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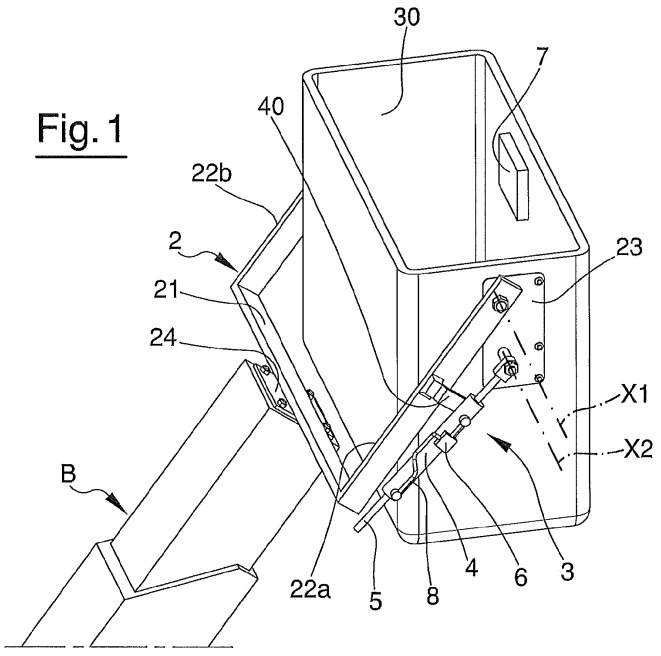
(54) A hooking and stabilising device for a lift work platform.

(57) A hooking and stabilising device for a lift work platform, comprising: a support body (2), predisposed for associating to a work platform (30) rotatably about a first rotation axis (X1) and for constraining to an end of a lift arm which can displace the work platform (30) between an initial position and a determined work position; a double-acting hydraulic cylinder (3), provided with a base (4), solidly constrained to the support body (2), which closes two chambers separated from one another by a sliding piston constrained to a stem (5) associable to the work platform (30) rotatably about a second rotation axis (X2) parallel to the first rotation axis (X1). The chambers of the cylinder (3) are in mutual fluid communication via a conduit along which a check valve (6) is arranged. This check valve (6) is predisposed to assume an open configuration, in which the chambers of the cylinder (3) are in mutual communication and the work platform (30) can oscillate with respect to the support body (2) about the first rotation axis (X1), and a closed configuration, in which the chambers are not in mutual communication and the work platform (30) cannot oscillate with respect to the support body (2). [Fig. 1]

Fig. 1



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Description

[0001] The object of the present invention is a hooking and stabilising device for a lift work platform.

[0002] The invention specifically relates to lift work platforms predisposed for associating to an end of an articulated and/or telescopic lift arm mounted on a transport vehicle. The lift arm is predisposed for lifting the work platform from a lowered position, which is generally the position kept when travelling to and from the work site, to a raised work position, in which the work platform is kept at a particular height in order to permit the operators to perform a particular job.

[0003] As is known, when the work platform is being raised or lowered, the inclination of the lift arm changes with respect to a horizontal plane, whereas the spatial orientation of the work platform must remain virtually constant, with the work platform floor substantially arranged horizontally, in order to permit the operators to keep their balance.

[0004] The work platform must therefore be constrained to the lift arm by means of an attachment device that allows the work platform to rotate, with respect to the arm itself, about a horizontal rotation axis.

[0005] Various types of attachment devices currently available on the market are provided with motorized mechanisms, typically of a hydraulic nature, the function of which is to actively determine a rotation of the work platform with respect to the lift arm, so as to keep the work platform in a constant orientation. Such motorized mechanisms are, however, rather unwieldy and heavy, and also relatively costly.

[0006] There are also attachment devices of a second type, in which the work platform is constrained to the end of the lift arm rotatably about a rotation axis arranged on a plane containing the centre of mass of the work platform. In attachment devices of this type, the work platform maintains a substantially constant orientation as a result of its own weight.

[0007] The present invention proposes to provide an attachment and stabilising device for a stabilising work platform of the second type described.

[0008] It is an advantage of the present invention that the attachment and stabilising device is simple, not very unwieldy, and also relatively lightweight.

[0009] Another advantage of the present invention is that it makes it possible to achieve stable and safe positioning of the work platform in a desired work position.

[0010] Another advantage of the present invention is that the attachment and stabilising device is suited to being managed automatically by means of an electromechanical/electronic type of control unit. Further characteristics and advantages of the present invention will emerge more clearly in the general and thus non-limiting, description provided hereinbelow with reference to the accompanying figures in which:

- Figure 1 is a perspective view of the device according to the present invention;
- Figure 2 is a schematic view of a hydraulic circuit making up part of the device.

[0011] With reference to the figures cited, the hooking and stabilising device according to the present invention comprises a support body 2, predisposed for associating to a work platform 30 rotatably about a first rotation axis X1. In a preferred embodiment, the support body 2 has a C-shaped conformation defined by a transverse portion 21 from which two arms 22a, 22b extend. The free ends of the two arms 22a, 22b are pivoted to the work platform 30 in opposite positions on a plane containing the centre of the mass of the work platform 30. Preferably, the free ends of the two arms 22a, 22b are not pivoted directly to the work platform 30, but rather, to two attachment plates 23 which, in turn, can be fastened to the work platform 30.

[0012] The support body 2 is also predisposed to be constrained to the end of a lift arm B suitable for shifting the work platform 30 between an initial position and a determined work position. The lift arm B, which is only partially illustrated in the figures, is a common articulated and/or telescopic arm typically mounted on a transport vehicle. As is known, during extension and lifting of the work platform 30, the inclination of the lift arm varies with respect to the horizontal plane. On the contrary, the orientation of the work platform 30 must remain virtually constant in order to allow the operators to stay safely balanced. For this purpose, the connection is predisposed to freely oscillate about the first rotation axis X1 between the support body 2 and the work platform 30, a connection that permits the work platform to maintain a stable orientation as a result of its weight. As regards the connection with the lift arm, the transverse portion 21 the central part of the support body 2 is provided with an attachment plate 24. In any case, other attachment means may be utilised for this purpose.

[0013] The device according to the present invention further comprises a double-acting hydraulic cylinder 3. This cylinder is provided with a base 4 that closes two chambers C1, C2 separated from one another by a sliding piston P constrained to a stem 5 that protrudes from the two ends of the base 4.

[0014] The base 4 is associated to the support body 2. More specifically, the base 4 is connected to a first one 22a of the arms 22a, 22b of the support body 2 by means of a connection element 40 which is solidly constrained to the first arm 22a and connected to the base 4 rotatably about an axis parallel to the first rotation axis X1.

[0015] At one of its own ends facing the end of the first arm 22a, the stem 5 is predisposed to be associated to the work platform 30 rotatably about a second rotation axis X2 parallel to the first rotation axis X1. In this manner, the work platform 30 can oscillate about the first rotation axis X1 with respect to the support body 2. During rotation of the work platform 30 about the first rotation axis X1, the stem 5 of the cylinder 3 rotates about the second rotation axis X2, sliding contemporaneously with respect

to the base 4. The angle between the first arm 22a and the longitudinal axis of the stem 5 varies progressively during rotation of the work platform 30 about the first rotation axis X1.

[0016] The two chambers C1, C2 of the cylinder 3 are separated by the piston P solidly constrained to the stem 5 and they are in mutual fluid communication via a conduit 8. Rotation of the work platform 30 about the first rotation axis X1 with respect to the support body 2 thus involves a transfer of fluid between the two chambers C1, C2 via the conduit 8, by virtue of the sliding of the stem 5 and of the piston associated to it, with respect to the base 4.

[0017] A check valve 6 is arranged along the communication conduit 8 between the chambers C1, C2 of the cylinder 3. This check valve 6 is predisposed to assume an open configuration, in which the chambers C1, C2 of the cylinder 3 are in mutual communication, and a closed configuration, in which the chambers C1, C2 are not in mutual communication.

[0018] In the open configuration of the check valve 6, the work platform 30 can oscillate with respect to the support body 2 about the first rotation axis X1, thereby determining a transfer of fluid between the chambers C1, C2 of the cylinder 3. In the closed configuration of the check valve 6, the work platform 30 cannot oscillate with respect to the support body 2. The geometry of the connection between the support body 2, the work platform 30 and the lift arm, in the open configuration of the check valve 6, permits rotation of the work platform 30 with respect to the support body 2 maintaining, as a result of its own weight, a substantially constant orientation with variations in the inclination of the lift arm. Moreover, the transfer of fluid between the two chambers C1, C2 of the cylinder 3 makes it possible to dampen eventual excessive oscillations of the work platform 30. When the work platform 30 has reached a desired position wherein the operator can perform the job planned, the check valve 6 can be activated in the closed configuration, thereby preventing the transfer of fluid between the chambers C1, C2 of the cylinder 3 and locking the work platform 30 into position with respect to the support body 2 and the lift arm.

[0019] In a preferred embodiment, the check valve 6 is an electromechanically-activated valve. The activation of the check valve 6 is controlled by a control unit 7 predisposed to maintain the check valve 6 in the open configuration during the displacing stages of the work platform 30 by means of the lift body, and to maintain the check valve 6 in the closed configuration during the pause stages of the work platform 30 in a desired work position.

[0020] Preferably the control unit 7 is predisposed to be located on board the work platform 30. By means of the control unit, the operators on board the work platform can control the ascent and descent of the lift arm, as well as the activation of the check valve 6. Alternatively, the control unit 7 could manage the activation of the check valve 6 in an automatic manner, bringing it to the open configuration during lifting or lowering stages of the work platform 30 and to the closed configuration during pause stages of the work platform 30.

[0021] In a less preferred embodiment, the check valve 6 can be manually activated, for example by means of a cock equipped with an activation handle. Although this manual activation solution is, in essence, as effective as the preferred solution described above, the use of an electromechanically-activated check valve 6 makes it possible to achieve more precise and safer operation of the device according to the present invention. In fact, while an operator could forget to close the check valve 6 once the work position has been reached, the control unit 7 ensures closure of the check valve 6 under all the foreseen conditions of pause and work on the part of the operator. Furthermore, by providing the control unit 7 with an electronic level, it is also possible to set the same control unit 7 in such a manner that it activates closure of the check valve 6 only at a position of the work platform 30 in which the supporting deck for the operators is horizontal.

[0022] The hooking and stabilising device according to the present invention offers important advantages. In fact, the device is simpler and of lighter weight than the known types of devices, although it is equally, if not more, efficient. The device is also very stable and safe, permitting operators to work under optimal conditions.

Claims

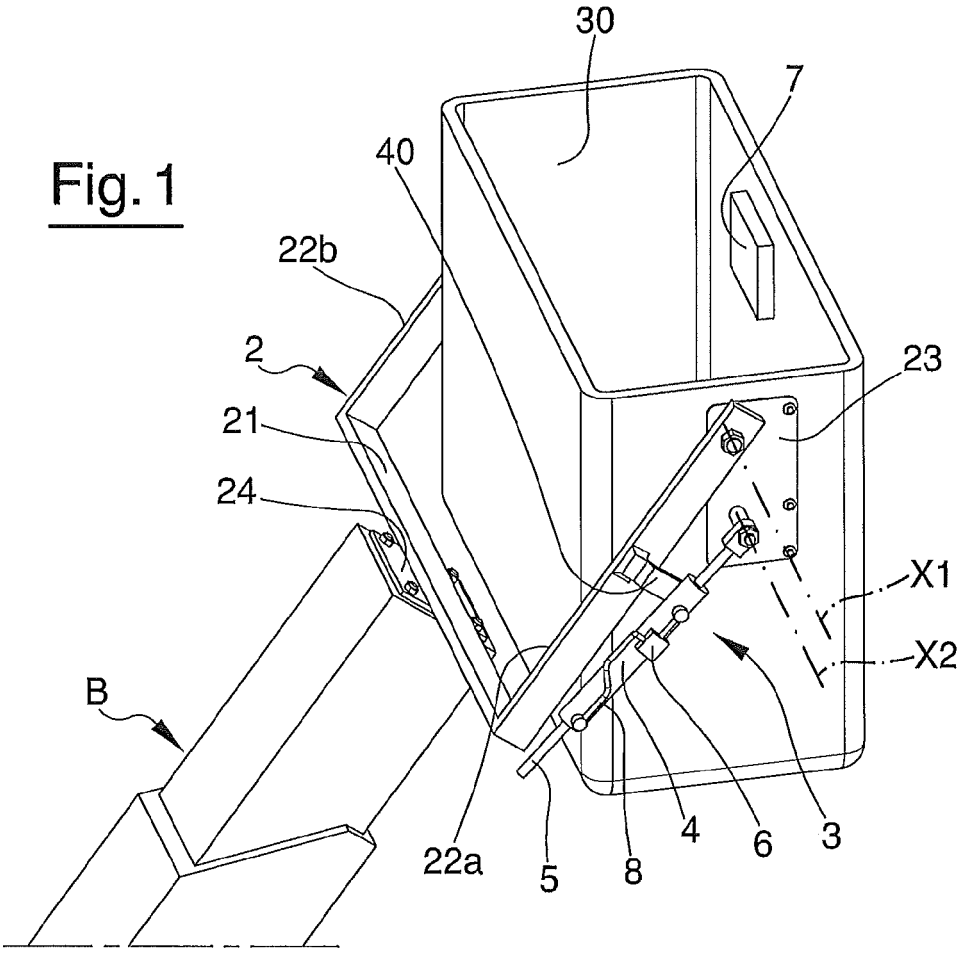
1. A hooking and stabilising device for a lift work platform, comprising: a support (2), predisposed for associating to a platform (30) rotatably about a first rotation axis (X1) and for constraining to an end of a lift arm which can displace the platform (30) between an initial position and a determined work position; **characterised in that** it comprises: a double-acting hydraulic cylinder (3) provided with a base (4), solidly constrained to the support body (2), which closes two chambers (C1, C2) separated from one another by a sliding piston (P) constrained to a stem (5) associable to the platform (30) rotatably about a second rotation axis (X2) parallel to the first rotation axis (X1), the chambers (C1, C2) being in mutual fluid communication via a conduit; a check valve (6), arranged along the communication conduit between the chambers (C1, C2) of the cylinder (3), which check valve (6) is predisposed to assume an open configuration in which the chambers (C1, C2) of the cylinder (3) are in mutual communication and the platform (30) can oscillate with respect to the support body (2) about the first rotation axis (X1), and a closed configuration, in which the chambers (C1, C2) are not in mutual communication and the platform (30) cannot oscillate with respect to the support body (2).

2. The device of claim 1, wherein the check valve (6) is an electromechanically-activated valve.

3. The device of claim 2, wherein the activating of the check valve (6) is controlled by a control unit (7) predisposed to maintain the check valve (6) in the open configuration during the displacing stages of the platform (30) by means of the lift arm, and to maintain the check valve (6) in the closed configuration during pause stages of the platform (30) in a desired working position.

4. A lift platform, **characterised in that** it comprises a hooking and stabilising device as in one of the preceding claims.

Fig. 1



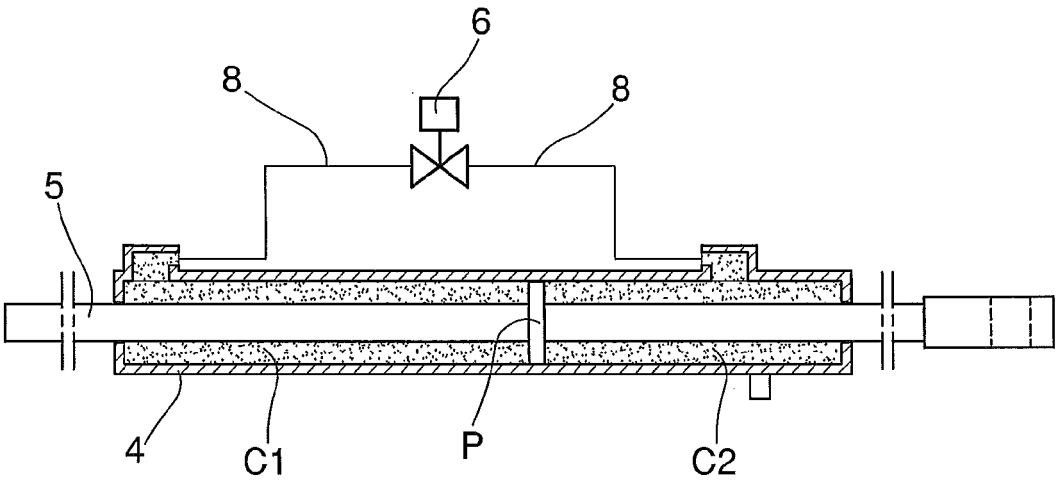


Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 4808

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 1 440 874 A (MAGIRUS DEUTZ AG) 30 June 1976 (1976-06-30) * the whole document * -----	1-4	INV. B66F11/04
A	US 2 786 723 A (HARSCH CHESTER A) 26 March 1957 (1957-03-26) * the whole document * -----	1-4	
A	US 3 645 359 A (RAYMOND JAMES W) 29 February 1972 (1972-02-29) * abstract; figures * -----	1-4	
A	US 4 049 079 A (STEDMAN ROBERT N) 20 September 1977 (1977-09-20) * abstract; figures * -----	1-4	
			TECHNICAL FIELDS SEARCHED (IPC) B66F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 December 2011	Verheul, Omiros

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 17 4808

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-12-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82