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Description

The invention relates to a semi-fixed covering for an automobile-carrying wagon, a covering which comprises covering sections which can be moved outwards from the center line of the wagon in order to provide space for walking and for opening automobile doors in a loaded wagon.

Efforts to make the transportation of automobiles maximally efficient lead to a requirement of increasing the length of railway wagons. Owing to the space available at track curves, however, any increase in the length of a wagon requires a decrease in the width of the wagon. On the other hand, in order to increase the number of automobiles in each wagon, they are typically placed on two decks. If larger automobiles, such as vans, are to be transported, it is not possible to place them on two decks, in which case the upper transport deck must be made capable of being either lowered or removed. In all these transport situations, when a railway wagon has been made long, the result has been that automobile doors will not have proper space to open in the lateral direction of the wagon but touch the fixed covering, regardless of whether the automobiles are on one deck or two decks. In addition, the walking space at the side of the automobiles is restricted and, especially on the upper deck, also low owing to the slant of the roof section of the covering, thus making it difficult for drivers to get out of and into the loaded automobiles. When the coverings are fixed, another problem involved in automobile-carrying wagons is how to remove exhaust gases during the loading and unloading of automobiles, and how to provide light. However, the aim is to use covered wagons in the transport of automobiles in order both to avoid vandalism and to keep the automobiles cleaner.

Efforts have been made to solve partially the problems described above by using, for example, a covering the roof section of which can be lifted rectilinearly upwards. Thereby light and ventilation, as well as moving space in the vertical direction, are obtained at least on the upper deck. However, on the lower deck the problems remain unchanged.

The publication US-2,794,402 proposes a side wall which pivots outwards about hinge whereupon the upper section of this pivoting wall will form the roof section for a catwalk formed along the side of the wagon, the lower section of the covering will form the side wall of the catwalk, and a further section, being its continuation, will form the floor of the catwalk. This outwards pivoted construction is supported by separate supports pivoting about vertical axes. By means of this construction it is possible to solve the problem of space requirement at the sides of the lower deck in a two-deck freight wagon. However, by means of this construction it is not possible to increase the height of the passage on the upper deck, and providing space for opening automobile doors on the upper deck is also difficult. In no case can this construction be applied in such a manner that it would, unaltered, be applicable to both single-decked and multiple-decked freight wagons. Furthermore, the construction is highly complicated, heavy and difficult to use, requiring a number of operating stages during both opening and closing.

The object of the present invention is thus to provide for an automobile-carrying wagon a covering and its transfer mechanism, enabling the doors of automobiles loaded in the wagon to be opened without hindrance, increasing space in the wagon during loading and for purposes of getting off and on the wagon and for facilitating the installation of wheel chocks. It is also an object of the invention to provide a construction of this type which as such produces the results described above, regardless of whether the automobiles are loaded on one deck or two decks, the increasing of space also meaning the increasing of vertical clearance. It is a further object of the invention to provide a covering structure of this type, which enables the discharge of automobile exhaust gases and the supply of light from outside to both the upper driving deck and the lower driving deck. It is a further object of the invention to provide a covering structure of this type, which is simple as well as easy and light to operate, so that the drivers of the automobiles can, when necessary, move the covering themselves without any specific auxiliary tools.

By means of a covering structure according to the invention, a crucial improvement can be achieved with respect to the disadvantages described above, and the objectives defined can be reached. In order to accomplish this, the covering according to the invention is characterized in what is disclosed in the characterizing clause of Claim 1. It can be deemed to be the most important advantage of the invention that it is applicable to being used in an automobile-carrying wagon in which the upper transport deck can be adjusted to different heights or be removed, additional clearance thus being always available regardless of the manner of use or the type of the automobiles to be transported. It is thus a further advantage of the invention that the construction is simple and reliable in operation, as well as easy to use.

The invention is described below in detail, with reference to the accompanying drawings.

Figure 1 depicts generally two automobile-carrying wagons, partly as a cutaway.

Figure 2 is a presentation of the principle of the covering structure according to the invention, in a cross section of the automobile-carrying wagon.

Figure 3 depicts the structure of Figure 2, the automobile-carrying wagon being in another operating state.

Figure 1 depicts two automobile-carrying wagons in which the semi-fixed covering according to the invention has been used; the covering of one automobile-carrying wagon is divided into sections, in this case into four covering sections, i.e. sections 2a, 2b, 2c and 2d in one wagon and respectively into sections 2e-h in the other. Each covering section 2a-d or 2e-h is in itself fixed in construction, i.e. each covering section, when shifted, moves as one unit, without changing its shape. In Figure 1, the covering sections 2a, 2b, 2c, 2d, 2f, 2g are depicted in the opened position, and the covering section 2e, as well as the cutaway section 2h, not shown, in the closed position. Each covering section 2 is transferred, according to the invention, between its closed position and its opened position by means of pivot-arm structures 3 and 4, which are at a distance from each other.

Figures 2 and 3 depict cross sections of the automobile-carrying wagon according to the invention in such a manner that the continuous line depicts the sections 2 in the closed position, i.e. they correspond to a cross-section through B-B in Figure 1, of the state of its right side. The dot-dash line for its part depicts the sections 2 in the open position, which corresponds to a cross-section through A-A in Figure 1. The pivot arms 3 and 4, secured to a column, arch or the like 5, are located at a distance H1 from each other, the distance being parallel to the longitudinal wall 7 of the wagon. The pivot arms 3 and 4 are both hinged to this wagon frame part 5 by first hinges 9 and respectively 10 and to the covering section by second hinges 11 and respectively 12, in such a manner that all of the pivot axes 9', 10', 11', 12' corresponding to these four hinges are perpendicular to the said distance H1. In the case of Figures 2 and 3, the pivot axes 9'-12' are thus perpendicular to the plane of the figure. Because of the length of the covering section 2 it is in general necessary to provide at least two such pivot-arm pairs 3, 4 at a distance L, parallel to the longitudinal center line P of the wagon, from each other, for example in the vicinity of the end edges 17 of the covering sections, in order that the load be evenly distributed and that no point loads or excessively high moments be produced in the covering section or the wagon frame. Depending on the dimensioning of the covering section and on the construction of the wagon frame, there may be one, two, three or more pairs of pivot arms 3, 4. However, the pivot axes 9', 11', corresponding to the hinge structures 9 and 11, of the first pivot arms 3 must in each covering section be mutually aligned, and respectively the pivot axes 10', 12', corresponding to the hinges 10 and 12, of the second pivot arms 4 must be mutually aligned, i.e. all the four hinge axes 9', 10' 11', 12' must be parallel.

The distance H2 between the hinging points 11 and 12 of the pivot arms 3 and 4 in the covering section 2 is equal to the previously mentioned distance H1 between the hinges 9 and 10 in the frame structure 5 of the wagon. Also, it is advantageous if all the lengths R of the pivot arms 3, 4 are equal, in which case the hinge distances H1, H2 in the frame and in the covering section, together with the pivot arms, will always form a parallelogram having constant sides.

The mechanism according to the invention functions as follows:
When it is desired to move the covering section 2 from the closed position to the open position, for example the pivot arms 3 and 4 on the right side of the wagon move counterclockwise about the hinge axes 9', 10' of the hinges 9 and 10 in the wagon frame, and simultaneously, according to the laws of mechanics, the pivot arms will pivot clockwise about the hinge axes 11', 12' of their hinges 11 and 12 in the covering section, over the same angle α as they move counterclockwise. The arms 3 and 4 concerned and the distances H1 and H2 form a parallelogram throughout the duration of the pivoting movement, in which parallelogram the distance H1 in the frame will thus remain stationary and H2 will move away from it, and parallel to it, while the arms 3 and 4 pivot. The covering section will retain its position, unturned, throughout the transfer movement, thus implementing a so-called parallel transfer.

Preferably the first hinges 9 and 10 are mounted in the frame part 5 in such a manner that their hinge axes 9', 10' are in the closed position close to the side surface 15 of the covering section wall 7, the pivot arms 3 and 4 being located in an approximately vertical position and parallel to the covering section 15 when the covering section is in the closed position. In this case the advantageous extent of the pivoting movement is approx. 90°, the pivot arms 3 and 4 projecting, in the open position of the covering section, directly to the sides, i.e. in the case of Figures 2 and 3 horizontally. At this time the covering section 2 has moved outwards to the distance of the length R of the pivot arms and upwards over the same length R, both lateral and vertical clearance having thus been produced in the wagon. If the pivoting angle α is smaller than 90°, more lateral clearance is formed than vertical clearance, but if the pivoting angle is considerably larger than 90°, proportionately more vertical clearance than lateral clearance is formed. The desired shape and extent of the additional clearance can always be obtained by selecting a suitable length R for the pivot arms 3 and 4 and by

locating the frame-side hinges 9 and 10 in a suitable relation to the covering section and respectively the covering-side hinges 11 and 12 at predetermined points. In this case, the hinges 9-12 may in principle be located anywhere inside the permitted outline of the wagon, as long as the distance H1 between the hinges 9 and 10 and the distance H2 between the hinges 11 and 12 are equal, and the pivot arms 3 and 4 are mutually equal.

When it is desired that between the closed position and the open position the covering section makes, instead of a parallel transfer, also a pivoting movement, in which case each of the different edges of the covering section will move over a different distance, the arms 3 and 4 may be made of different lengths and/or the distances H1 and H2 may be made different. The length of the arms and/or the distances may also be made adjustable in effect.

According to the invention, it is advantageous to arrange the opposite covering sections 2a and 2c, 2b and 2d, etc., asymmetrically, and thus also the adjacent covering sections 2a and 2b, 2c and 2d, etc., to be of different sizes and/or asymmetrically located in the longitudinal direction of the wagon, in such a manner that on the different sides of the wagon the joints 13 and respectively 14 between successive covering sections will come at different points and the possible additional columns or the like 5 on the different sides of the wagon will also come at different points, as shown in Figure 1. This makes it possible that, regardless of the parking site of an automobile, a door on one side of the automobile is always out of alignment with the frame support structure 5, and the door can thus be opened.

In the embodiment described above, the pivot axes 9', 10', 11' and 12' are horizontal, but they can also be positioned vertically, in which case the covering sections will move in the horizontal direction. It is also conceivable that a covering section is divided in the vertical direction into sections for the upper and lower decks, in which case the pivot axes in these sections could be mutually parallel or non-parallel, i.e. horizontal or vertical. It is conceivable even to use inclined pivot-axes.

The opening of the covering sections according to the invention may take place in a number of different ways. One possibility is to arrange, for example, an arm extension from the hinge 9 in the lower pivot arm 3, a counterbalance spring or alternatively a counterweight being attached to the wagon frame by this arm extension. In this case the arm 3 and its extension constitute a double-arm lever which, by means of spring force or respectively weight keeps the covering section in the open position and eases its opening. During closing, the covering section is turned against the spring force, and with a suitable design the spring force will lose its opening effect when the covering section reaches its closed position. The section itself is handled by using handles or the like, fastened to the covering section. In addition, for reasons of safety, a locking mechanism is to be provided in the covering sections, at least for the duration of transportation, in order to prevent inadvertent opening, but this mechanism is not described here in greater detail.

Claims

1. A semi-fixed covering construction for an automobile-carrying wagon with covering sections (2), which are capable of being moved outwards from the center line (P) of the wagon in order to provide walking space and space for opening automobile doors in the loaded wagon; which construction for a covering section comprises at least two pivoting means fastened to the wagon frame (5), which pivoting means are at a distance (H1), parallel to the wagon side (7), from each other, and are hinged at one end to the wagon frame by first hinges (9, 10) and at the other end to the covering section by second hinges (11, 12), in such a manner that the mutually parallel pivot axes (11', 12', 9', 10') of these hinge articulations are perpendicular to the said distance (H1), **characterized** in that said pivoting means are pivot arms (3, 4), other than portion of the covering section (2a, 2b, 2c,...), forming at least one pivot arm pair and that each covering section (2a-d; 2e-h) in itself is fixed in construction for movement as one unit without changing its shape.

2. A semi-fixed covering according to Claim 1, **characterized** in that each covering section (2a-h) is fastened to the wagon frame (5) by means of at least two pivot-arm pairs (3, 4) of the said type, the pairs being at a distance (L), perpendicular to the said distance (H1), from each other, in which case the pivot axes of all those first-arm (3) ends hinged to the wagon frame join, forming the first frame-side hinge axis (9'), and the pivot axes of those second pivot arm (4) ends hinged to the wagon frame form the second frame-side hinge axis (10'), and the pivot axes of the first pivot arms (3) hinged to the section form the third section-side hinge axis (11') and the pivot axes of the ends of the second pivot arms (4) hinged to the section form the fourth section-side hinge axis (12').

3. A semi-fixed covering according to Claim 2, **characterized** in that the said distance (H1) between the first and second hinge axes (9', 10') and the distance (H2) between the third and fourth hinge axes (11', 12') are mutually equal, and that the lengths of the first and second pivot arms (3, 4) between the first (9') and the third (11') hinge axes and respectively between the second (10') and the fourth (12') hinge axes are equal, in which case the pivot arms (3, 4) and the said distances (H1, H2) in the section and frame will always form a constant-side parallelogram in the various positions of the pivoting movements of the arms (3, 4).

4. A semi-fixed covering according to Claim 3, **characterized** in that the pivot arms are hinged to the wagon frame (5) in such a manner that the first and second hinge axes (9', 10') are located in the vicinity of the side surface (15) of a covering section in a closed position, towards the wagon center from it, in which case, whenever the covering section is in the closed position, the pivot arms (3, 4) will run at least approximately parallel to the side surface (15) of the covering section and, when the covering section is in the open position, the pivot arms (3, 4) will be at a substantial angle to the side surface (15).

5. A semi-fixed covering according to Claim 1, **characterized** in that in an individual covering section (2a or 2b or 2c...2h) the pivot axes (9', 10', 11', 12') are either horizontal or, alternatively, vertical.

6. A semi-fixed covering according to Claim 1, **characterized** in that the pivot-arm pairs (3, 4) are located in the direction of the center line (P) of the wagon on the end edges (17) of each covering section, or in their vicinity, and at different points on the opposite sides of the wagon, the joints (13, 14) of the covering sections on the opposite sides being non-aligned and that each wagon has a plurality of covering sections (2a-d; 2e-h).

Patentansprüche

1. Vorrichtung mit einer halbfesten Abdeckung für einen Waggon zum Transport von Kraftfahrzeugen mit Abdeckungsabschnitten (2), die von der Mittellinie (P) des Waggons nach außen bewegt werden können, um Raum zum Gehen zu schaffen und auch Raum zum Öffnen der Türen der Kraftfahrzeuge bei beladenem Waggon, wobei die Konstruktion für einen Abschnitt der Abdeckung wenigstens zwei Schwenkmittel aufweist, die am Rahmen (5) des Waggons befestigt sind, welche Schwenkmittel sich in einem Abstand (H1) voneinander parallel zur Seite (7) des Waggons befinden und an ein Ende des Rahmens des Waggons mit Hilfe von ersten Gelenken (9, 10) angelenkt sind und am anderen Ende am Abschnitt mit Hilfe von zwei Gelenken (11, 12) derart, daß die jeweils parallelen Schwenkachsen (11', 12', 9', 10') der Gelenke senkrecht zu dem Abstand (H1) sind,
dadurch gekennzeichnet,
daß die Schwenkmittel als Schwenkarme (3, 4) ausgebildet sind, und zwar nicht als ein Teil des Abschnitts (2a, 2b, 2c ...), und wenigstens ein Schwenkarmpaar ausbilden, und daß jeder Abschnitt (2a - 2d; 2e - 2h) in sich in seiner Konstruktion fest ist zur Bewegung als eine Einheit, ohne daß dabei seine Form geändert wird.

2. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß jeder Abschnitt (2a - 2h) am Rahmen (5) des Waggons mit Hilfe von wenigstens zwei Schwenkarmpaaren (3, 4) des erwähnten Typs befestigt sind, wobei die Paare in einem Abstand (L) rechtwinkelig zum Abstand (H1) voneinander vorgesehen sind, in welchem Fall die Schwenkachsen aller Enden der ersten Arme (3) an die Verbindung des Waggonrahmens angelenkt sind und die ersten Gelenkachsen (9') am Seitenrahmen ausbilden, wobei die Schwenkachsen der Enden der zweiten Schwenkachsen (4), die an den Waggonrahmen angelenkt sind, die Schwenkachsen (10') der zweiten Gelenke am Seitenrahmen ausbilden, wobei fernerhin die Schwenkachsen der ersten Schwenkarme (3), die an den Abschnitt angelenkt sind, die dritte Gelenkachse (11') der Seite des Abschnitts ausbilden, und wobei die Schwenkachsen der Enden der zweiten Schwenkarme (4), die an den Abschnitt angelenkt sind, die vierte Gelenkachse (12') an der Seite des Abschnitts ausbilden.

3. Vorrichtung nach Anspruch 2,
dadurch gekennzeichnet,
daß der Abstand (H1) zwischen der ersten und der zweiten Gelenkachse (9', 10') und der Abstand (H2) zwischen der dritten und der vierten Gelenkachse (11', 12') jeweils gleich sind, und daß die Längen und des zweiten Schwenkarms (3, 4) zwischen der ersten und der dritten Gelenkachse (9'; 11') bzw. zwischen der zweiten und der vierten Gelenkachse (10'; 12') gleich sind, in welchem Fall die Schwenkarme

(3, 4) und die Abstände (H1, H2) im Abschnitt und Rahmen stets in den verschiedenen Positionen der Schwenkbewegungen der Arme (3, 4) ein Parallelogramm mit gleichbleibenden Seiten ausbilden.

4. Vorrichtung nach Anspruch 3,
dadurch gekennzeichnet,
daß die Schwenkarme am Rahmen (5) des Waggons derart angelenkt sind, daß die erste und die zweite Schwenkachse (9', 10') sich in der Nähe der Seitenfläche (15) eines Abschnitts einer Abdeckung in geschlossener Position befinden, und zwar zur Mitte des Waggons, wobei, wenn immer der Abschnitt sich in der geschlossenen Position befindet, die Schwenkarme (3, 4) wenigstens ungefähr parallel zur Seitenfläche (15) des Abschnitts gehen, und wenn der Abdeckungsabschnitt sich in der offenen Position befindet, daß dann die Schwenkarme (3, 4) einen wesentlichen Winkel mit der Seitenfläche (15) ausbilden.

5. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß bei einem einzelnen Abdeckungsabschnitt (2a oder 2b oder 2c ... 2h) die Schwenkachsen (9', 10', 11', 12') entweder horizontal oder alternativ vertikal ausgerichtet sind.

6. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß die Schwenkarmpaare (3, 4) sich in Richtung der Mittellinie (P) des Waggons an den Endkanten (17) jedes Abdeckungsabschnitts befinden, oder in deren Nähe, und an unterschiedlichen Punkten an entgegengesetzten Seiten des Waggons, wobei die Verbindungen (13, 14) der Abdeckungsabschnitte an den entgegengesetzten Seiten nicht fluchten, und daß jeder Waggon eine Vielzahl von Abdeckungsabschnitten (2a - 2d; 2e - 2h) hat.

Revendications

1. Ensemble de recouvrement semi-fixe destiné à un wagon transportant des automobiles, comportant des sections couvrantes (2), qui sont susceptibles d'être déplacées vers l'extérieur à partir de la ligne médiane (P) du wagon afin de ménager un espace pour marcher et un espace pour ouvrir les portières des automobiles dans le wagon chargé ; ensemble qui comprend, pour une section couvrante, au moins deux moyens de pivotement fixés au châssis (5) du wagon, ces moyens de pivotement se trouvant espacés l'un de l'autre selon une distance (H1), parallèlement à la paroi (7) du wagon et étant articulés, à une extrémité, au châssis du wagon, par des premières charnières (9, 10) et, à l'autre extrémité, à la section couvrante, par des deuxièmes charnières (11, 12), de telle sorte que les axes de pivotement (11', 12', 9', 10'), parallèles entre eux, de ces articulations en forme de charnières, sont perpendiculaires à ladite distance (H1), caractérisé en ce que les moyens de pivotement sont des bras de pivotement (3, 4), et ne sont pas une partie de la section couvrante (2a, 2b, 2c, ...), formant au moins une paire de bras de pivotement et en ce que chaque section couvrante (2a-d, 2e-h) est, en soi, fixée à l'ensemble de façon à pouvoir se déplacer d'un bloc sans changer de forme.

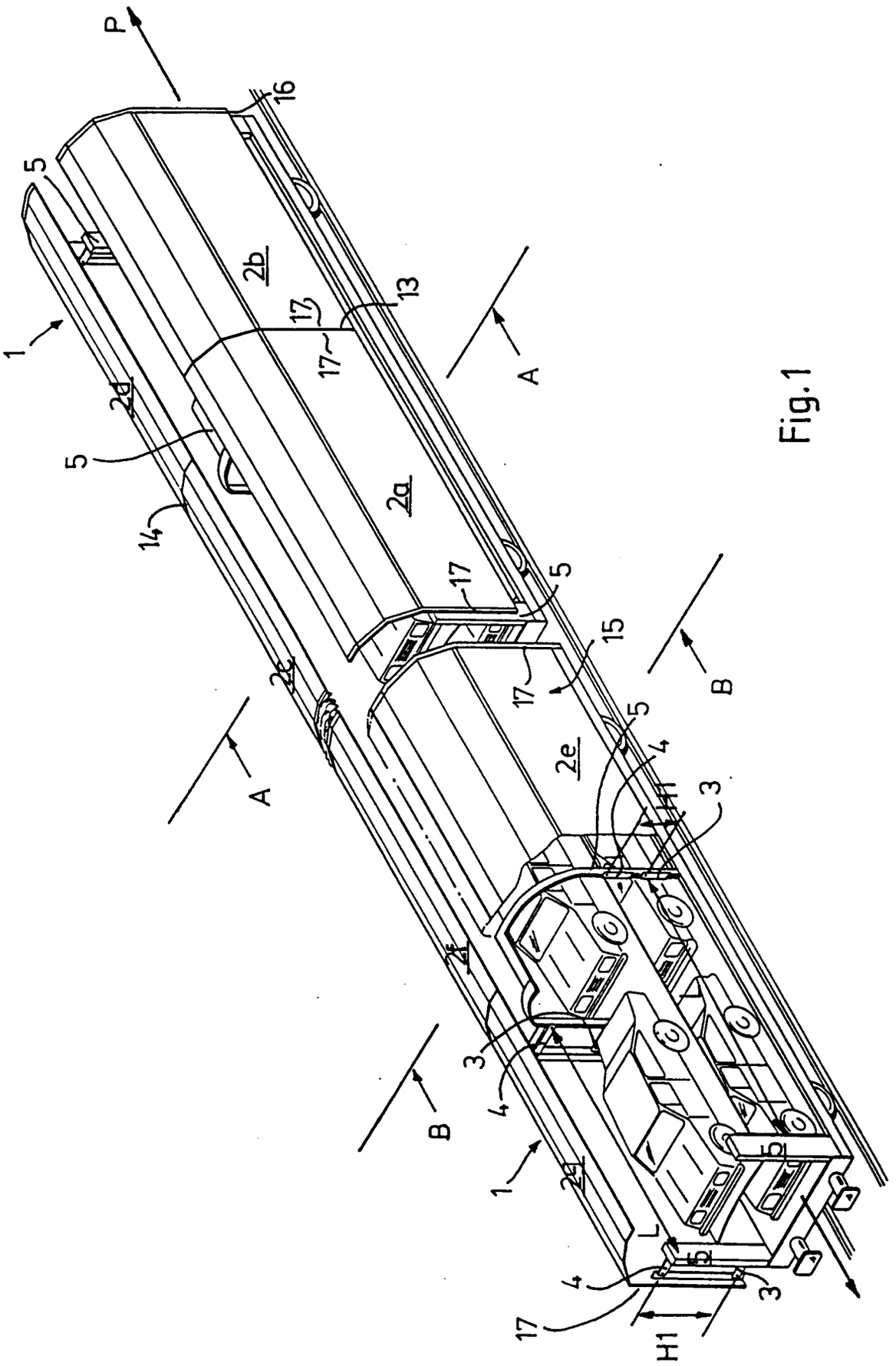
2. Ensemble de recouvrement semi-fixe selon la revendication 1, caractérisé en ce que chaque section couvrante (2a-h) est fixée au châssis (5) du wagon au moyen d'au moins deux paires de bras de pivotement (3, 4) du type mentionné, les paires étant espacées l'une de l'autre selon une distance (L), perpendiculairement à la distance (H1), auquel cas les axes de pivotement de toutes les extrémités de premiers bras (3) qui sont articulées sur le châssis du wagon se rejoignent, formant le premier axe de charnière (9') situé du côté du châssis, et les axes de pivotement des extrémités de deuxièmes bras de pivotement (4) qui sont articulées sur le châssis du wagon forment le deuxième axe de charnière (10') situé du côté du châssis, et les axes de pivotement des premiers bras de pivotement (3) articulés sur la section forment le troisième axe de charnière (11') situé du côté de la section et les axes de pivotement des extrémités des deuxièmes bras de pivotement (4) articulés sur la section forment le quatrième axe de charnière (12') situé du côté de la section.

3. Ensemble de recouvrement selon la revendication 2, caractérisé en ce que la distance (H1) entre les premier et deuxième axes de charnière (9', 10') et la distance (H2) entre les troisième et quatrième axes de charnière (11', 12') sont égales, et en ce que les longueurs des premier et deuxième bras de pivotement (3, 4), entre le premier (9') et le troisième (11') axes de charnière et, respectivement, entre le deuxième (10') et le quatrième (12') axes de charnière sont égales, auquel cas les bras de pivotement (3, 4) et les distances (H1, H2) prévues dans la section et le châssis formeront toujours un parallélogramme à côtés de longueur constante dans les différentes positions des mouvements pivotants des bras (3, 4).

4. Ensemble de recouvrement semi-fixe selon la revendication 3, caractérisé en ce que les bras de pivotement sont articulés sur le châssis (5) du wagon de telle sorte que les premier et deuxième axes de charnière (9', 10') sont situés à proximité de la surface latérale (15) d'une section couvrante en position fermée, en direction du centre du wagon à partir de celle-ci, auquel cas, chaque fois que la section couvrante se trouve en position fermée, les bras de pivotement (3, 4) s'étendront de façon au moins approximativement parallèle à la surface latérale (15) de la section couvrante et, lorsque la section couvrante est en position ouverte, les bras de pivotement (3, 4) formeront un angle important avec la surface latérale (15).

5. Ensemble de recouvrement semi-fixe selon la revendication 1, caractérisé en ce que, dans une section couvrante isolée (2a ou 2b ou 2c ... 2h), les axes de pivotement (9', 10', 11', 12') sont soit horizontaux soit, en alternative, verticaux.

6. Ensemble de recouvrement semi-fixe selon la revendication 1, caractérisé en ce que les paires de bras de pivotement (3, 4) sont situées dans la direction de la ligne médiane (P) du wagon, sur les bords (17) de chaque section couvrante, ou à proximité de ceux-ci, et à différents points sur les côtés opposés du wagon, les jointures (13, 14) des sections couvrantes, sur les côtés opposés, étant non-alignées et en ce que chaque wagon possède une pluralité de sections couvrantes (2a-d ; 2e-h).


P
16
5
1
2b
17
13
2d
5
14
2a
A
17
5
2c
15
17
B
5
2e
4
H1
3
A
2f
3
4
B
1
2g
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4
3
17
H1

Fig.1

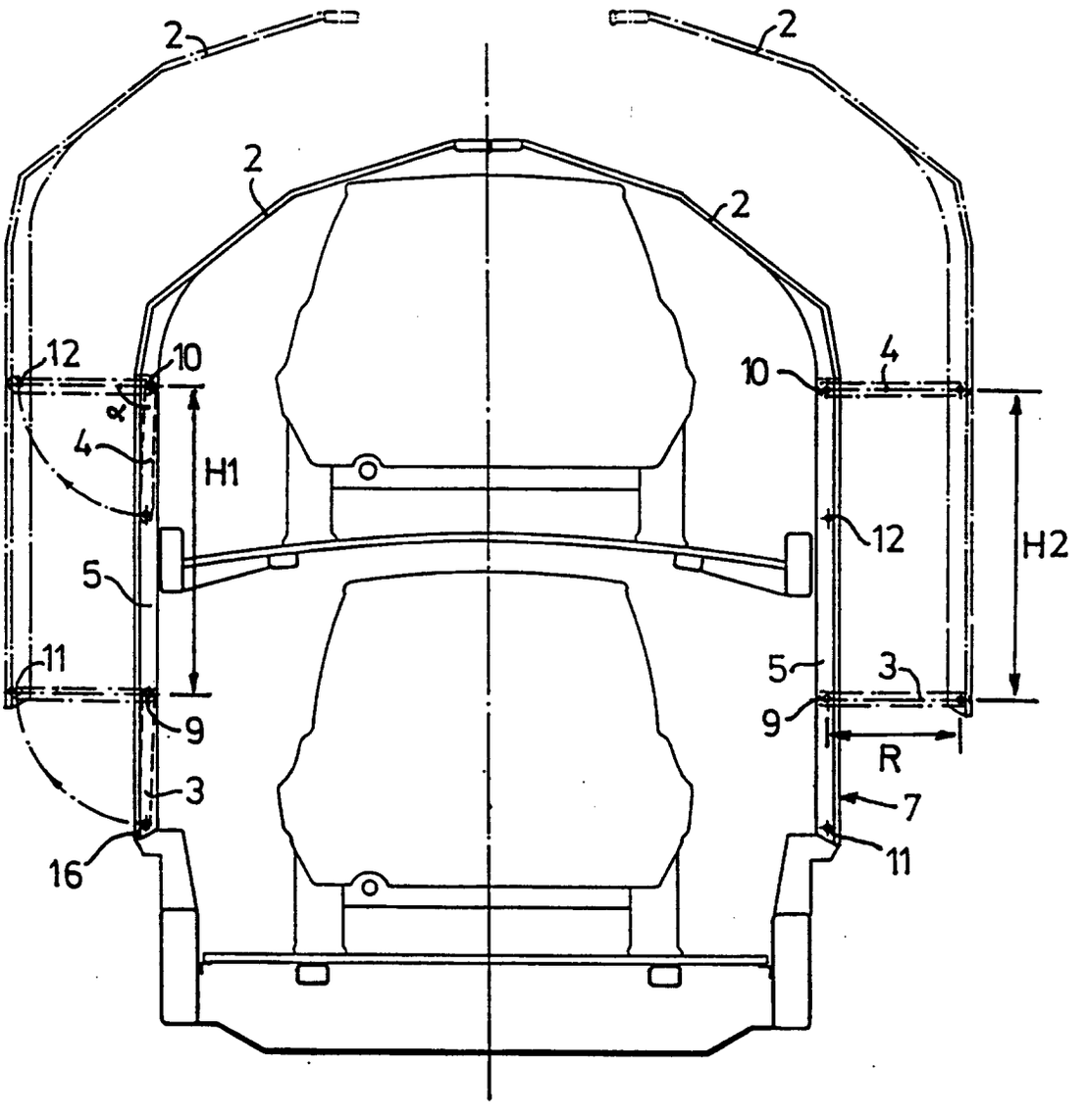

Fig. 2

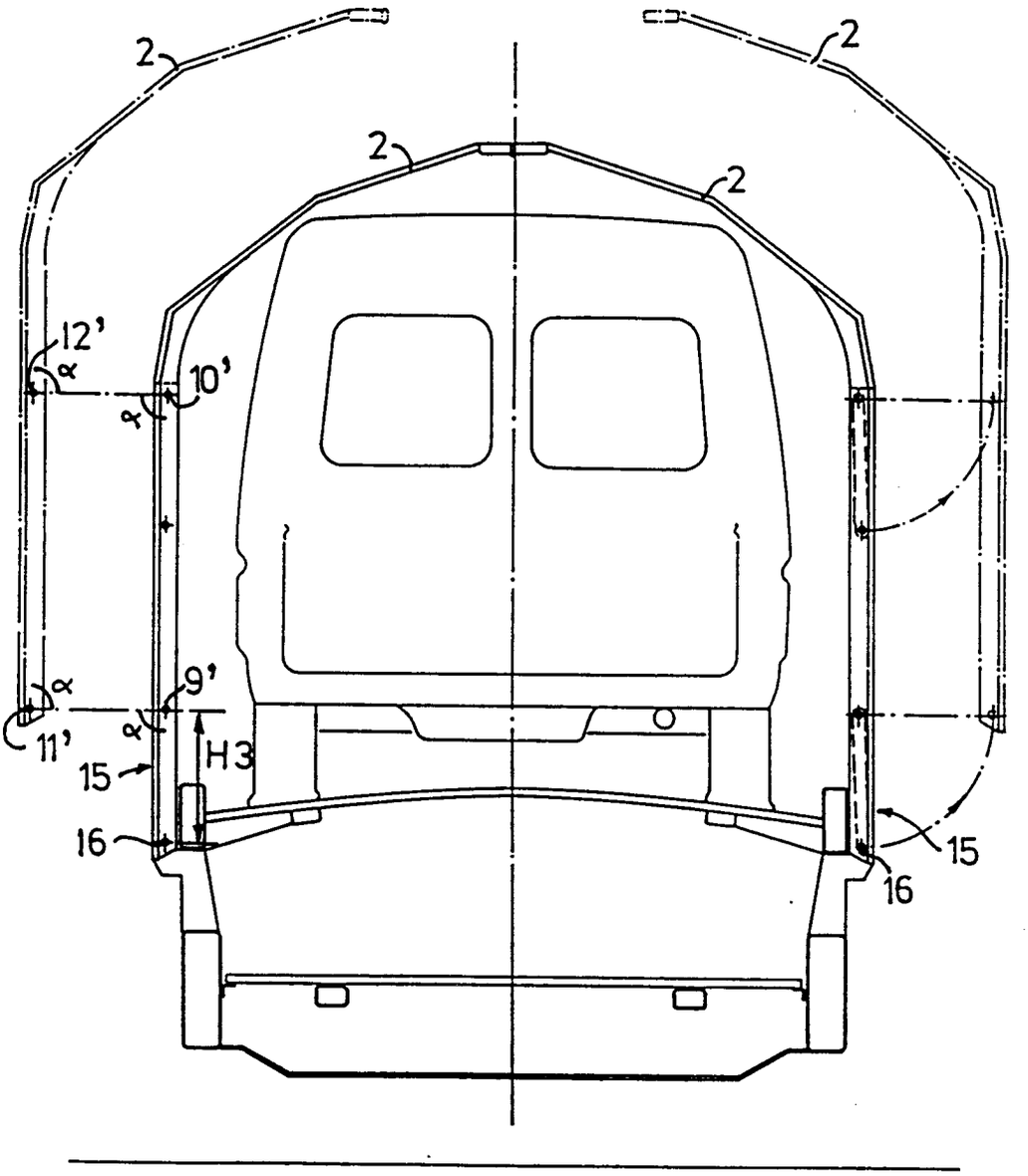

Fig. 3