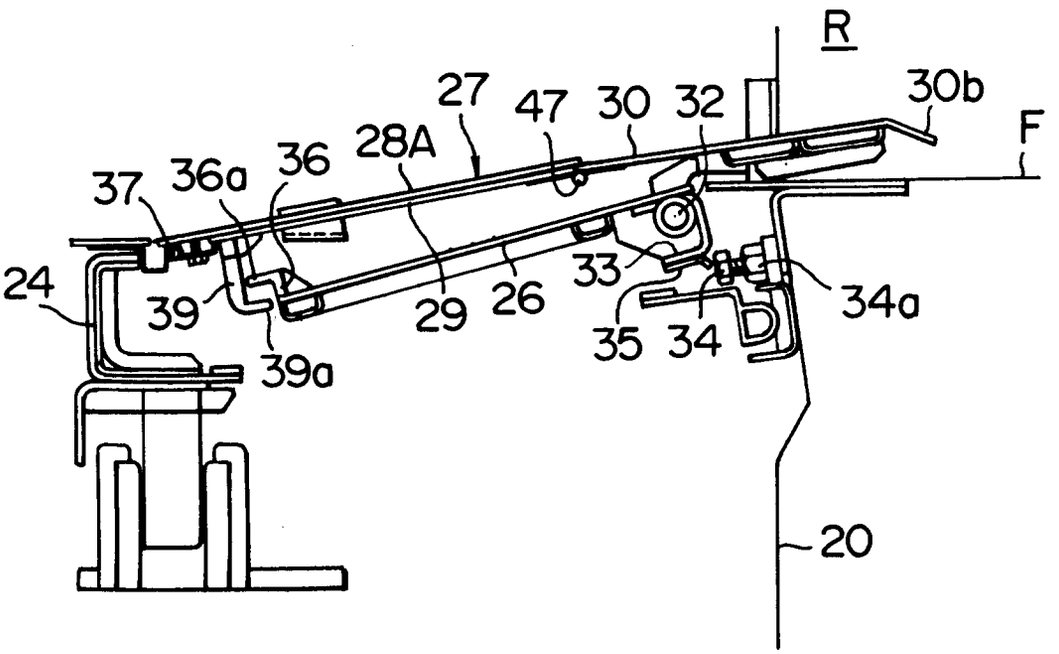

R
27
47
30
32
30b
F
28A
36
36a
37
24
39
39a
29
26
33
35
34
34a
20

FIG. 13

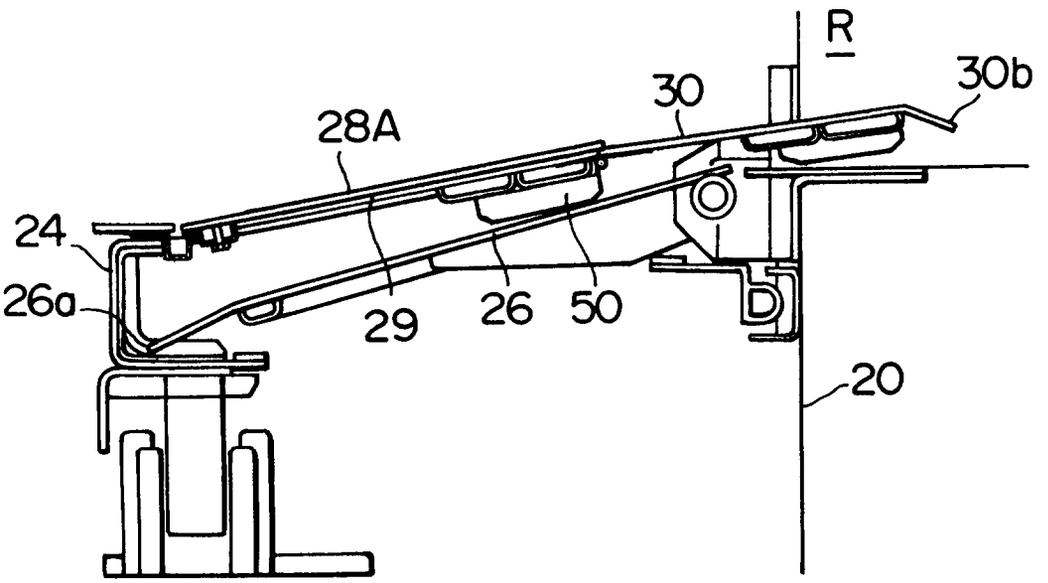

R
30
30b
28A
24
26a
29
26
50
20

FIG. 14 PRIOR ART

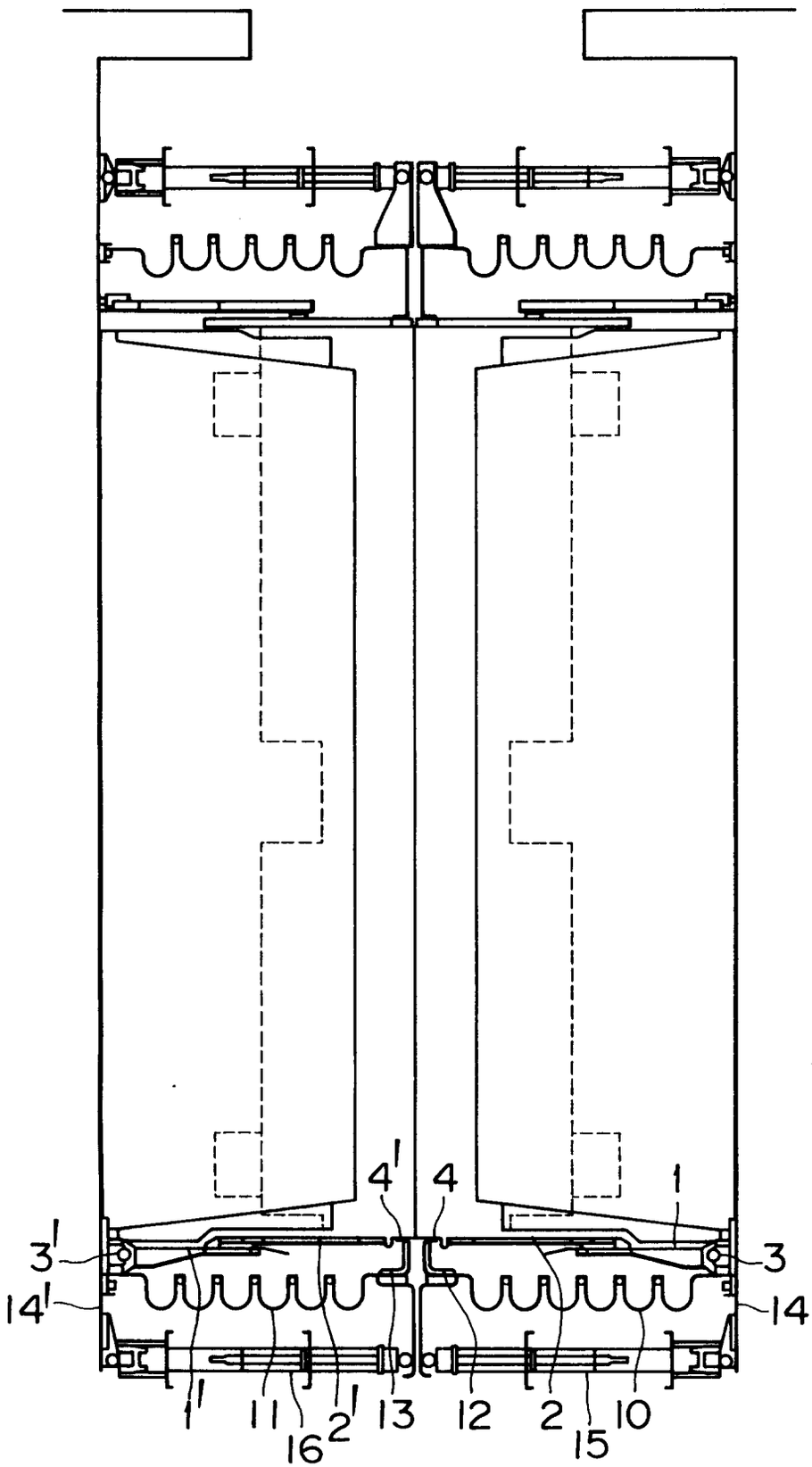


FIG. 15 PRIOR ART

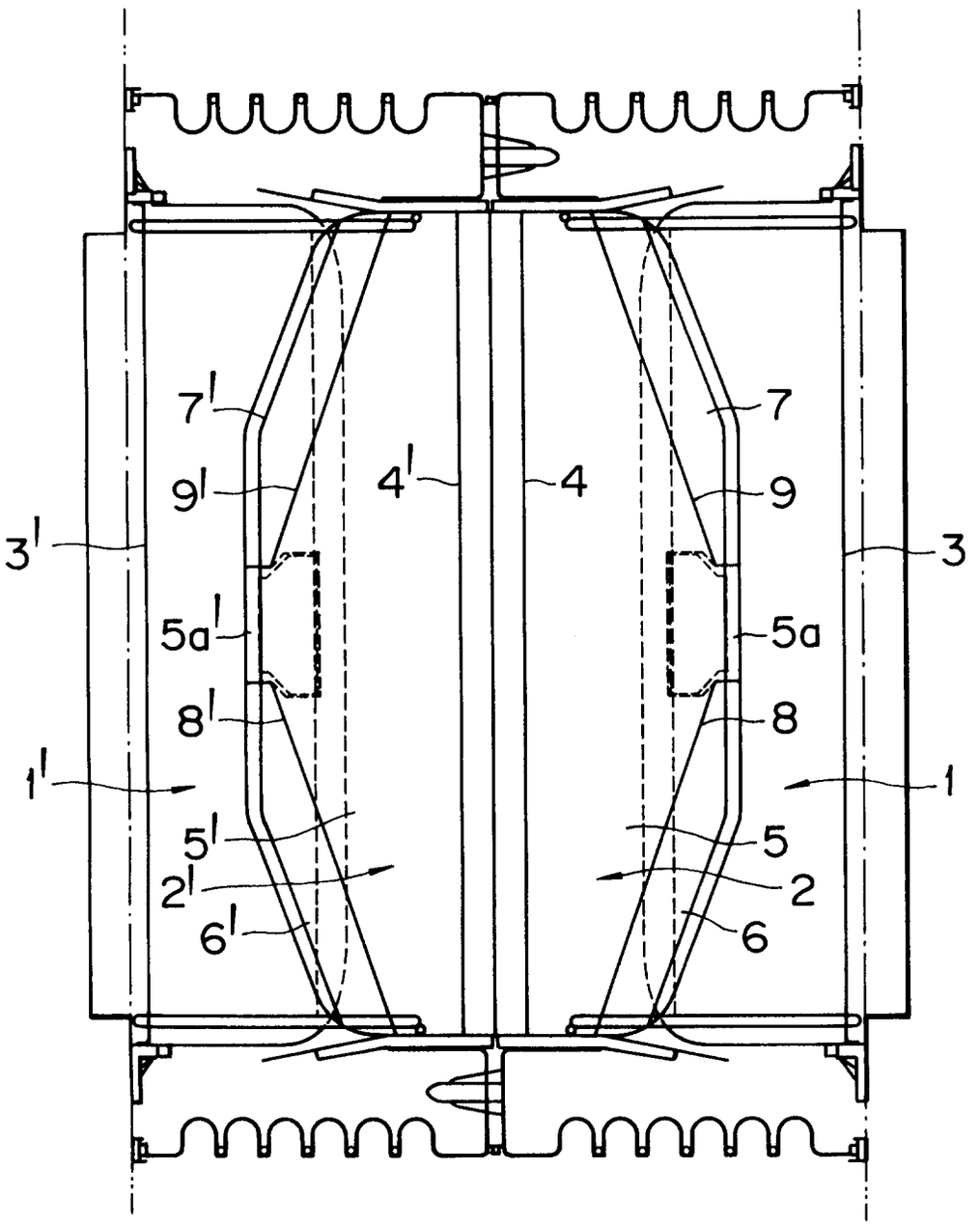


FIG. 16A PRIOR ART

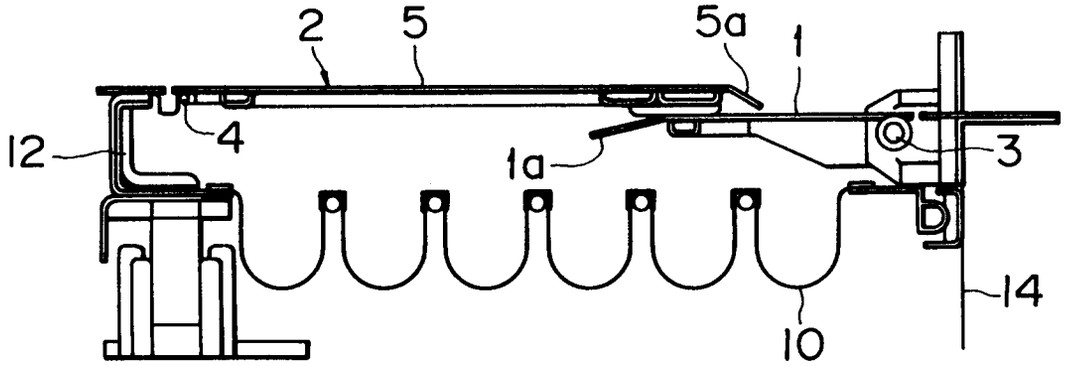



FIG. 16B PRIOR ART

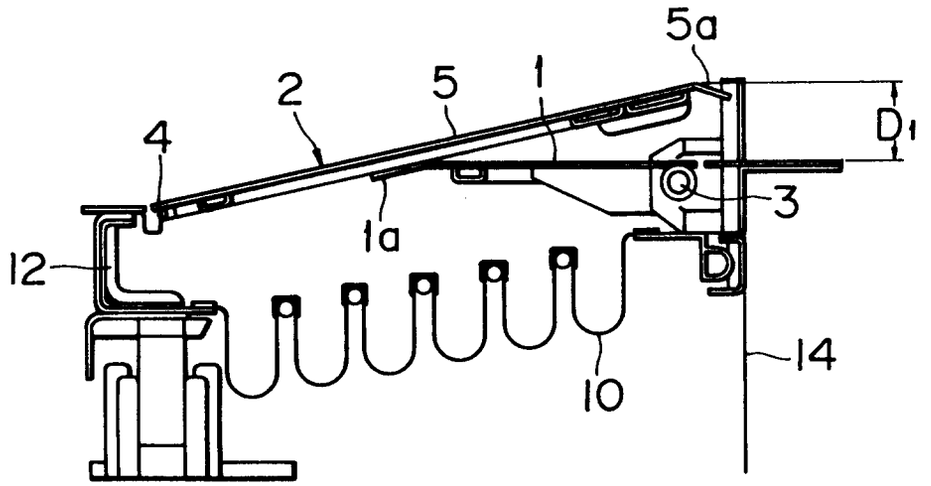
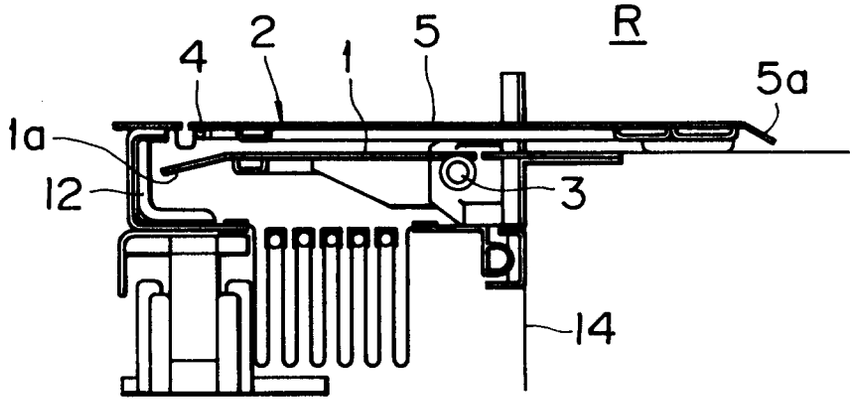



FIG. 16C PRIOR ART



European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 95 10 8525

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
|---|---|---|---|
| A | DE-B-12 48 087 (MASCHINENFABRIK AUGSBURG-NÜRNBERG AG) 24 August 1967<br>* column 3, line 65 - column 5, line 52; figures 1,2 * | 1 | B61D17/20 |
| A | DE-C-518 414 (J. RONAI) 19 May 1929<br>* page 1, line 67 - page 2, line 26; figure 1 * | 1 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B61D
B60D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 25 August 1995 | Chlosta, P |

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