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(54) **Mechanism for container beds**

(57) Mechanism for beds with a tiltable sleeping surface (12), fixed to a base (20) of the bed, and used for the movement of said sleeping surface, characterised in that it comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10), a shaped element (11), two gas springs (8, 9), a second quadrilateral defined by the elements (1, 6, 7) with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, and two support elements (5, 15).

Not only does said mechanism allow tilting the sleeping surface, reaching a sub-vertical position with respect to the horizontal line, but also its repositioning always at a horizontal position, but raised with respect to the base of the bed.

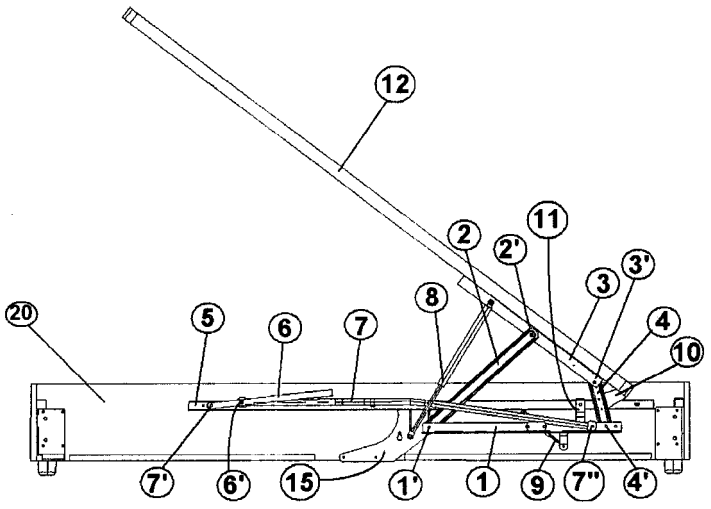

Fig. 1

EP 1 977 663 A1

Description

[0001] The objective of the present finding is a mechanism for beds with a tiltable sleeping surface and the bed using such mechanism for its opening and closure. Usually, these beds, referred to as beds with a tiltable sleeping surface or container beds are used to exploit the volume that forms inside the base of the bed, on which the sleeping surface lies.

[0002] Known to the current art, are various embodiments of container beds. Some examples can be found in the US 6151738, GB 326224, FR 2563717 and CA 2487847 Patent texts. In most embodiments, the sleeping surface can be tilted with respect to its support base almost reaching a sub-vertical position with respect to the ground line. In other configurations, less common, the sleeping surface translates with respect to the base. In both cases, the objective is that of opening the filling compartment. However, all these embodiments have various drawbacks. For example, the sleeping surface of a container bed is usually lower - and hence more uncomfortable - with respect to the sleeping surface of a traditional bed, both in terms of its use and its remaking; furthermore, many movement mechanisms of the sleeping surface are not capable of avoiding inadvertent closures of the bed; the movement of the sleeping surface comprising a mattress, thus of considerable weight, is quite complex; lastly, there is no system for safe locking the sleeping surface. In order to find an idea to overcome all these drawbacks, a new design of the movement mechanism of the sleeping surface is required.

[0003] Thus, the objective of the present invention is to provide a new mechanism for beds with a tiltable sleeping surface capable of overcoming the abovementioned technical problems. This is attained by providing a mechanism with a tiltable sleeping surface (12), which is fixed onto the base (20) of the bed, and it is characterised in that comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10) a shaped element (11) two gas springs (8, 9) a second quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, and two support elements (5, 15), as described in claim 1.

[0004] These and other advantages shall be observed in the detailed description of the invention with specific reference to drawings 1/4, 2/4, 3/4 and 4/4 in which preferred embodiments are represented strictly for exemplifying and non-limiting purposes. In particular:

- Fig. 1 represents a bed with its sleeping surface tilted and it identifies the main details of the mechanism providing the movement of the sleeping surface;
- Fig. 2 shows the bed of Fig. 1 in a closed configuration, that is with the sleeping surface laying on the base of the bed;
- Figures 3, 4 and 5 represent three steps for the movement of the sleeping surface;
- Fig. 6 shows the bed of the previous figures with the sleeping surface in a horizontal configuration but raised with respect to the base of the bed;
- Fig. 7 shows a convenient and detailed embodiment of the bed locking system in the configuration of figure Fig. 6;
- Fig. 8 is the same representation of Fig.6 with the mechanism provided with the locking system of Fig. 7;
- Lastly, Fig. 9 is a detail of the mechanism with special reference to the shaped element (11).

[0005] Referring to the abovementioned figures, the bed with a sleeping surface provided with the mechanism subject of the present finding, comprises a base (20) and a sleeping surface (12) which can move from a horizontal position in which it lies on said base (Fig. 2) to an almost sub-vertical position with respect to the base itself. Furthermore, as observable hereinafter, the sleeping surface can also be advantageously arranged at a horizontal position but at a given height with respect to the base, in such a manner to obtain a resting surface with a height not lower with respect to the height of the traditional fixed beds, and hence of easier access both in terms of its use and remaking. The mechanism for the movement of the sleeping surface comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10), a shaped element (11), two gas springs (8, 9), a second quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, two support elements (5, 15).

[0006] This mechanism represents an improvement with respect to the analogous known products, in that it allows the opening of the sleeping surface and also its arrangement at a horizontal position, but raised with respect to the base of the bed. As a matter of fact, the trajectory of the sleeping surface is determined by the quadrilateral formed by the elements (1, 2, 3, 4) and having points (1', 2', 3', 4') serving as joints. The element (1) is made up of a plate for fixing the mechanism onto the wooden portion of the base (20). The improvement is represented by the fact that the element (1), L-shaped or of any other similar shape, is fixed only at point (1'). Hence, the element has the possibility to rotate anticlockwise until it brings the sleeping surface (12) back to the horizontal position (see figures 5 and 6). During the rotation the quadrilateral is rigid due to the abutment element (10). The rotation of the quadrilateral, under these conditions, is possible only if the gas spring (8) is compressed balancing the force of the weight of the entire mechanism of the sleeping surface and of the mattress.

[0007] The element (11) has a complex geometry, it is integrally joined to the element (1) and it has a double function: on one end it is bent at 90° and laying on the element (5) it serves as a support and block element

during the rotation of the quadrilateral 1'-2'-3'-4'. On the other end, said element (11) is anchored to the second gas spring (9), whose function shall be described better hereinafter.

[0008] Considering the force exerted by the gas spring (9), the mechanism exploits its vertical component. During the movement, said spring rotates anticlockwise passing from a negative angle (-90° ÷ 0°, see Fig. 4) to a positive angle (0° ÷ 90, see Fig. 6). Regarding the negative angles, the spring (9) exerts a downwards force and thus provides valid help in case the container bed is intended to be closed entirely (as in Fig. 2). In the absence of the spring (9), when closing the container bed completely, by lowering the front part of the sleeping surface (12), inadvertent raising of the rear part of the sleeping surface would occur.

[0009] When the spring (9) faces upwards (as in Fig. 6), it exerts its force raising the rear part of the sleeping surface (12). In this manner, the problem regarding inadvertent closure of the bed is overcome: as a matter of fact, in the absence of the spring (9), should the user lie on the sleeping surface at a position comprised between the joint (1') and the rear end of the sleeping surface, with the mechanism completely open, the user would encounter the problem of inadvertent closure of the bed in question, with evident exposure to injury .

[0010] Another extremely important component of the mechanism is the quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 being made up of two portions slightly inclined with respect to each other and by the joints (1', 7', 6', 7"). As observable in the attached drawings this quadrilateral draws its motion from the rotation of the quadrilateral (1', 2', 3', 4') moves the element (6) following a circular trajectory around the joint (7'). All this provides a valid support for the sleeping surface when the latter is at a horizontal position (Figures 6 and 8). The quadrilateral (1', 7', 6', 7") is dimensioned in such a manner that, when the sleeping surface is inclined, the element (6) reaches a sub-horizontal position, while, when the sleeping surface (12) is horizontal, the element (6) is at a vertical position. For the best operation of the mechanism, it should be observed that the angle formed by the element (6) with respect to the horizontal position is always positive, and this due to an abutment element interposed between the said elements (6) and (7).

[0011] A further characteristic of the present mechanism is the bed locking system with a sleeping surface at a horizontal and raised position. As observable in Fig. 7, fitted beneath the sleeping surface (12) is a plate (13) with a suitable shape which bears a pin (14) held by a return spring. When the bed is positioned in the completely open configuration the pin is removed from its idle position and it is fitted into a hole provided on the free end of the element (6). Alternatively to the hole, as shown in Fig. 7, a cylinder (6") could be welded to the head of the element (6). Hence, once the pin (14) has been fitted into the cylinder it remains inside the same in that it is compressed by the action of the return spring. In this manner, the system is kept locked.

[0012] A further significant characteristic both for the improvement of the quality of the mechanism, and for simplifying the mounting operations of the bed is as follows: the elements (5) and (15) are integrally welded and joined to each other. In this manner, all the articulation points of the mechanism, alongside the coupling points of the gas springs are defined in an extremely accurate manner, in that their positioning is based on the limited machining tolerances typical of metal materials. Non-compliance with this method and fixing the mechanism with its articulation points directly on the base structure of the bed would jeopardise the accuracy of the mechanism, in that, as known, wood requires much larger machining tolerances with respect to metal. Additionally, operating according to the present teaching, the mechanism can be mounted independently and provided as a complete sub-group to the users requiring it for constructing beds.

[0013] Lastly, the element (11) is provided with a hole, for example a threaded hole, into which an element, for example a screw, is fitted integrally joining it to the element (5) thus preventing the rotation of the quadrilateral 1'2'3'4' around point 1'. In this manner, the operation of the bed is limited to raising the sleeping surface and not positioning it at a horizontal and raised position with respect to the base.

Claims

1. Mechanism for beds with a tiltable sleeping surface (12), fixed onto a base (20) of the bed, and used for the movement of said sleeping surface, **characterised in that** it comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10), a shaped element (11), a pair of gas springs (8, 9), a second quadrilateral defined by the elements (1, 6, 7, 5, 15), with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, and two integrally joined support elements (5, 15).

2. Mechanism according to claim 1, **characterised in that** not only does it allow tilting the sleeping surface, reaching a sub-vertical position with respect to the horizontal line, but also its positioning always at a horizontal position, but raised with respect to the base of the bed.

3. Mechanism according to claim 2, wherein the trajectory of the sleeping surface is determined by said first quadrilateral formed by the elements (1, 2, 3, 4) and having points (1', 2', 3', 4') serving as joints.

4. Mechanism according to claim 3, wherein the element (1), L-shaped or of any other similar shapes,

is fixed only in point (1'), with the possibility of rotating anticlockwise until the sleeping surface (12) reaches the horizontal position again.

5. Mechanism according to claims 3 or 4, **characterised in that** during the rotation said first quadrilateral is rigid due to the abutment element (10) and **in that** the rotation of the quadrilateral is possible only by compressing the gas spring (8).

6. Mechanism according to one of the preceding claims, **characterised in that** the element (11) has a complex geometry, it is integrally joined to the element (1), it is bent at 90° at an end and laying on the element (5) it serves as a support and block element of the rotation of the quadrilateral 1'-2'-3'-4', while at the other end said element (11) is anchored to the gas spring (9).

7. Mechanism according to claim 6, wherein said element (11) is provided with a hole fitted into which is an element which integrally joins it to the element (5) thus preventing the rotation of the quadrilateral 1'2'3'4' around point 1'.

8. Mechanism according to any of the preceding claims, **characterised in that** said gas spring (9) rotates anticlockwise passing from a negative angle to a positive angle.

9. Mechanism according to claim 8, **characterised in that** said gas spring (9), when positioned at a negative angle with respect to the horizontal position, exerts a downwards force, facilitating the complete closure of the bed.

10. Mechanism according to claim 8, **characterised in that** said gas spring (9), when positioned at a positive angle with respect to the horizontal position, exerts an upwards force, preventing inadvertent closure of the bed.

11. Mechanism according to one of the preceding claims, **characterised in that** said second quadrilateral, defined by the elements (1, 6, 7, 5, 15) with said element 7 made up of two portions slightly inclined with respect to each other and by joints (1', 7', 6', 7"), moves the element (6) following a circular trajectory around the joint (7'), providing a support for the sleeping surface when at a horizontal position.

12. Mechanism according to claim 11, wherein said element (6) reaches a sub-horizontal position when the bed is closed or the sleeping surface is inclined and reaches a vertical position when the sleeping surface is horizontal and raised and by means of a plate (13) it serves as a support for the sleeping surface itself.

13. Mechanism according to claim 12, wherein the angle formed by the element (6) with respect to the horizontal position is always positive due to an abutment element interposed between said elements (6) and (7).

14. Mechanism according to one of the preceding claims, **characterised by** a bed locking system, with the sleeping surface at a horizontal and raised position.

15. Mechanism according to claim 14, wherein said locking system is obtained by locking the quadrilateral defined by the elements (1, 6, 7, 5, 15).

16. Mechanism according to claim 15, wherein said locking system comprises a plate (13) and a pin (14), held by a return spring, which is fitted into a hole provided on the free end of the element (6) or into a cylinder (6") welded against the head of the element (6).

17. Mechanism according to one of the preceding claims, **characterised in that** the elements (5) and (15) are welded and joined integrally to each other.

18. Mechanism according to claim 17 wherein all the moveable elements are articulated to said elements (5) and (15).

19. Bed with a tiltable sleeping surface, comprising a base (20), a sleeping surface (12) and **characterised by** a mechanism for the movement of said sleeping surface according to any one of the preceding claims.

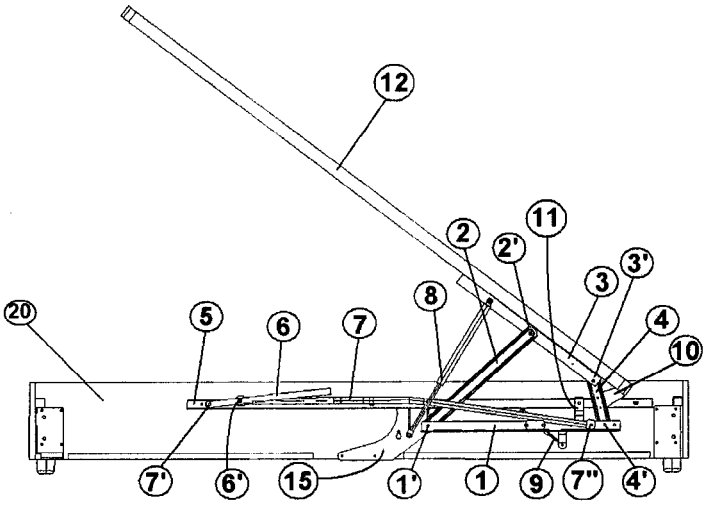

Fig. 1

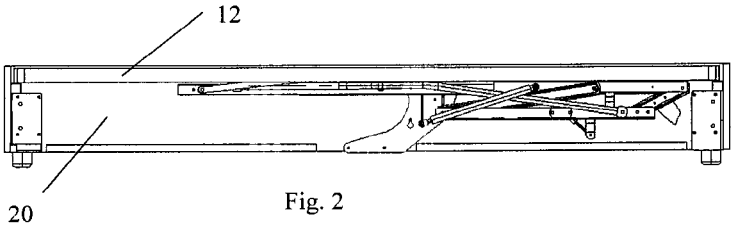

Fig. 2

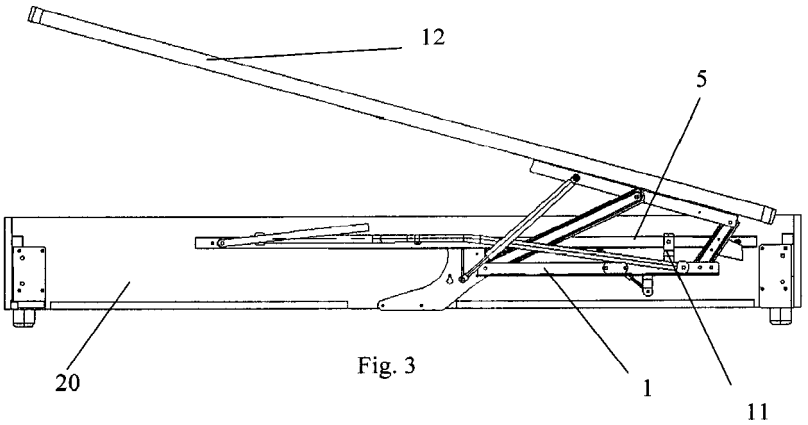

Fig. 3

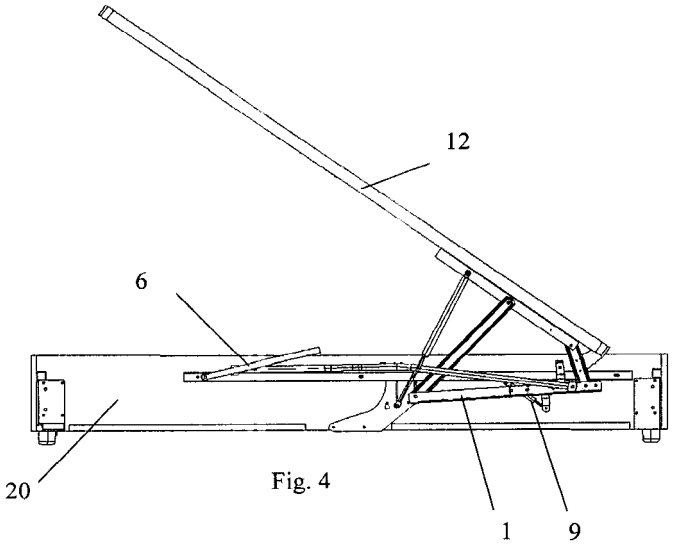

Fig. 4

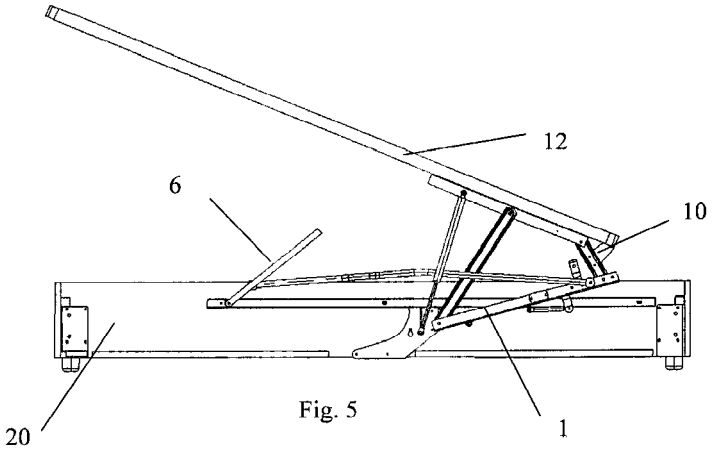

Fig. 5

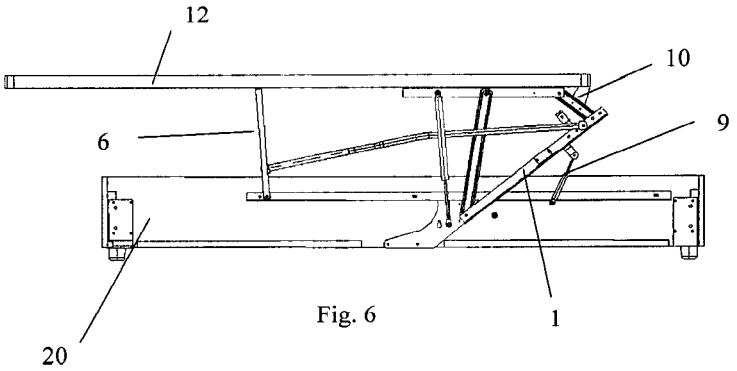

Fig. 6

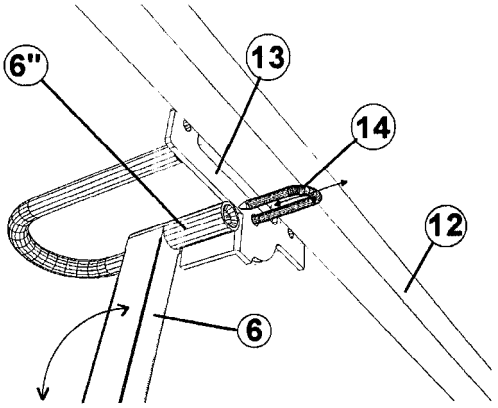

Fig. 7

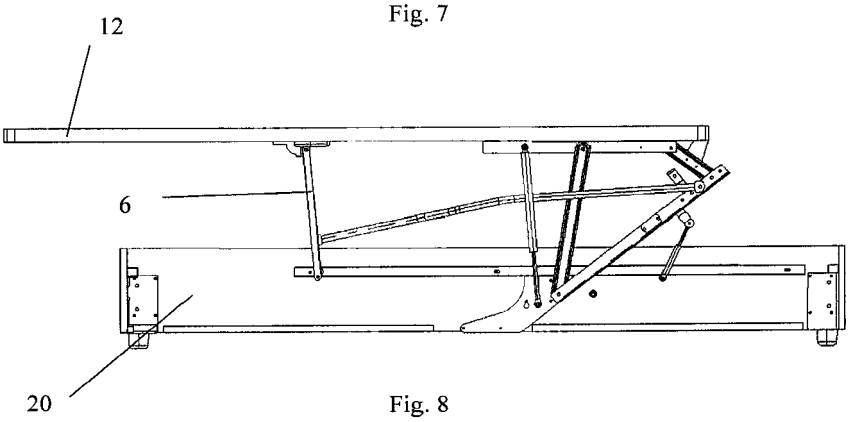

Fig. 8

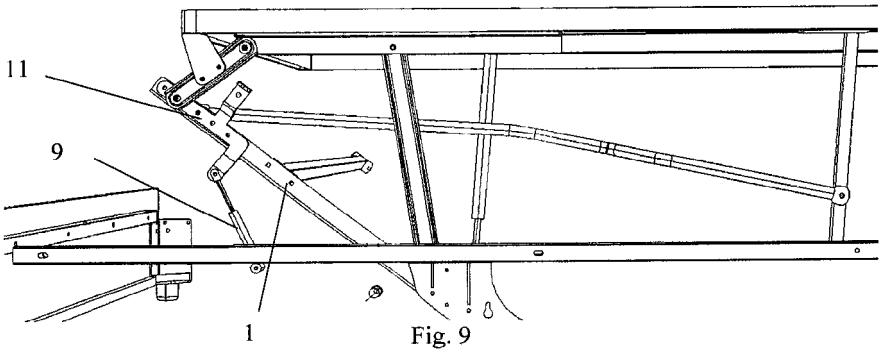

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 08 00 5807

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 4 258 445 A (ZUR HENRY C) 31 March 1981 (1981-03-31) * column 6 - column 10 * * figures *	1-13,19	
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A	US 2004/194213 A1 (WEINMAN ADAM MICHAEL [US] ET AL) 7 October 2004 (2004-10-07) * abstract * * figures *	1-19	

TECHNICAL FIELDS SEARCHED (IPC)

A47C
A61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 June 2008	MacCormick, Duncan

CATEGORY OF CITED DOCUMENTS

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27-06-2008

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

REFERENCES CITED IN THE DESCRIPTION

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- GB 326224 A **[0002]**
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- CA 2487847 **[0002]**