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(54) **Motorized wheelchair**

(57) The present invention relates to a motorized wheelchair (1) comprising easily removable batteries (45). The batteries comprise a lock mechanism (32), which can be easily unlocked by hand movement. Following unlocking, the battery can be removed by way of

the same movement, which is continued. The present invention allows a convenient removal of the battery boxes (16,17) and thereby allows also a wheelchair user to effectuate maintenance operations such as the dismantling of the wheelchair for storage and transport, for example.

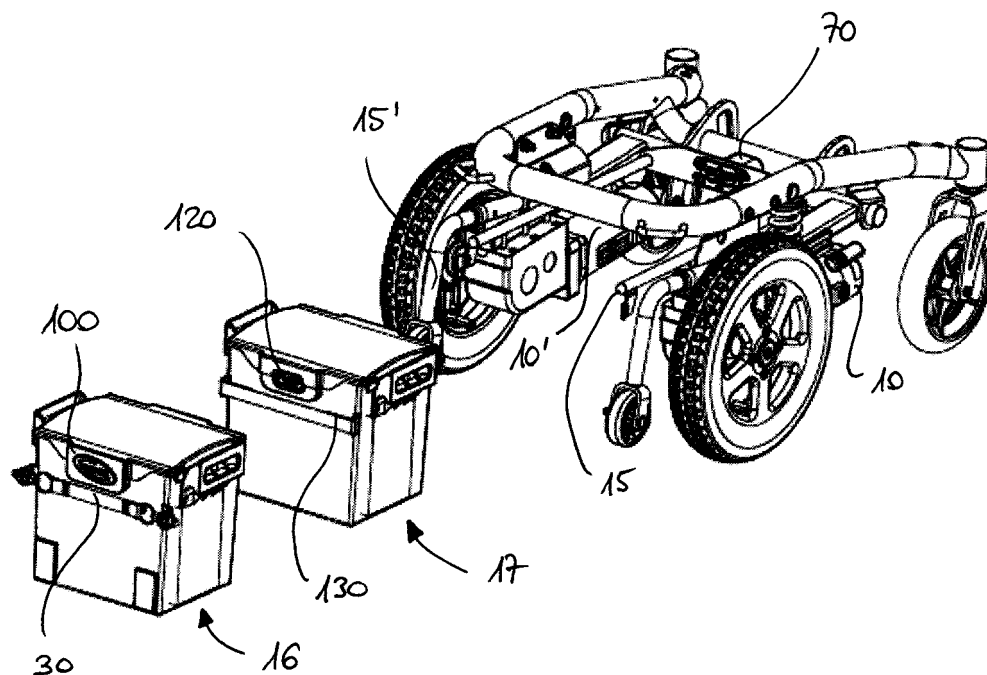


Figure 2

Description

Technical Field

[0001] The present invention relates to a motorized wheelchair. More particularly, the present invention relates to a construction of the chassis of a motorized wheelchair, which allows to quickly remove the batteries of the wheelchair without the need of any special tool and/or without the need of removing any important part of the wheelchair before being able to access the batteries. The invention also relates to a wheelchair comprising an easily accessible casement for storing spare fuses.

Prior Art and the Problem Underlying the Invention

[0002] The enhancement of convenience has been an important factor in the development of wheelchairs in the recent years. Convenience has thereby been understood as the number of functionalities of a wheelchair and characteristics of a wheelchair, such as stand-up function, and the like. The present invention addresses the concept of convenience also in the context of maintenance, servicing but also of storage of a wheelchair and/or for transport. Accordingly, it is an objective of the present invention to render one or more servicing and/or maintenance activities and processes more convenient. It is also an objective to enable a wheelchair user to perform one or more servicing and/or maintenance processes by her- or himself.

[0003] Removal of the batteries of a wheelchair is necessary for maintenance activities, but is also required in some wheelchairs for storage of the wheelchair in a space-saving manner. Therefore, it is an objective of the present invention to provide a convenient possibility of removing the batteries of a wheelchair. It is an objective to provide a construction that enables quick removal of the batteries, preferably without the need of any tool and with few manipulations being necessary. It is also an objective of providing a wheelchair in which the batteries can be easily accessed.

[0004] The present invention addresses the problems depicted above.

Summary of Invention

[0005] In an aspect, the present invention provides a motorized wheelchair comprising a wheelchair frame and at least one container comprising at least one battery, wherein said battery is retained on the wheelchair by way of a lock mechanism that can be loosened without any special tool and/or by way of a limited number of movements.

[0006] Further aspects and preferred embodiments are provided in the appended claims.

Brief Description of the Drawings

[0007] The wheelchair of the present invention will be described in further detail further below, when useful with reference to the attached drawings, which show an exemplary wheelchair according to the invention.

Figure 1 is a rear perspective view showing the base of a wheelchair according to an embodiment of the invention. The base shows a motorized wheelchair from which the seat construction including arm and legrests were removed.

Figure 2 is a rear perspective view of the same wheelchair base as shown in Figure 1, with the battery boxes being removed from the base and placed behind the wheelchair.

Figure 3 is a rear perspective view of the same wheelchair base as shown in Figure 1, with the battery boxes being removed.

Figure 4 is a front perspective view of the battery boxes and of the rail construction of the chassis of the wheelchair base of Figure 1. The battery boxes are situated rearward behind the rail construction thereby illustrating a position where the battery boxes are unloaded.

Figure 5 is the same view as Figure 4, but with a front battery box already placed on the rail construction and a rear battery being aligned but not yet placed on the rail construction.

Figure 6 is the same view as Figures 4 and 5, but with both battery boxes placed on the rail construction and locked thereon by a lock mechanism, illustrating a situation of the battery boxes in a position of use.

Figure 7 is a rear perspective view showing an extract of the wheelchair base of Figure 1. The extract shows the rear battery box when placed on rails of the chassis and the lock mechanism that retains the battery on the rails.

Figure 8 is a partial rear view showing in greater detail the lock mechanism on the right side of the rear battery box of Figure 7, the lock mechanism being in a locked position.

Figure 9 is the same view as Figure 8, the lock mechanism being in an unlocked position.

Figure 10 is the same view as in Figures 8 and 9, the rear battery box being partially removed from the rail of the chassis of the wheelchair of the invention.

Figure 11 is the same lock mechanism in the same position as shown in Figure 8, but in a rear perspective view.

Figure 12 is the same lock mechanism in the same position as shown in Figure 9, but in a rear perspective view.

Figure 13 is the same lock mechanism in the same position as shown in Figure 10, but in a rear perspective view.

Figure 14 is a rear left perspective view on the rear battery box of the wheelchair of the present invention.

Figure 15 shows the battery box of Figure 14 in an exploded view.

Figure 16 is a rear left perspective view on the front battery box of the wheelchair according to an embodiment of the invention.

Figure 17 shows the battery box of Figure 16 in an exploded view.

Detailed Description of the Preferred Embodiments

[0008] For the purpose of the present specification, situations and directions of elements of the wheelchair of the present invention are determined by the perspective of a user seated in the wheelchair. Accordingly, the left side of the wheelchair corresponds to the left side of Figure 1. The situations or directions "up" or "top" and "down" or "bottom", "rear" or "back" and "front", "behind" and "in front", "distal" and "proximal", "lateral" and "central" follow the same rule.

[0009] The present invention relates to a motorized wheelchair. The motorized wheelchair may be a dismountable wheelchair, meaning that at least a part of the wheelchair can be reversibly removed from the wheelchair. In this way, it is possible to remove at least one part, for example for the purpose of repairing the part or in order to arrange the wheelchair in a more space-saving manner, for example for storage and/or transport of the wheelchair.

[0010] **Figure 1** shows an embodiment of the wheelchair 1 of the present invention with the seat, arm and legrests of the wheelchair being removed for the reasons of clarity. Any one selected from the seat, the armrests and or the legrests may be demountable and remountable. The perspective rear view of Figure 1 shows a pair of right and left motor wheels 6, 6', right and left rear anti-tip wheels 8, 8' and a right front castor wheel 7 (the left front castor wheel not being visible in this view). The anti-tip wheels are connected at the end of right and left curved support arms 9, 9', respectively. A right motor 10 is visible, and together with a left motor 10' (not visible), the

motors are provided in order to propel the right and left motorized wheels 6, 6', respectively. The castor wheels 7, 7' and the motorized wheels 6, 6' are fixed to a chassis or frame 5. The anti-tip wheels 8, 8' are provided at the rear end of the right and left curved support arms 9, 9', said support arms being attached to swing arms being part of the chassis 5. The chassis 5 comprises a main, U-shaped frame element 11, the open end of the U being oriented towards the front. A horizontal frame element 12 is provided in a front area of the chassis 5.

[0011] The wheelchair 1 shown in Figure 1 comprises two demountable boxes, a rear box 16 and a front box 17, in which batteries are accommodated. On the rear box 16, a hand-actuated device 30 can be seen. For the purpose of clarity it is noted that the term "box" and "container" are generally regarded as equivalent, which applies in particular to the appended claims. For the purpose of the present disclosure, however, the term box is generally used for referring to the entire element encasing the battery, the box thus comprising a lid and a container as such, which can be closed by the lid. The term "container" then generally refers to the lower, open element of the battery box. The term "hand-accessible" refers to the fact that this structure can be reached and gripped by the hand of a person, for example a wheelchair user, a service person or any assisting person. The hand-actuated device 30 is provided in the form of a strap or band, and when a person draws on the strap, a locking mechanism opens and the battery box 16 can be removed from the chassis.

[0012] The batteries provided in the containers 16, 17 are preferably reloadable batteries.

[0013] **Figure 2** shows the same wheelchair as Figure 1, but with the battery boxes 16 and 17 being removed from the chassis and placed on the ground behind the wheelchair 1. With the batteries being removed, the left motor 10' can be seen, and rails 15, 15' can be seen better. As will be described in more detail below, the battery boxes 16 and 17 are placed on the rails in the position shown in Figure 1, and also in the position of use of the wheelchair. In Figure 2, a strap or gripper 130 provided on the front battery box 17 can be seen. While the strap 130 on the front battery box also provides a grip for removing the battery box 17 from the rails, there is no lock mechanism provided associated with the front battery box 17. Of course, it would be possible to provide such a lock mechanism also on the front box 17. The position of the battery boxes 16 and 17 following their removal from the chassis 5 indicates that the rear battery box 16 is removed first, followed by the removal of the front battery box 17. The latter can be accessed only after removal of the former, and is otherwise sandwiched and thus blocked within the chassis and the rear battery box 16. The rear battery box 16, in turn, is stabilized or blocked against any uncontrolled movement by the front battery box 17 and a lock mechanism provided between the rear box 16 and the chassis, as will be detailed further below. The rails 15, 15' connected to the chassis 5 prevent lat-

eral displacement of the battery boxes 16 and 17 in a position of use of the wheelchair (Figure 1).

[0014] Figure 3 shows an enlarged view of the wheelchair with the batteries being removed as in Figure 2. The battery boxes are no longer shown in Figure 3.

[0015] Figure 4 shows the battery boxes 16 and 17 and the rail construction 20 comprising right and left rails 15, 15' being removed from the chassis of the wheelchair, the battery boxes and the rail construction being aligned for the purpose of illustration. The rail construction 20 comprises right and left connection plates 21, 21' attached to said right and left rails 15, 15' at about halfway of the longitudinal extension of said rails. The connection plates 21, 21' comprise openings for attaching the rail construction on the chassis, for example by way of screws or bolts. Both rails 15, 15' are connected to each other by way of a front transversal connecting structure 22, which, together with said rails 15, 15', forms an U-shaped structure, with the open end of the U oriented towards the rear end of the wheelchair. In a central position, said connecting structure comprises an electric socket 70, which is designed to engage with an electric connector 60 provided on the front battery box 17. A similar electric connector 50 is provided on the rear battery box 16, which engages with a corresponding female part on the front battery box, not visible in Figure 4. From the socket 70, cables are provided, not shown, which supply electric energy from the socket 70 to motors 10 and 10' (Figures 1 and 2) and to a central data processing unit or a computer (not shown). As can also be seen in Figure 4, each battery box 16, 17, comprises a pair of right and left lateral carriers 26, 26' and 27, 27', respectively. As will become apparent from the following figures, the carrying structures are placed on the rails 15, 15' and thus provide the guiding of the battery boxes 16, 17 on the rails 15, 15'. The carrying structures 26, 26', 27, 27' are rigidly attached to the boxes and are sufficiently solid and strong to allow the weight of the batteries in the battery boxes being suspended by way of the carriers on the rails. Each carrying structure comprise a profile having the shape of a longitudinally cut hollow cylinder, which is oriented in parallel to the rails and thus engages the rails when the box is placed on the rails. The hollow cylindrical shape prevents lateral movement of the battery boxes by fitting with and partially surrounding the cylindrical form of the rails.

[0016] Figure 5 shows the same elements as Figure 4, with the front battery box 17 being situated on the rails 15, 15', and the rear battery box closely behind the rails.

[0017] Figure 6, finally, shows the battery boxes 16 and 17 being positioned and locked on the rails 15, 15'. Figures 4 through 6 together thus illustrate the way of movement that the battery boxes 16 and 17 undergo when being placed on the rails 15, 15' in the wheelchair of the present invention. Inversely, when regarded in the order Figure 6, 5 and 4, these figures illustrate the removal of the battery boxes 16 and 17 from the rail system provided on the chassis of the wheelchair in accordance

with an embodiment of the present invention.

[0018] Figure 7 is a closer view to the rear end of the rear battery box 16 when placed on the rails 15, 15' of the wheelchair of the invention. The hand-actuated device 30 and the associated lock mechanisms 32, 32' are provided on right and left sides of the battery box 16. The hand-actuated device 30 is provided in the form of a tension boom or tension flange 30 that basically comprises a flexible strap or band 31, which can be grasped by a person from behind the wheelchair, when the wheelchair is in a position of use. When drawing the tension boom 30 towards the rear, the lock mechanisms 32, 32' are unlocked and the battery box 16 can be removed at the rear end of the wheelchair by sliding on the rails 15, 15' and finally sliding off the rails. As can already be recognized in Figure 7, right and left stand-off plates 33, 33' are attached, for example welded, at the rear end of the rails 15, 15'. Each stand-off plate comprises a hole, in which a pin 34, 34' is engaged. The pins 34, 34' are part on the lock mechanism provided on the battery box 16, and the engagement of said pins with the holes provided in the stand-off plates 33, 33' on the rails 15, 15' thus locks the battery box against movement on or away from the rails and prevents removal of the box 16.

[0019] Figure 8 is a closer view showing in more detail the right lock mechanism shown in Figure 7. An identical mirrored structure can be recognized on the left side of Figure 7. It can be seen that a lateral end of the strap 31 of the tension boom 30 is connected to a ring 35, which is preferably made from a non flexible, rigid material, such as metal or hard plastic. The ring 35 engages in a hole at a central end of a pin, the pin being retained in a support comprising a holding element 36 and two screw nuts 37, 38, through which the pin 34 is guided. The holding element is rigidly attached to and stands off from the wall of the battery box 16. The pin 34 is resiliently harboured within a space provided by said nuts 37, 38 and said holding element 36. When a person draws the strap 31, the pin is drawn in a transversal movement towards a slightly more central position with respect to the wheelchair. The lateral end of the pin, which engages the hole in the stand-off plate 33 of the rail 15 is removed from said hole. However, at some point, the pin is blocked within the elements 36-38 in which it is harboured, so that the pin cannot be completely removed by exerting a drawing force on the strap 31. The pin 34 thus contributes together with the support elements 36-38 to a secure connection between the strap 31 and the battery box 16. However, a resilient element, for example a spring, which is not visible in the figures, is also harboured within the support elements 36-38 and is placed so as to provide a resilient pressure on the pin in an axially outward direction, that is towards the locked position, in which the pin 34 is engaged in the hole of the stand-off plates 33. This resilient construction prevents the lock mechanism from being unlocked unintentionally, in that the pin 34 does not spontaneously disengage from the hole in the stand-off plates 33.

[0020] Figure 8 shows the lock mechanism in the wheelchair of the invention in a locked position. When a traction is exerted on the tension boom 30, said traction being passed via the ring 35 on the pin 34 as shown in **Figure 9**. The traction is exerted against the force of the resilient means (not shown) keeping the pin in the engagement with the corresponding hole in the stand-off plate 33 of the rail 15 and thus results in an unlocking of the lock mechanism. Although this cannot be seen in **Figure 9**, the skilled person will understand that the traction on strap 31 by drawing in a rearward direction also results in the corresponding pin 34' on the left side of the wheelchair (not shown) being disengaged and thereby the left lock mechanism being unlocked. Further traction on the strap 31 results in a movement of the battery box 16 on and along the rails 15, 15' towards the rear, as is illustrated in **Figure 10**. In **Figure 10**, the battery box 16 can be seen to be still hung up on the rail 15 by way of the carrier 26 of the battery box 16. Further traction in the rearward direction as indicated by the arrow in **Figure 13** will result in removal of the battery box 16 from the rails and thereby also from the chassis of the wheelchair.

[0021] **Figures 11 through 13** show the same situation as **Figures 8 through 10**, respectively, but from a different, lateral perspective view. In **Figure 13**, part of the carrier 26 has already been passed over the rear end of the rails. As in described with respect to **Figure 10** above, further traction exerted on the strap in the direction indicated by the arrow will lead to a removal of the battery box 16 from the rails 15, 15'.

[0022] **Figure 14** shows the battery box 16 in a perspective view of its left, rear and top side. The box 16 comprises a basic container 41 on which a lid 42 is placed and detachably fixed by way of four clip mechanisms 43, 43', 44, 44', two on each side, with the clips on the right side not being visible in this view. The four clips on the lid can be actuated by hand for lifting the lid and removing the battery inside the battery box, as will be described further below. **Figure 14** shows the hand-actuated device (the tension flange 30) comprising the strap 31 that can be grasped by a person when the box 16 is hung up on the rails on the chassis of the wheelchair, as has been described above. The right and left lock mechanisms 32 and 32' as well as the respective pins 34, 34' can also be seen to be part of the box. Similarly, the right and left carriers 26, 26' of the box, which lie on the rails and thus carry the box 16 in a position of use can be seen to be relatively large and comprising a plurality of reinforcing structures 49 for assuring that the battery is safely harboured in the box when the latter is suspended on the rails. Each right and left carriers 26, 26' also comprise an opening 58, 58' forming a grip, respectively, which allows to a person to conveniently lift the battery box 16 by gripping the container 41 at the carriers 26, 26'.

[0023] **Figure 15** is an exploded view of the battery box 16 with the lid 42 being lifted and showing more details of some inner elements of the box such as the battery 45 itself as well as the male connector 50. The battery

45 can be conveniently removed from the container when the lid is lifted following opening the four clips 43, 43', 44, 44', preferably by hand. An advantage of the present invention is that the wheelchair can at least partly be de-mounted by hand, without the need of any special or ordinary tool. From the exploded view of **Figure 15**, it can be seen that a connector 50 is provided, which, when the lid 42 is on the container, is retained in an open area 110a and 110b provided in the lid 42 and the container 41. This open area is situated in a central position at the interface of the container 41 and the lid 42 (the open area 110b in the lid 42 is not visible in **Figure 15** but its position is indicated by reference numeral 110b). The open areas 110a, 110b are bordered by a doubled wall 48a and 48b on the container and the lid, respectively. A sleeve 111 provided on the connector fits within the double walls 48a and 48b so that when the lid 42 is mounted the connector is stabilized in the open areas 110a, 110b of the container and the lid. The male connector 50 in the rear box 16 is adapted to fit a female connector 120 of the front battery box 17, which can be seen in **Figure 2** and also in **Figure 17** below. It is worthwhile noting that open areas 112a and 112b are also provided on the rear side of the rear battery box. As can be recognized from comparing **Figures 14 and 15**, when the rear battery box 16 is mounted and the lid 42 closed, the open area 112 formed by open areas 112a and 112b on the rear side of the container 41 and the lid 42, respectively, is closed by a place-holder 100, which can also be seen in **Figures 1, 2 and 7**. The place-holder 100 actually comprises a small lumen (not shown) in which small spare parts 101 can be placed. In the embodiment shown in **Figure 15**, there are two spare fuses 101 placed in the place-holder disk 100.

[0024] **Figures 16 and 17** show an assembled and an exploded view, respectively, of the front box 17. The front box 17 is largely identical in shape and size as the rear box 16, and in particular the container 41 as such and the lid 42 of the front box 17 is substantially identical to the corresponding structure, which is why identical reference numerals are used. This also applies to the open areas 112a, 112b, 110a, 110b in the front box 17, whereas the suspension carriers 27, 27' provided on the right and left side, respectively, of the container 41, were given separate reference numerals already previously.

[0025] It is noted though that the front battery box 17 does not comprise a lock mechanism. The tension boom 130 of the front box 17 thus comprises a band 131, which is directly attached to the container 41 and does not comprise a resilient locking pin as described with reference to **Figures 7-14** above. Once the rear battery box 16 being unlocked and removed from the rails 15, 15', the front battery box 17 can be grasped at tension boom 130 and the front battery can be drawn along the rails 15, 15' towards the rear end of the wheelchair and removed from the chassis as the rear battery box. Since, in a position of use, the front battery box is sufficiently blocked between the rails 15, 15', further elements of the chassis and, towards the rear, by the rear battery box, a separate

lock mechanism for the front battery box is advantageously not necessary any more.

[0026] A further difference between the front and the rear battery box is that the front battery box 17 harbors a female connector 120, which is designed to engage with the male connector 50 of the rear battery box 16. In this way, the batteries 45 of the front and rear battery boxes 16, 17 are connected with each other. A front connector 60 of the front battery box 17 is designed to engage with a female socket 70 visible in Figures 3-6.

[0027] The batteries 45 visible in the exploded views of Figures 15 and 17, provided in the rear and front battery boxes 16 and 17, respectively, both comprise positive and negative poles 46, 46', which are connected by electric connections such as isolated cables (not shown) to the connectors 50, 60, 120 of the respective battery box in an adequate way, thereby providing a functional electrical connection between the batteries and also between the batteries and the socket 70 provided on the chassis (Figs. 3-7).

Claims

1. A motorized wheelchair (1) comprising a wheelchair frame (5) and at least one container (16, 17) comprising at least one battery (45), wherein said battery is retained on the wheelchair by way of a lock mechanism (32) that can be loosened without any special tool and/or by way of a limited number of movements.
2. The wheelchair of claim 1, wherein the container (16, 17) can be unlocked and removed from said wheelchair by actuating a single device (30) on the container, and/or in a single movement.
3. The wheelchair of any one of the preceding claims, wherein said at least one container (16, 17) comprising at least one battery (45) is guided on rails (15, 15') provided on the frame of said wheelchair.
4. The wheelchair of any one of the preceding claims, comprising a hand-actuated device (30), wherein said lock mechanism (32) is unlocked by manipulation of said hand-actuated device, and wherein said hand-actuated device is connected to said at least one container (16), wherein the container can be removed from the wheelchair by manipulation of said hand-actuated device.
5. The wheelchair of any one of the preceding claims, wherein a hand-actuated device (30) provided on said at least one container (16) comprises a strap (31) comprising two ends, said two ends being attached to the container, and wherein said strap is further connected to at least one pin (34) forming part of a lock mechanism (32), wherein, upon a specific manipulation of said strap, said pin is displaced

thereby unlocking said lock mechanism.

6. The wheelchair of any one of the preceding claims, wherein said lock mechanism (32) comprises a resilient element, said resilient element exerting a force so as to resiliently maintaining said lock mechanism in a locked position.
7. The wheelchair of any one of the preceding claims, wherein a hand-actuated device (30) is provided on said container (16), said hand-actuated structure being connected with a first element (34) of a lock mechanism (32), a second element (33) of said lock mechanism being provided on the frame (5) of the wheelchair, said first and second elements being engaged in a locked position and disengaged in an unlocked position, wherein a specific manipulation of said hand-actuated device (30) disengages said first and second elements (34, 33) and allows for removal of said container with said hand-actuated device.
8. The wheelchair of claim 7, wherein said hand-actuated device (30) comprises a strap (31) comprising two ends, each end being connected to a right and left pin (34, 34'), respectively, each pin being guided in an attachment structure (36, 37, 38), said attachment structure being rigidly connected to the container, wherein, in a locked position, said pins (34, 34') engage a hole of a right and left element (33), respectively, rigidly connected to the chassis (5) and/or to a rail construction (20) of the wheelchair, and wherein the application of a traction force on said strap (31) by hand results in the right and left pins (34, 34') being disengaged from said hole of the element (33) of the chassis (5) and/or of a rail construction (2).
9. The wheelchair of any one of claims 6 to 8, wherein said resilient element exerts a first force on a pin (34, 34') of a lock mechanism (32), and wherein a traction force exerted by a person on a said hand-actuated device (31) results in a second force exerted on said pin, said second force being opposed to said first force, and said second force thus moving said pin in a direction of an unlocked position, thereby unlocking said lock mechanism.
10. The wheelchair of any one of the preceding claims, wherein replacement fuses (101) are provided on said wheelchair, preferably in association with said container (16).
11. The wheelchair of claim 10, wherein said container (16) comprises an opening (112a, 112b) in a lid (42) and/or a wall (41) of said container, wherein said opening is closed by way of a place-holder structure (100), said place-holder structure (100) forming a lumen in which said spare-fuses are placed.

12. The wheelchair of any one of the preceding claims, wherein said battery (45) can be removed from said container without any special tool.
13. The wheelchair of any one of the preceding claims, wherein the container (16, 17) comprises a lid (42), and wherein, in a position of use, said lid being detachably attached to the container by way of a clip mechanism (43, 43', 44, 44'), and wherein said lid can be removed by manipulating said clip-mechanism by hand.
14. The wheelchair of any one of the preceding claims, wherein said container (16, 17) comprises a connector (50, 60, 120), and wherein said frame of said wheelchair comprises a socket (70), said socket being electrically connected to electricity consuming units (10, 10') of said wheelchair, wherein, when the container is placed on the frame in a position of use, said connector is connected to said socket and thereby electrically connects the battery (45) for electrical energy with the socket.
15. The wheelchair of any one of the preceding claims, comprising two or more containers (16, 17) each comprising at least one battery (45), wherein connectors (50, 60, 120) are provided on each of said containers, each connector of each container being connected to the at least one battery positioned within said container, wherein, in a position of use, said containers are provided on said wheelchair so that at least one container is connected with another container by way of said connectors.
16. The wheelchair of claims 14 or 15, wherein said socket (70) is attached at a fixed position on the frame (5) of the wheelchair, so that when a container (17) is loaded on the frame of the wheelchair in a predetermined manner, the connector (60) on the container automatically engages the socket on the frame of the wheelchair.

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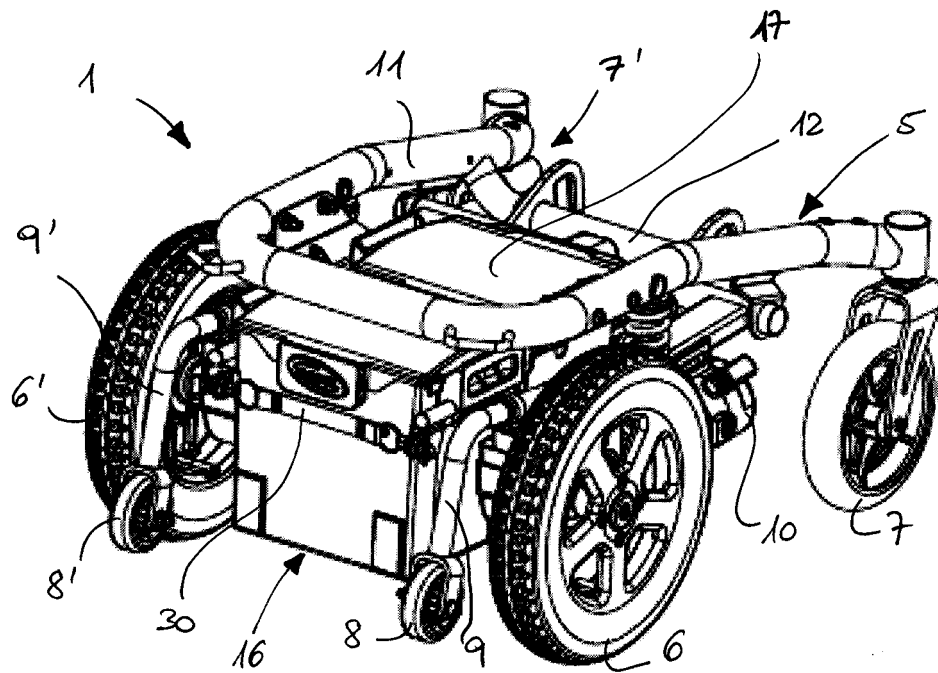


Figure 1

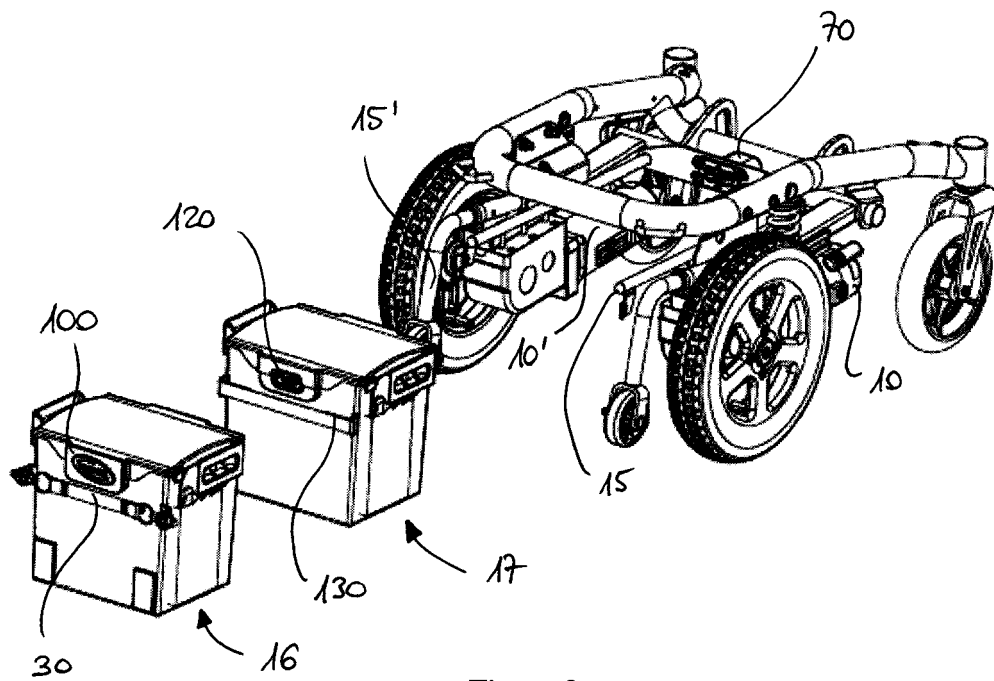


Figure 2

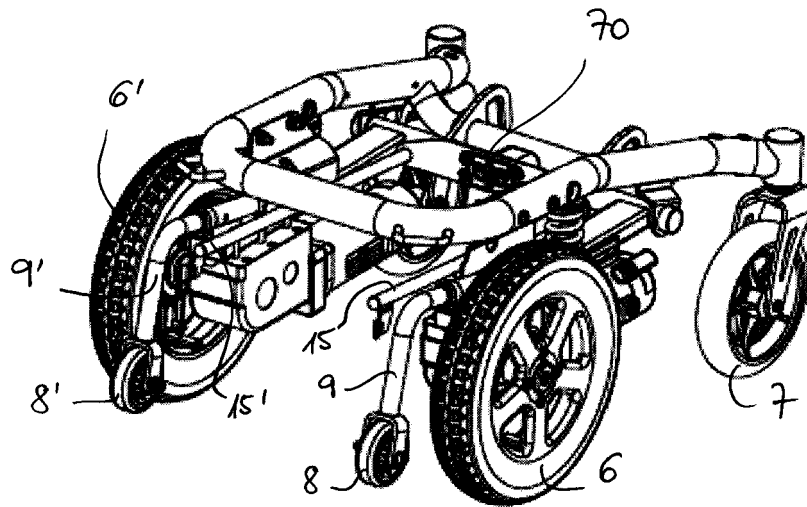


Figure 3

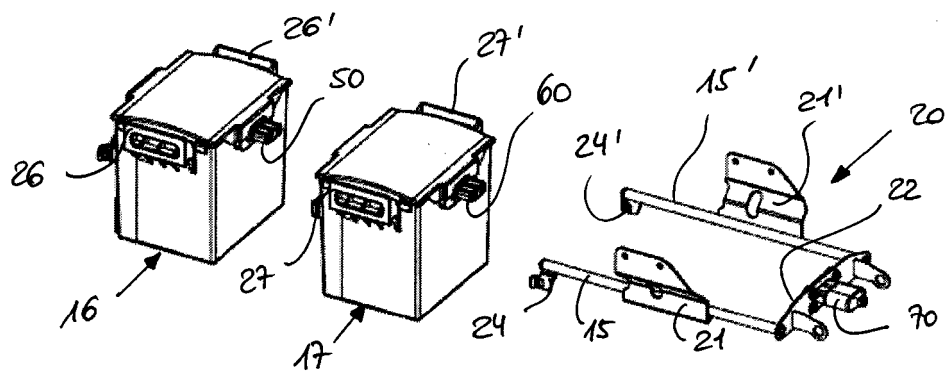


Figure 4

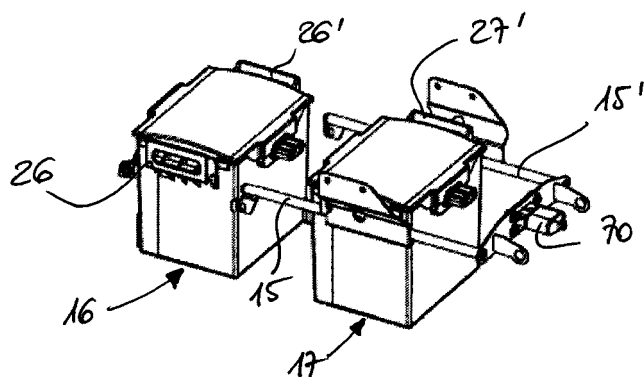


Figure 5

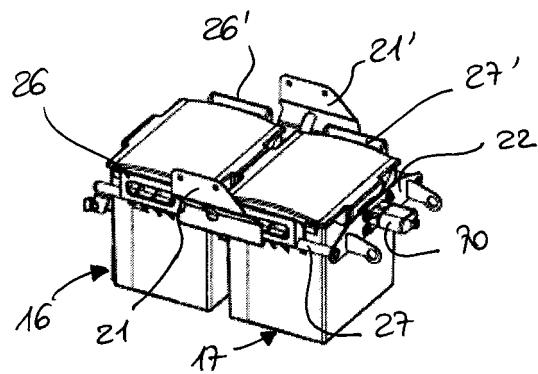


Figure 6

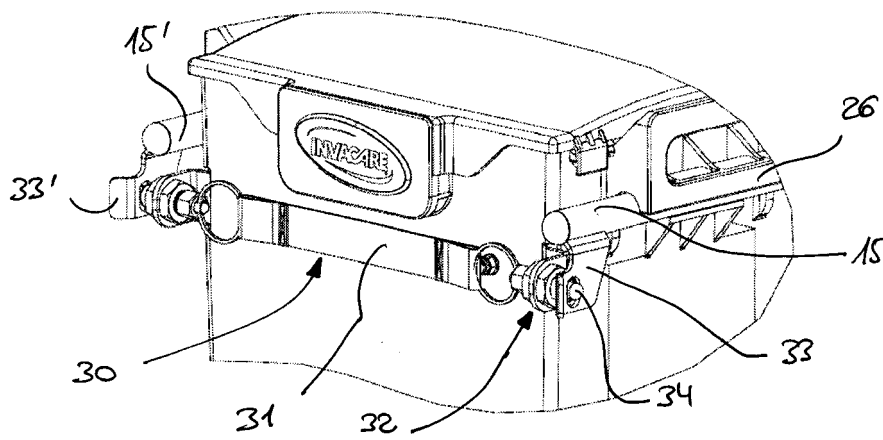


Figure 7

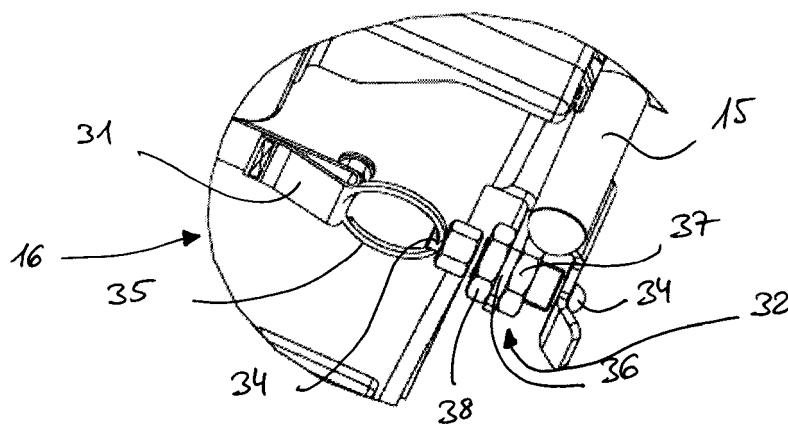


Figure 8

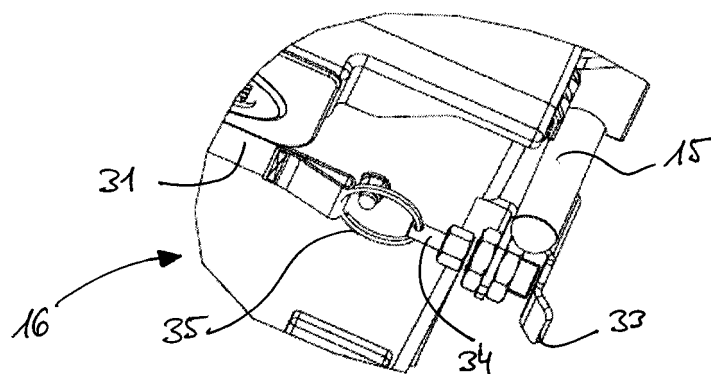


Figure 9

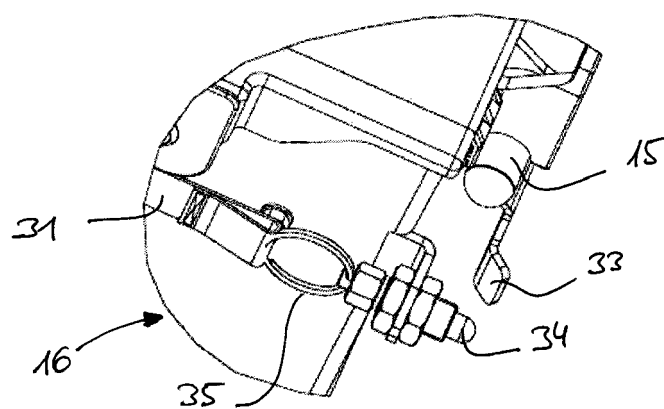


Figure 10

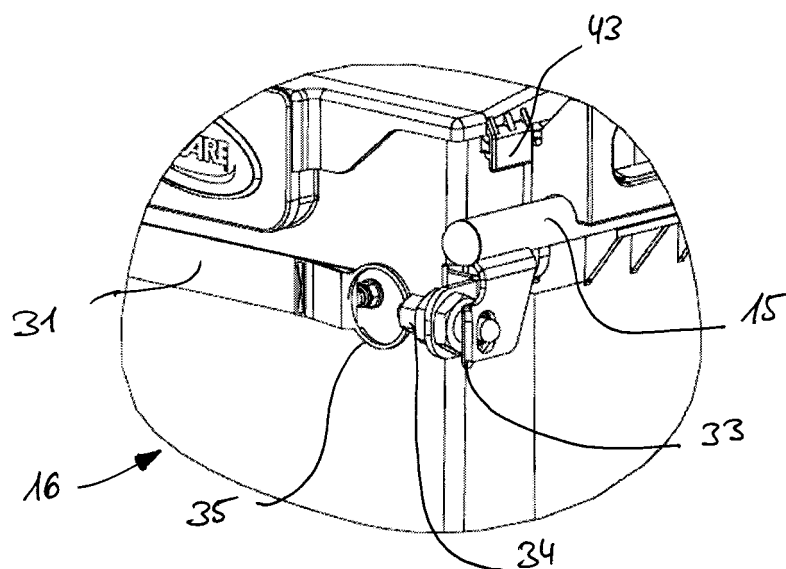


Figure 11

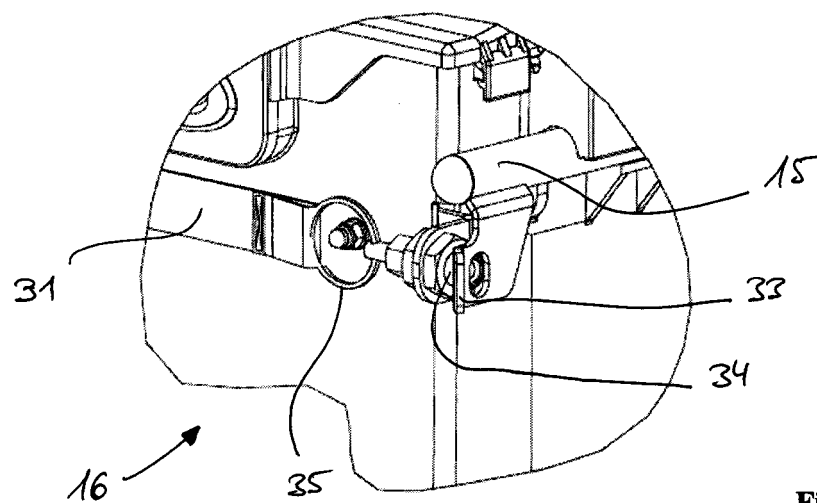


Figure 12

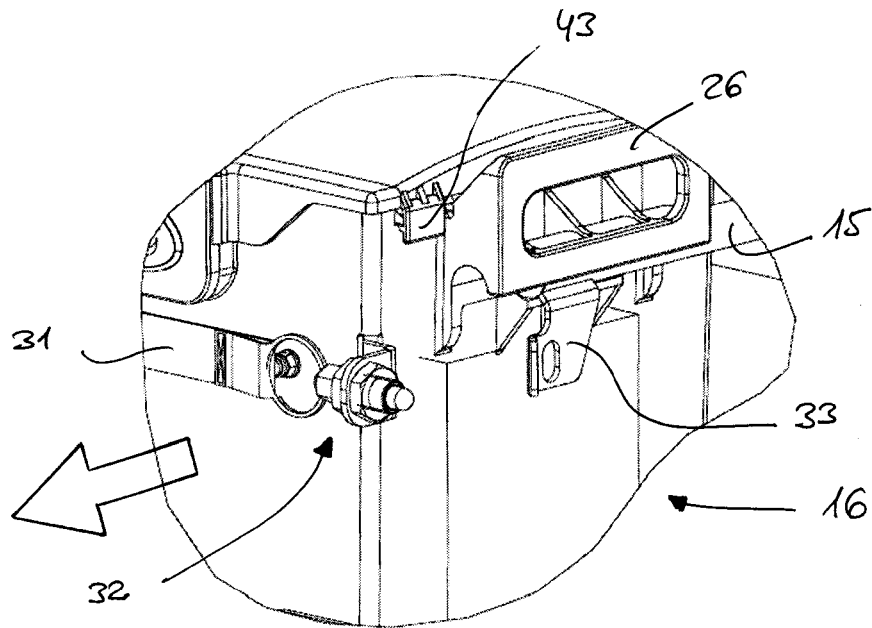


Figure 13

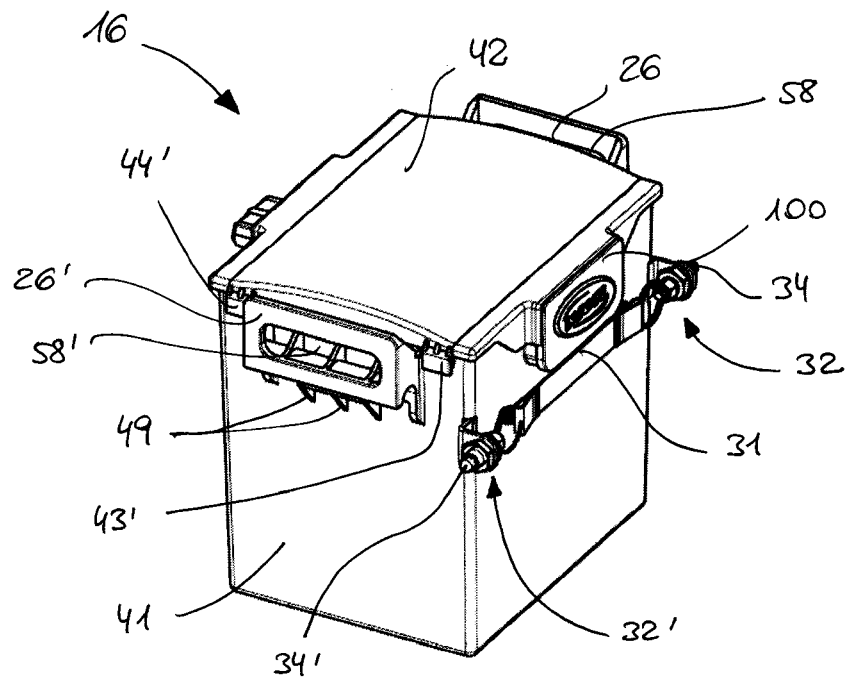


Figure 14

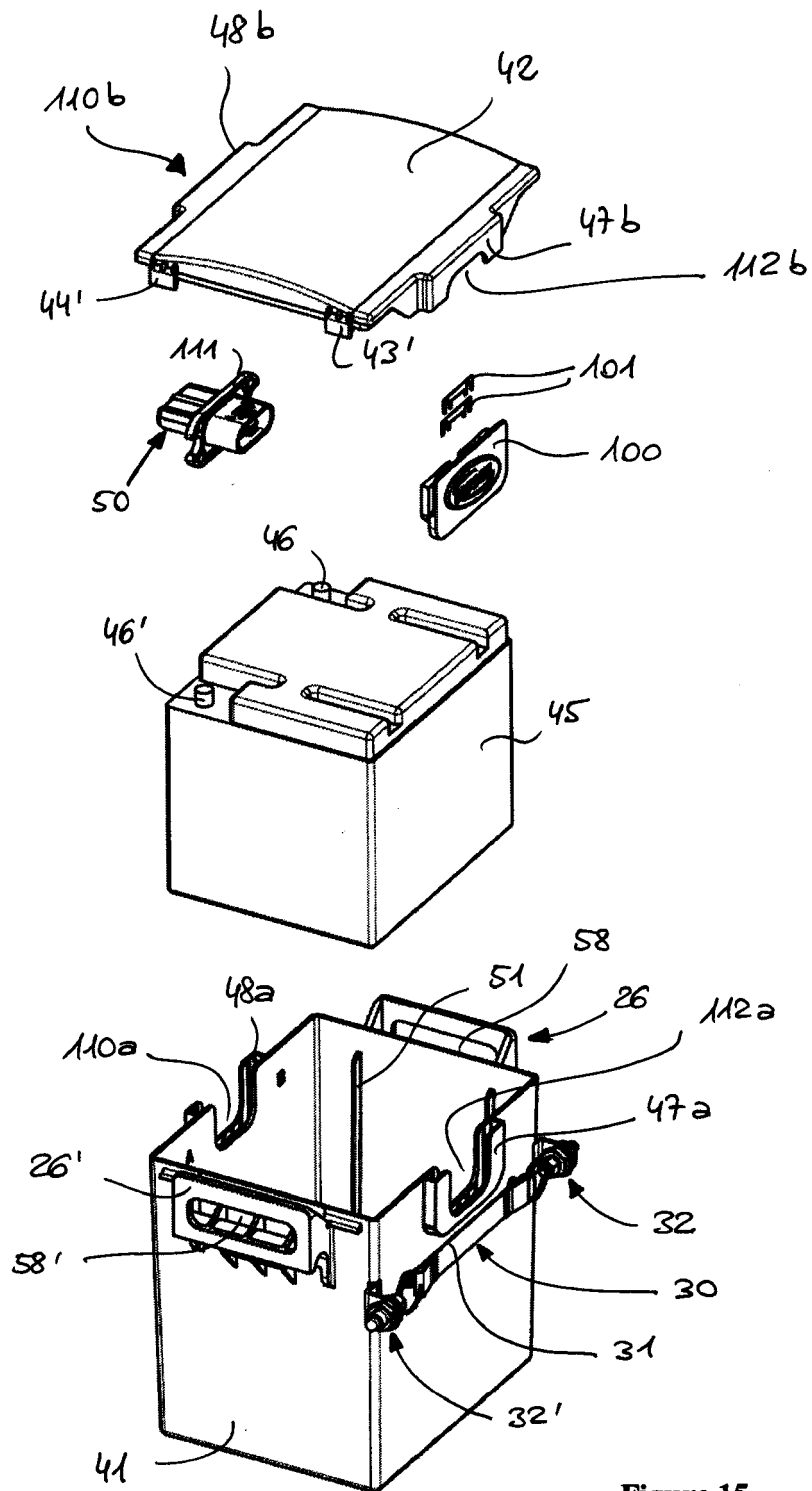


Figure 15

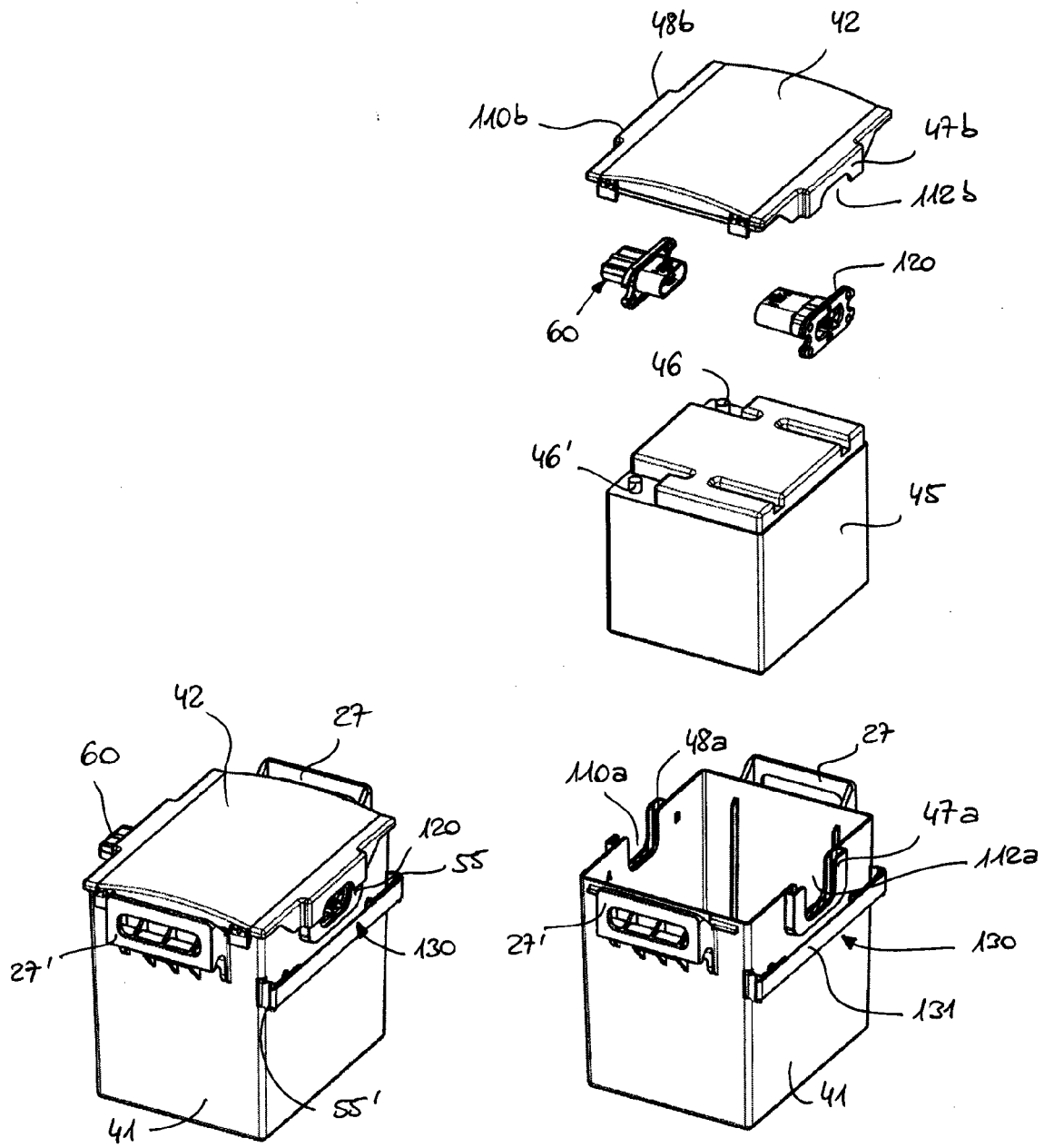


Figure 16

Figure 17



EUROPEAN SEARCH REPORT

Application Number
EP 09 15 4143

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 July 2009	Examiner Petzold, Jan
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