



- (51) **International Patent Classification:**
B62D 33/067 (2006.01) *B62D 25/24* (2006.01)
B62D 25/10 (2006.01)
- (21) **International Application Number:**
PCT/SE2008/000502
- (22) **International Filing Date:**
8 September 2008 (08.09.2008)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant (for all designated States except US):** VOLVO LASTVAGNAR AB [SE/SE]; S-405 08 Göteborg (SE).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** LARSEN, Jessica [SE/SE]; Nordgårdsvägen 13, S-429 34 Kullavik (SE). DAVIDSON, Geoffrey [GB/SE]; Södragårdsvägen 22, S-438 36 Landvetter (SE).
- (74) **Agent:** FRÖHLING, Werner; Volvo Technology Corporation, Corporate Patents, 06820, M1.7, S-405 08 Göteborg (SE).

- (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, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** VEHICLE FRONT PANEL ARRANGEMENT

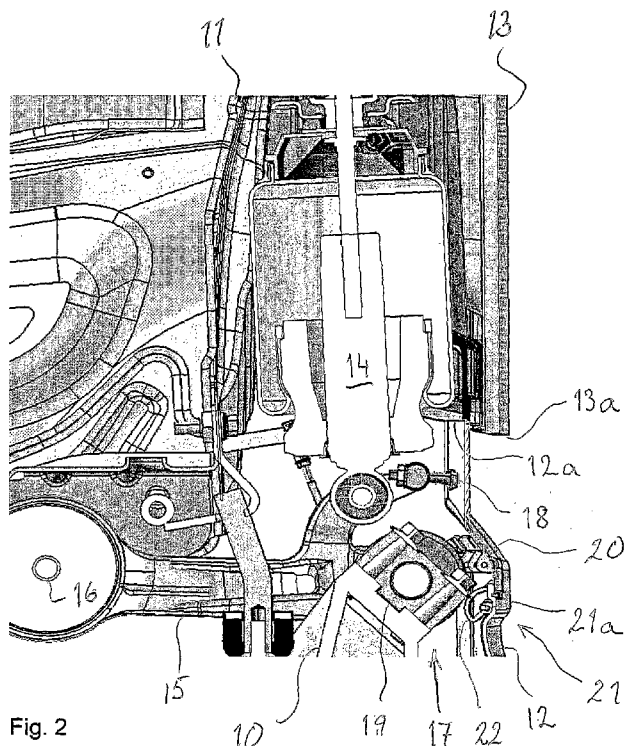


Fig. 2

(57) **Abstract:** The invention relates to a lower front panel for a cab-over engine commercial vehicle with a chassis frame and a forward tiltable cab comprising a drivers compartment. The cab is mounted to the frame via a suspension system and via a cab tilting pivot shaft rotatably mounted at the forward end of the frame to allow the cab to be tilted from a normal position of use to an engine service access position. The lower front panel is arranged at the forward end of the chassis frame and an upper front panel is attached to the cab between the chassis frame and a cab windscreen. A panel segment is adapted to follow the tilt angle of the cab when the cab is tilted from a normal position of use to the service access position. The invention also relates to cab-over engine commercial vehicle provided with the above described improved lower front panel.

WO 2010/027301 A1

VEHICLE FRONT PANEL ARRANGEMENT

TECHNICAL FIELD

The invention relates to a lower front panel according to the preamble of claim 1. The invention also relates to a cab-over engine commercial vehicle
5 according to the preamble of claim 6.

BACKGROUND ART

Cab-over engine type vehicles, in particular trucks, are designed with the engine located below the cab. One advantage with this configuration is that by minimizing the space taken up by the cab and power plant it is possible to
10 use a longer body or cargo space of a truck with the same over-all length. In the case of a tractor and trailer combination, it is possible to use longer trailer units within a predetermined or maximum allowed over-all length.

In cab-over engine type trucks the cab is normally tilted forward over the engine for service access to the engine. For driver comfort, a suspension
15 system is arranged between the cab and the truck chassis to reduce chassis to cab vibration transfer. Typically, the cab suspension system can be designed to allow a vertical cab movement of +/- 50 mm. A typical cab suspension system also allows some cab motion around the pitch-, roll- and yaw-axle.

20 On a cab-over engine truck, the front panels, i.e. the panels attached to the front of the chassis frame and the front of the cab, are normally arranged so that there is a substantial clearance between chassis panels and cab panels for cab movement, both for normal suspension motion and for tilting the cab from a normal position of use to an engine access position. This clearance at
25 the front of the truck can have a negative influence on the aerodynamic efficiency of the vehicle, and may also be considered as negative to the aesthetical appearance of the vehicle.

When designing a truck, consideration for maximizing both loading capacity and driver comfort within a given vehicle length is normally taken. Thus, it is difficult to provide enough space for positioning panels at the front of a truck with enough clearance for the above described movements.

- 5 The invention aims to provide an improved lower front panel for a cab-over engine truck that overcomes the above problems relating to the clearance between lower front panels of the chassis and the cab structure, while maintaining the functional motion properties.

DISCLOSURE OF INVENTION

- 10 The invention solves the above problems by means of an improved lower front panel according to the characterizing part of claim 1, wherein the lower front panel is provided with a panel segment which is adapted to follow the tilt angle of the cab when the cab is tilted from a normal position of use to a service access position. The improved lower front panel makes it possible to
15 position the panel close to the front suspension components of the cab without interfering with cab movements.

According to a preferred embodiment of the invention, the panel segment is connected to the lower front panel via a hinge allowing the segment to swing to an open position when the cab is tilted to the service access position.

- 20 Preferably, the hinge is provided with a spring means acting to return the panel segment from the open position to a closed position.

According to another embodiment of the invention, the hinge is connected to the panel segment via a goose-neck portion.

- 25 The panel segment is preferably adapted to permit parts of the cab suspension system to pass the upper edge of the lower front panel when the cab is tilted to the service access position.

In a cab-over engine commercial vehicle according to the invention, the cab suspension system is preferably provided with an actuator for moving a segment of the lower front panel from a closed position when the cab is tilted to the service access position. The actuator may be adjustably connected to the cab suspension system.

BRIEF DESCRIPTION OF DRAWINGS

In the following text, the invention will be described in detail with reference to the attached drawings. These schematic drawings are used for illustration only and do not in any way limit the scope of the invention. In the drawings:

- 10 Figure 1 shows a perspective view of the front panels of a cab-over engine truck with a lower front panel in accordance with the invention;
- Figure 2 shows a broken side section view of the front end of a truck in accordance with Figure 1;
- 15 Figure 3 shows a perspective view of the lower front panels with parts of the cab suspension and tilting system; and
- Figure 4 shows a perspective view of the lower front panels from the opposite direction as in Figure 3.

EMBODIMENTS OF THE INVENTION

- 20 Figure 1 shows a perspective view of the front panels of a cab-over engine truck provided with a chassis frame 10 and a driver cab 11. The truck frame 10 has two substantially parallel longitudinal beams. An engine (not shown) is mounted between the beams of the frame 10 underneath at least the rear section of the cab 11 and extends through an engine tunnel passing through
- 25 the centre of the cab between a pair of individual seats (not shown). The front panels comprise lower front panels 12 and upper front panels 13. The lower front panels 12 are attached to the chassis frame 10 and the upper front

panels 13 are attached to the cab 11. The panels 12, 13 are installed with a mutual vertical overlap, so as to avoid a vertical gap between lower and upper panels.

As shown in figure 2, the cab 11 is supported at the front end of the frame 10
5 by means of a shock absorber unit 14 positioned at each side of the truck engine coolers (not shown in the drawings). Each shock absorber unit 14 is connected at its upper end to the cab (not shown in the drawings) and connected at its lower end to the chassis frame 10 via a link arm 15. The link arm is mounted between an attachment point 16 on the cab and an
10 attachment point 17 at the front end of the frame 10 for controlling vertical movement of the cab 11 in relation to the frame. Thus, the cab is suspended in relation to the frame for driver comfort. The link arm 15 is provided with an actuator finger 18, which is adjustably connected to the link arm.

A torsion bar 19 is rigidly connected to the two link arms 15 and rotatably
15 supported by the attachment points 17 at the front end of the frame. The torsion bar 19 acts like a stabilizer for the cab 11 when turning the truck, for minimizing cab sideways roll when driving through turns, by transferring force from the loaded side of the cab suspension to the unloaded side. The rotatably supported torsion bar 19 also functions as pivot point for the cab 11
20 when tilting the cab from a normal position of use to an engine service access position, for example with an angle of forward tilt of about 60 degrees.

According to Fig. 1 and 2, the front panels 12, 13 are designed and attached to the vehicle frame so that the upper edge 12a of the lower front panels 12 overlaps the lower edge 13a of the upper front panels 13. To enable tilting of
25 the cab 11 to its service access position without having the cab suspension interfering with the lower front panels, the mid section of the lower front panel 12 is provided with two side panel segments 20. Each of these two panel segments 20 is located in front of the respective left and right panel suspension. Each panel segment 20 is adapted to follow the tilt angle of the
30 cab 11 when the cab is tilted from a normal position of use to the service

access position. This is made possible by connecting each of the panel segments 20 to the main lower front panel 12 via a hinge 21 allowing the segments to swing to an open position when the cab 11 is tilted to the service access position.

- 5 The hinge 21 is connected to the panel segment 20 via a goose-neck portion 22 which allows the panel segment 20 to pivot around a pivot point 21a located at the back of the mid section of the lower front panel. This arrangement makes it possible to get a tight fit with overlap between the panel segment 20 and the mid section of the lower front panel. This tight fit
10 and overlap is important for aerodynamic control of airflow around the vehicle front.

- When the cab 11 is tilted to the service access position the cab 11 pivots forward with the link arm 15, shock absorber 14 and the torsion bar 19 in the attachment points 17. During this cab movement the outer end of the
15 actuator finger 18 contacts the inside of the panel segment 20 to open a clearance for the shock absorber 14, at each side of the mid section of the lower front panels. Now the two panel segments 20 can slide between the inside of the upper front panel 13 and the shock absorbers 14 during the tilting movement.

- 20 The hinge 21 is provided with a torsion spring 23 (see Fig. 4) acting to return the panel segment 20 from the open position to the closed position when the cab is returned from its service access position to its normal position of use.

- Thus, the arrangement of the panel segments 20 in accordance with the invention facilitates an aerodynamically efficient design of a cab-over engine
25 truck with normal cab suspension functionality and forward tilt functionality.

The invention is not limited to the embodiments described above, but may be varied freely within the scope of the claims. For example, the two panel segments 20 in the above described embodiment could be replaced by a single wide panel segment.

CLAIMS

1. A lower front panel (12) for a cab-over engine commercial vehicle with a chassis frame (10) and a forward tiltable cab (11) comprising a drivers
5 compartment, said cab (11) being mounted to the frame via a suspension system (14, 15) and via a cab tilting pivot shaft (19) rotatably mounted at the forward end of the frame (10) to allow the cab to be tilted from a normal position of use to an engine service access position, wherein the lower front panel (12) is arranged at the forward end of the chassis frame and an upper
10 front panel (13) is attached to the cab between the chassis frame and a cab windscreen, characterized in a panel segment (20) which is adapted to follow the tilt angle of the cab (11) when the cab is tilted from a normal position of use to the service access position.
2. A lower front panel according to claim 1, characterized in that
15 the panel segment (20) is connected to the lower front panel (12) via a hinge (21) allowing the segment to swing to an open position when the cab (11) is tilted to the service access position.
3. A lower front panel according to claim 2, characterized in that
20 the hinge (21) is provided with a spring means (23) acting to return the panel segment (20) from the open position to a closed position.
4. A lower front panel according to claim 2 or 3, characterized in that the hinge (21) is connected to the panel segment (20) via a goose-neck portion (22).
5. A lower front panel according to any one of claims 1-4,
25 characterized in that the panel segment (20) is adapted to permit parts of the cab suspension system (14) to pass the upper edge (13a) of the lower front panel when the cab (11) is tilted to the engine access position.

6. A cab-over engine commercial vehicle with a chassis frame (10) and a forward tiltable cab (11) comprising a drivers compartment, said cab (11) being mounted to the frame via a suspension system (14, 15) and via a cab tilting pivot shaft (19) rotatably mounted at the forward end of the frame (10) to allow the cab to be tilted from a normal position of use to an engine service access position, wherein the lower front panel (12) is arranged at the forward end of the chassis frame and an upper front panel (13) is attached to the cab between the chassis frame and a cab windscreen, characterized in that it comprises a lower front panel (12) according to any one of claims 1 to 5.

7. A vehicle according to claim 6, characterized in that the cab suspension system (14, 15) is provided with an actuator (18) for moving a segment (20) of the lower front panel (12) away from a closed position when the cab (11) is tilted to the service access position.

8. A vehicle according to claim 7, characterized in that the actuator (18) is adjustably connected to the cab suspension system (14, 15).

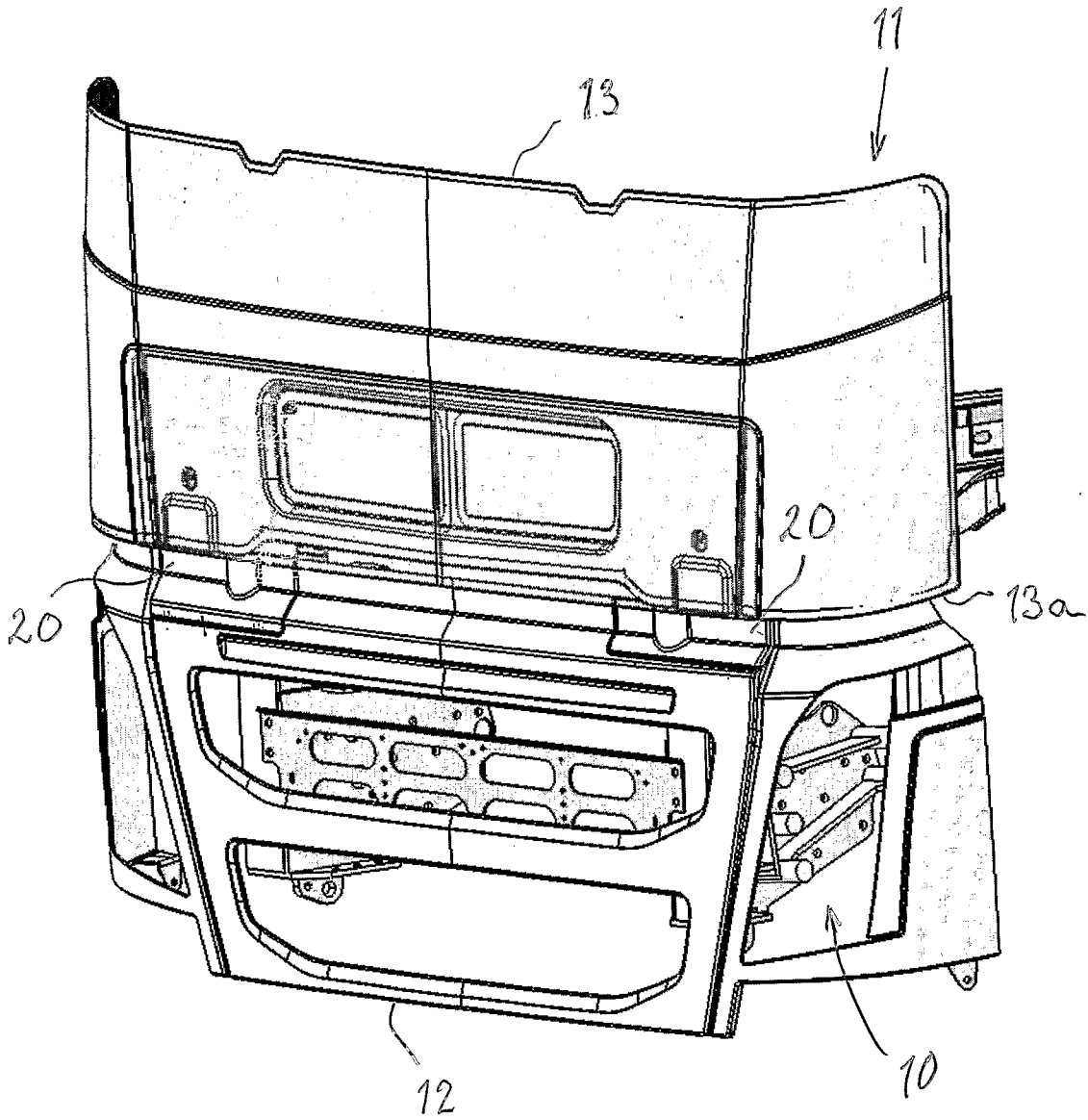


Fig. 1

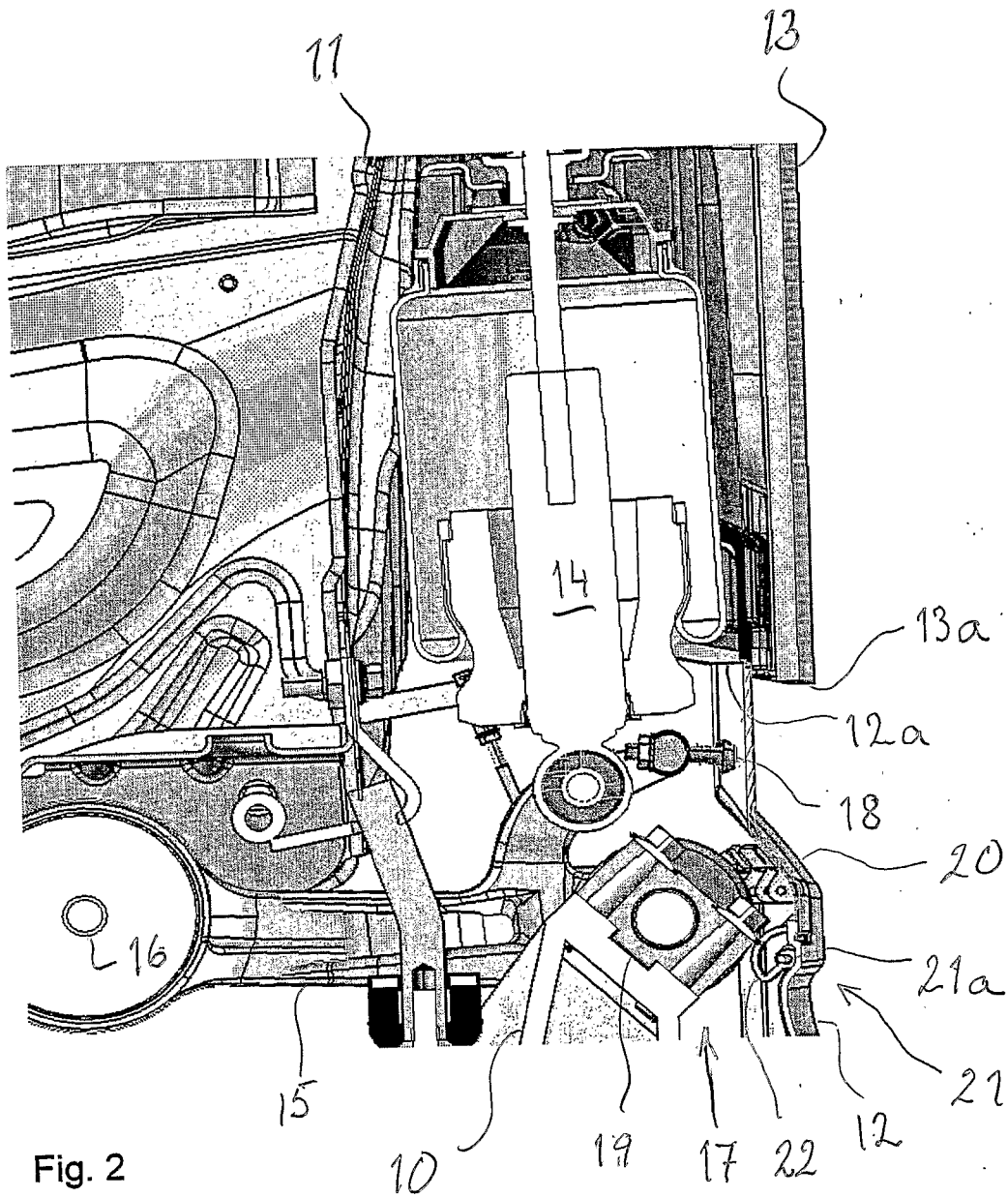


Fig. 2

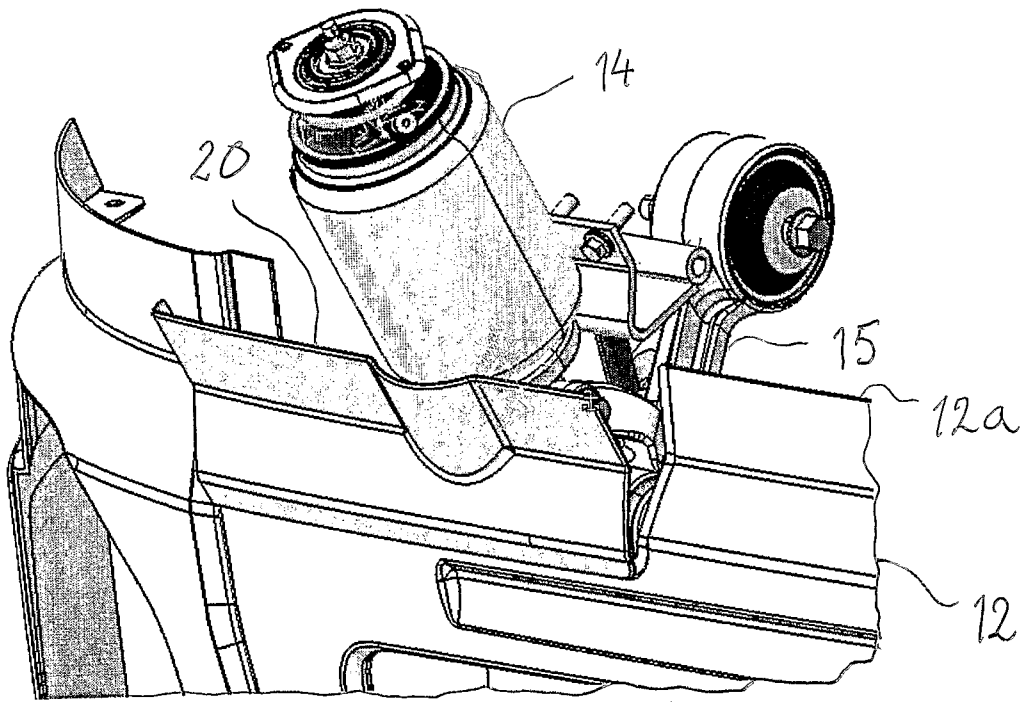


Fig. 3

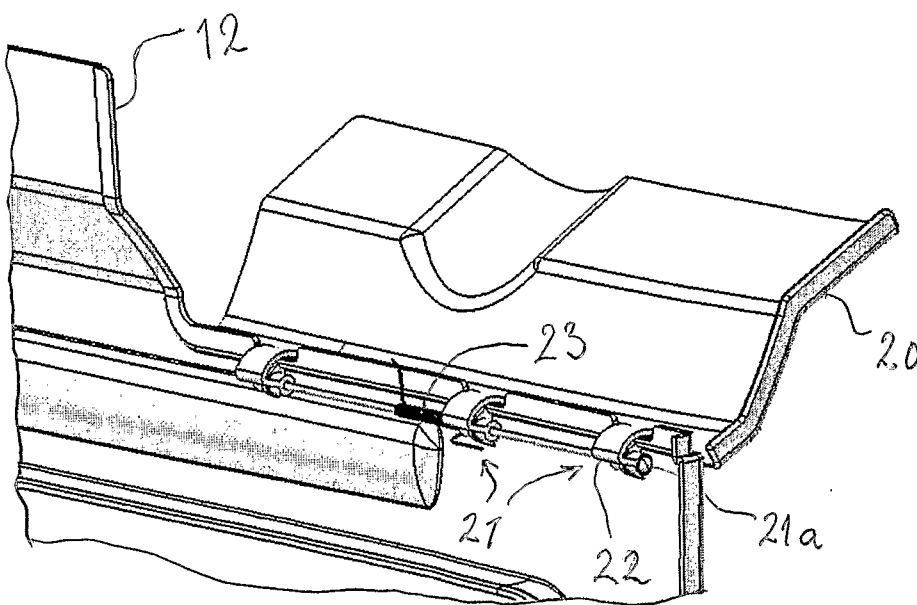


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2008/000502

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: B62D

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2007604 A (VAUXHALL MOTORS LIMITED), 23 May 1979 (23.05.1979), figures 1-4, abstract --	1-8
A	US 3805909 A (R. KOEPPEN), 23 April 1974 (23.04.1974), whole document --	1-8
A	US 20060097526 A1 (J.J. CONNETT ET AL), 11 May 2006 (11.05.2006), whole documnt -- -----	1-8

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

5 May 2009

Date of mailing of the international search report

06-05-2009

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Göran Carlström / MRo
Telephone No. +46 8 782 25 00

International patent classification (IPC)

B62D 33/067 (2006.01)

B62D 25/10 (2006.01)

B62D 25/24 (2006.01)

Download your patent documents at www.prv.se

The cited patent documents can be downloaded:

- From "Cited documents" found under our online services at www.prv.se (English version)
- From "Anförda dokument" found under "e-tjänster" at www.prv.se (Swedish version)

Use the application number as username. The password is **YLDVEGKOFG**.

Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2008/000502

GB	2007604	A	23/05/1979	NONE
----	---------	---	------------	------

US	3805909	A	23/04/1974	CA	963507	A	25/02/1975
				DE	2152294	A,B	17/03/1977
				FR	2157598	A	01/06/1973
				GB	1404784	A	03/09/1975

US	20060097526	A1	11/05/2006	NONE
----	-------------	----	------------	------