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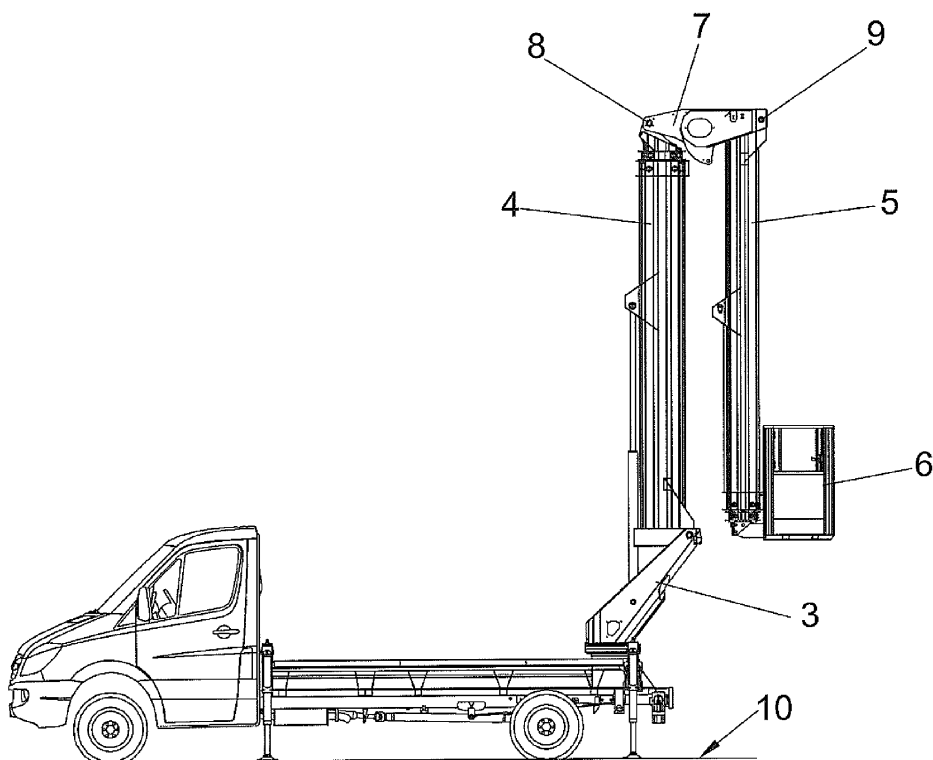
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(54) **Vehicle-mounted platform lift**

(57) A vehicle-mounted platform lift (2) comprises at least two articulated boom members (4, 5) for positioning a work platform (6). The inner boom (4) and the outer boom (5) are interconnected by a knuckle (7) with the feature that the pivot axes (8, 9) for respective boom members (4, 5) are spaced apart such that an offset is

provided between interconnected ends of the booms (4, 5). Thereby it is provided extended range and enhanced functionality of the platform lift (2) in different operational positions while at the same time the total length of the platform lift (2) is not increased in the transport position.



**Fig. 5**

## Description

### Field of the Invention

[0001] The present invention relates to platform lifts for mounting on a vehicle chassis. Such platform lifts are typically used on pickups, trucks and vans and may be applied on trailer vehicles for service work at buildings, electricity poles, and other highly positioned or difficult accessible installations. A work platform is provided at the end of an articulated boom for a worker/operator.

### Background of the Invention

[0002] The prior art platform lifts comprise a wide range of variants for various purposes, such as Versalift® platform lifts marketed by the applicant.

[0003] Such a platform lift may include a base adapted to be secured to a vehicle, an articulated boom pivotably connected to the base, the boom including at least a first boom member and a second boom member. The second boom member is pivotably connected to the first boom member through a knuckle structure at which adjacent ends of the first and second boom members are seated pivoting about respective pivot axes where the pivot axes establishing the mutual pivoting of the first and second boom members extend through the knuckle structure. The knuckle structure provides a lateral offset of the mutual position of the first and second boom members as seen from above so that the first and second boom members can be arranged side by side in a folded condition.

[0004] The prior art platform lift has a tie rod arranged between the base and the knuckle so as to provide forced control of the angular position of the knuckle. The pivot axes may coincide or be located in parallel at the knuckle structure; when located in parallel, the pivot axes are so close that the adjacent ends of the boom members lie behind each other when viewed in direction of the pivot axes.

[0005] Typically, the base is rotatably positioned on the vehicle, and configurations with e.g. three boom members are known, each boom member constituted of several telescoping parts.

[0006] By such a platform lift an appreciable reach can be attained combined with a boom which can be disposed in various geometric positions for reaching difficult accessible points at buildings, masts or even excavated places at points which are below the surface on which the lift is positioned. A limitation to the reach of a platform lift is the length of the vehicle, even when using telescopic boom members.

### Objects of the Invention

[0007] An object of the invention is to provide a platform lift of the above indicated kind which is capable of a reaching farther than the prior art platform lifts without increasing the length of the lift in the folded condition in which

the platform lift is transported. Another object of the invention is to provide a platform lift wherein the second boom member can be positioned in parallel with and spaced apart from the first boom member for easier accessing low-lying positions. A further object of the invention is to provide enhanced versatility of a vehicle-mounted platform lift.

### Description of the Invention

[0008] These objects are achieved by a platform lift as indicated in the introduction and which is peculiar in that the knuckle structure is adapted such that the pivot axes for mutual pivoting of the first and second boom members are spaced apart so far that respective ends of the first boom member and the second boom members seated in the knuckle structure appear separated as seen in direction of the pivot axes in any position of the articulated boom.

[0009] The knuckle structure is thus providing an offset between the adjacent ends of the first and second boom members, which offset is utilised by the invention into extending the reach of boom and thereby the operational range of the work platform. When the first boom member has been pivoted in the vertical position, the knuckle can provide a horizontal extension of the reach of the work platform when the second and possibly additional boom members are extended horizontally. When continuing pivoting the second and possibly additional boom members upwards, the knuckle can continue to be aligned in line with the second boom member and thus increasing the height reached by the work platform as well. Also, the offset created by the spacing between the pivot axes at the knuckle provides the option of positioning the second boom member in parallel with the first boom member, a fact which enables the platform lift to reach down vertically, e.g. to a constricted cavity or excavation below the ground level on which the platform lift vehicle is placed.

[0010] The second boom member of the platform lift may comprise telescoping parts, preferably three mutually telescopic parts. Similarly, the first boom member may comprise telescoping parts.

[0011] In order to optimise the angular mobility of the boom it is advantageous to avoid a tie rod between the base and the knuckle, and instead the knuckle structure is angularly positioned in relation to the first boom member by a hydraulic cylinder which is disposed inside the first boom member.

### The Drawings

[0012] A preferred embodiment of the invention will be described in detail below with reference to the drawings, in which:

Fig. 1 is a side view of a vehicle mounted with a platform lift according to the invention with

- the boom in folded condition for transport;  
 Fig. 2 is a perspective view of the platform lift of Fig. 1 by itself;  
 Figs. 3 and 4 show the same as Fig. 1 but seen in a view from the side and a view from above, respectively;  
 Figs. 5-8 show the same as Fig. 1 but with the articulated and telescoping boom in four different operational positions;  
 Figs. 9 and 10 are enlarged details of an embodiment of the knuckle structure according to the invention, as seen in perspective view from above and from below, respectively;  
 Fig. 11 shows the same as Fig. 1 but with the articulated and telescoping boom in a fifth operational position.

### Description of a Preferred Embodiment of the Invention

**[0013]** Appearing on Fig. 1 it is a vehicle in the form of a conventional pickup 1 which is fitted at its rear end with a platform lift 2 according to the invention, comprising a base 3, telescoping boom members 4, 5 and a work platform 6.

**[0014]** The base 3 is mounted rotatably about a vertical axis z (see Fig. 11), and a first boom member, the inner boom 4, is pivotably connected to the base 3. A second boom member, the outer boom 5, is connected to the inner boom 4 via a knuckle 7, and the work platform 6 is connected to the outer part of the outer boom 5. The general construction of the platform lift is similar to the prior art except for the configuration and design of the knuckle 7.

**[0015]** The pivoting and telescoping movements of the boom members 4, 5 are provided by hydraulic cylinders and other mechanical means that are well known in the art.

**[0016]** The new feature according to the invention is the design of the knuckle 7 (see Figs. 2 - 4). As by the conventional knuckles, the knuckle 7 has a width providing for side-by-side disposition of the boom members 4, 5 when in folded condition so that the booms 4, 5 take up as little space as possible when not in operation. However, it is seen that the height of the knuckle 7 is larger than by the prior art knuckles. The end of the inner boom 4 and the adjacent end of the outer boom 5 joined by the knuckle 7 are each hingedly connected to the knuckle 7 so as to pivot about respective axes 8 and 9. The axes 8, 9 are separated by a distance A which can be varied according to the actual implementation of the platform lift; however, in order to be effective, the distance A should be at least so great that the adjacent ends of the booms 4, 5 are clearly separated when viewed along the axes 8, 9 (see Fig. 3). In the present embodiment the distance A is between 1 and 1.2 m.

**[0017]** A tie rod between the base 3 and the knuckle 7 as used in some prior art platform lifts may be possible

in connection with the invention in order to control the angle of the knuckle. However, in order to achieve full mobility of the knuckle according to the invention, there is provided a hydraulic cylinder 12 (see Figs. 9-10) between the inner boom 4 and the knuckle 7, a feature the advantage of which will appear below. The cylinder 12 is located mostly inside the extreme telescoping part 13 of the inner boom 4 and the knuckle 7.

**[0018]** Turning to Fig. 5, a possible first operational position of the platform lift 2 is shown with the inner boom 4 raised to a vertical position, the knuckle 7 extending approximately horizontally and the outer boom 5 suspended vertically down. In this position, the work platform 6 is elevated a certain, though not large, distance above the ground level 10 such that work can be performed by a worker at this height.

**[0019]** Turning to Fig. 6, a possible second operational position of the platform lift 2 is shown where outer boom 5 is extended telescoping so as to reach down into a hole or a constricted space below ground level 10 where the space is narrow and where service or work is to be performed. The horizontal offset provided by the knuckle 7 according to the invention thus provides the small, but necessary horizontal extension so that the platform 6 can go straight down into a narrow space.

**[0020]** Turning to Fig. 7, a possible third operational position is shown where the knuckle 7 according to the invention can provide an additional extension of the maximum horizontal reach of the platform 6 while at the same time this additional reach does not mean an increased length of the lift platform 2 in its folded condition, a significant advantage as the length of the vehicle 1 is limited for various reasons.

**[0021]** Turning to Fig. 8, a possible fourth operational position is shown where the lift platform 2 is depicted in its upwardly extended state with all three telescoping parts of respective boom members 4, 5 fully extended. Due to the knuckle 7 according to the invention, an additional height is achieved for the platform 6 as the cylinder 12 causes the knuckle 7 to be aligned with the outer boom 5. As noted in connection with Fig. 7, this operational feature is also achieved without increasing the length of the lift platform 2 in its folded condition. While the inner boom 4 is vertical, the outer boom 5 can be raised to an angle of 80° in relation to horizontal.

**[0022]** Figs. 5-8 show that the outer boom 5 is activated when the inner boom 4 is in a vertical position. Nevertheless, Fig. 11 shows a possible fifth operational position where the outer boom 5 is activated as soon as the inner boom 4 is elevated over a height h at the back of the vehicle's cabin. Advantageously, the inner boom 4 can be extended telescoping as soon as it is free from the vehicle's cabin.

**[0023]** The invention is only limited by the scope of the attached claims. Other embodiments than the above described are possible within the scope of the invention. For example, the outer boom may have less than three telescoping parts and the inner boom may comprise only

one part. The described embodiment only shows one second or outer boom, but additional boom members are possible with the invention similar to the prior art platform lifts. Also, the platform lift according to the invention can be mounted on other vehicles than vans and trucks, for example on trailers or self-propelled, remotely controlled vehicles.

## Claims

1. A platform lift (2) for mounting on a vehicle chassis, the lift (2) including a base (3) adapted to be secured to a vehicle (1), an articulated boom pivotably connected to the base (3), the boom including at least a first boom member (4) and a second boom member (5),
  - wherein the second boom member (5) is pivotably connected to the first boom member (4) through a knuckle structure (7) at which adjacent ends of the first and second boom members (4, 5) are seated hingedly for pivoting about respective pivot axes (8, 9),
  - wherein the pivot axes (8, 9), which establish the mutual pivoting of the first and second boom members (4, 5), extend through the knuckle structure (7), and
  - wherein the knuckle structure (7) provides a lateral offset of the mutual position of the first and second boom members (4, 5) as seen from above so that the first and second boom members (4, 5) can be arranged side by side in a folded condition, **characterised in that** the knuckle structure (7) is adapted such that the pivot axes (8, 9) for mutual pivoting of the first and second boom members (4, 5) are spaced apart so far that respective ends of the first and second boom members (4, 5) seated in the knuckle structure (7) appear separated as seen in direction of the pivot axes (8, 9) in any position of the articulated boom.
2. Platform lift (2) according to claim 1, **characterised in that** the second boom member (5) comprises telescoping parts, preferably three mutually telescopic parts.
3. Platform lift (2) according to any preceding claims, **characterised in that** the first boom member (4) comprises telescoping parts.
4. Platform lift (2) according to any preceding claims, **characterised in that** the knuckle structure (7) is angularly positioned in relation to the first boom member (4) by a hydraulic cylinder (12) which is disposed inside the first boom member (4).

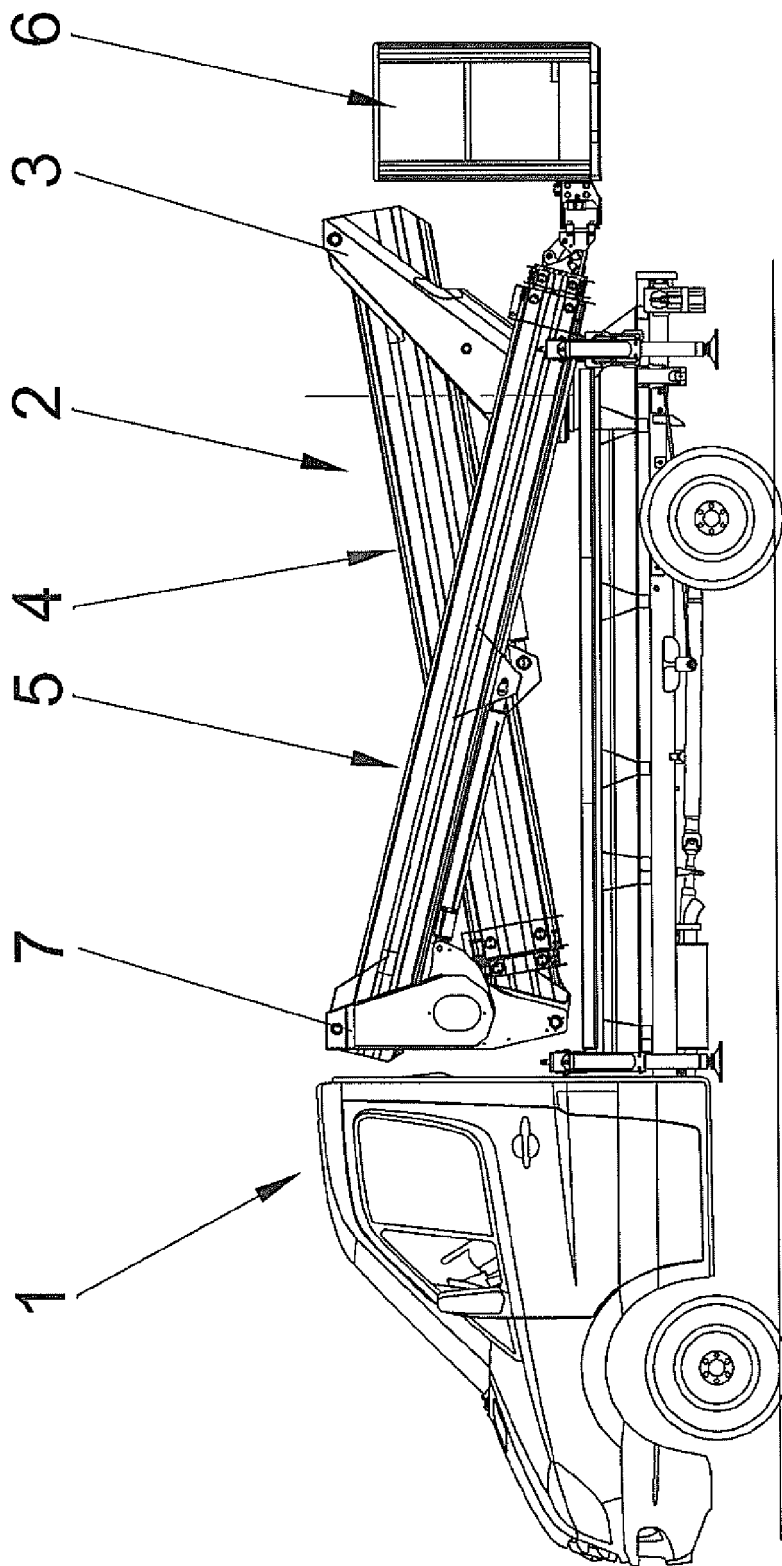


Fig. 1

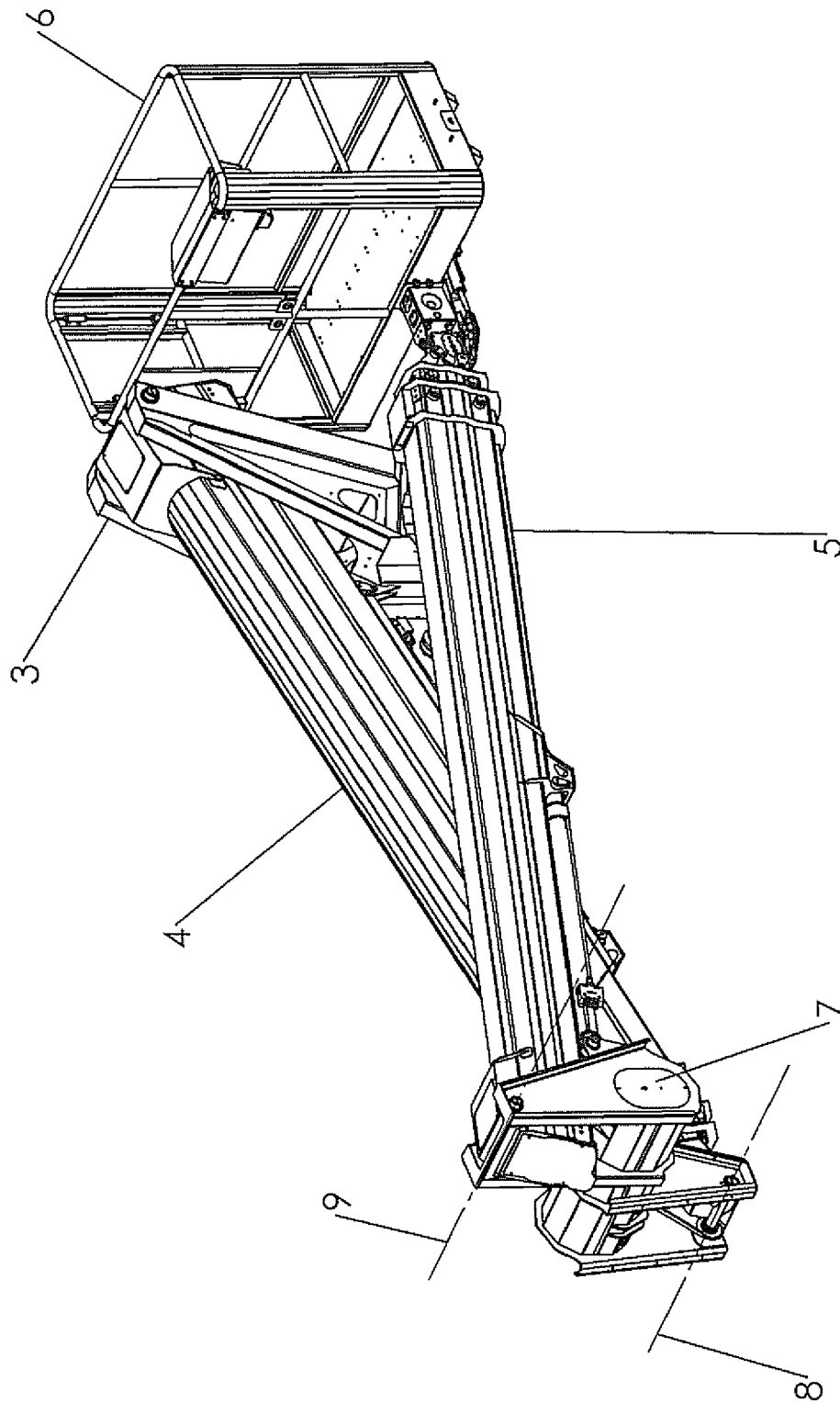
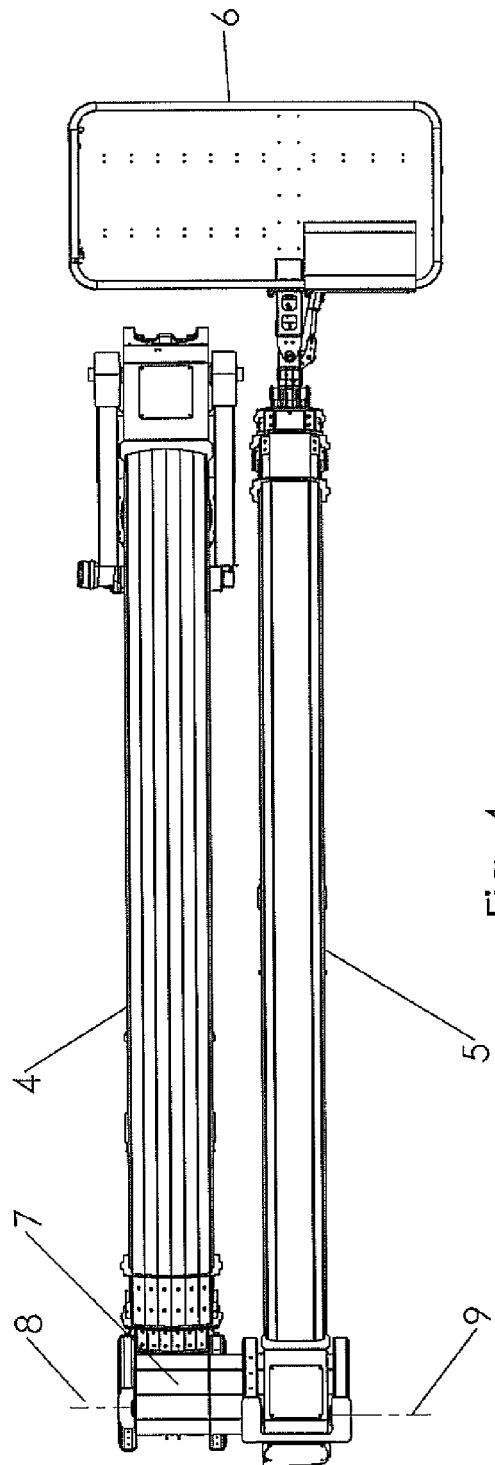
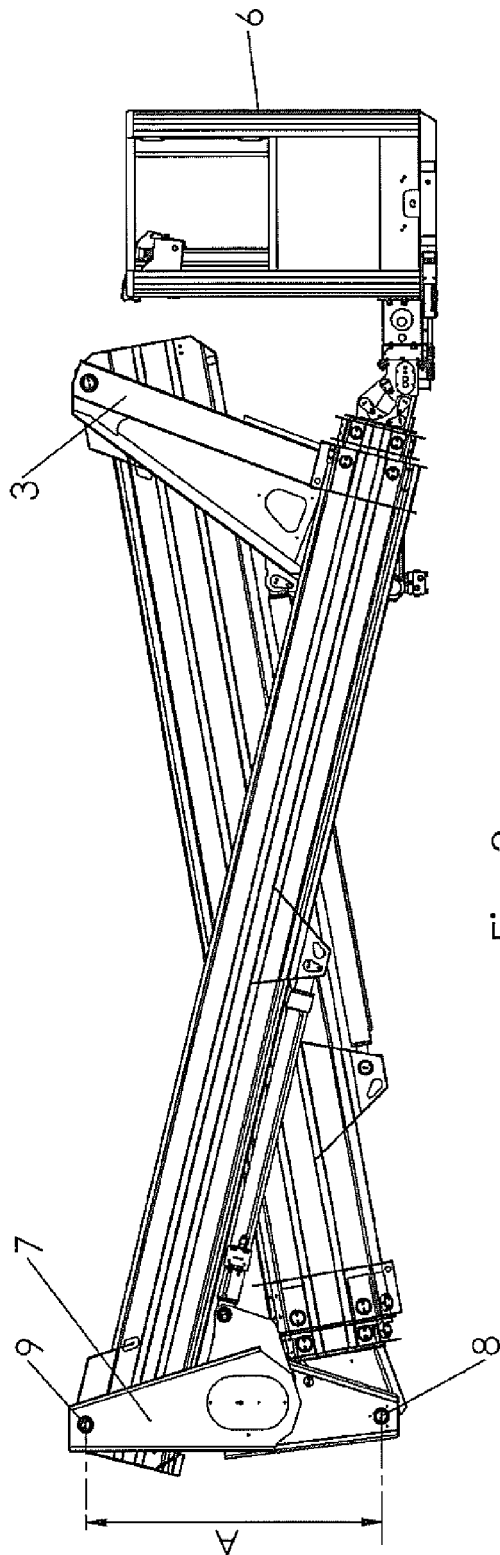


Fig. 2



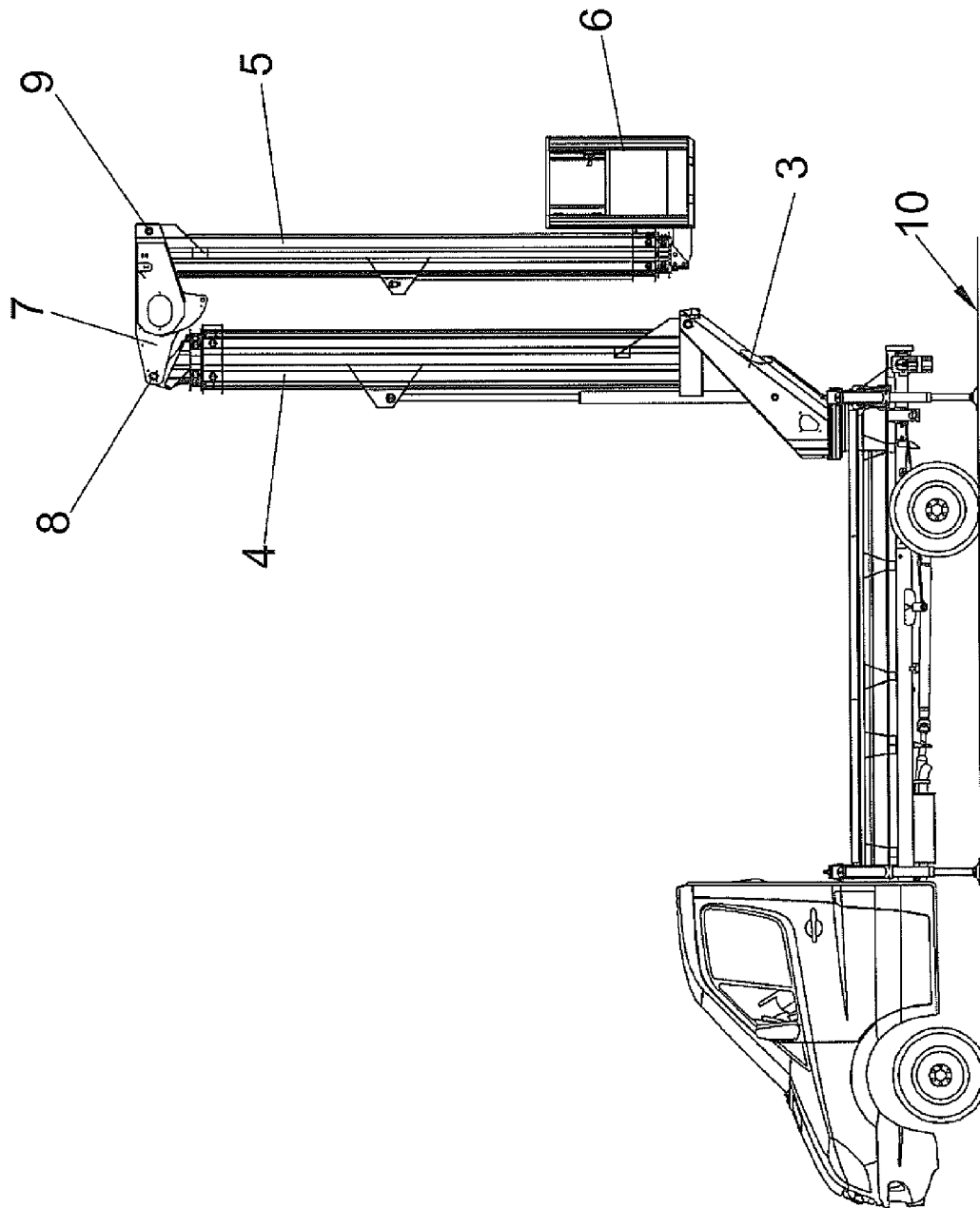


Fig. 5



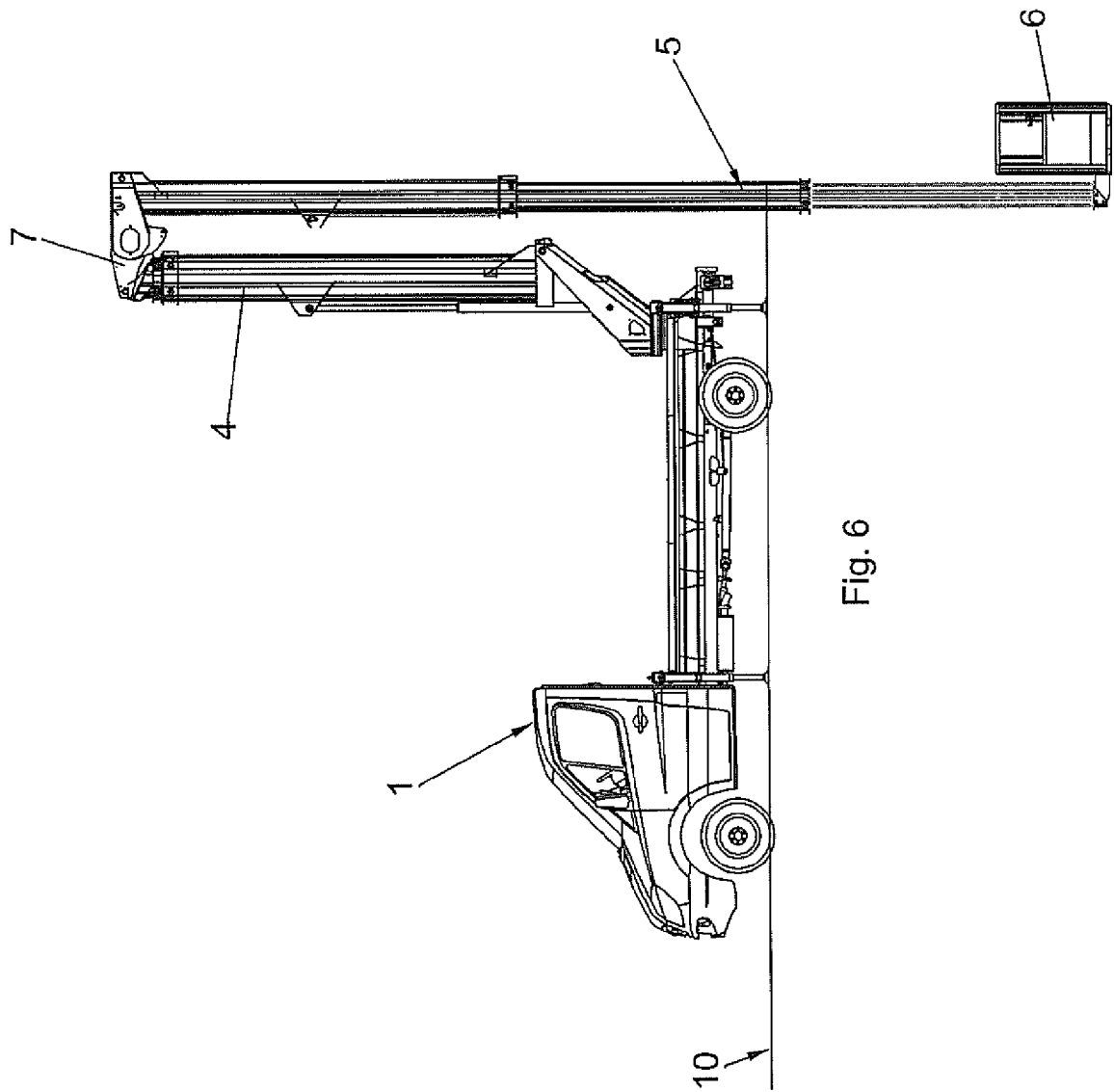


Fig. 6

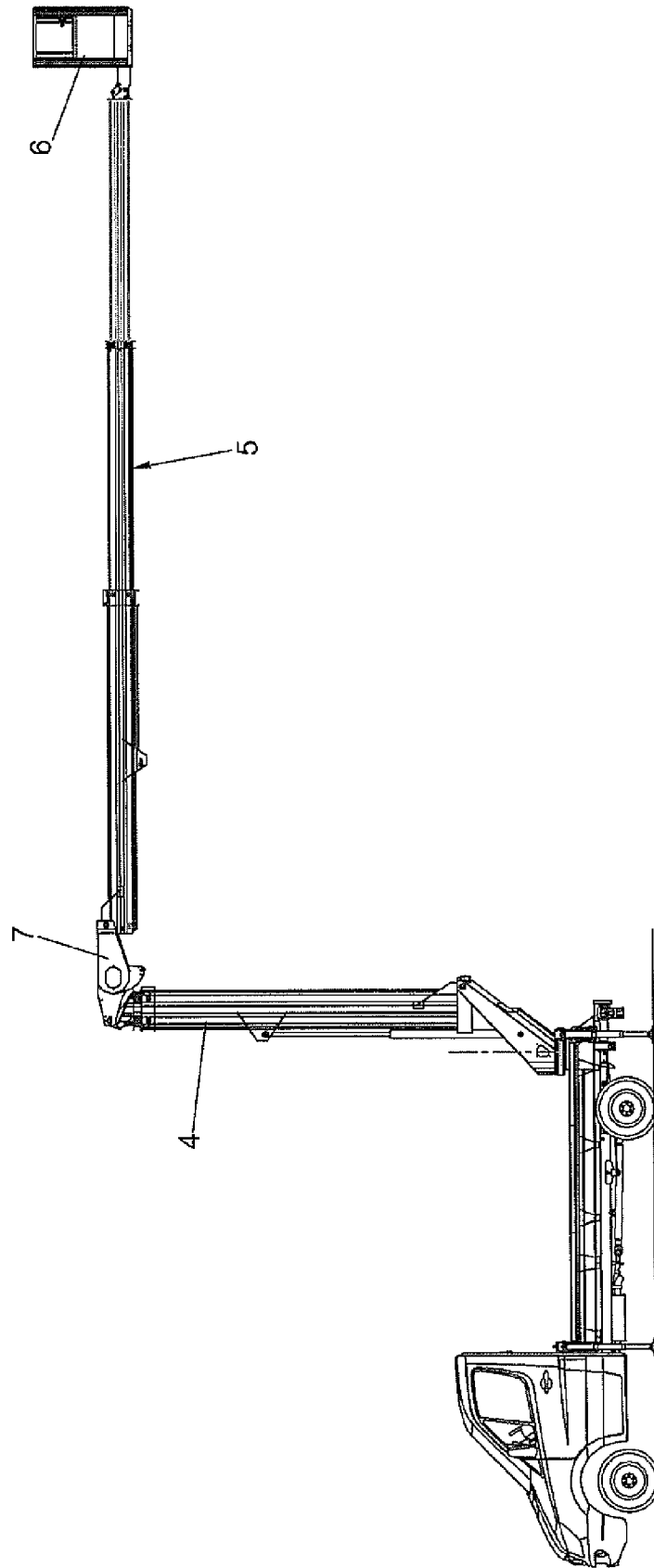
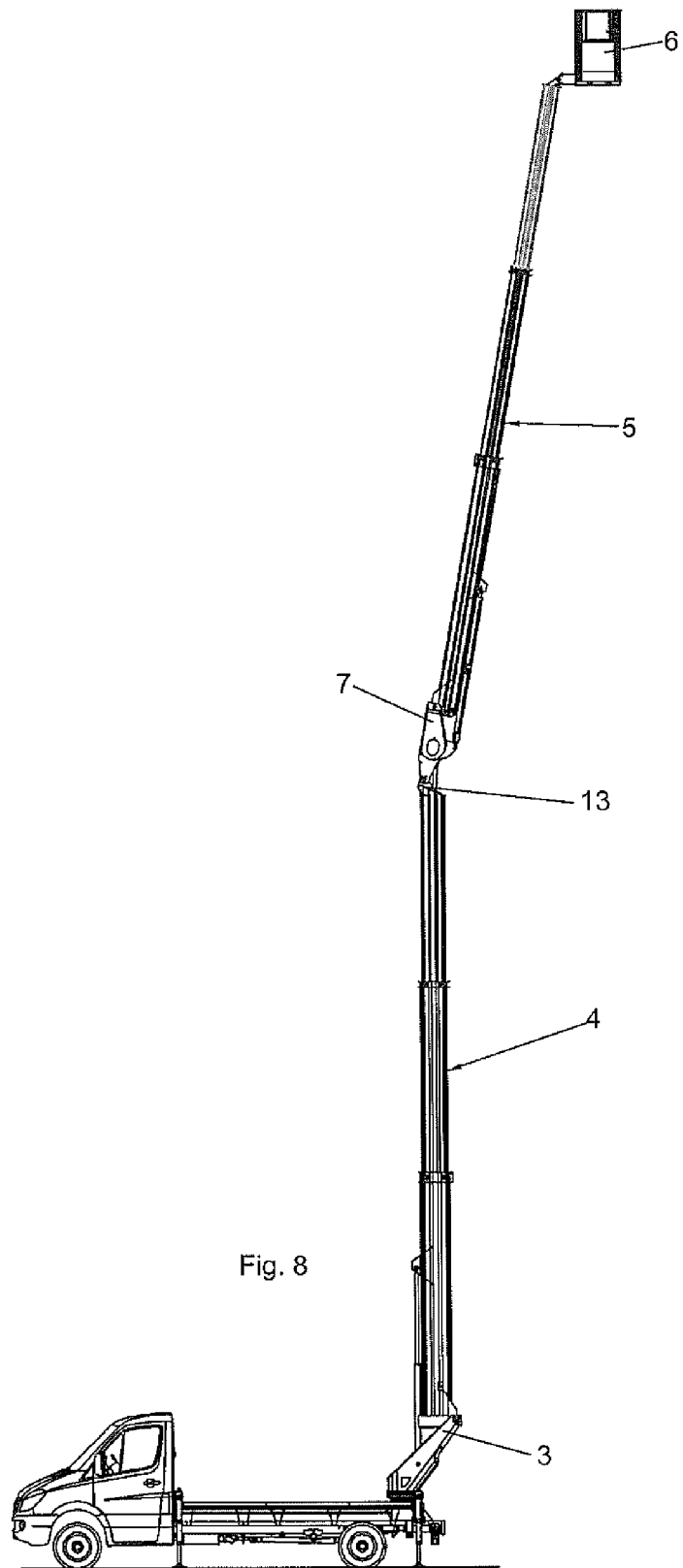


Fig. 7



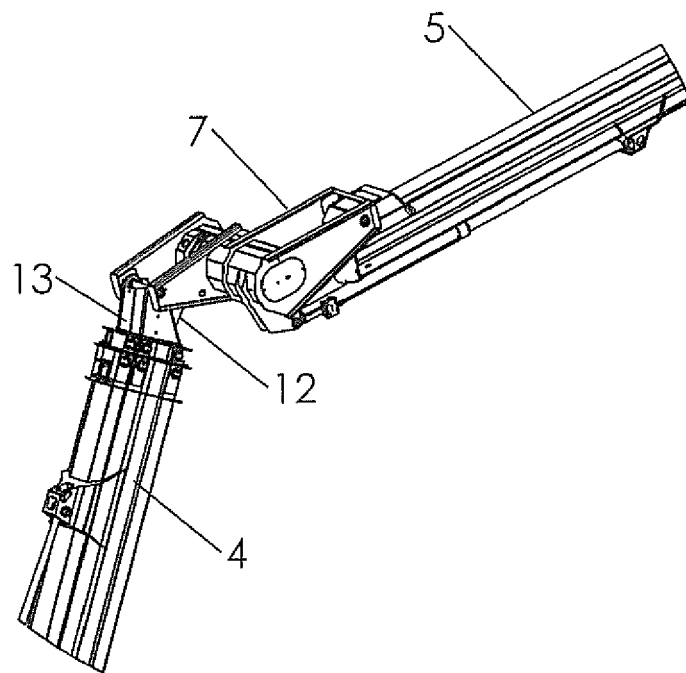


Fig. 9

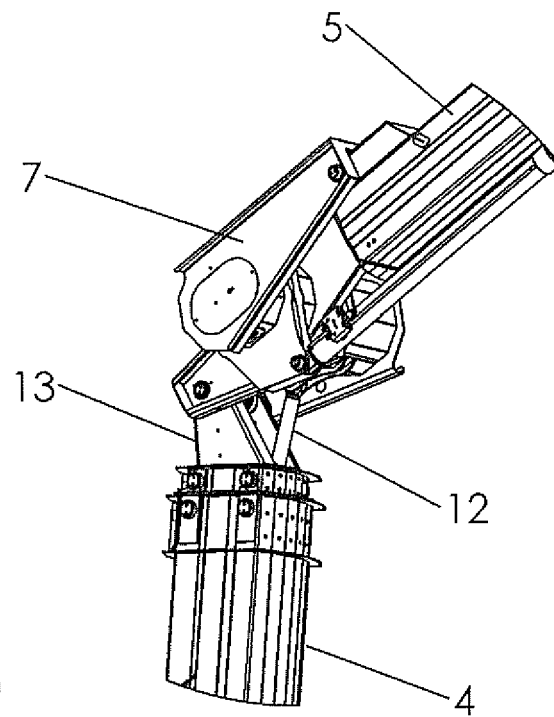


Fig. 10

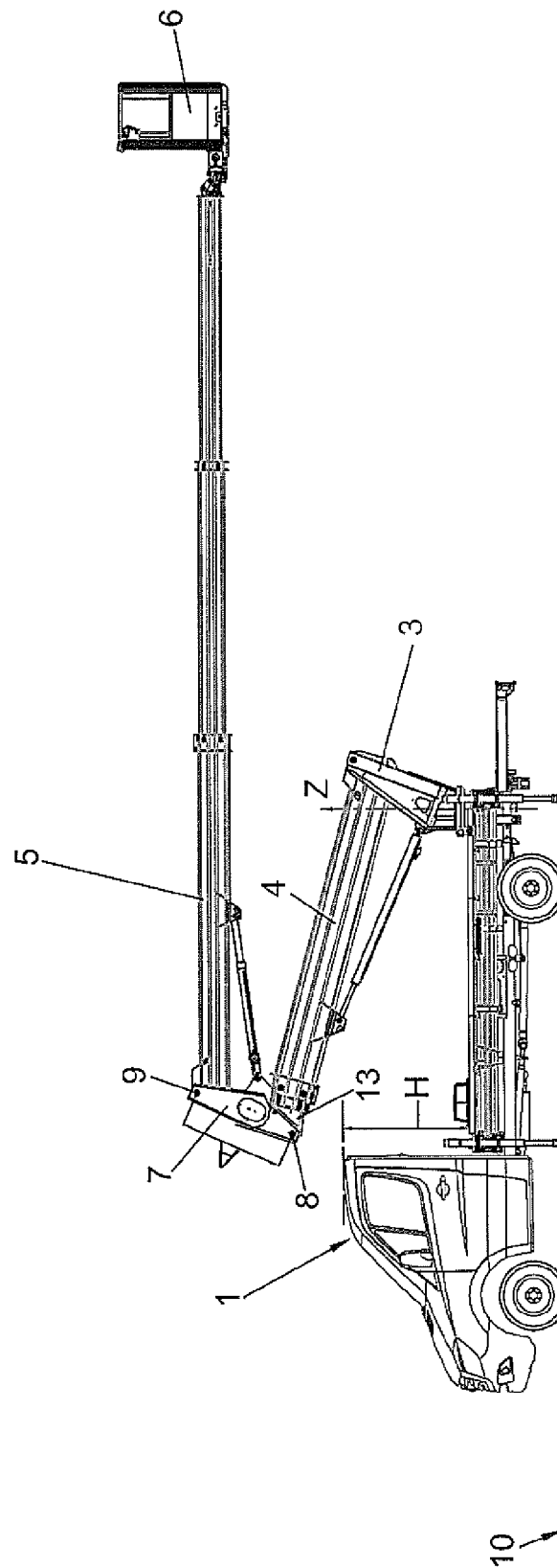


Fig. 11



## EUROPEAN SEARCH REPORT

Application Number  
EP 14 16 4016

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                         |                                                  |                                         |
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| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | * page 1, lines 67-101; figure *<br>* page 2, lines 9-13 *                                                                              | 2-4                                              |                                         |
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| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | * column 2, lines 27-68; figure 1 *                                                                                                     | 1                                                |                                         |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                         |                                                  | B66F                                    |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                         | Date of completion of the search<br>30 June 2014 | Examiner<br>Özsoy, Sevda                |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                         |                                                  |                                         |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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30-06-2014

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

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