



- (51) International Patent Classification:
B62D 33/067 (2006.01) *B62D 33/07* (2006.01)
- (21) International Application Number:
PCT/SE2024/050430
- (22) International Filing Date:
07 May 2024 (07.05.2024)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2350574-6 10 May 2023 (10.05.2023) SE
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- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) Title: CAB TILTING ARRANGEMENT AND VEHICLE AND ASSEMBLY

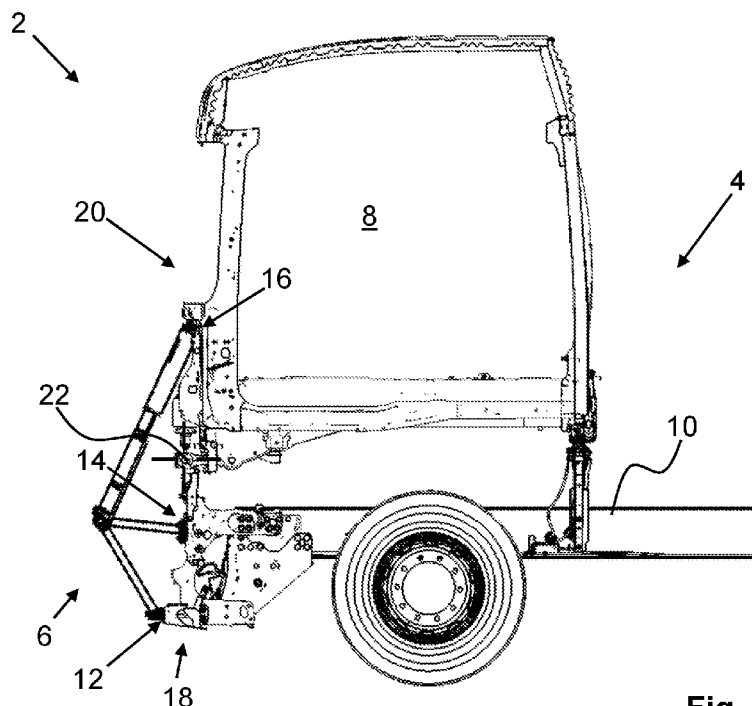


Fig. 2a

(57) Abstract: The disclosure concerns a cab tilting arrangement (6) for tilting a cab (8) of a vehicle (4). The cab tilting arrangement (6) comprising a support structure (23) and an elongated actuator (24). The support structure (23) comprises a first connection portion (26) for being connected to a first vehicle connection part (12) at a chassis (10) of the vehicle (4) and a second connection portion (28) for being connected to a second vehicle connection part (14) at the chassis. The elongated actuator (24) is pivotably connected to the support structure (23) at a pivot joint (44). The elongated actuator (24) comprises a third connection portion (48) for being connected to a third vehicle connection part (16) at the cab (8). Seen in a two-dimensional plane, the first connection portion (26), the second connection portion (28), and the pivot joint (44) are each arranged at one corner of a triangle.

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Cab Tilting Arrangement and Vehicle and Assembly

TECHNICAL FIELD

The invention relates to a cab tilting arrangement. The invention further relates to a vehicle
5 and to an assembly comprising a vehicle and a cab tilting arrangement.

BACKGROUND

A heavy load vehicle comprises a chassis and a cab which is pivotably connected to the
chassis. The term cab may refer to a cabin in which e.g. a driver seat is provided for a driver
10 of the heavy load vehicle. However, the term cab may be interpreted in a broader sense,
covering different container structures at a front end portion of a vehicle.

In order to reach various components and the chassis underneath the cab, it has to be tilted
in a pivotal motion. A lifting device, such as e.g. a hydraulic cylinder, mounted between the
15 frame and the cab in the heavy load vehicle is commonly utilised for tilting the cab.

A removable lifting device for tilting a cab of a heavy load vehicle has been suggested.
Namely, DE 102018133430 discloses a lifting device for a tilting cab of a utility vehicle,
wherein the lifting device is configured for at least partial tilting of the cab. The lifting device is
20 manually removable from the vehicle and is additionally configured for lifting the vehicle e.g.,
for a tire change.

SUMMARY

It would be advantageous to provide an alternative removable arrangement for tilting a cab of
25 a vehicle. In particular, it would be desirable to provide leverage in a removable cab tilting
arrangement. To better address one or more of these concerns, one or more of a cab tilting
arrangement, a vehicle, and an assembly having the features defined in one or more of the
independent claims is provided.

30 According to an aspect of the invention, there is provided a cab tilting arrangement for tilting
a cab of a vehicle, the cab tilting arrangement comprising a support structure and an
elongated actuator. The support structure comprises a first connection portion configured for
being connected to a first vehicle connection part at a chassis of the vehicle and a second
connection portion configured for being connected to a second vehicle connection part at the
35 chassis of the vehicle. A first end portion of the elongated actuator is pivotably connected to
the support structure at a pivot joint and a second end portion of the elongated actuator

comprises a third connection portion configured for being connected to a third vehicle connection part at the cab of the vehicle. Seen in a two-dimensional plane, the first connection portion, the second connection portion, and the pivot joint are each arranged at one corner of a triangle.

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Since the support structure comprises the first connection portion configured for being connected to the first vehicle connection part at the chassis of the vehicle and the second connection portion configured for being connected to the second vehicle connection part at the chassis of the vehicle, and the first end portion of the elongated actuator is pivotably connected to the support structure at the pivot joint and the second end portion of the elongated actuator comprises a third connection portion configured for being connected to the third vehicle connection part at the cab of the vehicle – the cab tilting arrangement provides for the support structure to be connected to the chassis of a relevant vehicle and the elongated actuator to be connected to the cab of the vehicle. Moreover, since seen in the two-dimensional plane, the first connection portion, the second connection portion, and the pivot joint each are arranged at one corner of a triangle – the pivot joint will be positioned at a distance from the vehicle chassis when the cab tilting arrangement is connected to the vehicle. Thus, the cab tilting arrangement is configured for providing leverage for the elongated actuator to actuate tilting of the cab.

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The cab of the vehicle is typically a cabin in which a driver of the vehicle is positioned, such as seated, when driving the vehicle. The cab may comprise one or more seats for the driver and codrivers or passengers. Optionally, and depending on the kind of vehicle, the cab may comprise one or more of a bunk bed, a table, storage facilities, etc.

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In a broader sense, the cab may be any container structure at a front end portion of a vehicle, the container structure being configured for housing components of the vehicle. Accordingly, a further example of a cab may be a container structure at a front end portion of a driverless vehicle, wherein the container structure houses one or more of electronic components, sensors, batteries, etc.

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In order to provide access under the cab, the cab of the vehicle is tiltable. For instance, access may be provided to portions of a chassis of the vehicle and/or to portions of a powertrain of the vehicle when the cab has been tilted.

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When called for, the cab tilting arrangement is connectable to the vehicle in order to tilt the cab. When there is no need for tilting the cab the cab tilting arrangement is disconnect from the vehicle.

- 5 Accordingly, the cab tilting arrangement may be configured to be temporarily connected to the vehicle for tilting the cab of the vehicle. The cab tilting arrangement may be configured to be removably arranged to the vehicle.

- Each of the first, second, and third connection portions may comprise at last one releasable
10 securing device and the releasable securing devices may be configured for releasable mounting to respective of the first, second, and third vehicle connection parts. Thus, the temporary connection of the cab tilting arrangement to the vehicle may be provided.

- Suitably, after use, the cab tilting arrangement is disconnected from the vehicle before
15 driving the vehicle.

- The cab tilting arrangement may be carried aboard the vehicle when disconnected from the vehicle. The cab tilting arrangement may only be connected to the vehicle when its cab is to be tilted.

- 20 However, since cab tilting usually only is performed when particular work is to be performed on a vehicle, a cab tilting arrangement of the herein discussed kind need not be carried by every vehicle. Instead one cab tiling arrangement may be utilised for the tilting of cabs of several vehicles. The cab tilting arrangement may be provided at one or more of a vehicle
25 service provider, a garage of an owner of one or more vehicles with tiltable cabs, and aboard an assistance vehicle that service personnel use when tending to vehicles in need of assistance along the road.

- There are several advantages associated with the vehicle not having an integrated cab tilting
30 arrangement but instead being devised for tilting of its cab utilising the present cab tilting arrangement, to name a few:

- No disturbances such as noise and/or vibration from a tilt arrangement during use of the vehicle.
- Reduced weight of the vehicle and therefore, possibility to increased payload and revenue
35 to the vehicle owner.

- Less parts in the vehicle and thus, less parts to assemble, which reduces the cost of manufacturing the vehicle, both from a material aspect and a labour aspect. Also, less components require less natural resources for building the vehicle.

- 5 The support structure of the cab tilting arrangement provides support for the elongated actuator such that the elongated actuator can be utilised for tilting the cab of the vehicle.

The first and second connection portions and the pivot joint may be arranged in the two-dimensional plane. Alternatively, the first and second connection portions and the pivot joint
10 may be displaced in relation to each other in a third dimension, perpendicularly to the two-dimensional plane. In both instances, as mentioned above, seen in the two-dimensional plane, first and second connection portions and the pivot joint form a triangle.

The cab tilting arrangement may be able to be taken apart. For instance, the support
15 structure as such may comprise more than one part, which parts can be assembled and disassembled for ease of connecting the support structure to the vehicle. Similarly, the elongated actuator may be connected to and disconnected from the support structure in order to facilitate connecting the elongated actuator to the vehicle.

20 The support structure may comprise beams, such as stiff elongated members, as force carrying parts. The connections of such beams to each other and to the relevant vehicle form nodes. Together, the beams and nodes form a truss through which a combination of compressive and tensile loads transfers the load, caused by the elongated actuator tilting the cab, to the chassis of the vehicle.

25 Since no connection to the ground or other structure than the vehicle is necessary for the cab tilting arrangement, tilting is possible anywhere, independently of where the vehicle is standing, in a workshop or along the road.

30 A vehicle, the cab of which is to be tilted, is devised for use of the cab tilting arrangement. That is, the vehicle comprises the first, second, and third vehicle connection parts, such that the first and second connection portions of the support structure and the third connection portion of the elongated actuator can be connected to the vehicle connection parts.

35 The first, second, and third vehicle connection parts may be dedicated for the connection of the cab tilting arrangement thereto. Alternatively, one or more of the first, second, and third

vehicle connection parts may have further functions during use, assembly, and/or service of the vehicle.

According to embodiments, the elongated actuator may be one of a hydraulic actuator, a pneumatic actuator, or an electric actuator. In this manner, a hydraulically, pneumatically, or electrically powered elongated actuator may be provided.

According to a further aspect of the invention, there is provided a vehicle comprising a tiltable cab, the vehicle being configured for tilting of the cab by utilising a cab tilting arrangement according to any one of aspects and/or embodiments discussed herein. The vehicle further comprises a chassis and the cab connected to the chassis for being tilted in relation to the chassis. The chassis comprises the first and second vehicle connection parts, the second vehicle connection part being arranged above the first vehicle connection part when the vehicle is standing in an ordinary operating position. The cab comprises the third vehicle connection part.

Since the chassis of the vehicle comprises the first and second vehicle connection parts, the second vehicle connection part being arranged above the first vehicle connection part and the cab of the vehicle comprises the third vehicle connection part – the vehicle is configured for connecting a cab tilting arrangement according to any one of aspects and/or embodiments discussed herein to the vehicle. Thus, a tilting of the cab of the vehicle is actuatable with the leverage provided by the support structure and the elongated actuator of the cab tilting arrangement.

The ordinary operating position of the vehicle is one where the vehicle is standing on its wheels with the cab in a position as when the vehicle is being driven e.g., by a driver seated in the cab.

According to embodiments, the first and second vehicle connection parts may be arranged at a front end portion of the chassis and the third vehicle connection part may be arranged at a front portion of the cab. In this manner, the cab tilting arrangement may be connectable to a front end of the vehicle and the cab may be tilted forwardly with respect to the vehicle.

According to a further aspect of the invention, there is provided an assembly comprising a vehicle according to any one of aspects and/or embodiments discussed herein and a cab tilting arrangement according to any one of aspects and/or embodiments discussed herein.

Since the assembly comprises a vehicle according to any one of aspects and/or embodiments discussed herein and a cab tilting arrangement according to any one of aspects and/or embodiments discussed herein - a tilting of the cab of the vehicle is actuatable with the leverage provided by the support structure and the elongated actuator of the cab tilting arrangement.

For instance, the assembly may be provided in connection with the vehicle requiring its cab to be tilted. This may be the case when maintenance of the vehicle or a repair of the vehicle is to be performed e.g., at a garage or at the roadside.

Further features of, and advantages with, the invention will become apparent when studying the appended claims and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

Various aspects and/or embodiments of the invention, including its particular features and advantages, will be readily understood from the example embodiments discussed in the following detailed description and the accompanying drawings, in which:

Fig. 1 schematically illustrates embodiments of an assembly comprising a vehicle and a cab tilting arrangement,

Figs. 2a and 2b illustrate embodiments of an assembly comprising a vehicle and a cab tilting arrangement,

Figs. 3a and 3b illustrate a cab tilting arrangement, and

Figs. 4a – 4c illustrate embodiments of an assembly, of a vehicle, and of a cab tilting arrangement.

DETAILED DESCRIPTION

Aspects and/or embodiments of the invention will now be described more fully. Like numbers refer to like elements throughout. Well-known functions or constructions will not necessarily be described in detail for brevity and/or clarity.

Fig. 1 schematically illustrates embodiments of an assembly 2 comprising a vehicle 4 and a cab tilting arrangement 6.

The vehicle 4 is a vehicle 4 according to any one of aspects and/or embodiments discussed herein and the cab tilting arrangement 6 is a cab tilting arrangement 6 according to any one of aspects and/or embodiments discussed herein.

The vehicle 4 may be any kind of vehicle configured for land-based propulsion, which comprises a cab 8 that can be tilted. In **Fig. 1**, the vehicle 4 is illustrated as a heavy load vehicle in the form of a truck.

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The cab tilting arrangement 6 is configured to be temporarily connected to the vehicle 6 when the cab 8 of the vehicle 4 is to be tilted.

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Accordingly, the assembly 2 is provided in connection with the cab 8 being tilted. After tilting of the cab 8 has been performed and the cab 8 is in its ordinary operating position for use of the vehicle 4, the cab tilting arrangement 6 is disconnected from the vehicle 4. Thereafter, the vehicle 4 is ready for use or further service that does not require tilting of the cab 8.

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Once disconnected from the vehicle 4, the cab tilting arrangement 6 may be provided standby for a succeeding cab tilting of the cab 8 of the present vehicle 4 or of a cab of a different vehicle.

20

Figs. 2a and 2b illustrate embodiments of an assembly 2 comprising a vehicle 4 and a cab tilting arrangement 6. Thus, **Figs. 2a and 2b** also illustrate embodiments of the vehicle 4 and of the cab tilting arrangement 6.

The assembly 2 resembles in much the assembly of **Fig. 1**. Accordingly, in the following reference is also made to **Fig. 1**.

25

In **Figs. 2a and 2b** a frame portion of a cab 8 and a front portion of a chassis 10 of the vehicle 4 are shown. Irrelevant vehicle components have been omitted to facilitate reading of the figures.

30

As already discussed, the vehicle 4 comprises a tiltable cab 8 and a chassis 10. The cab 8 is connected to the chassis 10 for being tilted in relation to the chassis 10. **Fig. 2a** shows the cab 8 in its ordinary position. **Fig. 2b** shows the cab 8 in its tilted position, as tilted utilising the cab tilting arrangement 6 according to any one of aspects and/or embodiments discussed herein.

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The vehicle 4 is configured for its cab 8 to be tilted by the cab tilting arrangement 6. The vehicle 4 is so configured inter alia since the chassis 10 comprises first and second vehicle connection parts 12, 14 and the cab 8 comprises a third vehicle connection part 16. The

second vehicle connection part 14 is arranged above the first vehicle connection part 12 when the vehicle 4 is standing on a vertical surface i.e., as shown in **Figs. 2a and 2b**.

As discussed below with reference to **Figs. 3a and 3b**, first, second, and third connection portions of the cab tilting arrangement 6 are configured for being releasably connected to the first, second, and third vehicle connection parts 12, 14, 16.

The first and second vehicle connection parts 12, 14 are arranged at a front end portion 18 of the chassis 10. The third vehicle connection part 16 is arranged at a front portion 20 of the cab 8.

The first, second, and third vehicle connection parts 12, 14, 16 may be dedicated for the connection of the cab tilting arrangement 6 thereto.

Alternatively, one or more of the first, second, and third vehicle connection parts 12, 14, 16 may have further functions during use, assembly, and/or service of the vehicle 4. For instance, the first vehicle connection part 12 may form part of a vehicle towing connection and/or the third connection part 16 may form part of a cab lifting connection utilised e.g., during mounting of the cab 8 to the chassis 10 during assembly of the vehicle 4.

The cab 8 is tiltable about a pivot axis 22 in a forward direction of the vehicle 4. In this manner, the cab tilting arrangement 6 arranged at the front of the vehicle 4 can be utilised for tilting the cab 8 in the forward direction of the vehicle 4, as shown in **Fig. 2b**.

The pivot axis 22 may be stationary i.e., the pivot axis 22 remains in one position when the cab 8 is tilted about the pivot axis 22. Alternatively, the pivot axis 22 may be movable i.e., the pivot axis 22 may be parallel displaced when the cab 8 is tilted about the pivot axis 22. For instance, this may be the case when the pivot axis 22 is provided by a linkage mechanism.

Generally, with reference to **Figs. 1 – 2b**, the cab tilting arrangement 6, which is provided separate from the vehicle 4, is mounted to the vehicle 4 front when the cab 8 is to be tilted. Force carrying parts included in the cab tilting arrangement 6 are mounted to the chassis 10 front and form a base, towards which an actuator is pulling the cab 8 for tilting it forwardly, and against which base the actuator may push for pivoting the cab 8 backwards.

Figs. 3a and 3b illustrate the cab tilting arrangement 6 of the embodiments of **Figs. 2a and 2b** in more detail. Accordingly, in the following reference is also made to **Figs. 2a and 2b**.

Fig. 3a shows a side view of the cab tilting arrangement 6 and **Fig. 3b** shows a partial perspective view of the cab tilting arrangement 6.

- 5 The cab tilting arrangement 6 comprises a support structure 23 and an elongated actuator 24. The support structure 23 forms a base, to which the elongated actuator 24 is connected.

The support structure 23 comprises a first connection portion 26 and a second connection portion 28. The first connection portion 26 is configured for being connected to the first
10 vehicle connection part 12 and the second connection portion 28 is configured for being connected to the second vehicle connection part 14, see also e.g. **Fig. 2a**.

According to some embodiments, such as the illustrated embodiments, the support structure 23 comprises a first elongated member 30 and a second elongated member 32. The first
15 connection portion 26 is arranged at a first end portion 34 of the first elongated member 30. The second connection portion 28 is arranged at a first end portion 36 of the second elongated member 32. The first and second elongated members 30, 32 are connected to each other at respective second end portions 38, 40 thereof. In this manner, the support structure 23 may be provided as an uncomplicated structure and for connection to the first
20 and second vehicle connection portions 12, 14, see also e.g. **Fig. 2a**.

Accordingly, the first elongated member 30 comprises a second end portion 38 and the second elongated member 32 comprises a second end portion 40.

- 25 The first and second elongated member 30, 32 may be directly connected to each other. Alternatively, the first and second elongated member 30, 32 may be indirectly connected to each other.

The first and second elongated members 30, 32 may comprise beams made e.g. from steel
30 or aluminium. The beams may have e.g., a round cross section, a square cross section, a U-shaped cross section, a T-shaped, or an I-shaped cross section to provide stiff and rigid first and second elongated members 30, 32.

According to embodiments the first elongated member 30 may have a length within a range
35 of 0.3 – 1.0 m and the second elongated member 32 may have a length within a range of 0.3 – 1.0 m.

According to alternative embodiments, the first and second elongated members 30, 32 may have lengths within different ranges.

A first end portion 42 of the elongated actuator 24 is pivotably connected to the support structure 23 at a pivot joint 44. A second end portion 46 of the elongated actuator 24 comprises a third connection portion 48. The third connection portion 48 is configured for being connected to the third vehicle connection part 16 at the cab 8 of the vehicle 4, see also e.g. **Fig. 2a**.

Seen in a two-dimensional plane, as in the plane of **Fig. 3a**, the first connection portion 26, the second connection portion 28, and the pivot joint 44 are each arranged at one corner of a triangle. The triangle is indicated with dash-dotted-lines in **Fig. 3a**. The corners of the triangles disclosed herein may also be referred to as vertices.

Thus, the support structure 23 provides support for the elongated actuator 24 such that, when mounted to the vehicle 4, the elongated actuator 24 can be utilised for tilting the cab 8 of the vehicle 4.

The pivot joint 44 is arranged at the second end portions 38, 40 of the first and second elongated members 30, 32.

According to embodiments, at the corner of the triangle formed by the pivot joint 44, the triangle may have an interior angle α within a range of 30 – 90 degrees.

According to some embodiments, the elongated actuator 24, in an elongated state, may have a length within a range of 0.7 – 2.0 m and in a contracted state may have a length within a range of 0.35 – 1.0 m.

According to alternative embodiments, the elongated actuator 24 may have a length within different ranges in its elongated and/or contracted state.

In this manner, the elongated actuator 24, in its elongated state, as shown e.g. in **Figs. 2a and 3a**, may be mounted at the front 20 of the cab 8. In its contracted state, as shown e.g., in **Fig. 2b**, the elongate actuator 24 has a length that achieves at least partial tilting of the cab 8. Even maximum tilting of the cab 8 may be provided in the contracted state.

The elongated actuator 24 may be one of a hydraulic actuator such as a hydraulic cylinder, a pneumatic actuator such as a pneumatic cylinder, or an electric actuator such as an electric cylinder/linear actuator. In **Fig. 3a**, a control arrangement 50 for the elongated actuator 24 is schematically indicated.

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Depending on the type of elongated actuator 24, the control arrangement 50 may comprise a hydraulic pump, a pneumatic pump, or an electric powered supply and a manoeuvring arrangement. Thus, service personnel, may control the elongated actuator 24 for tilting the cab 8 and for pivoting it back to its ordinary position. Service personnel may operate the manoeuvring arrangement for supplying hydraulic, pneumatic, or electric power to elongate and contract the elongated actuator 24.

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Each of the first, second, and third connection portions 26, 28, 48 comprises at last one releasable securing device 52. As shown at the first and second connection portions 26, 28 in **Fig. 3b**, such releasable securing devices 52 are exemplified as threaded bolts. Other releasable securing devices may be utilised, such as releasable clamps.

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Each releasable securing device is configured for releasable mounting to respective of the first, second, and third vehicle connection parts 12, 14, 16 at the vehicle 4. In accordance with the illustrated embodiments wherein the releasable securing devices comprise threaded bolts, the first, second, and third vehicle connection parts 12, 14, 16 may comprise internally threaded holes (not shown).

20

Figs. 4a – 4c illustrate embodiments of an assembly 2, of a vehicle 4, and of a cab tilting arrangement 6.

25

The assembly 2, the vehicle 4, and the cab tilting arrangement 6 of the **Fig. 4a – 4c** embodiments resemble in much the assembly 2, the vehicle 4, and the cab tilting arrangement 6 discussed above with reference to **Figs. 1 – 3b**. Accordingly, in the following, reference is also made to the above discussion of the **Figs. 1 – 3b** embodiments. In the following mainly, the differences between the embodiments will be discussed.

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In **Fig. 4a**, the cab 8 of the vehicle 4 is positioned in its ordinary operating position. In **Fig. 4b**, the cab 8 has been tilted. In **Fig. 4c**, the cab tilting arrangement 6 is shown in a perspective view together with portions of the chassis 10 of the vehicle 4.

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Again, the assembly 2 comprises the vehicle 4 and the cab tilting arrangement 6.

Again, the vehicle 4 comprises first, second, and third vehicle connection parts 12, 14, 16.

Again, the cab tilting arrangement 6 comprises a support structure 23 and an elongated actuator 24 with a third connection portion 48. The support structure 23 comprises first and second elongated members 30, 32 with first and second connection portions 26, 28.

According to these embodiments, the cab tilting arrangement 6 comprising a further support structure 23' and a further elongated actuator 24'. The further support structure 23' comprises a fourth connection portion 54 configured for being connected to a fourth vehicle connection part 56 at the chassis 10 of the vehicle 4 and a fifth connection portion 58 configured for being connected to a fifth vehicle connection part 60 at the chassis 10 of the vehicle 4. A first end portion 62 of the further elongated actuator 24' is pivotably connected to the further support structure 23' at a further pivot joint 44' and a second end portion 64 of the further elongated actuator 24' comprises a sixth connection portion 66 configured for being connected to a sixth vehicle connection part 68 at the cab 8 of the vehicle 4. Seen in a further two-dimensional plane, the fourth connection portion 54, the fifth connection portion 58, and the further pivot joint 44' are each arranged at one corner of a further triangle.

In this manner, the cab tilting arrangement 6 may support and provide an additional actuator for tilting the cab 8 of the vehicle 4. Thus, for instance, depending on a weight of the cab 8 and/or a position of its centre of gravity, the force applied for tilting the cab 8 may be increased in comparison with a cab tilting arrangement comprising only one elongated actuator.

The further support structure 23' may be of the same or similar kind as the support structure 23. Accordingly, with respect to the further support structure 23' reference is made to the above description of the support structure 23.

The further elongated actuator 24' may be of the same or similar kind as the elongated actuator 24. Accordingly, with respect to the further elongated actuator 24' reference is made to the above description of the elongated actuator 24.

Concerning the further two-dimensional plane and the further triangle formed by the fourth, and fifth connection portions 54, 58, and the further pivot joint 44', reference is made to the above discussion of the two-dimensional plane and the triangle formed by the first and second connection portions 12, 14 and the pivot joint 44.

Accordingly, the vehicle 4 is configured for tilting of the cab 8 by utilising a cab tilting arrangement 6 as discussed with reference to **Figs. 4a – 4c**. The chassis 10 comprises the fourth and fifth vehicle connection parts 56, 60 and the cab 8 comprises the sixth vehicle connection part 68.

For instance, in the assembly 2, the support structure 23 and the elongated actuator 24 may be arranged towards one lateral side of the vehicle 4, such as towards its lefthand side and the further support structure 23' and the further elongated actuator 24' may be arranged towards the opposite lateral side of the vehicle 4, such as towards its righthand side.

Similarly, for the vehicle 4, the first, second, and third vehicle connection parts 12, 14, 16 may be arranged towards one lateral side of the vehicle 4, such as towards its lefthand side. The fourth, fifth, and sixths vehicle connection parts 56, 60, 68 may be arranged towards the opposite lateral side of the vehicle 4, such as towards its righthand side.

Suitably, the control of the elongated actuator 24 and the further elongated actuator 24' is coordinated in order to synchronize their contractions when tilting the cab 8 and their elongations when the cab 8 is pivoted back to its operating position.

According to embodiments, the further support structure 23' is connected to the support structure 23. In this manner, the cab tilting arrangement 6 may be provided as one unit, at least when connected to the vehicle 4 to form the assembly 2.

For instance, the cab tilting arrangement 6 may comprise a member 70, such as a rod or a pipe, which connects the support structure 23 and the further support structure 23'. The member 70 may be aligned with the pivot joint 44 and the further pivot joint 44'.

The further support structure 23', the further pivot joint 44' and the further elongated actuator 24' as disclose herein may also be referred to as the second support structure 23', the second pivot joint 44' and the second elongated actuator 24'. Hence, the support structure 23, the pivot joint 44 and the elongated actuator 24 as disclose herein may be referred to as the first support structure 23, the first pivot joint 44 and the first elongated actuator 24.

It is to be understood that the foregoing is illustrative of various example embodiments and that the invention is defined only by the appended claims. A person skilled in the art will realize that the example embodiments may be modified, and that different features of the

example embodiments may be combined to create embodiments other than those described herein, without departing from the scope of the invention, as defined by the appended claims.

CLAIMS

1. A cab tilting arrangement (6) for tilting a cab (8) of a vehicle (4), the cab tilting arrangement (6) comprising a support structure (23) and an elongated actuator (24), wherein the support structure (23) comprises a first connection portion (26) configured for being connected to a first vehicle connection part (12) at a chassis (10) of the vehicle (4) and a second connection portion (28) configured for being connected to a second vehicle connection part (14) at the chassis (10) of the vehicle (4), wherein

a first end portion (42) of the elongated actuator (24) is pivotably connected to the support structure (23) at a pivot joint (44) and a second end portion (46) of the elongated actuator (24) comprises a third connection portion (48) configured for being connected to a third vehicle connection part (16) at the cab (8) of the vehicle (4), and wherein

seen in a two-dimensional plane, the first connection portion (26), the second connection portion (28), and the pivot joint (44) are each arranged at one corner of a triangle.

2. The cab tilting arrangement (6) according to claim 1, wherein at the corner of the triangle formed by the pivot joint (44), the triangle has an interior angle (α) within a range of 30 – 90 degrees.

3. The cab tilting arrangement (6) according to claim 1 or 2, wherein the support structure (23) comprises a first elongated member (30) and a second elongated member (32), wherein the first connection portion (26) is arranged at a first end portion (34) of the first elongated member (30) and the second connection portion (28) is arranged at a first end portion (36) of the second elongated member (32), and wherein

the first and second elongated members (30, 32) are connected to each other at respective second end portions (38, 40) thereof.

4. The cab tilting arrangement (6) according to claim 3, wherein the pivot joint (44) is arranged at the second end portions (38, 40) of the first and second elongated members (30, 32).

5. The cab tilting arrangement (6) according to claim 3 or 4, wherein the first elongated member (30) has a length within a range of 0.3 – 1.0 m, and the second elongated member (32) has a length within a range of 0.3 – 1.0 m.

6. The cab tilting arrangement (6) according to any one of the preceding claims, wherein the elongated actuator (24), in an elongated state, has a length within a range of 0.7 – 2.0 m and in a contracted state has a length within a range of 0.35 – 1.0 m.

7. The cab tilting arrangement (6) according to any one of the preceding claims, wherein the elongated actuator (24) is one of a hydraulic actuator, a pneumatic actuator, or an electric actuator.

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8. The cab tilting arrangement (6) according to any one of the preceding claims, comprising a further support structure (23') and a further elongated actuator (24'), wherein

the further support structure (23') comprises a fourth connection portion (54) configured for being connected to a fourth vehicle connection part (56) at the chassis (10) of the vehicle (4) and a fifth connection portion (58) configured for being connected to a fifth vehicle connection part (60) at the chassis (10) of the vehicle (4), wherein

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a first end portion (62) of the further elongated actuator (24') is pivotably connected to the further support structure (23') at a further pivot joint (44') and a second end portion (64) of the further elongated actuator (24') comprises a sixth connection portion (66) configured for being connected to a sixth vehicle connection part (68) at the cab (8) of the vehicle (4), and wherein

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seen in a further two-dimensional plane, the fourth connection portion (54), the fifth connection portion (58), and the further pivot joint (44') are each arranged at one corner of a further triangle.

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9. The cab tilting arrangement (6) according to claim 8, wherein the further support structure (23') is connected to the support structure (23).

10. The cab tilting arrangement (6) according to any one of the preceding claims, wherein the cab tilting arrangement (6) is configured to be temporarily connected to the vehicle (4) for tilting the cab (8) of the vehicle (4).

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11. A vehicle (4) comprising a tiltable cab (8), the vehicle (4) being configured for tilting of the cab (8) by utilising a cab tilting arrangement (6) according to any one of the preceding claims, wherein

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the vehicle (4) further comprises a chassis (10) and the cab (8) connected to the chassis (10) for being tilted in relation to the chassis (10), wherein

the chassis (10) comprises the first and second vehicle connection parts (12, 14), the second vehicle connection part (14) being arranged above the first vehicle connection part (12) when the vehicle (4) is standing in an ordinary operating position, and wherein

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the cab (8) comprises the third vehicle connection part (16).

12. The vehicle (4) according to claim 11, wherein the cab (8) is tiltable about a pivot axis (22) in a forward direction of the vehicle (4).

5 13. The vehicle (4) according to claim 11 or 12, wherein first and second vehicle connection parts (12, 14) are arranged at a front end portion (18) of the chassis (10) and the third vehicle connection part (16) is arranged at a front portion (20) of the cab (8).

10 14. The vehicle (4) according to any one of claims 11 - 13, being configured for tilting of the cab (8) by utilising a cab tilting arrangement (6) according to claim 8 or 9, wherein
the chassis (10) comprises the fourth and fifth vehicle connection parts (56, 60)
and the cab (8) comprises the sixth vehicle connection part (68).

15 15. An assembly (2) comprising a vehicle (4) according to any one of claims 11 - 14 and a cab tilting arrangement (6) according to any one of claims 1 - 10.

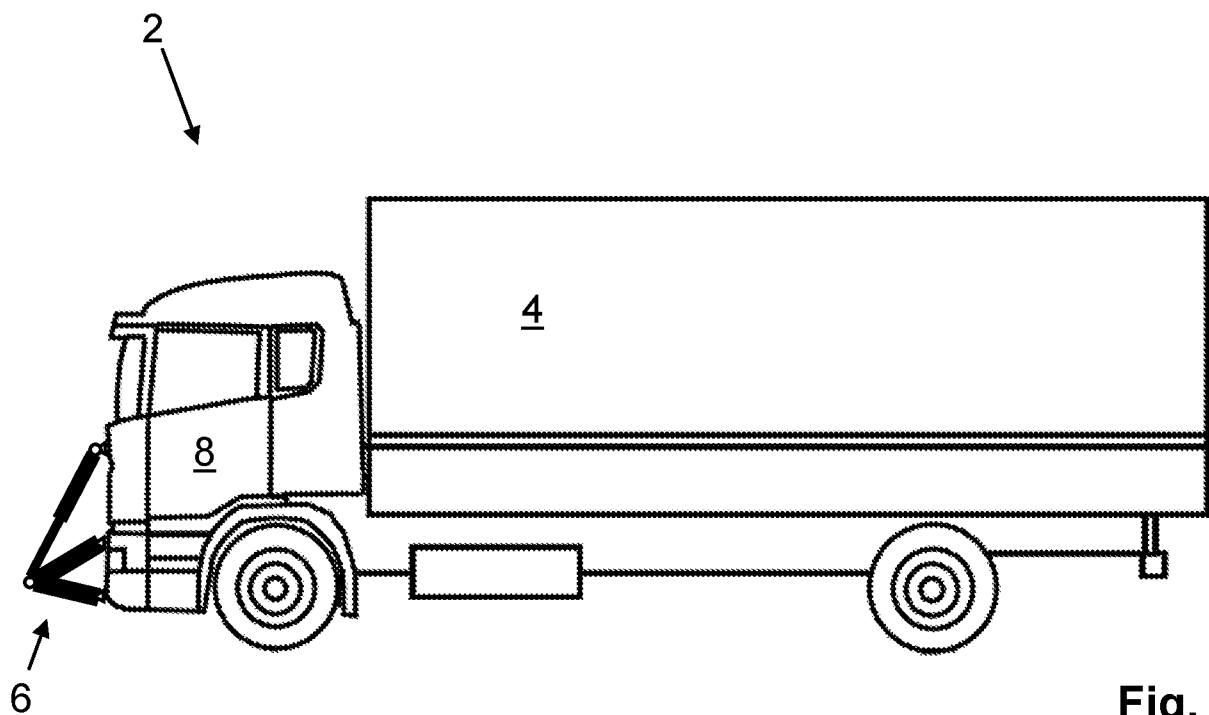


Fig. 1

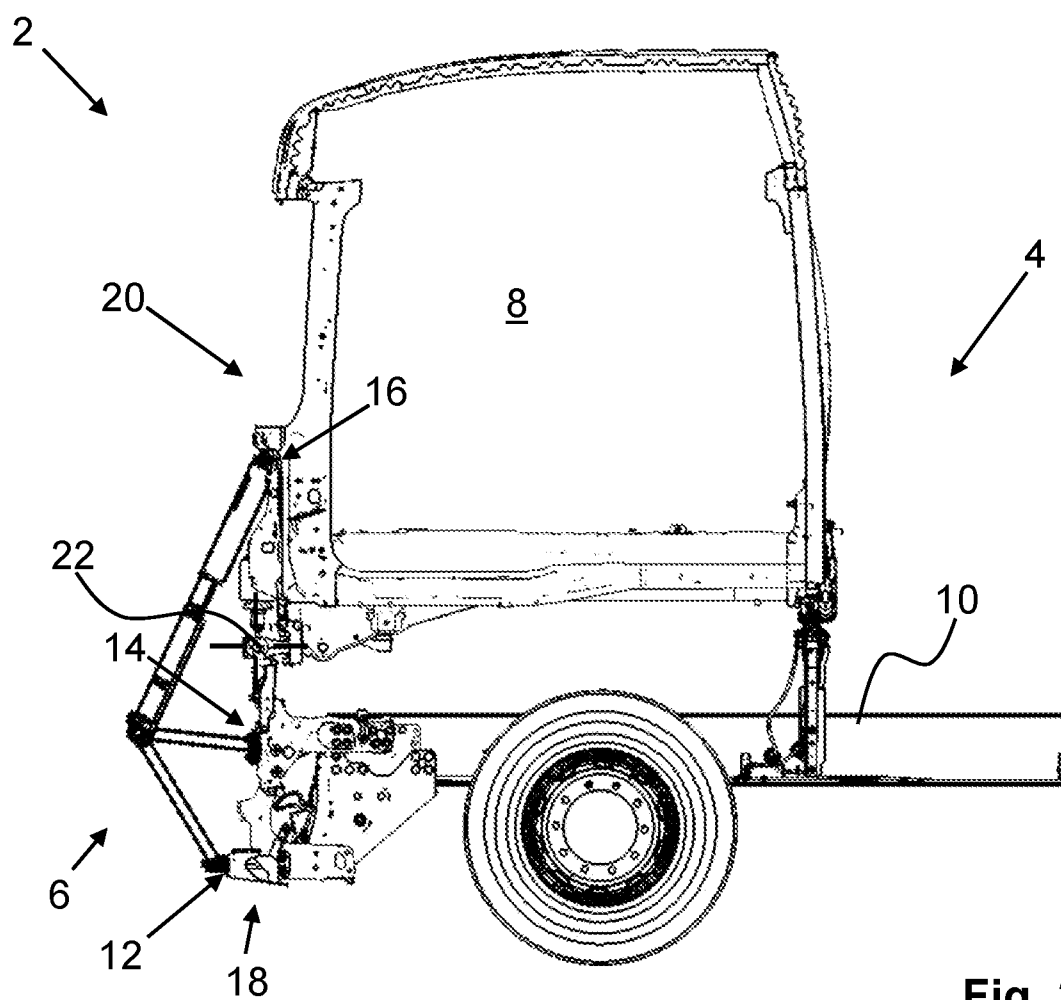


Fig. 2a

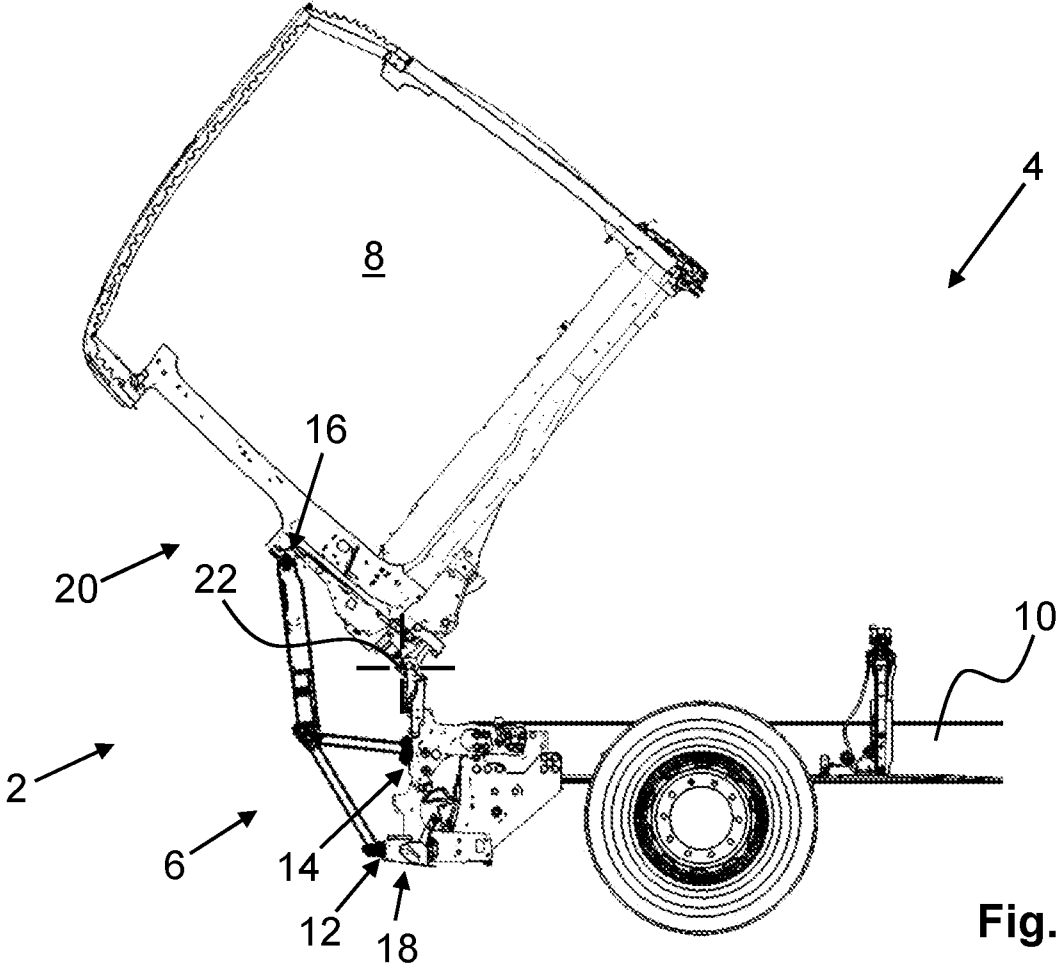


Fig. 2b

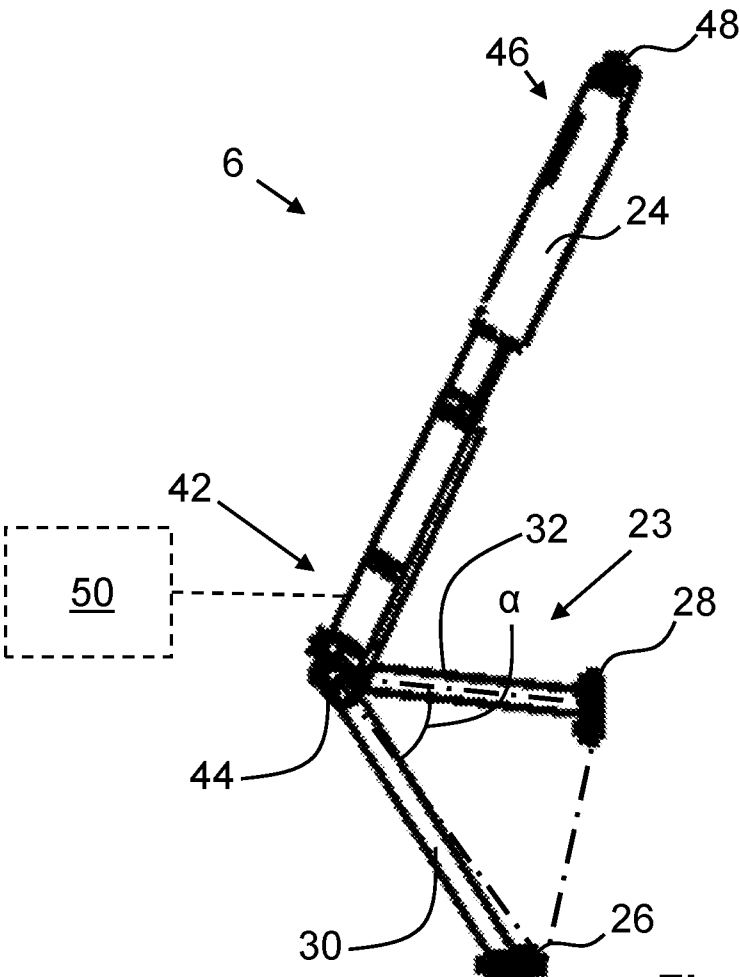


Fig. 3a

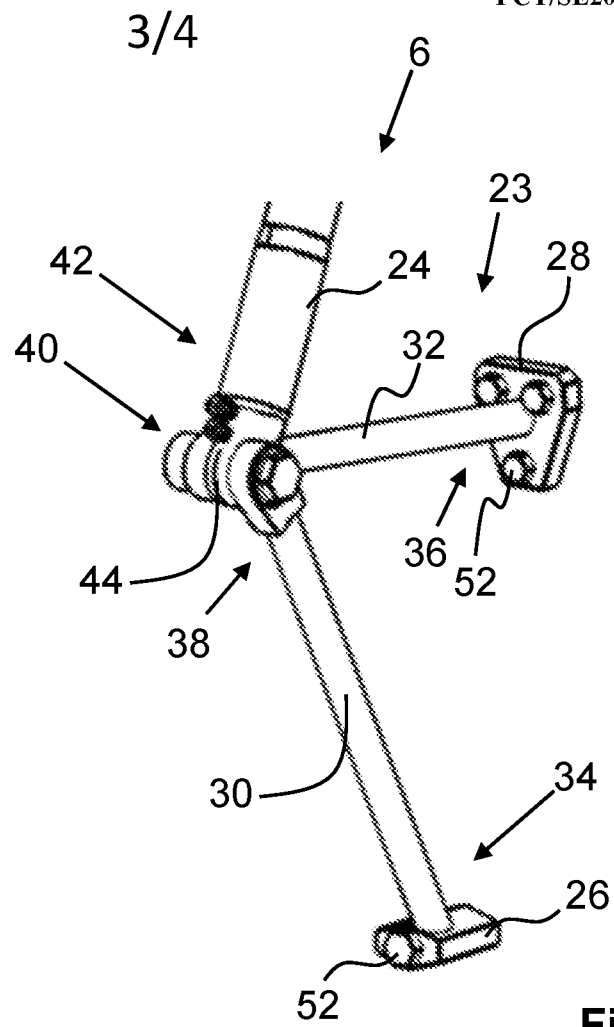


Fig. 3b

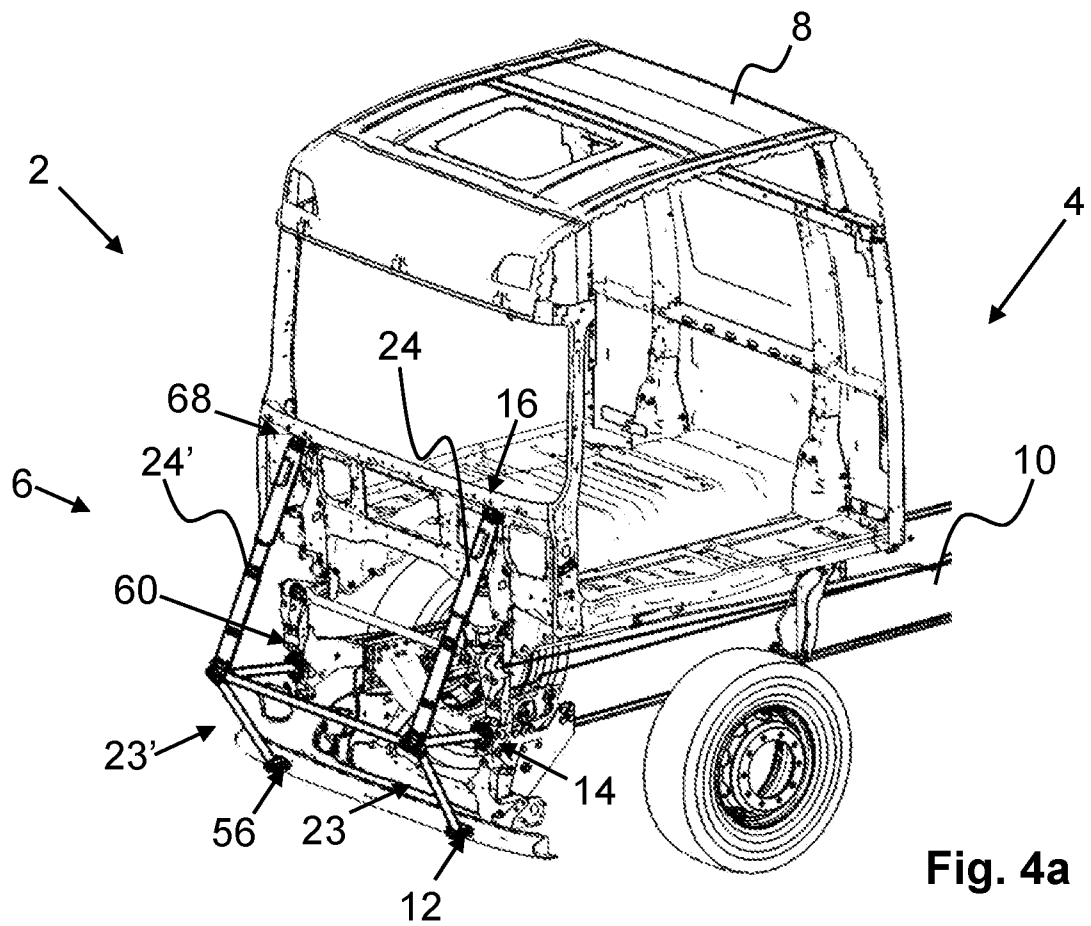
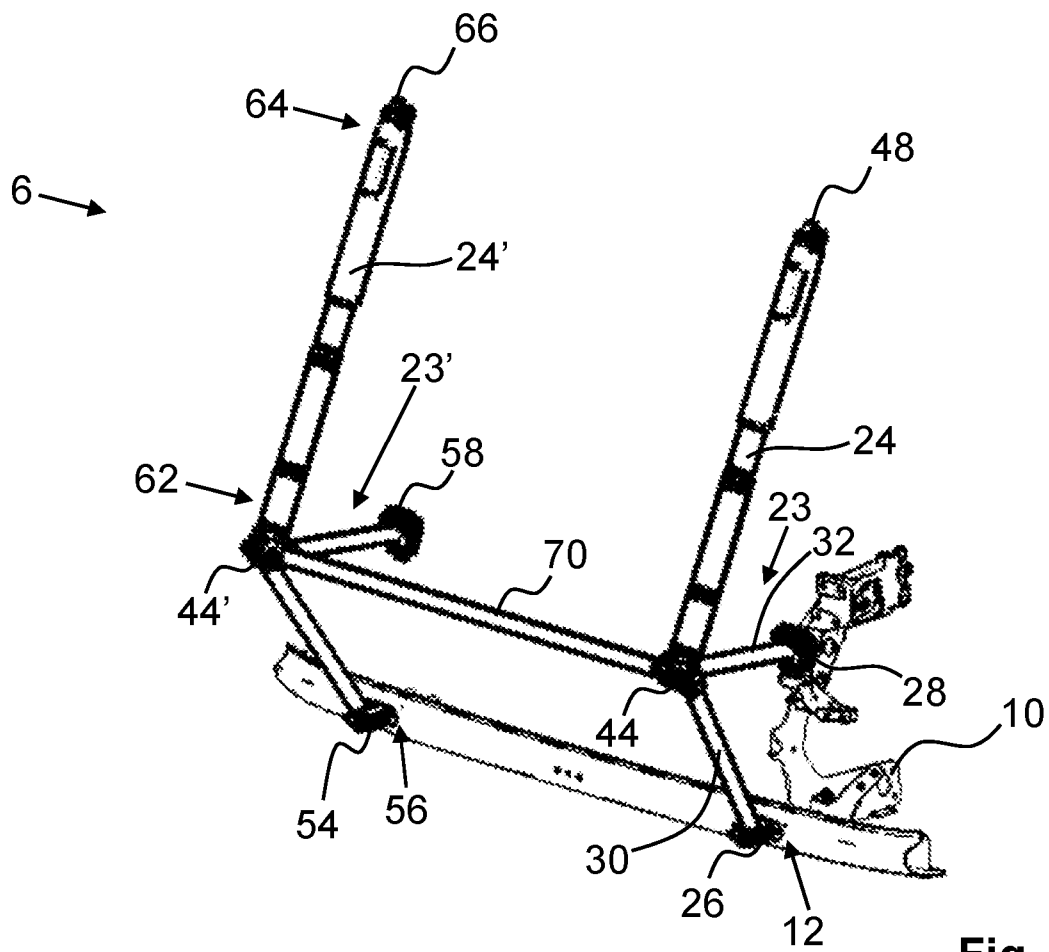
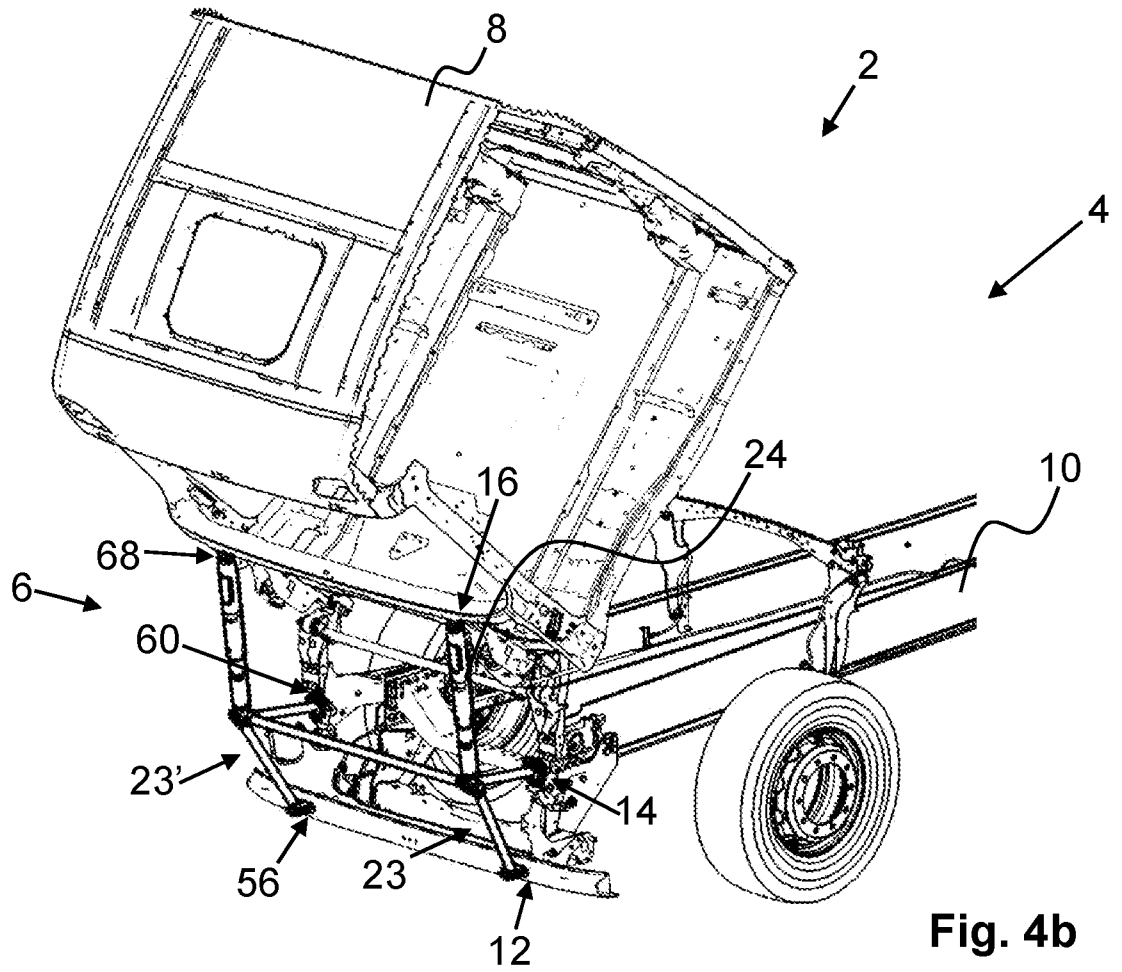


Fig. 4a

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INTERNATIONAL SEARCH REPORT

International application No
PCT/SE2024/050430

A. CLASSIFICATION OF SUBJECT MATTER

INV. B62D33/067 B62D33/07
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 033 851 A (WEBER OELHYDRAULIK) 29 May 1980 (1980-05-29)	1,2,5-15
A	figure 1 page 1, line 48 - line 50 page 1, line 53 - line 59 -----	3,4
X	DE 102 61 929 A1 (DAIMLER CHRYSLER AG [DE]) 15 July 2004 (2004-07-15)	1,2,5-9, 11-15
A	figures 1a-1b paragraph [0027] -----	3,4,10
X	WO 2004/089728 A1 (KONGSBERG AUTOMOTIVE ASA [NO]; BJOERKGAARD SVEN [NO] ET AL.) 21 October 2004 (2004-10-21)	11
A	figures 2-3 -----	1,3,4, 8-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

22 August 2024

Date of mailing of the international search report

04/09/2024

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/SE2024/050430

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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