



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.04.2020 Bulletin 2020/15

(51) Int Cl.:
B61D 17/08 (2006.01) B61D 17/04 (2006.01)

(21) Application number: **18306300.7**

(22) Date of filing: **02.10.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **BOESE, Ben**
30459 HANNOVER (DE)
• **MEHLER, Carsten**
38228 Salzgitter (DE)

(74) Representative: **Lavoix**
2, place d'Estienne d'Orves
75441 Paris Cedex 09 (FR)

(71) Applicant: **ALSTOM Transport Technologies**
93400 Saint-Ouen (FR)

(54) **ASSEMBLY FOR A MODULAR SIDE WALL OF A CAR BODY AND ASSOCIATED SIDE WALL**

(57) The assembly (12) comprises:
- a top profile (40) and a bottom profile (42), each extending along a principal direction (X) with a substantially identical cross-section, to be adapted for a one-piece fabrication by extrusion along the principal direction, each of the profiles comprising a wall with an inner face and an outer face, each face substantially extending along a principal plane (X, Y) parallel to the principal direction,

at least one of the top and bottom profiles comprising at least one rib (64) or groove extending continuously on the inner face along the principal direction; and
- at least a first intermediate adapter (44), comprising a top edge and a bottom edge, said edges being configured for assembling with the top and bottom profiles respectively, so as to form a first side wall part (14).

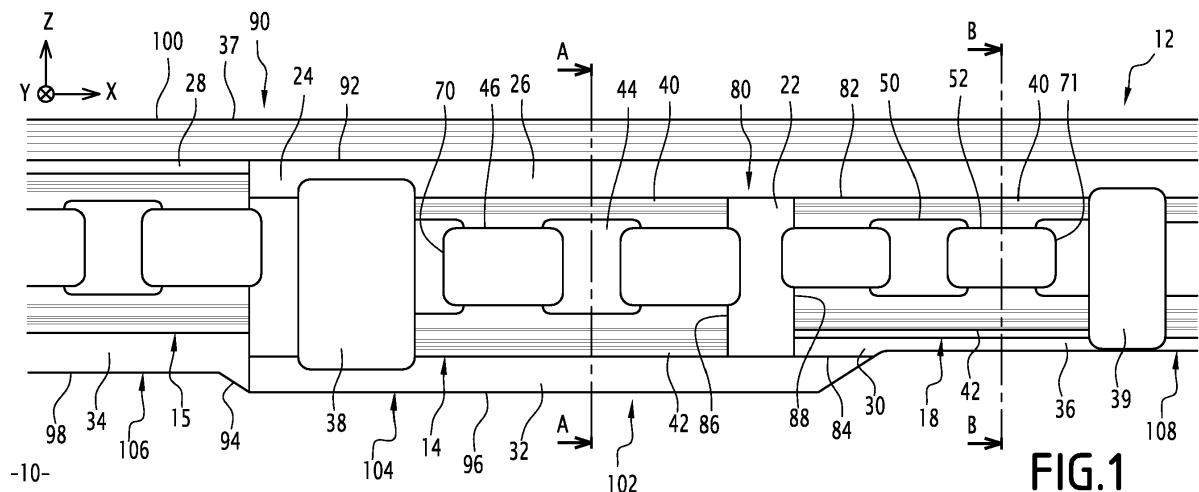


FIG.1

Description

[0001] The present invention relates to an assembly for a modular side wall of a car body, in particular for rail vehicles.

[0002] Rail vehicles often display different floor heights, such as a first floor height above a front bogie, a second floor height above a rear bogie and a third floor height in an intermediate zone between the front and rear bogies.

[0003] It is advantageous to produce car body shells in the shape of longitudinally extruded structures. However, such a production method is well adapted to vehicles with a same floor level on the whole length, but difficult to use on vehicles with variable floor heights.

[0004] In particular, side walls of car bodies are advantageously provided with interfaces such as rails or grooves, for assembly with seats, tables or luggage racks for example. Due to the different floor heights, the interfaces of different zones are likely to overlap and therefore cannot be produced by continuous extrusion.

[0005] The present invention aims to provide a method for producing a modular side wall of a car body, adapted to different floor levels and wherein the main parts can be produced by longitudinal extrusion.

[0006] For this purpose, the invention relates to an assembly of the aforementioned type, comprising:

- a top profile and a bottom profile, each of the top and bottom profiles extending along a principal direction with a substantially identical cross-section, so as to be adapted for a one-piece fabrication by extrusion along the principal direction, each of the top and bottom profiles comprising a wall with an inner face and an outer face, each face substantially extending along a principal plane parallel to the principal direction, at least one of the top and bottom profiles also comprising at least one or groove extending continuously on the inner face along the principal direction ; and
- at least a first intermediate adapter, comprising a top edge and a bottom edge, said top and bottom edges being configured for assembling with the top and bottom profiles respectively, so as to form a first side wall part.

[0007] According to preferred embodiments, the assembly may include one or more of the following features, considered alone or in any technically possible combination:

- the assembly also comprises a second intermediate adapter, each of the first and second intermediate adapters comprising a top edge, a bottom edge and a lateral edge said top and bottom edges being configured for assembling with the top and bottom profiles respectively, the lateral edges of the first and second intermediate adapters being configured for

assembling with each other, so as to form the first side wall part with the top and bottom profiles;

- one of the first and second intermediate adapters is a window-type adapter comprising a frame and a transparent panel, the frame forming the top edge, bottom edge and lateral edge of said intermediate adapter;
- the assembly also comprises a third intermediate adapter, each of the first and third intermediate adapters comprising a top edge and a bottom edge, said top and bottom edges being configured for assembling with the top and bottom profiles respectively, the first and third intermediate adapters having respectively a first and a second distances between the top and bottom edges, said first and second distances being distinct from each other, so that assembling the top and bottom profiles with the third intermediate adapter forms a second side wall part, a height of said second side wall part being inferior to a height of the first side wall part;
- the assembly also comprises a lateral adapter with a first and a second lateral edges, configured for assembling with the first and second side wall parts respectively, for forming a first side wall portion;
- the assembly also comprises a first height adapter configured for assembling with a top edge of the top profile or with a bottom edge of the bottom profile;
- the first height adapter is configured for assembling with the top or bottom profile of the second side wall part, a height of the first height adapter being substantially equal to a difference between the first and second heights of the first and second side wall parts;
- the assembly comprises a first and a second height adapters of different heights, each being configured for assembling with a top edge of the top profile or with a bottom edge of the bottom profile.

[0008] The invention also relates to a modular side wall issued from an assembly according to the invention, comprising a first and a second side wall parts, said side wall parts comprising identical top profiles and identical bottom profiles.

[0009] The invention also relates to a vehicle comprising a modular side wall according to the invention.

[0010] The invention will be easier to understand in view of the following description, provided solely as an example, and with reference to the appended drawings, wherein :

- figure 1 is a schematic, lateral view of a side wall of a car body according to an embodiment of the invention, realized by means of an assembly according to an embodiment of the invention ; and
- figures 2 and 3 are partial, sectional views of the side wall of figure 1.

[0011] Figure 1 shows a side wall 10 of a car body, in particular for a rail vehicle, according to an embodiment

of the invention.

[0012] In the following description, an orthonormal basis (X, Y, Z) is considered, Z being the vertical direction. The side wall 10 essentially extends along a principal direction X and is substantially parallel to a plane (X, Z).

[0013] The side wall 10 comprises an upper edge 100 and a lower edge 102, adapted for assembling respectively with a roof and with a floor of a car body. The upper edge 100 is substantially rectilinear, extending along X. On the contrary, the lower edge 102 comprises a first 104, a second 106 and a third 108 rectilinear zones, spaced apart along Z. The first 104, second 106 and third 108 rectilinear zones correspond to floor zones of different heights.

[0014] The side wall is realized by assembling modular parts of an assembly 12, which will be detailed below.

[0015] The side wall 10 comprises at least a first group of first side wall parts 14, 15, each of the first side wall parts having a first height 16. Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least a second group of second side wall parts 18, each of the second side wall parts having a second height 20 inferior to the first height.

[0016] Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least one lateral adapter 22, 24. Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least one top adapter 26, 28 and/or at least one bottom adapter 30.

[0017] Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least one bottom interface 32, 34, 36 comprising the lower edge 102 adapted for assembling with a floor of a car body.

[0018] In the embodiment of figure 1, the side wall parts 14, 15, 18, the adapters 22, 24, 26, 28, 30 and the bottom interfaces 32, 34, 36 are substantially planar.

[0019] Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least one top interface 37 comprising the upper edge 100 adapted for assembling with a roof of a car body. In the embodiment of figure 1, the top interface 37 preferably has a curved section (Y, Z). The top interface 37 is preferably made one-piece by extrusion along X.

[0020] Preferably, as in the embodiment of figure 1, the side wall 10 also comprises at least one door 38, 39.

[0021] Figures 2 and 3 respectively show a cross-sectional view of a first side wall part 14 and of a second side wall part 18. A third side wall part 15, shown on figure 1, is identical to the first side wall part 14. In the following description, the first 14 and second 18 side wall parts are described simultaneously, the common features being designed by the same reference numbers.

[0022] The side wall part 14, 18 comprises a top profile 40, a bottom profile 42 and at least one intermediate adapter 44, 46, 50, 52.

[0023] Each of the top 40 and bottom 42 profiles extends along the principal direction X with a substantially identical cross-section, so as to be adapted for a one-piece fabrication by extrusion along the principal direc-

tion.

[0024] Each of the top and bottom profiles comprises a wall 54 with an inner face 56 and an outer face 58, each face being substantially planar and parallel to (X, Y). The wall 54 comprises a top edge 60 and a bottom edge 62, the top and bottom edges being substantially rectilinear and extending along X.

[0025] At least one of the top 40 and bottom 42 profiles also comprises at least one rib 64 or groove, extending continuously on the inner face 56 along the principal direction. In the embodiment of figures 1, 2 and 3, each of the top 40 and bottom 42 profiles comprises at least two ribs 64.

[0026] A position of the ribs 64 of the top profile 40 is for example configured for assembly with luggage racks. A position of the ribs 64 of the bottom profile 42 is for example configured for assembly with seats and/or tables.

[0027] The at least one intermediate adapter 44, 46, 50, 52 is substantially planar and parallel to (X, Y) and comprises a top edge 66, a bottom edge 68 and lateral edges 70. The top 66 and bottom 68 edges are substantially rectilinear and extending along X. The top edge 66 is configured for assembling with the bottom edge 62 of the top profile 40, and the bottom edge 68 is configured for assembling with the top edge 60 of the bottom profile 42, so as to form the side wall part 14, 18.

[0028] Preferably, as in the embodiment of figure 1, the at least one intermediate adapter 44, 46, 50, 52 has a length along X inferior to the length of the top 40 and/or bottom 42 profiles and the side wall part 14, 18 comprises several intermediate adapters 44, 46, 50, 52 aligned along X, two adjacent intermediate adapters 44, 46, 50, 52 of a same side wall part 14, 18 being assembled by their lateral edges 70. As shown on Figure 1, the lateral edges 70 may display curved parts 71 and/or angles.

[0029] In the embodiment of figure 1, the side wall part 14, 18 comprises one or more opaque intermediate adapters 44, 50 and one or more window-type intermediate adapters 46, 52 disposed alternatively along X. Figure 2 shows a cross-section of an opaque intermediate adapter 44 of the first side wall part 14. Figure 3 shows a cross-section of a window-type intermediate adapter 52 of the second side wall part 18.

[0030] The window-type intermediate adapter 46, 52 comprises a frame 72 and a transparent panel 74, the frame forming the top edge 66, bottom edge 68 and lateral edge 70 of said intermediate adapter 46, 52.

[0031] The opaque 44 and window-type 46 intermediate adapters of the first side wall part 14 have a same first distance 76 between their top 66 and bottom 68 edges. In the same manner, the opaque 50 and window-type 52 intermediate adapters of the second side wall part 18 have a same second distance 78 between their top 66 and bottom 68 edges.

[0032] The first 76 and second 78 distances are chosen in function of the desired first 16 and second 20 heights of the first 14 and second 18 side wall parts. In

the embodiment of Figure 1, the second distance 78 is inferior to the first distance 76.

[0033] In the embodiment of Figure 1, the window-type intermediate adapters 46, 52 of a same side wall part 14, 18 are substantially identical. In another embodiment (not shown), a same side wall part comprises different window-type intermediate adapters, with a same distance between their top 66 and bottom 68 edges but with frames 72 and transparent panels 74 of different size and/or shape.

[0034] In the embodiment of Figure 1, the first 14 and second 18 side wall parts are assembled to a first lateral adapter 22 and to a bottom adapter 30 so as to form a first side wall portion 80 with continuous top 82 and bottom 84 edges, rectilinear and extending along X.

[0035] More specifically, the first lateral adapter 22 has substantially the same first height 16 as the first side wall part 14. A first 86 and a second 88 lateral edges of said first lateral adapter 22 are respectively assembled to lateral ends of the first 14 and second 18 side wall parts.

[0036] The bottom adapter 30 is assembled to the bottom edge of the bottom profile 42 of the second side wall part 18, so as to form an assembly having the same height 16 as the first side wall part 14 and the first lateral adapter 22. A lateral end of the bottom adapter 30 is assembled to the second lateral edge 88 of the first lateral adapter 22.

[0037] In another embodiment (not shown), the bottom adapter 30 is replaced by a top adapter, assembled to the top edge of the top profile 40 of the second side wall part 18.

[0038] A second side wall portion 90, with a continuous and rectilinear top edge 92, comprises two side wall parts 14, 15, a first 26 and a second 28 top adapters, a second lateral adapter 24, a door 38 and a first 32 and a second 34 bottom interfaces.

[0039] The first 32 and second 34 bottom interfaces are connected and aligned along X. The first 32 or second 34 bottom interface comprises a transition zone 94 for adapting the side wall 10 to floor zones of different heights. On each side of the transition zone 94, the first 32 and second 34 bottom interfaces respectively have a first 96 and a second 98 bottom edges, extending along X and spaced apart along Z. The first 96 and second 98 bottom edges respectively form the first 104 and second 106 rectilinear zones of the bottom edge 102 of the side wall 10.

[0040] Level to the first 96 and second 98 bottom edges, the first 32 and second 34 bottom interfaces have approximately the same height along Z.

[0041] The first 14 and third 15 side wall parts are assembled to a top edge of the first 32 and second 34 bottom interfaces respectively. The first 14 and third 15 side wall parts have a same height 16. Therefore, the top edges of said first 14 and third 15 side wall parts are spaced apart along Z.

[0042] The first 26 and second 28 top adapters are assembled to the top edges of the first 14 and third 15 side wall parts respectively. The first 26 and second 28

top adapters have different heights, so as to form the continuous and rectilinear top edge 92 extending along X. The top edge 92 is assembled to the curved top interface 37.

[0043] The second lateral adapter 24 is assembled to the third side wall part 15 and to the door 38, so as to form a continuous side wall 10 between the first 14 and third 15 side wall parts.

[0044] The assembly 12 according to the invention allows the fabrication of several side wall parts 14, 15, 18 from the same extruded top 40 and bottom 42 profiles, said side wall parts 14, 15, 18 having different heights and/or different window configurations. The assembly 12 also allows the fabrication of a side wall 10 of specific shape, adaptable to particular floor zones of specific heights, from said side wall parts 14, 15, 18.

[0045] In order to form a side wall 10 of specific shape from the assembly 12, only the top, bottom and lateral adapters 22, 24, 26, 28, 30 and the bottom interfaces 32, 34, 36 have to be designed specifically. The top 40 and bottom 42 profiles and the top interface 37 may be manufactured in the form of long extruded elements, then cut at the requisite length. Also, the intermediate adapters 44, 46, 50, 52 and the doors 38, 39 may be manufactured in large quantities. The side wall 10 is thus obtained at a moderate cost.

Claims

1. Assembly (12) for a modular side wall (10) of a car body, comprising :

- a top profile (40) and a bottom profile (42), each of the top and bottom profiles extending along a principal direction (X) with a substantially constant cross-section, so as to be adapted for a one-piece fabrication by extrusion along the principal direction,
each of the top and bottom profiles comprising a wall (54) with an inner face (56) and an outer face (58), each face substantially extending along a principal plane (X, Y) parallel to the principal direction,
at least one of the top and bottom profiles also comprising at least one rib (64) or groove extending on the inner face along the principal direction ; and
- at least a first intermediate adapter (44), comprising a top edge (66) and a bottom edge (68), said top and bottom edges being configured for assembling with the top and bottom profiles respectively, so as to form a first side wall part (14).

2. Assembly (12) according to claim 1, also comprising a second intermediate adapter (46), each of the first and second intermediate adapters comprising a top edge (66), a bottom edge (68) and a lateral edge

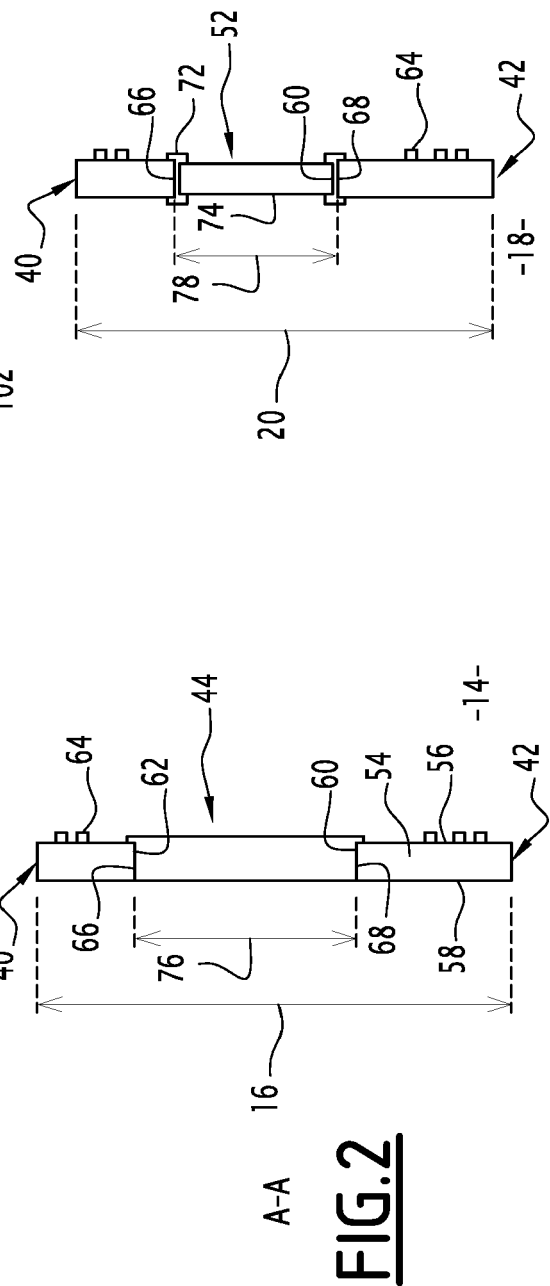
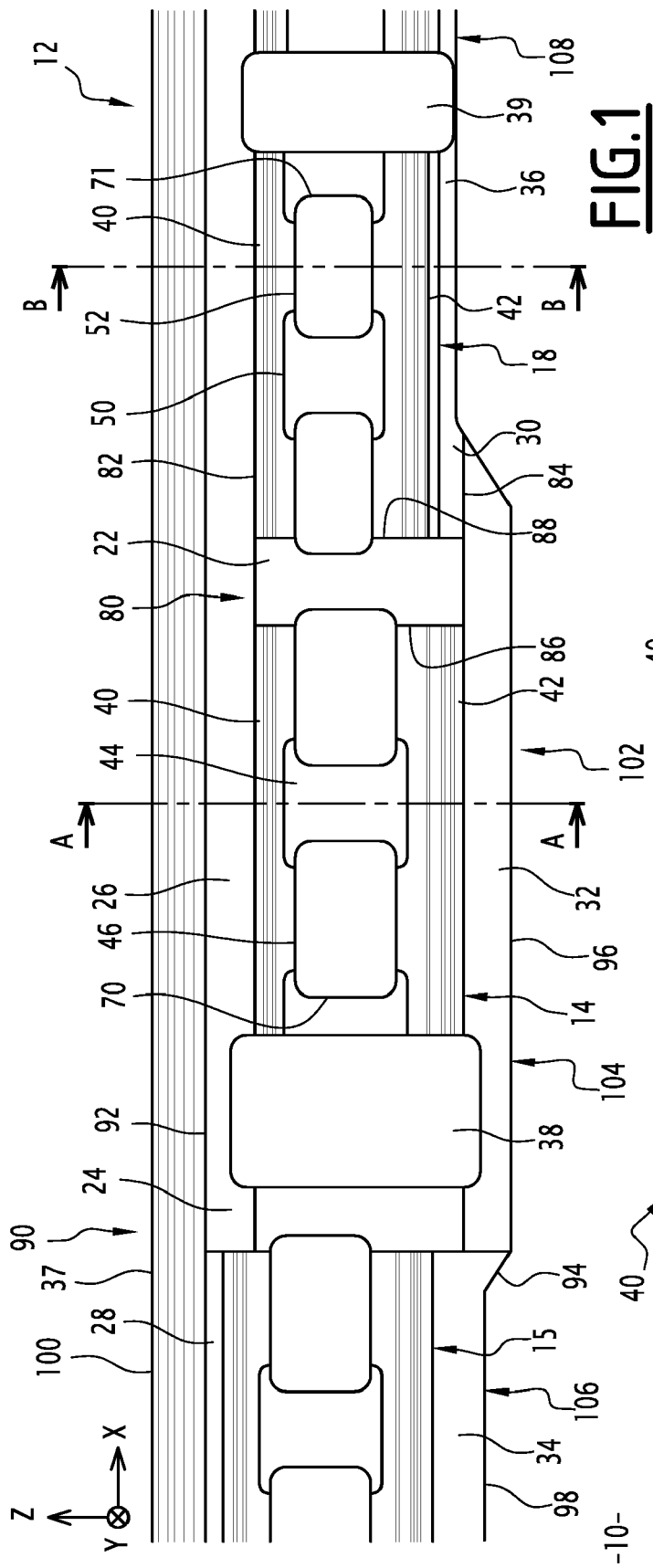
(70) said top and bottom edges being configured for assembling with the top and bottom profiles respectively,

the lateral edges (70) of the first (44) and second (46) intermediate adapters being configured for assembling with each other, so as to form the first side wall part (14) with the top and bottom profiles.

3. Assembly (12) according to claim 2, wherein one (46) of the first and second intermediate adapters is a window-type adapter comprising a frame (72) and a transparent panel (74).
4. Assembly (12) according to one of the previous claims, also comprising a third intermediate adapter (50, 52), each of the first and third intermediate adapters comprising a top edge (66) and a bottom edge (68), said top and bottom edges being configured for assembling with the top and bottom profiles respectively,
the first and third intermediate adapters having respectively a first (76) and a second (78) distances between the top and bottom edges, said first and second distances being distinct from each other, so that assembling the top (40) and bottom (42) profiles with the third (50, 52) intermediate adapter forms a second (18) side wall part, a height (20) of said second side wall part being inferior to a height (16) of the first side wall part (14).
5. Assembly (12) according to claim 4, also comprising a lateral adapter (22) with a first (86) and a second (88) lateral edges, configured for assembling with the first (14) and second (18) side wall parts respectively, for forming a first side wall portion (80).
6. Assembly (12) according to one of the previous claims, also comprising a first height adapter (26, 28, 30) configured for assembling with a top edge of the top profile or with a bottom edge of the bottom profile.
7. Assembly (12) according to claim 6 combined with claim 4 or claim 5, wherein the first height adapter (30) is configured for assembling with the top or bottom profile of the second side wall part (18), a height of the first height adapter being substantially equal to a difference between the first and second heights of the first and second side wall parts.
8. Assembly (12) according to claim 6, comprising a first (26) and a second (28) height adapters of different heights, each being configured for assembling with a top edge of the top profile (40) or with a bottom edge of the bottom profile (42).
9. Modular side wall (10) issued from an assembly according to one of the previous claims, comprising a

first (14) and a second (15, 18) side wall parts, said side wall parts comprising identical top profiles (40) and identical bottom profiles (42).

10. Modular side wall (10) according to claim 9, comprising a first (96) and a second (98) bottom edges adapted for being assembled with floor zones of different vertical levels.
11. Vehicle comprising a modular side wall (10) according to claim 9 or 10.





EUROPEAN SEARCH REPORT

Application Number
EP 18 30 6300

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 267 515 A (TSURUDA HITOSHI [JP] ET AL) 7 December 1993 (1993-12-07)	1-8	INV. B61D17/08 B61D17/04
A	* column 3, lines 45-50; figure 2 * * column 4, lines 4-6, 55-65 *	9	
X	CN 205 469 077 U (CRRC QINGDAO SIFANG CO LTD) 17 August 2016 (2016-08-17) * figures *	1-8	
X	US 6 446 562 B1 (HITACHI LTD [JP]) 10 September 2002 (2002-09-10) * column 2, lines 10-22; figure 3 *	1-8	
X	JP 6 382671 B2 (NIPPON SHARYO SEIZO KK) 29 August 2018 (2018-08-29) * abstract; figures *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			B61D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 March 2019	Examiner Schultze, Yves
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 30 6300

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5267515 A	07-12-1993	NONE	
CN 205469077 U	17-08-2016	NONE	
US 6446562 B1	10-09-2002	JP 2000351365 A US 2002117078 A1	19-12-2000 29-08-2002
JP 6382671 B2	29-08-2018	JP 6382671 B2 JP 2016068898 A	29-08-2018 09-05-2016