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(54) Title: AN ARRANGEMENT IN CONNECTION WITH A VEHICLE CAB

(57) Abstract: The invention relates to an arrangement in connection with a vehicle cab, which arrangement comprises a cab structure (2) that delimits a driver's working area. The arrangement comprises a support structure (3) arranged to support the cab structure (2) in the event of a considerable inclination of the cab structure relative to the frame (4) of the vehicle.
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FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
An arrangement in connection with a vehicle cab

5 TECHNICAL FIELD AND BACKGROUND ART
The present invention relates to an arrangement in connection with a vehicle cab, which arrangement comprises a cab structure that delimits a driver's working area. The invention is primarily intended for use with a working vehicle such as a construction vehicle, for example in the form of the wheeled loader or dumper (articulated lorry). The invention is therefore described below for a wheeled loader. However, this is not to be regarded as limiting the field of application of the invention.

10 A wheeled loader is often utilized in terrain with very uneven surfaces which give rise to strong vibrations and shocks. In order to make the driver's working environment comfortable, the cab must be suspended in such a way that the vibrations and shocks are reduced or eliminated and are thus not transferred directly from the frame of the vehicle to the cab. For reasons of safety, the cab must, in addition, be sufficiently strong to provide the driver with a personal survival space if the vehicle should roll over onto the cab. In this connection, ROPS requirements are often mentioned, with ROPS standing for Roll Over Protection Structure. The ROPS requirement depends upon the vehicle's weight, that is to say, a heavier machine requires a more substantial and therefore often heavier cab.

DISCLOSURE OF INVENTION
An object of the invention is to achieve an arrangement in connection with a vehicle cab that provides an overall weight reduction in comparison to previously known technology, and to provide a design that is sufficiently stable to meet the ROPS requirement.
This object is achieved by means of an arrangement comprising a support structure arranged to support the cab structure in the event of this being inclined considerably relative to the horizontal plane and in the event of an inclination of the cab structure relative to the frame of the vehicle. The support structure is thus arranged to provide a transmission of forces to the cab structure in the event of a specific inclination or canting of the cab being exceeded. The specific inclination corresponds suitably to the driver experiencing the inclination as unpleasant and/or a danger arising that the vehicle will tip over.

In addition, by utilizing a support structure, a modular cab system can be created. It is possible for a specific cab structure to be utilized for several types or models of vehicle with different weights, with the support structure being varied instead.

According to a preferred embodiment, the cab structure and the support structure are arranged in such a way that they essentially do not affect each other in a force-transmitting way when the inclination of the cab structure relative to the horizontal plane is less than said inclination, and the cab structure and the support structure are arranged to be connected in a force-transmitting way when the inclination of the cab structure relative to the horizontal plane exceeds said inclination. The cab structure can thus essentially move freely relative to the support structure in the event of only a small inclination of the cab structure relative to the support structure.

According to a second preferred embodiment, the support structure extends to a considerably lower height than the height of the cab structure, for example to a height that is approximately 50% of the height of the
cab structure. By means of a suitable design of the support structure, the driver's view is not affected in the direction, normally backwards, where the support structure is located.

According to another preferred embodiment, the arrangement comprises means for connecting the cab structure to the support structure in such a way that the support structure supports the cab structure in the event of the said inclination of the cab relative to the horizontal plane. More specifically, the said connecting means is arranged, in an active mode, to provide a force-transmitting connection between the cab structure and the support structure and, in an inactive mode, to provide the cab structure with at least essentially freedom of movement without the transmission of forces from the support structure. By this means, the cab's normal shock-absorbing system can function as normal during normal driving, that is to say, the connecting means is here in inactive mode. In event of a greater inclination or canting of the cab, however, the support structure provides the intended support, that is to say the connecting means is here in active mode.

Other advantageous embodiments of the invention and its associated advantages are apparent from the other patent claims and from the following description.

BRIEF DESCRIPTION OF DRAWINGS
The invention will be described in greater detail in the following, with reference to the embodiments shown in the attached drawings, in which Figure 1 shows a perspective view from the back of a first embodiment of the arrangement, Figure 2 shows a partly cutaway side view of the arrangement according to Figure 1, and Figure 3 shows a partly cutaway perspective view of a
second preferred embodiment of the invention.

MODE(S) FOR CARRYING OUT THE INVENTION

Figure 1 shows a perspective view from the back of an arrangement 1 in connection with a cab of a working vehicle in the form of a wheeled loader. The arrangement comprises a cab structure 2 that delimits a driver's working area and a support structure 3 that is arranged to support the cab structure 2 in the event of a considerable inclination of the cab relative to the horizontal plane and in the event of an inclination of the cab structure 2 in relation to the frame of the vehicle, here illustrated by a bottom plate 4. The support structure 3 thus absorbs forces and, in conjunction with the cab structure 2, forms a sufficiently strong construction to fulfil the ROPS requirement.

The cab structure 2 is constructed of a plurality of long construction elements, girders, that are joined in such a way that together they form a rectangular box shape. In other words, the cab structure 2 is in the shape of a perpendicular block. More specifically, four vertical long construction elements 7 are arranged in such a way that they delimit the corners of the perpendicular block. Additional long construction elements delimit a horizontal upper plane 8 and lower plane 9. The cab structure 2 comprises, in addition, elements 5 for damping shocks and/or noise, etc, from the frame 4 of the vehicle. The damping elements 5 consist of rubber insulators that are arranged at the floor level of the cab structure 2, below the lower plane 9.

The support structure 3 is arranged at a distance from the cab structure, behind this. The support structure 3 is constructed of a plurality of long construction elements, girders, that are joined together in such a
way that together they form a frame or an arch. Two vertical long construction elements 10 define the side edges of the support structure. Two horizontal long construction elements 11 are arranged between the vertical construction elements and connect these together. The support structure 3 extends in a plane parallel to the back of the cab structure 2. The support structure 3 comprises, in addition, means 6 for connecting it securely to the frame 4 of the vehicle. The connecting means 6 comprises two connecting devices 6a, 6b spaced a distance apart, each of which comprises a bolt connection.

The arrangement 1 comprises, in addition, means 12 for connecting the cab structure 2 to the support structure 3 in such a way that the support structure absorbs the lateral forces that act on the cab structure when the vehicle is in use and that exceed the lateral forces with which the shock-absorbing system 5 can cope.

In an active mode, the said connecting means 12 is arranged to provide a force-transmitting connection between the cab structure 2 and the support structure 3. By active mode is meant that the vehicle is driven in such a way that a certain inclination or canting of the cab structure is exceeded. In addition, in an inactive mode, the said connecting means 12 is arranged to give the cab structure 2 at least essentially freedom of movement without the transmission of forces from the support structure 3. By inactive mode is thus meant the normal mode for normal operation of the vehicle, without a certain inclination or canting being exceeded.

The connecting means 12 thus forms a type of connecting arrangement that permits a certain movement of the cab structure 2 relative to the support structure 3 before the structures are connected together. In the
"connected together" mode, however, they work as a single unit.

The connecting means 12 comprises two male elements 12a in the form of claw-shaped elements, see Figure 2, which project downwards from the back of the cab structure 2. The claws 12a are here attached to the cab structure 2 by a welded connection (not shown). The connecting means 12 comprises, in addition, a female element 12b in the form of an opening 12b in the support structure 3 which is open at the top. More specifically, the opening 12b is formed in the top of each of the long vertical construction elements 10 due to the fact that they are hollow. The said connecting means 12 is therefore arranged on an upper part of the support structure 3.

When mounting the arrangement on the frame 4 of the vehicle, the support structure 3 is suitably first attached to the frame and then the cab structure 2 is lowered from above into its intended position. The claws 12a are then received into the openings 12b in the support structure 3.

The support structure 3 extends to an essentially lower height than the height of the cab structure 2 in a vertical direction. More specifically, the support structure 3 extends to a height that is less than 75% of the height of the cab structure 2, and suitably to a height that is approximately 50% of the height of the cab structure. By height is meant here the extent in a vertical direction when the vehicle is in its normal position, that is to say when it is standing on a flat surface.

In the description above in connection with Figure 2, the claw-shaped element 12a is attached to the cab structure 2 by a welded connection. As an alternative,
other types of connection can, of course, be utilized, such as bolt connections, soldered connections, etc.

Figure 3 shows a second preferred embodiment of the invention. This embodiment is distinguished from the first embodiment that was described above in connection with Figures 1 and 2 by the means 112 for connecting the cab structure 2 and the support structure 3. The connecting means 112 comprises here a screw connection 13. A construction element 14 which is provided with a hole is arranged in the opening in the vertical long construction element 110 of the support structure and is attached to this. In addition, the hole 15 in the construction element 14 is threaded. A plate element 16 which is provided with a hole is attached to the vertical long construction element 107 of the cab structure by a welded connection. The plate element 16 is arranged at a level just above the construction element 14 provided with a hole, in such a way that the holes coincide. A screw 17 is arranged in the hole through the plate element 16 and engages with the threads in the hole 15 in the construction element 14.

In the second embodiment, the support structure can, in addition, be provided with a damping device (not shown) at the bottom of the support structure for damping relative to the frame of the vehicle. In this way, the cab structure and the support structure can be damped individually before sufficient inclination/canting arises for them to be joined to each other mechanically in a force-transmitting way and thereby form a single force-transmitting unit.

The arrangement can, for example, comprise elements for adjusting the position of at least one of the male element and female element of the connecting means in a vertical direction.
The invention is not to be considered to be limited to the embodiments described above, a number of additional variants and modifications being possible within the framework of the following patents claims.

5 The connecting means 12 can, for example, comprise a pin or a fork-shaped element instead of a claw-shaped element. In the case with the fork-shaped element, it is possible, for example, for the fork-shaped element to project horizontally from the cab structure and to engage with a correspondingly-shaped engagement element that projects vertically from the support structure. Many variants of this are possible.

15 According to an additional example, it is possible for the opening 12b in the connecting means 12 to be provided with a damping element, for example in the form of a rubber element. This damping element will provide a certain damping of the movements of the cab structure and thus act as a supplement to the other damping system 5 for the cab structure. The damping element is, for example, arranged to surround at least partially, and preferably completely, a male element that has been inserted into the opening.
CLAIMS

1. An arrangement in connection with a vehicle cab, which arrangement comprises a cab structure (2) that delimits a driver's working area and a support structure (3) arranged to support the cab structure (2) in the event of a considerable inclination of the cab structure relative to the horizontal plane and in the event of an inclination of the cab structure (2) relative to the frame (4) of the vehicle, characterized in that the support structure (3) is arranged behind the cab structure (2) in the vehicle's intended driving direction.

2. The arrangement as claimed in claim 1, characterized in that the cab structure (2) and the support structure (3) are arranged essentially not to affect each other in a force-transmitting way when the inclination of the cab structure relative to the horizontal plane and to the frame is less than said inclination and to be connected in a force-transmitting way when the inclination of the cab structure relative to the horizontal plane and to the frame exceeds said inclination.

3. The arrangement as claimed in claim 1 or 2, characterized in that the support structure (3) extends to an essentially lower height than the height of the cab structure (2).

4. The arrangement as claimed in claim 1 or 2, characterized in that the support structure (3) extends to a height that is less than 75% of the height of the cab structure (2).

5. The arrangement as claimed in claim 1 or 2, characterized in that the support structure (3) extends to a height that is approximately 50% of the height of
the cab structure (2).

6. The arrangement as claimed in any one of the preceding claims, characterized in that the support structure (3) comprises two devices 6a, 6b spaced a distance apart, for connecting the support structure to the frame (4), and in that the support structure is in the shape of a frame or arch that extends between the connecting devices.

7. The arrangement as claimed in claim 6, characterized in that said connecting devices (6a, 6b) form a means (6) for attaching the support structure (3) to the frame.

8. The arrangement as claimed in any one of the preceding claims, characterized in that the support structure (3) comprises two upright long support elements (10, 110) arranged at a distance from each other and at least one transverse long support element (11) that connects the two upright long support elements.

9. The arrangement according to any one of the preceding claims, characterized in that the support structure (3) extends essentially parallel to one side of the cab structure (2).

10. The arrangement as claimed in any one of the preceding claims, characterized in that the arrangement comprises means (12, 112) for connecting the cab structure (2) to the support structure (3) in such a way that the support structure supports the cab structure in the event of said inclination of the cab relative to the horizontal plane and to the frame of the vehicle.

11. The arrangement as claimed in claim 10,
characterized in that, in an active mode, said connecting means (12) is arranged to provide a force-transmitting connection between the cab structure (2) and the support structure (3) and, in an inactive mode, to give the cab structure (2) at least essentially freedom of movement without the transmission of forces from the support structure (3).

12. The arrangement as claimed in claim 10 or 11, characterized in that said connecting means (12, 112) is arranged on an upper part of the support structure (3).

13. The arrangement as claimed in any one of claims 10-12, characterized in that said connecting means (12, 112) comprises a male element (12a, 17) and a female element (12b, 15), and in that the male element (12a, 17) is attached to the cab structure (2) and the female element (12b, 15) is attached to the support structure (3) or, alternatively, the male element (12a, 17) is attached to the support structure (3) and the female element (12b, 15) is attached to the cab structure (2).

14. The arrangement as claimed in claim 13, characterized in that the female element (12b, 15) is arranged in the support structure (3) and comprises an opening which is open at the top to receive the male element (12a, 17) in the event of a vertical movement of the cab structure (2) relative to the support structure (3).

15. The arrangement as claimed in claim 14, characterized in that the male element (12a) consists of a claw-shaped element.

16. The arrangement as claimed in any one of the preceding claims, characterized in that the cab structure (2) comprises means (5) for damping shocks
and/or noise from the frame (4) of the vehicle.
FIG. 3
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B62D 24/00, B62D 33/077
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)

IPC7: 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)

WPI DATA, EPO-INTERNAL, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>A</td>
<td>US 4515234 A (LOY ET AL), 7 May 1985 (07.05.1985)</td>
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Further documents are listed in the continuation of Box C. [X] 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
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Date of the actual completion of the international search

18 November 2004

Date of mailing of the international search report

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