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(54) Benævnelse: **Lastvogn med stiver, der er indsat mellem chassiset og det selvbærende karosseri**

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**CN-U- 203 237 305**
**DE-U1- 29 800 368**
**FR-A1- 2 811 955**
**JP-A- S5 839 540**

**TITLE: Carrier truck with strut interposed between the chassis and the self-supporting body**

This invention concerns a carrier truck, of the type comprising a chassis and a self-supporting body attached to the chassis, the self-supporting body fastened in direct connection with the chassis.

In the field of commercial vehicles, a distinction is commonly made between carrier trucks, which have on the same chassis a cab and a load area for transporting goods, and articulated vehicles, which comprise a driving part without a load area, known as a tractor, to which a semi-trailer is attached for transporting goods. The load volume of a carrier truck usually consists of a flatbed, a tank, a tipper or a body.

Carrier trucks are known to be produced by joining a body to a pre-existing chassis cab. However, in order for the truck obtained by this process to meet safety standards, the chassis of the chassis-cab usually has to be reinforced.

This is usually done by adding a subframe, also known as a false chassis or mounting frame, between the chassis and the cab floor. This underbody is formed by two longitudinal members generally connected to each other by cross members, and the body and chassis are each attached to this underbody, without any direct attachment of one to the other, so that the underbody ensures the transfer of forces between the body and the chassis while absorbing part of these forces. In order to provide this stiffening function, the underbody is usually made of steel.

A disadvantage of this solution is the weight of the underbody, which is usually substantial and adds significantly to the weight of the carrier truck, thereby reducing its payload.

In recent years, so-called "self-supporting" bodies have been developed, whose floor is adapted to perform the functions of the underbody. These body can be attached directly to the chassis, saving on the underbody and making the truck lighter, thereby increasing its payload. A carrier truck with such a body is known, for example, from DE 296 07 597 Ul.

This solution, however, is not wholly satisfactory. Indeed, by placing the body directly on the chassis, it becomes necessary to form drums in the body to allow the wheels to pass through, which makes the construction of the body more complex and thus increases its cost. In addition, the drums impede the flow of traffic inside the body and make it difficult to arrange goods inside the body.

One objective of the invention is thus to obtain a lightweight carrier truck that

can be easily produced. Another objective is to facilitate circulation inside the body.

To this end, the invention relates to a carrier truck of the aforementioned type, wherein the carrier truck further comprises a strut interposed between the chassis and the self-supporting body.

An example of a carrier truck is known from document WO2005/002951 A1 in which a strut is provided between the self-supporting body and the chassis and is connected to both the chassis and the self-supporting body.

According to particular embodiments of the invention, this carrier truck also has one or more of the following features taken in isolation or in any combination that is technically possible:

- the chassis comprises two transversely spaced-apart chassis side members and the strut comprises two transversely spaced-apart strut side members, each strut side member being interposed between the self-supporting body and a respective chassis side member.

- the strut is devoid of a cross member connecting the strut side members to each other.

- the strut comprises a plurality of brackets each abutting a side face of one of the strut members, the self-supporting body being secured to the chassis by bolt assemblies extending through said brackets.

- each bracket is slidably mounted in the longitudinal direction relative to the strut side member to which it is attached.

- the chassis comprises a plurality of consoles each attached to a side face of one of the chassis side members, each bolt assembly extending through one of said consoles and each bracket being interposed between the self-supporting body and one of said consoles and having a height substantially equal to the distance of said console from the self-supporting body.

- each bolt assembly comprises a screw with a head and a threaded shank, the head bearing against either the floor or chassis and the threaded shank bolted to the other of the floor and chassis;

- the carrier truck comprises a front intermediate connecting device between the body and the chassis, formed by two intermediate connecting members each fixed to the body and to a respective chassis side member.

- each intermediate connecting member is attached to a respective strut side member.

- the carrier truck comprises a tailgate support for attaching a tailgate to the chassis, said tailgate support comprising two plates each attached to the self-

supporting body and to a respective chassis side member.

- each plate is attached to a side face of the respective chassis side member and to a floor of the self-supporting body.

- the strut is made of aluminium alloy or composite material.

Other characteristics and advantages of the invention will become apparent upon reading the following description, given only as an example and referencing the attached drawings, in which:

- [Fig 1] Figure 1 is a side view of a carrier truck according to the invention,

- [Fig 2] Figure 2 is a side view of a subassembly of the carrier truck of Figure 1,

- [Fig 3] Figure 3 is a cross-sectional view along the plane III-III of the subassembly of Figure 2,

- [Fig 4] Figure 4 is a side view of a detail marked IV of the subassembly of Figure 2, and

- [Fig 5] Figure 5 is a side view of a detail marked V of the subassembly of Figure 2.

In the following, the orientation terms used refer to the usual orientation system of vehicles, consisting of:

- a longitudinal axis X, oriented from the rear to the front,

- a transverse axis Y, oriented from right to left, perpendicular to the longitudinal axis X axis and forming a horizontal plane with it, and

- a vertical axis Z, oriented from the bottom to the top, perpendicular to the horizontal plane and forming with the axes X and Y a direct orthogonal coordinate system.

The carrier truck 10 shown in Figure 1 comprises, in a known manner, a chassis cab 12 and a body 14 attached to the chassis cab 12.

The chassis cab 12 comprises a chassis 16 and a cab 18.

The chassis 16 is formed by two chassis side members 20 (Figure 2), each elongated in the longitudinal direction X and transversely spaced from each other, and a plurality of crossmembers 22 (Figure 3), each oriented in the transverse direction Y and connecting the side members 20 to each other. The chassis 16 forms the basic rigid structure of the truck 10.

Each side member 20 is advantageously formed of one piece. For this purpose, each side member 20 here is made up of a profile. In the example shown, this profile has a U-shaped cross-section open towards the inside, i.e. towards the other side member 20. Alternatively, the profile has a different cross-section.

As can be seen in Figure 2, the chassis 16 also comprises a plurality of consoles 24A, 24B each attached, in particular riveted, to a side face 26 of one of the side members 20. This side face 26 is in particular an outer side face, i.e. it faces away from the other side member 20. Each console 24A, 24B thus projects transversely outwards from the truck 10 relative to the side member 20 to which it is attached.

The consoles 24A, 24B are spaced apart from each other.

The consoles 24A, 24B comprise consoles 24A arranged under the body 14, i.e. such that the body 14 is arranged vertically in line with said consoles 24A. Here, the consoles 24A, 24B also comprise two front consoles 24B interposed between the body 14 and the cabin 18, each of said front consoles 24B being attached to a respective side member 20.

As shown in Figure 3, each console 24A, 24B has a substantially horizontal shelf 28. This shelf 28 is substantially flush with an upper face 29 of the side member 20 to which the console 24A, 24B is attached. The term "substantially flush" is understood to mean that the offset between the shelf 28 and the top surface 29 is less than 5 mm and may also be zero.

The chassis 16 is typically made of steel.

Returning to Figure 1, the cab 18 is mounted at the front of the chassis 16. It is adapted to accommodate a driver of the vehicle 10 and, advantageously, at least one passenger.

The body 14 is mounted on the chassis 16, at the rear of the cab 18.

The body 14 is suitable for transporting goods. To this end, it comprises, in a known manner, two vertical sidewalls 30 spaced transversely from each other (only the left sidewall 30 appears in the Figures), a horizontal roof 32 connecting the upper edges of the two sidewalls 30, a horizontal floor 34 connecting the lower ends of the two sidewalls 30, and a front wall 36 connecting the front ends of the two sidewalls 30, the sidewalls 30, the roof 32, the floor 34 and the front wall 36 together defining an interior space (not shown) suitable for receiving goods.

The sidewalls 30, roof 32 and floor 34 together define a rear opening to access the cargo inside the body 14. Here, the body 14 also includes a door 38 adapted to selectively open and close said rear opening. This door 38 is typically a sectional door, such as the sectional door described in application FR 17 58653, or a swing door.

The body 14 is self-supporting, i.e. the floor 34 has sufficient mechanical strength and modulus of inertia that the direct connection of the body 14 to the chassis 16 is sufficient to meet the safety requirements for this type of vehicle. For this purpose, the floor 34 is for example as described in FR 2 671 532 A1.

As can be seen in Figure 2, the floor 34 has recesses 39 formed in its underside (only one of these recesses 39 being shown in the Figure), for the passage of wheels. However, these recesses 39 do not open into the upper side of the floor 34, so that no drums are required.

The body 14 is fastened in direct connection with the chassis 16. As can be seen in Figure 3, this fastening is here achieved by means of bolt assemblies 40 engaged through the floor 34 and through the consoles 24A of the chassis 16, in particular through the shelves 28 of said consoles 24A. Each bolt assembly 40 comprises a threaded rod 41 engaged through the floor 34 and screwed to a nut 45 or integral with a screw head abutting a respective console 24A of the chassis 16. In the example shown, the threaded rod 41 belongs to a screw 42 whose head 44 rests against the floor 34, and the threaded rod 41 is screwed to a nut 45 resting against said respective console 24A. Alternatively (not shown), for at least some of the bolted assemblies 40, the threaded rod 41 belongs to a screw whose head bears against said respective console 24A, and the threaded rod 41 is screwed to a nut bearing against the floor 34.

In the example shown, the body 14 is refrigerated. For this purpose, it is equipped with a refrigeration unit 50, as shown in Figure 1.

Here, the carrier truck 10 also includes a tailgate 52. This tailgate 52 is intended to facilitate the loading and unloading of goods into the body 14. To this end, it comprises a plate 54 and a mechanism 56 for hinging the plate 54 to the rest of the carrier truck 10, the mechanism 56 being adapted to move the plate 54 between a retracted position, in which the plate 54 is pressed against the door 38, as shown in Figure 1, and a deployed position (not shown) in which the plate 54 is substantially horizontal or inclined downwards from the base of the door 38.

In a non shown alternative embodiment of the invention, the body 14 does not comprise a door 38. In this case, the plate 54 of the tailgate 52 replaces the door 38 to open and close the rear opening of the body 14.

According to the invention, the carrier truck 10 comprises, as seen in Figure 2, a strut 60 interposed between the chassis 16 and the body 14.

This strut 60 is adapted to withstand compressive forces exerted by the body 14 on the strut 60 and compressing the strut 60 against the chassis 16.

The strut 60 comprises two strut members 62 each elongated along the longitudinal direction X and transversely spaced from each other.

Each strut side member 62 is advantageously formed of one piece. For this purpose, each strut side member 62 here is made up of a profile. In the example shown,

this profile has a rectangular cross-section.

As can be seen in Figure 3, each strut side member 62 is interposed between the body 14 and a respective chassis side member 20. Each strut side member 62 is thus vertically aligned with the respective chassis side member 20 and rests against the top face 29 of said respective chassis side member 20.

In the example shown, a thin plate 66 is interposed between the side member 62 and said top face 29. This thin plate 66 compensates for the difference in height between the shelves 28 of the consoles 24A attached to the side member 20 and the upper surface 29 of said side member 20.

Preferably, as shown here, each strut 62 does not protrude forward or rearward relative to the body 14.

The strut 60 further comprises a plurality of brackets 70 each of which is attached to a side face 72 of one of the strut side members 62.

Here, all the brackets 70 are adjoined to the same side face 72 of the strut side member 62, this side face 72 being in particular an outer side face, i.e. it is oriented away from the other side member 62. Each bracket 70 thus protrudes transversely towards the outside of the truck 10 relative to the strut side member 62 to which it is attached.

Alternatively (not shown), the side face 72 to which the brackets 70 are attached is an inner side face of the strut side member 62, so that each bracket 70 thus projects transversely towards the interior of the truck 10 relative to the strut side member 62 to which it is attached. Alternatively (not shown), at least two brackets 70 are attached to different side faces of the strut side member 62, so that at least one bracket 70 thus projects transversely towards the outside of the truck 10 and at least one other bracket 70 thus projects transversely towards the inside of the truck 10 relative to the strut side member 62 to which they are attached.

Each bracket 70 is slidably mounted in the longitudinal direction X relative to the strut side member 62 to which it is attached. It thus has a degree of freedom in translation along the longitudinal direction X relative to the strut 62 to which it is attached.

In particular, each bracket 70 is mounted on the strut side member 62 to which it is attached by means of a sliding connection 74. The translation along the longitudinal direction X thus constitutes, within manufacturing tolerances, the only degree of freedom of the bracket 70 relative to the strut 62 to which it is attached.

This slide connection 74 is achieved here by curved profiles 76 formed at the lower and upper ends of the bracket 70, which are curved towards each other and

engaged in complementary slides 78 formed in the side member 62.

This connection of the brackets 70 to the side members 62 facilitates the positioning of the brackets 70 and stabilises them when the body 14 is assembled to the chassis 16. This simplifies the manufacture of the carrier truck 10.

Each bracket 70 defines a vertical internal chamber 80, through which the threaded rod 41 of a respective bolt assembly 40 securing the body 14 to the chassis 16 passes.

Each bracket 70 is interposed between the body 14 and a respective console 24A. Each strut 62 is thus vertically aligned with the respective console 24A and rests against the shelf 28 of said respective console 24A.

Each bracket 70 is further penetrated by the threaded rod 41 engaged through said respective console 24A. In particular, this threaded rod 41 extends into the vertical inner chamber 80, through said bracket 70.

Each bracket 70 has a height equal to the distance from the respective console 24A to the body 14. This height is approximately equal to the height of the side member 62 to which the bracket 70 is attached.

Each bracket 70 has a straight cross-section, taken in a horizontal plane, with no sharp edges. This reduces the volume of the bracket 70, and therefore its mass.

In addition, the cross-section of each bracket 70 is advantageously in the shape of a triangle, the base of which is oriented towards the side member 62 to which the bracket 70 is attached and the apex of which is located as close as possible to the chamber 80. Thus, the mass of the bracket 70 is minimised.

Each bracket 70 is advantageously formed of one piece.

However, the strut 60 has no crosspiece connecting the side members 62 to each other. Indeed, since the floor 34 of the body 14 is sufficient to provide the chassis 16 with the necessary mechanical strength, it is not necessary to provide such a cross member at the strut 60. This makes the strut 60 lighter.

Due to the low stresses it supports, the strut 60 does not need to be made of steel. The strut 60 is therefore made exclusively of aluminium alloy. In other words, each side member 62 and each bracket 70 is made exclusively of aluminium alloy. Alternatively, the strut 60 is made exclusively of composite material, or another lightweight material. This further contributes to the lightness of the strut 60.

The term "composite material" is used here and in the following to mean both a material consisting of a fibrous reinforcement embedded in a resin matrix or a multilayer material with alternating layers of different mechanical strength.

With reference to Figure 4, the truck 10 further comprises a front intermediate

connecting device 90 between the body 14 and the chassis 16, connecting the body 14 and the front consoles 24B.

This intermediate connecting device 90 comprises two intermediate connecting members 92 each attached to the body 14 and a respective chassis side member 20, via a respective front console 24B.

Each intermediate connecting member 92 comprises a folded sheet 94 forming two vertical flanges 96, 97, connected to each other by a horizontal base 98, and a wing 100 projecting from one of the flanges 96, 97 substantially parallel to the base 98.

The flanges 96, 97 comprise an inner flange 96 and an outer flange 97.

Each flange 96, 97 comprises a rear end section 102, a front-end section 104, and an intermediate section 106 from the rear end section 102 to the front end section 104.

The rear end sections 102 of the flanges 96, 97 together enclose a front end of a strut side member 62.

The front-end section 104 and the central section extend forward of this strut 62.

The front-end section 104 is bevelled, its height decreasing from the rear to the front. The front-end section 104 is also free of sharp corners. This specific shape of the front-end section 104 allows a better transmission of forces between the chassis 16 and the body 14, thus reducing the risks of buckling and breaking of the sheet 94.

The central section 106 is arranged vertically in line with a front bracket 25B.

One of the two flanges 96, 97, in this case the outer flange 97, is attached by its rear end section 102 to the clamped strut 62. This is achieved here by means of bolt-on assemblies 108. Each intermediate connecting member 92 is attached to a respective strut side member 62.

The base 98 extends forward of the strut side member 62 and connects the two flanges 96, 97 to each other at their front 104 and centre 106 end sections only. In other words, the base 98 does not extend between the rear sections 102 of the flanges 96, 97.

The base 98 rests against the upper side 29 of the respective chassis side member 20.

The wing 100 projects transversely outwards from the truck 10 from an upper edge of the outer flange 97.

The wing 100 rests against the floor 34 of the body 14 and is attached to the floor 34. This is achieved here by means of a bolt assembly 110 engaged through the

floor 34 and through said wing 100.

Each intermediate connecting member 92 further comprises a flange 112 attached to the central section 106 of the outer flange 97, here by means of bolt assemblies 114.

This flange 112 projects outwardly from said flange 97 and faces the front console 24B. It is elastically attached to the front console 24B.

This resilient attachment is achieved here by means of a bolt assembly 116 passing through the flange 112, the front console 24B and a rubber stud 118.

Each intermediate connecting member 92 is preferably made of steel.

With reference to Figure 5, the truck 10 also comprises a tailgate support for attaching the tailgate 52 to the chassis 16.

This support comprises two support plates 120 each attached to the body 14 and to a respective chassis side member 20. This fastening of the plates 120 allows a better transmission to the body 14 of the forces exerted by the tailgate 52. This allows the loading capacity of the tailgate 52 to be increased.

Each plate 120 is advantageously formed of one piece. It is typically made of folded sheet metal.

Each plate 120 comprises a substantially flat plate 122 and two tabs 124, 126 each projecting transversely outwards from an edge of the plate 122.

The plate 122 is substantially vertical. It has a large face that rests against the outer face 26 of the respective chassis side member 20.

The plate 122 has a plurality of bolt assemblies 128 extending therethrough and engaged with the respective chassis side member 20, said bolt assemblies 128 securing the plate 122, and hence the plate 120, to said chassis side member 20.

The plate 122 also has means for attaching the tailgate 52 to the plate 120. These fixing means are formed here by oblong through-holes 130 opening into each of the large faces of the plate 122.

The tabs 124, 126 comprise a first tab 124 and a second tab 126.

The first tab 124 projects transversely outwards from a top edge of the plate 122. It is substantially horizontal.

The first tab 124 rests against the floor 34 of the body 14 and is attached to the floor 34. This is achieved here by means of a bolt assembly 132 engaged through the floor 34 and through said tab 124.

Thus, each support plate 120 is attached to a side face 26 of the respective chassis side member 20 and to a floor 34 of the self-supporting body 14.

The second tab 126 projects transversely outwards from a rear edge of the

plate 122. It is substantially vertical. It stiffens the plate 120.

Each support plate 120 is preferably made of steel.

By virtue of the invention described above, the body 14 is raised relative to the wheels of the truck 10, thus avoiding the formation of drums in the body 14 for the passage of said wheels. This simplifies the manufacture of the body 14.

Furthermore, as the body 14 is self-supporting, the strut 60 used to raise the body 14 does not have to take any significant load, other than the compressive load due to the weight of the body 14. It is therefore possible to use a lightweight strut 60 and thus retain a high payload.

The front intermediate connecting device 90 between the body 14 and the chassis 16 helps to prevent forces from being transmitted through the strut 60 and thus contributes to the lightening of the truck 10, without this lightening being at the expense of the safety of the truck 10.

Finally, the particular design of the strut 60, with its side members 62 and its brackets 70, allows a particularly easy assembly of the body 14 to the chassis 16.

## Patentkrav

**1.** Lastvogn (10), der omfatter et chassis (16) og et selvbærende karosseri (14), der er fastgjort til chassiset (16), hvor det selvbærende karosseri (14) er direkte forbundet med chassiset (16), **kendetegnet ved, at** lastbilen (10) omfatter endvidere en stiver (60), der er indskudt mellem chassiset (16) og det selvbærende karosseri (14).

**2.** Lastvogn (10) ifølge krav 1, hvor chassiset (16) omfatter to i tværgående afstand adskilte chassissideelementer (20), og stiveren (60) omfatter to i tværgående afstand adskilte stiversideelementer (62), hvor hvert stiversideelement (62) er indskudt mellem henholdsvis det selvbærende karosseri (14) og et chassissideelement (20).

**3.** Lastvogn (10) ifølge krav 2, hvor stiveren (60) er fri for et tværstykke, der forbinder stiversideelementerne (62) med hinanden.

**4.** Lastvogn (10) ifølge krav 2 eller 3, hvor stiveren (60) omfatter en flerhed af beslag (70), der hver især støder op til en sideflade (72) af et af stiverelementerne (62), hvor det selvbærende karosseri (14) er fastgjort til chassiset (16) ved hjælp af boltsamlinger (40), der strækker sig gennem beslagene (70).

**5.** Lastvogn (10) ifølge krav 4, hvor hvert beslag (70) er forskydeligt monteret i længderetningen (X) i forhold til stiversideelementet (62), hvortil det er forbundet.

**6.** Lastvogn (10) ifølge krav 4 eller 5, hvor chassiset (16) omfatter en flerhed af konsoller (24A), som hver især er fastgjort til en sideflade (26) af et af chassissideelementer (20), hvor hver boltsamling (40) strækker sig gennem en af konsollerne (24A), og hvert beslag (70) er indskudt mellem det selvbærende legeme (14) og en af konsollerne (24A) og har en højde, der i det væsentlige

er lig med afstanden af konsollen afstand (24A) til det selvbærende karosseri (14).

**7.** Lastbil (10) ifølge et hvilket som helst af kravene 2 til 6, som omfatter en forreste mellemforbindelsesindretning (90) mellem karosseriet (14) og chassiset (16), der er dannet af to mellemliggende forbindelseselementer (92), der hver især er fastgjort til henholdsvis karosseriet (14) og en chassissidedel (20).

**8.** Lastvogn (10) ifølge krav 7, hvor hvert mellemliggende forbindelseselement (92) er fastgjort til et respektive støttesideelement (62).

**9.** Lastbil (10) ifølge et hvilket som helst af kravene 2 til 8, der omfatter en bagklapstøtte til fastgørelse af en bagklap (52) til chassiset (16), hvilken bagklapsstøtte omfatter to plader (120), der hver især er fastgjort til det selvbærende karosseri (14) og til en respektive chassissidedel (20).

**10.** Lastbil (10) ifølge krav 9, hvor hver plade (120) er fastgjort henholdsvis til en sideflade (26) af chassissideelementet (20) og til et gulv (34) af det selvbærende karosseri (14).

**11.** Lastbil (10) ifølge et hvilket som helst af kravene 1 til 10, hvor stiveren (60) er fremstillet af en aluminiumlegering eller et kompositmateriale

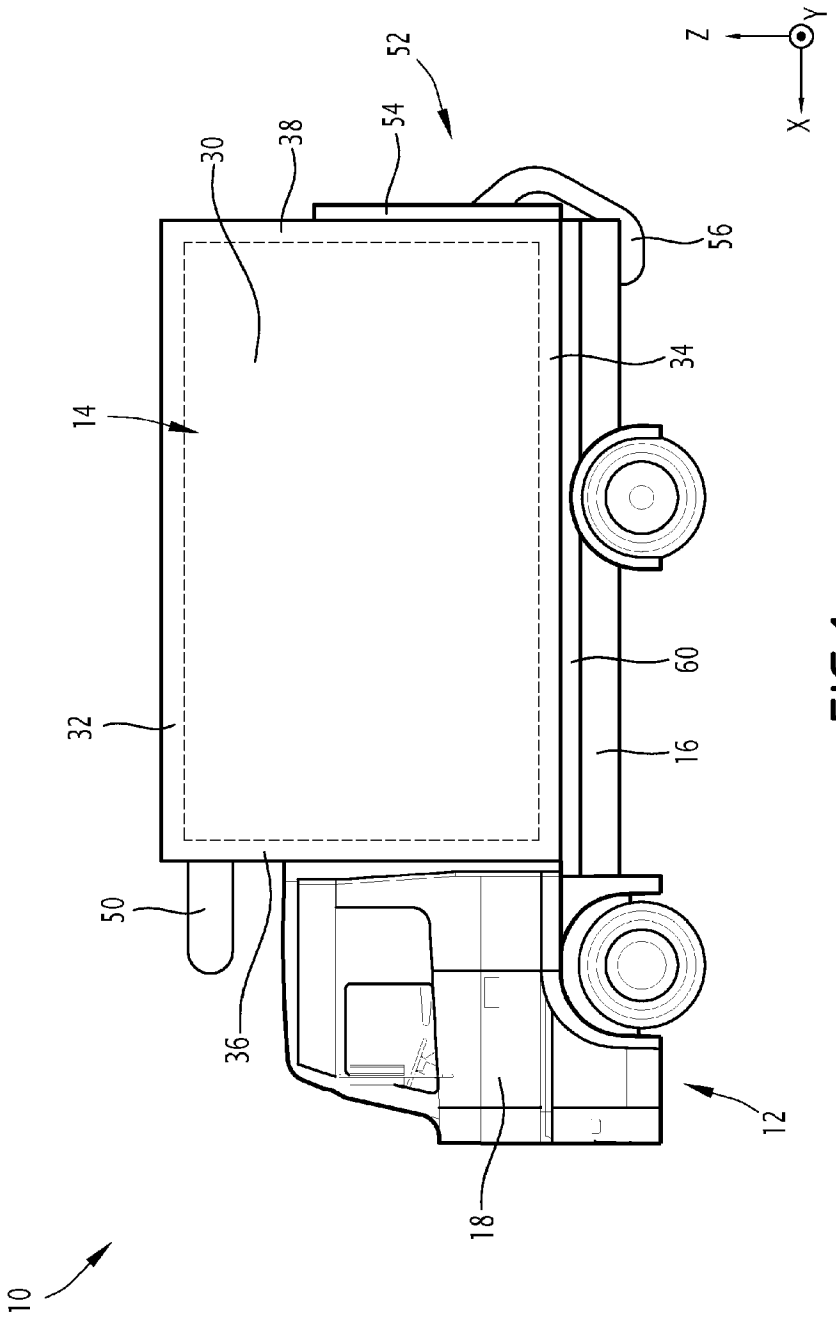
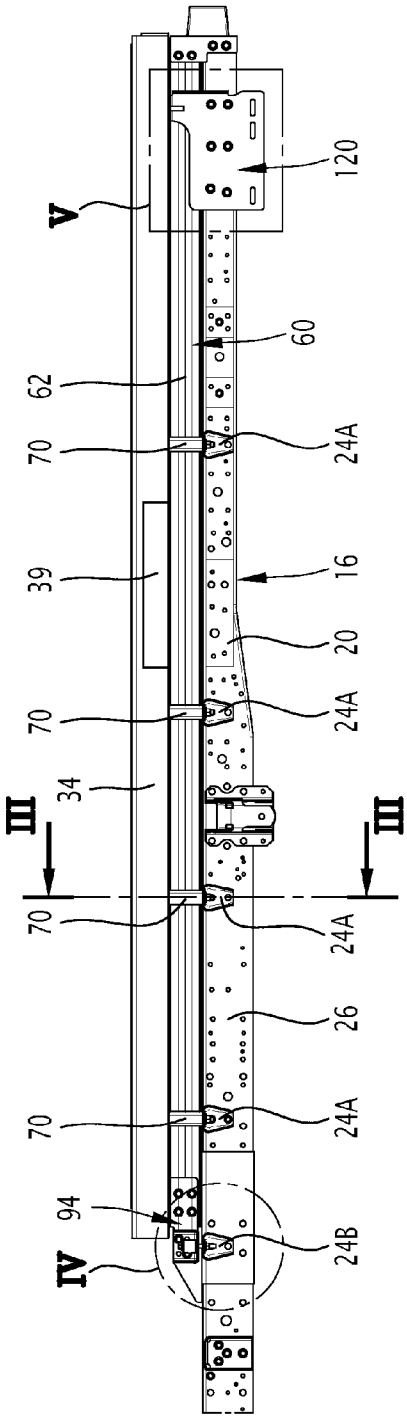



FIG.1


V
120
60
62
70
24A
39
16
20
70
24A
III
34
III
70
24A
26
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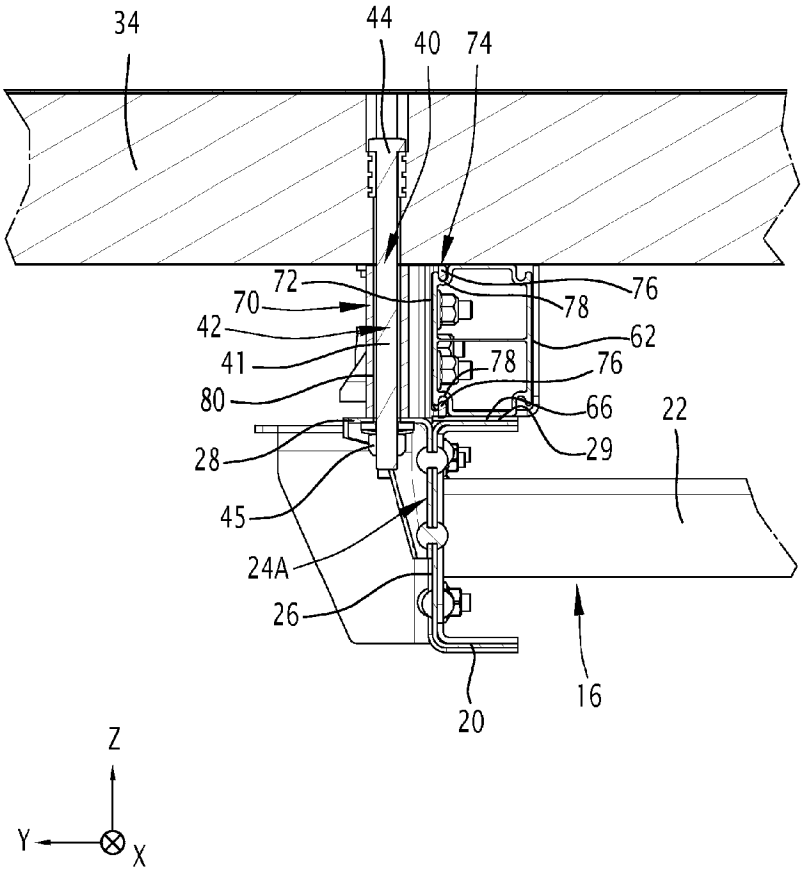
24A
94
IV
24B
Z
Y
X

FIG.2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70
42
41
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62
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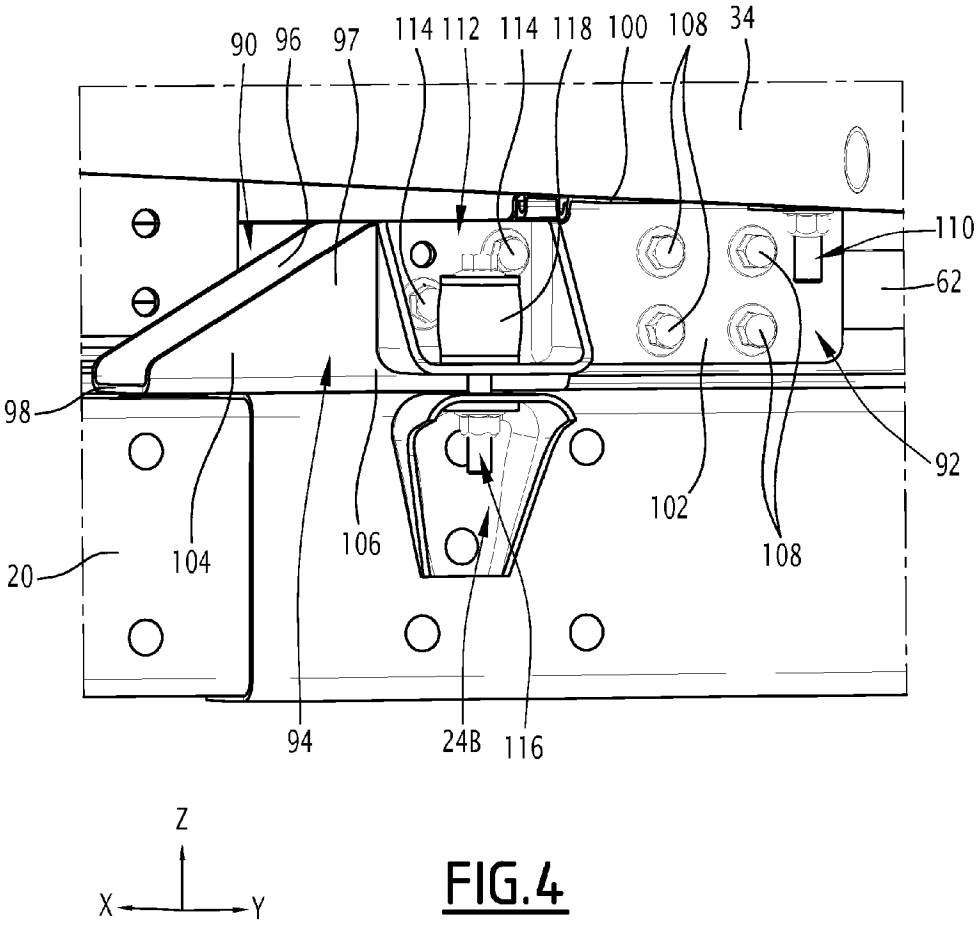
22
16
20
Z
Y
X

FIG.3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114
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114
118
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98
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24B
116
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X
Y

FIG.4

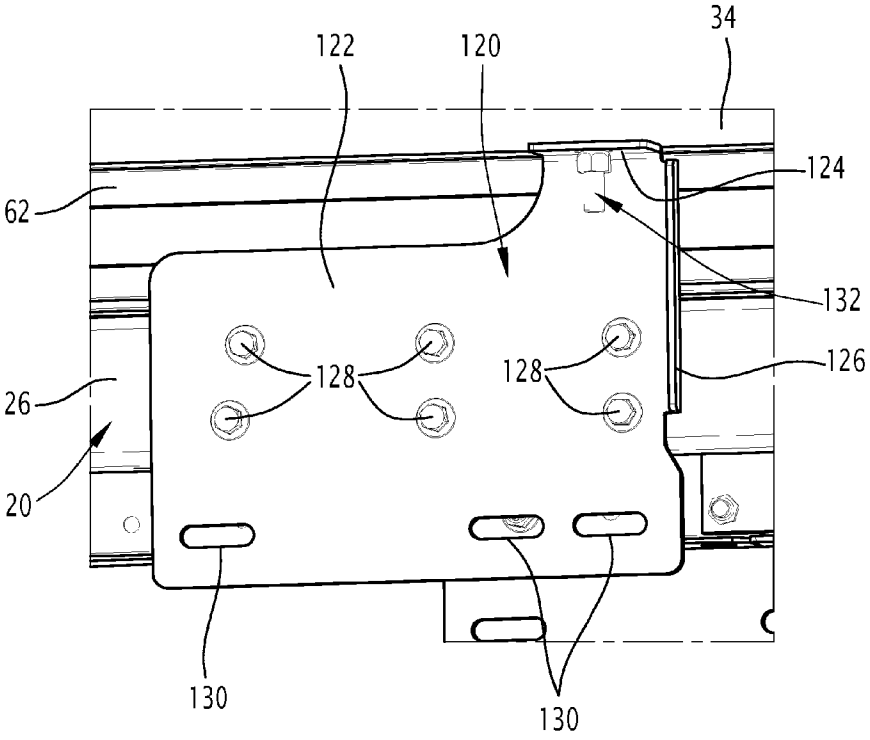


FIG.5