

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 April 2007 (12.04.2007)

PCT

(10) International Publication Number
WO 2007/039801 A1

(51) International Patent Classification:
H01M 2/10 (2006.01)

(21) International Application Number:
PCT/IB2006/002729

(22) International Filing Date:
28 September 2006 (28.09.2006)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
VI2005A000252 3 October 2005 (03.10.2005) IT

(71) Applicant and

(72) Inventor: **STOCCHIERO, Franco** [IT/IT]; Via G. Zanella 34/A, I-36050 Montorso Vicentino (VI) (IT).

(74) Agent: **ZILIOTTO, Tiziano**; Contrada Porta Santa Lucia, 48, I-36100 Vicenza (IT).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

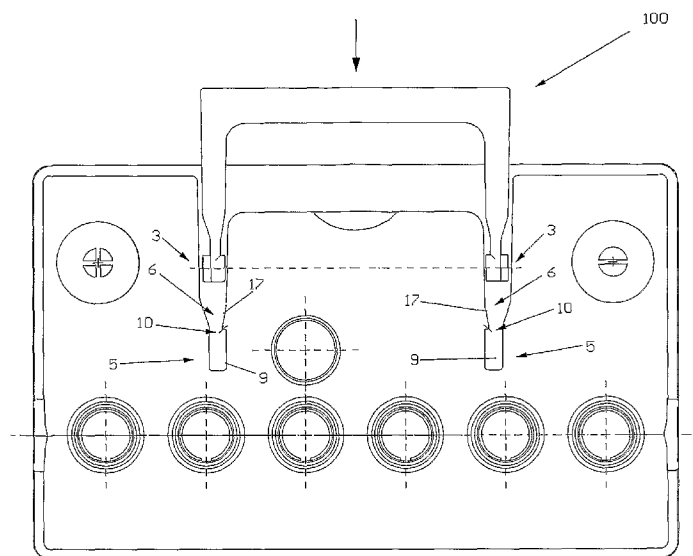
(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM FOR FITTING TO A BATTERY A DEVICE FOR THE HANDLING OF SAID BATTERY AND RELATIVE DEVICE AND BATTERY



(57) Abstract: The invention relates to a system for fitting to a battery (500) a device (100, 101, 102) for handling the battery, comprising a connection element (3) suitable for being accommodated in a housing (5) and guide means (6) suitable for guiding the connection element (3) during application of the device (100, 101, 102) to the battery (500), in order to move it away from its natural position and overcome a narrowing (10) of the housing (5), thus permitting insertion thereof in the housing (5) and subsequent return to its natural position. The invention furthermore concerns a corresponding device and a battery.

WO 2007/039801 A1

SYSTEM FOR FITTING TO A BATTERY A DEVICE FOR THE HANDLING OF SAID BATTERY AND RELATIVE DEVICE AND BATTERY

The invention concerns a system for fitting to a battery a device for handling it and a relative device and battery.

- 5 The system and the device proposed are particularly suitable for application to the cover of a battery.

As is known, the casing of a battery, and in particular of a starter or tractor battery, consists of a cover that closes a container provided internally with a plurality of partition walls. These identify the cells inside which the electrodes or positive and
10 negative plates that form the battery elements are arranged, immersed in the electrolyte. The cover is generally provided with a plurality of holes, one for each cell, closed by corresponding plugs, which permit the supply of top-up liquids to each cell.

The cover is generally applied to the container by means of a heat-sealing process which involves all the points of contact with the container and therefore the perimeter edge of
15 the container and the upper ends of the partition walls.

To facilitate lifting and transport of said batteries, some covers are furthermore provided with one or more devices for handling the batteries, also called handles that facilitate lifting and handling of the battery.

Said handles consist of a U-shaped element provided with two through holes made at
20 the ends of the two arms of the U, each suitable for receiving a corresponding pin provided on the cover.

Said connection system allows the handle to rotate around an axis and to assume a compact rest position, horizontally collapsed, and a vertical operating position, necessary to permit gripping of the handle.

- 25 The number of handles with which the battery is provided varies according to the dimensions of the battery and the load they have to withstand during the lifting and transport phases.

Each handle is generally applied manually to the cover.

A first drawback of the connection system described consists in the fact that the
30 coupling of the pin to each hole must be sufficiently accurate and precisely fitting to prevent detachment of the handle during lifting.

A further drawback, linked to the preceding one, consists in the fact that the rotation of the handle around the above-mentioned axis is not easy due to the friction that develops between the pin and the wall of the hole. This makes it difficult to raise the handle from
35 the rest position to the vertical operating position.

A further drawback consists in the fact that the known connection systems cannot be positioned at any point on the cover.

A further drawback, linked to the preceding one, consists in the fact that the connection pins are generally arranged in the vicinity of the areas where the cover is sealed to the container. This means that during the lifting phase, the connection pins discharge the weight of the battery onto said sealed areas, stressing them and at times damaging them.

A further drawback lies in that assembly of the handle generally requires the intervention of an operator, thus significantly affecting the cost of the battery.

The object of the present invention is to overcome said drawbacks.

In particular, a first object of the invention is to provide a system for fitting to a battery a device for the handling of said battery, as well as a relative device and battery, which are dependable and facilitate raising of the device from the rest position to the operating position, thus guaranteeing the necessary reliability and sturdiness.

A further object of the invention is to provide a dependable, simple and inexpensive fitting system.

A further object of the invention is to propose a fitting system that can be provided substantially at any point on the cover or container of a battery.

Another object of the invention is to provide a device which is dependable and can be anchored to the cover of a battery at any point.

A further object of the invention is to provide a fitting system and a device which, in the rest position, do not protrude from the upper surface of the cover.

A further object of the invention is to provide a device which, compared to the known handles, can be raised more easily to the operating position by the user.

A further object of the invention is to provide a fitting system that permits application of the lifting device to the relative cover, without the need for tools and in a simple quick manner.

Another object of the invention is to provide a fitting system, a device and a battery that have a low production cost.

A further object of the invention is to provide a fitting system, a device and a battery, the application of which is quick and easy and can also be performed automatically by mechanical actuators also directly on the cover and/or battery production line.

A further object of the invention is to provide a fitting system and device that withstand greater loads than the analogous handles of known type.

A further object of the invention is to provide a fitting system and a device that can be easily removed from the battery.

A further object of the invention is to provide a fitting system that permits simplification of the mould for the production of said covers, compared to the functionally analogous covers of known type.

Said objects have been achieved through the implementation of a system for fitting to a
5 battery a device for the handling thereof, a device for the handling of a battery and a battery, described and characterised in the respective independent claims.

Advantageous embodiments of the invention constitute the subject of the dependent claims.

Advantageously, the solution proposed permits arrangement of the anchoring points of
10 the device at any point on the battery cover. This advantageously enables the distribution of weight on the device to be improved and therefore offers greater safety and ease of transport of the battery.

Again advantageously, with the solution proposed the most suitable areas can be chosen for discharging the stress supported by the connection system, and the anchoring points
15 can be arranged well away from the sealed areas, thus significantly reducing the risk of damaging them.

In fact, the connection system proposed can be provided in the areas of the cover between two cells, thus advantageously obtaining discharge of the weight supported on two adjacent seals and reducing the risk of damaging the seals.

Again advantageously, the simplicity of assembly of the device on the cover means that
20 it can be installed at any time, also by the user, thus also permitting optimisation of storage of the various parts of the battery.

Said objects and advantages will be highlighted in greater detail in the description of some preferred embodiments of the invention, provided by way of non-limiting
25 examples, with reference to the attached drawings, wherein:

- Figure 1 shows a lateral view of a battery with a device for the handling thereof, subject of the invention, in an operating position and provided with a fitting system also subject of the invention;
- Figure 2 shows a different lateral view of the battery and the device shown in Figure
30 1;
- Figure 3 shows an elevation view of the battery of Figure 1 with the device arranged in a horizontal rest position;
- Figure 4 shows a lateral view of the device of Figure 1;
- Figure 5 shows a section along the horizontal plane A-A of Figure 1 of the device
35 and part of the battery cover, before fitting, in which the fitting system can be seen

more clearly;

- Figure 6 shows a section along the vertical plane B-B of Figure 6 of the device and part of the battery cover, before fitting, in which the fitting system can be seen more clearly;
- 5 - Figure 7 shows a partial enlarged section view of part of the fitting system of Figure 5;
- Figure 8 shows an enlarged section view of another part of the fitting system shown in Figure 5;
- Figure 9 shows an enlarged section view of a part of the fitting system shown in
10 Figure 6;
- Figure 10 shows a lateral view of another embodiment of a device carried out according to the invention;
- Figure 11 shows a lateral view of a further embodiment of a device carried out according to the invention;
- 15 - Figure 12 shows an elevation view of the battery and the device of Figure 1 before fitting;
- Figures 13 to 16 each show a section along the horizontal plane A-A of Figure 1 of some parts of the system of the invention, during fitting of the device to the battery;
- Figure 17 shows an elevation view of the battery and the device once fitting has been
20 performed;
- Figure 18 shows a section view along the horizontal plane A-A of Figure 1 of the cover and the device once fitting has been performed;
- Figure 19 shows a lateral view of the battery cover and the device of Figure 1 once fitting has been performed, in the operating position;
- 25 - Figure 20 shows a section view of the cover and the device along the plane B-B of Figure 19;
- Figures 21 and 22 each show a view of an enlarged section of some parts of the fitting system when the device is arranged in the operating position shown in Figure 20;
- 30 - Figure 23 shows a lateral view of a further embodiment of a device carried out according to the invention.

By way of introduction, it should be noted that the same parts of the individual embodiments have the same reference numbers. If the position of an element is varied, the position indications given in the individual examples of embodiment must be
35 transferred to the new position.

Although the embodiments described herein refer to lead acid batteries, it is clear that the solution proposed can also be applied to other types of batteries.

A system for fitting a battery handling device 100 to a battery 500, subject of the invention, is shown in Figures 1 to 4.

5 In the case in point the battery 500 comprises a casing with a cover 501 to which the device 100 is applied, which closes a container 502 provided internally with a plurality of partition walls, not shown herein, to define the cells inside which the electrodes forming the elements of the battery are arranged, immersed in the electrolyte.

10 The device 100 comprises, as can be better seen in Figures 4, 5 and 6, part of a fitting system proposed and a gripping element 50 which, in the example of embodiment shown and as will be better seen below, consists of an element of the fitting system.

The fitting system shown furthermore allows the device 100 to rotate around a substantially horizontal axis 2 to move the gripping element 50, as will be better seen below, from a substantially horizontal rest position, shown in Figure 3, to at least one
15 operating position, one of which is shown in particular in Figures 1 and 2.

Said system, indicated as a whole by 1 in Figures 5 and 6, comprises at least one connection element 3 suitable for being accommodated in a corresponding housing 5.

In particular, in the embodiment shown there are two connection elements 3, joined by a spacer element 4 and suitable for being accommodated in as many equally spaced
20 housings 5.

Said housings 5 are obtained, in the embodiment shown, in the cover 501 of the battery 500.

According to the invention, the system 1 furthermore comprises guide means 6 suitable for guiding each element 3 during application of the device 100 to the battery 500, to
25 move it from its natural position and overcome a narrowing 10 of the housing 5, permitting insertion in the respective housing 5, with subsequent return to the natural position, thus obtaining anchoring of the device 100 to the battery 500.

It should be observed that, in the particular embodiment shown, the elastic movement of the elements 3 moves them away from each other.

30 As regards the connection elements 3, each of them comprises a substantially cylindrical body 7, shown in detail in Figure 7, provided at the two ends of the spacer element 4, whose length 8 is such as to enable it to be accommodated in the corresponding housing 5.

Each housing 5 comprises a cavity 9, substantially cylindrical and substantially coaxial
35 to the axis 2, which continues through the above-mentioned narrowing or first passage

10 of width 11, visible in detail in Figure 8, developing in the lateral part of the cavity 9, and through a second passage 12 of width 13, visible in detail in Figure 9, involving the upper part of the cavity 9.

It should be observed that the length 14 of the cavity 9 is greater than the width 11 and
5 13 of the passages 10 and 12 and that the width 11 of the first passage 10 is substantially equal to the length 8 of the body 7.

Since the length 14 of the cavity 9 is greater than the length 8 of the cylindrical body 7, in the transit area between cavity 9 and passages 10, 12, there are two shoulders or teeth, indicated respectively by the numbers 15 and 16, against which the connection
10 element 3 and in particular the cylindrical surface of the body 7 rest.

It should furthermore be observed, as will be better seen below, that the first passage 10 advantageously permits insertion in the cavity 9 of the element 3, while the second passage 12 advantageously permits rotation of the device 100 around the axis 2.

As regards the guide means 6, they comprise, in the embodiment shown, two
15 substantially flat surfaces 17 provided on the cover 501 of the battery 500, visible in detail in Figures 5 and 8, each of which develops on a plane crosswise to the axis of rotation 2.

The surfaces 17 are arranged near each housing 4 and in particular near the first passage 10.

20 As regards the spacer element 4, in the embodiment shown it is substantially U-shaped and comprises two substantially parallel parts 40, each provided at one end with a connection element 5 and having the other end integral with a part 41 crosswise to the others which, in the case in point, constitutes the gripping element 50.

The spacer element 4 is made of a material and/or in a shape such as to give the parts 40
25 an elasticity which, during application of the device 100 to the battery 500, keeps the connection elements 3 apart.

In a preferred embodiment of the invention, the spacer element 4 is made of moulded plastic.

It is clear that in other embodiments it can have a different geometrical shape, for
30 example the shape of an arc, and be made of another material.

Another embodiment of a device for the handling of a battery carried out according to the invention, indicated as a whole by number 101 in Figure 10, differs from the preceding one due to the fact that the gripping element 50 does not consist of a part of the fitting system 1.

35 A further embodiment of a device for the handling of a battery carried out according to

the invention, indicated as a whole by number 102 in Figure 11, differs from the preceding one due to the fact that the fitting system comprises three connection elements 3 provided on as many parts 40 or parallel arms. This advantageously permits increase in the lifting capacity of the device and selection of the areas of the battery most suitable for withstanding the stress during handling thereof.

Again advantageously, the system allows the third arm to be positioned also near the centre of the battery, resulting in greater balance during transport of the same.

Assembly of the device on the battery will be described below with reference to the first of the embodiments described, shown in Figures 1 to 9, there being no substantial differences with respect to the other embodiments.

A further embodiment of a device with a fitting system carried out according to the invention, indicated as a whole by 103 in Figure 23, differs from the preceding ones due to the fact that it comprises only one connection element 3 suitable for being accommodated in a corresponding housing 5.

According to the invention, on assembly the device 100 is positioned with the connection elements 3 facing the first passage 10, as shown in detail in Figure 12, and said device is moved towards the housings 5.

Said movement brings the connection elements 3 into contact with the plane 17 which, due to the elasticity of the element 3 and/or of the spacer element 4, gradually moves each of the elements 3 away from their natural rest position, as shown in detail in Figures 13 and 14, until they are aligned with the corresponding first passage 10.

Continuing its movement, the connection element 3 crosses the first passage 10 and reaches the cavity 9, overcoming the first shoulder or tooth 15. This causes elastic return to the initial position of the two connection elements 3, which are thus positioned at the initial distance which is shorter than the distance between the first two passages 10, obtaining snap fitting of the device 100, as shown in Figures 16 and 17.

As can be observed, any attempt to extract the device 100 by moving it in a direction opposite to the previous one is hindered by the first shoulder 15 or tooth, as can be seen in Figures 16 and 18; the shoulder 15 counteract the surface of the body 7 and, once fitting has been obtained, prevents the element 3 from coming out of the housing 5.

Once the fitting has been obtained, the device 100 can rotate around the axis 2 to be set, for example, to the vertical operating position shown in Figures 19 and 20.

In said position the user can hold the device 100 by gripping the element 50 and then raise and handle the battery 500.

In said situation the second shoulder 16 prevents the element 3 from coming out of the

housing 5 in addition to supporting the weight of the battery 500.

The solution advantageously comprises two separate shoulders 15 and 16 provided on opposite parts of the same seat 5, which perform the same functions in different situations, more precisely each of them is respectively suitable for preventing the
5 element 3 from coming out of the seat 5 when the device is in the horizontal position and when the battery is lifted/transported.

In this regard it should be furthermore observed that, as can be seen also in the enlarged views of Figure 21 and 22, since the width 13 of the second passage 12 is narrower than the length 8 of the cylindrical body 7, even a possible movement of the body 7 inside
10 the cavity 9 would not cause the connection element 3 to come out of the housing 5.

This also advantageously permits a certain slack to be maintained in the coupling between the body 7 and the cavity 9 which allows for reduction of the friction that develops during rotation of the device 100 around the axis 2, facilitating the movement thereof.

15 It should furthermore be observed that advantageously the device 100 can be fitted to the battery also by setting the device 100 to an initial position different from the horizontal one shown. The fitting can in fact be obtained also by setting the device 100 to a different initial position with respect to the axis 2, for example the vertical position. Here again the user only has to position the elements 3 at the level of each seat 5 and
20 move the device 100 bringing the elements 3 towards the respective housings 5, to obtain the above.

If necessary, to release the device 100 from the battery 500, the user must use a tool, moving the connection elements 3 away from each other until they are aligned with the respective first passages 10, and simultaneously move the device 100 in the direction
25 opposite the previous one.

A further embodiment of the fitting system not shown herein differs from the preceding ones due to the fact that the connection elements are provided on the cover and/or on the container of the battery and the corresponding housing is integral with the device. From the above it is clear that, in said case, during application of the device to the battery, it is
30 the housings 5 that move away from each other and not the connection elements 3.

A further embodiment of the invention not shown herein differs from the preceding ones due to the fact that the first passages 10 are positioned at a distance from each other that is shorter than the distance between the corresponding connection elements 3. In this case the guide means 6 act during fitting of the device to the battery, moving the
35 two connection elements 3 and/or the housings 5 closer until they are aligned with the

respective first passages 10 and/or with the respective connection elements 3.

From what has been said, it is clear that the solution proposed eliminates the drawbacks described above and achieves the set objects.

It is clear that the dimensions and shapes of the various components of the fitting
5 system, of the device and of the battery can vary.

The descriptions provided have furthermore shown that application of said handle 3 to the cover 2 is easy and can be performed without the use of any tools, and can be easily automated, also on the production line.

It has advantageously been found that, given the configuration of the connection
10 elements 3 and the seats 5, the device can be easily lifted and gripped by the user.

It should furthermore be observed that it is advantageously possible, as shown also in the examples of embodiment illustrated in the attached drawings, to make in the cover and/or in the container of the battery a compartment suitable for accommodating the device, when it is in the rest position, reducing the overall dimensions thereof.

Lastly it should be observed that the housings 5 and/or the connection elements 3 can be
15 easily obtained by appropriately shaping the mould in which the cover and/or the container of the battery is produced; likewise, it is easy to see that the device and the fitting system proposed are simple to carry out.

It should furthermore be observed that the points for anchoring the fitting system to the
20 battery can be located in any area of the cover 501 and/or of the container 502, and in particular can be positioned, as in the examples of embodiment shown in the attached figures, between one cell and another of the battery or well away from the seals, thus reducing the risk of damaging said seals during handling.

Although the invention has been described with reference to the attached drawings, it
25 can undergo modifications during production, all falling within the same inventive concept expressed in the following claims and therefore protected by the present patent.

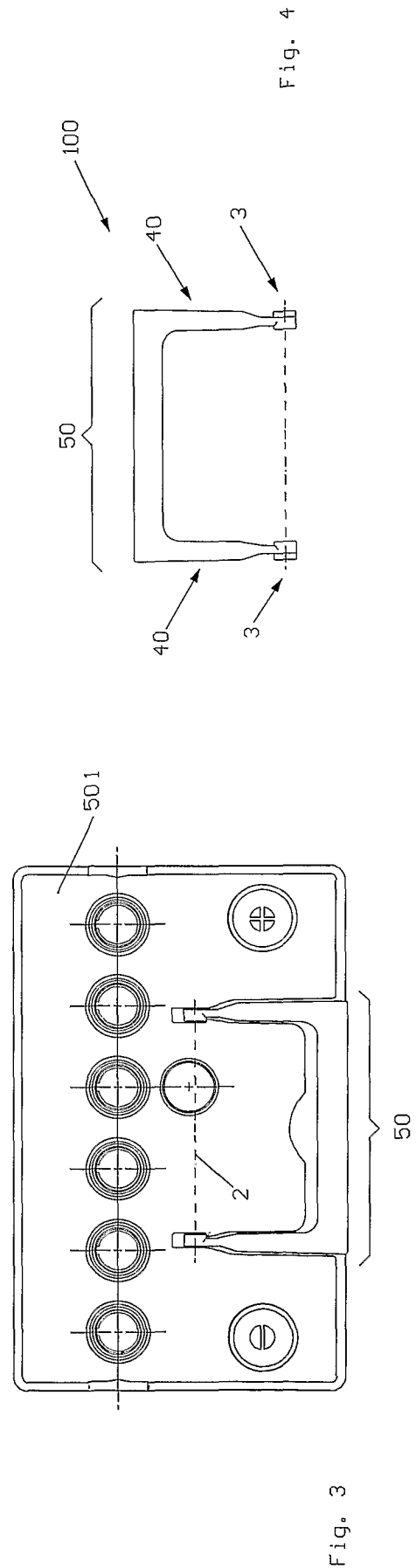
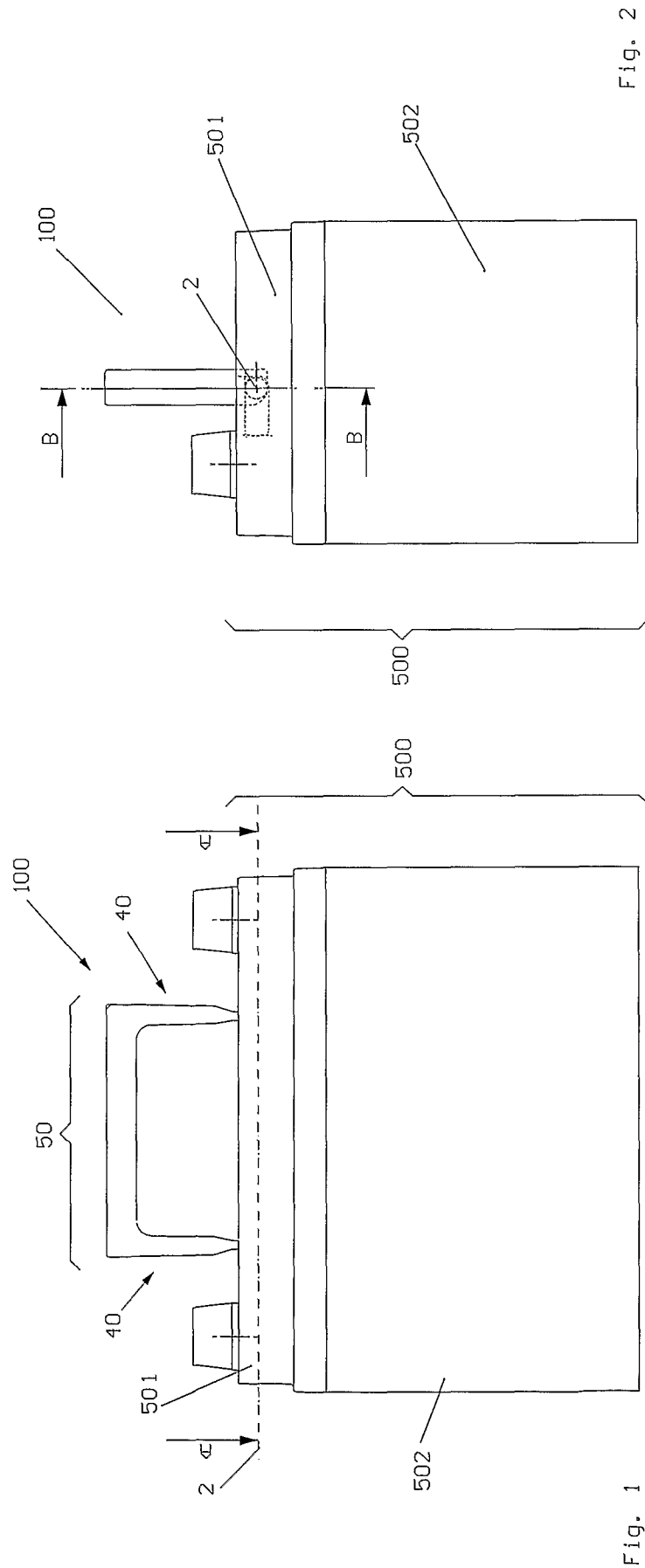
CLAIMS

- 1) System for fitting to a battery (500) a device (100, 101, 102) for the handling of said battery, comprising at least one connection element (3) suitable for being accommodated in at least one housing (5), **characterised in that** it furthermore
5 comprises guide means (6) suitable for guiding said at least one connection element (3) during application of said device (100, 101, 102) to said battery (500) to move it from its natural position and overcome a narrowing (10) of said at least one housing (5), permitting insertion thereof in said at least one housing (5) with subsequent return to the natural position.
- 10 2) System for fitting to a battery (500) a device (100, 101, 102) for the handling of said battery, comprising at least one connection element (3) suitable for being accommodated in at least one housing (5), **characterised in that** said at least one connection element (3) snap-fits into said at least one housing (5), allowing said device to rotate around at least one axis (2) and to be moved from at least one rest
15 position with minimum overall dimensions to at least one second operating position suited to permit gripping thereof.
- 3) System (1) for fitting to a battery (500) a device (100, 101, 102) for the handling of said battery, comprising at least two housings (5) joined to each other by a spacer element (4), said housings being suitable for accommodating as many connection
20 elements (3) substantially equally spaced from each other, **characterised in that** it also comprises guide means (6) suitable for moving apart or moving near each other said at least two connection elements (3) during application of said device (100, 101, 102) to said battery (500), to permit the insertion of said connection elements (3) in the respective housings (5).
- 25 4) System (1) for fitting to a battery (500) a device (100, 101, 102) for the handling of said battery (500), comprising at least two connection elements (3) joined to each other by a spacer element (4), said connection elements (3) being suitable for being accommodated in as many housings (5) substantially equally spaced from each other, **characterised in that** it also comprises guide means (6) suitable for moving
30 apart or moving near each other said housings (5) during application of said device (100, 101, 102) to said battery (500), to permit insertion of the respective connection elements (3).
- 5) System according to claim 1) or 2) or 3) or 4), **characterised in that** said at least one or two connection elements (3) comprise a substantially cylindrical body (7)
35 suitable for being accommodated in the corresponding housing (5).

- 6) System according to claim 1) or 2) or 3) or 4) or 6), **characterised in that** said at least one or two housings (5) comprise a cavity (9) which continues through a first passage (10) developing in the lateral part of said cavity (9), suitable for permitting insertion in said cavity (9) of said corresponding element (3), and through a second passage (12) involving the upper part of said cavity (9), suitable for permitting the rotation of said device around an axis (2).
- 7) System according to claim 6), **characterised in that** the length (14) of said cavity (9) is greater than the width (11, 13) of said passages (10, 12) thus forming in the transit area between said cavity (9) and said passages (10, 12) two shoulders or teeth (15, 16) suitable for counteracting said connection element (3), once fitting has been performed, to prevent it from coming out of said housing (5).
- 8) System according to claims 5) and 6) or 5) and 7), **characterised in that** the width (11) of said first passage (10) is substantially equal to the length (8) of said body (7).
- 9) System according to any of the preceding claims, **characterised in that** said guide means (6) comprise at least one surface (17) cooperating by contact with said at least one or two connection elements (3) or with said one or two housings (5).
- 10) System according to claim 9), **characterised in that** said at least one surface (17) is arranged in the vicinity of said housing (5).
- 11) System according to claims 6) and 9), **characterised in that** said at least one surface (17) is arranged in the vicinity of said first passage (10).
- 12) System according to claim 3) or 4), **characterised in that** said spacer element (4) comprises at least one part (41) connected to the ends of other two substantially parallel parts (40), each provided at one end with at least one of said at least one or two connection elements (3) or at least one of said one or two housings.
- 13) System according to claim 12), **characterised in that** said spacer element has an elasticity such as to allow said at least two connection elements and/or at least one of said housings to be elastically moved together or apart.
- 14) System according to any of the preceding claims, **characterised in that** it has at least one rotation axis (2) for said device to allow said device to move from at least one rest position with minimum overall dimensions to at least one second operating position to permit gripping thereof.
- 15) System according to claims 1) and 6) or 2) and 6) or 6) and 14), **characterised in that** said cavity (9) is substantially coaxial to the rotation axis (2) of said device.
- 16) Device (100, 101, 102) for handling a battery (500), comprising at least one

gripping element (50) and a system for fitting to said battery, **characterised in that** said fitting system (1) is produced according to the contents of any of the preceding claims.

- 17) Device according to claim 16), **characterised in that** said at least one or two
5 connection elements (3) are integral with said device and said at least one or two housings (5) are integral with said battery (500).
- 18) Device according to claim 1) or 2) or 3) or 4), **characterised in that** said at least one or two housings are integral with said device and said at least one or two connection elements are integral with said battery.
- 10 19) Device (100) according to claim 16) or 17) or 18), **characterised in that** said gripping element (50) consists at least partially of a part of said spacer element (4).
- 20) Battery (500), comprising a casing and a device for the handling thereof, **characterised in that** said device is applied to said battery by means of a fitting system (1) according to any of the claims from 1) to 15).
- 15 21) Battery according to claim 20), **characterised in that** said casing has a compartment suitable for accommodating said device (100, 101, 102) when the latter is arranged in said rest position, reducing the overall dimensions thereof.
- 22) Battery (500) according to claim 20), **characterised in that** said fitting system is provided partly on the cover (501) or the container (502) of said casing.
- 20 23) Battery (500) according to claims 20) or 21) or 22), **characterised in that** the parts of said fitting system provided on said battery are positioned between one cell and another of said battery and/or well away from the sealed areas of said battery.
- 24) Battery (500) comprising a casing and a device for the handling thereof, **characterised in that** said device is produced according to any of the claims from
25 16) to 19).



2/7

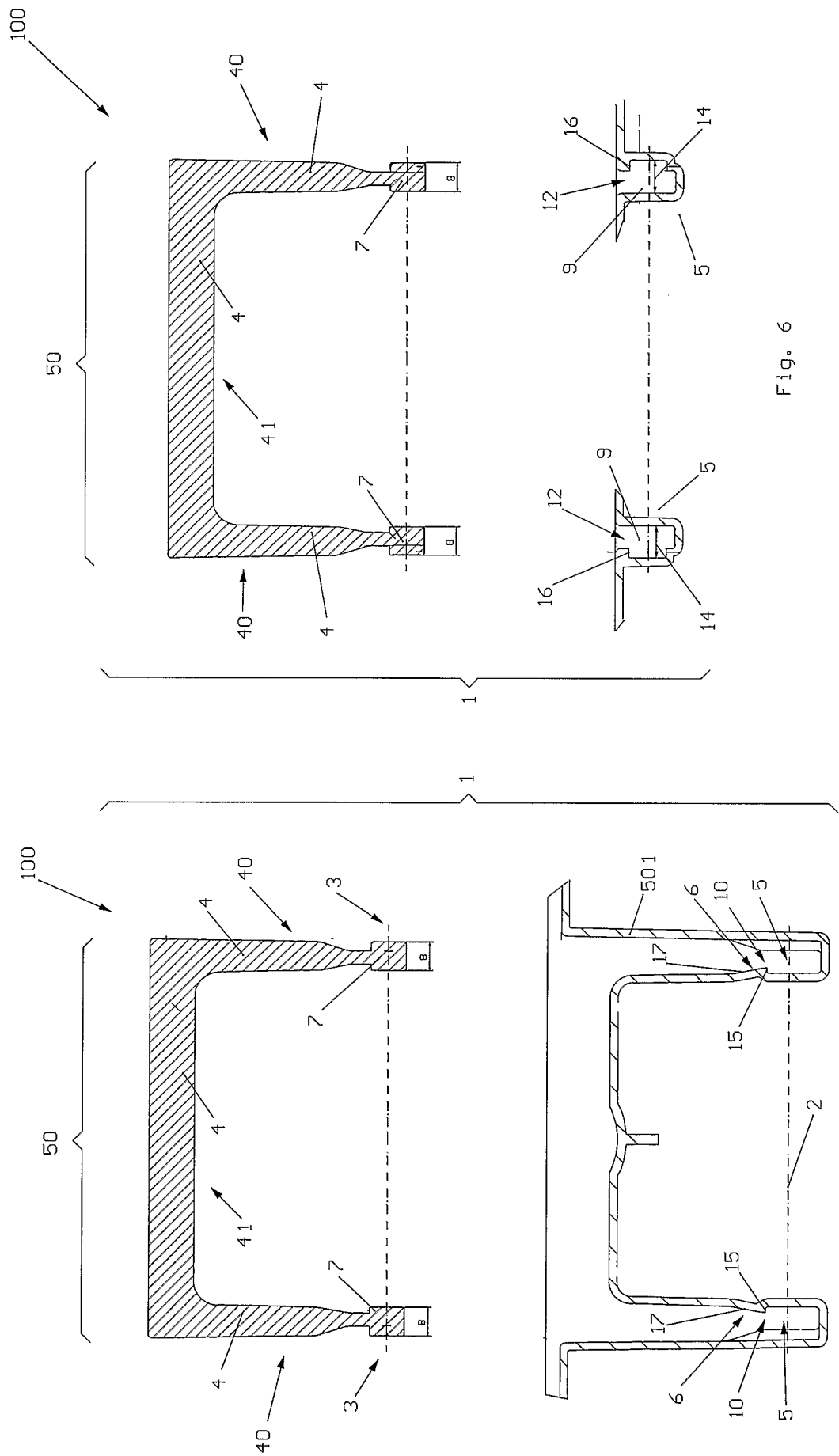
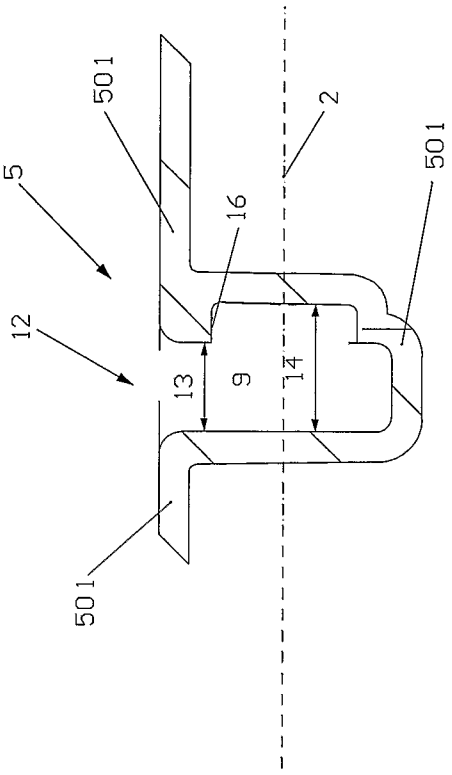
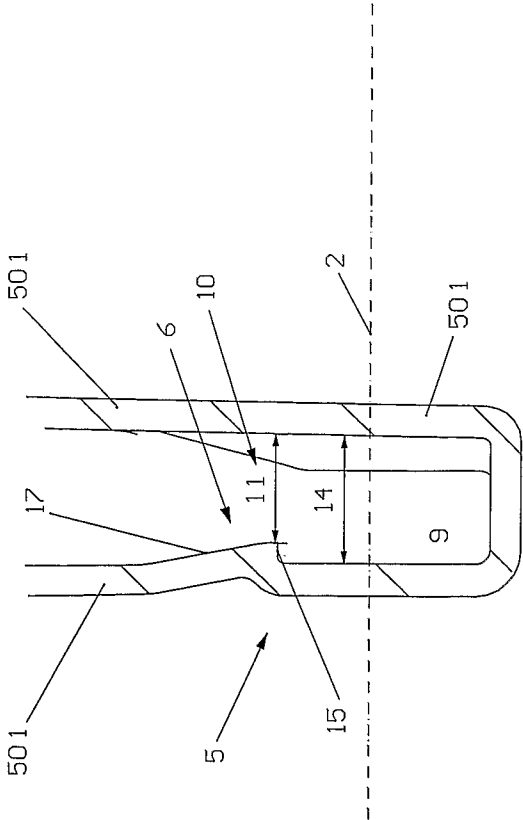
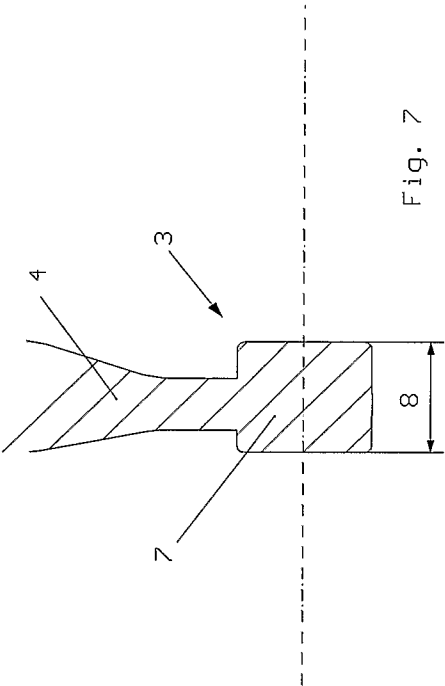
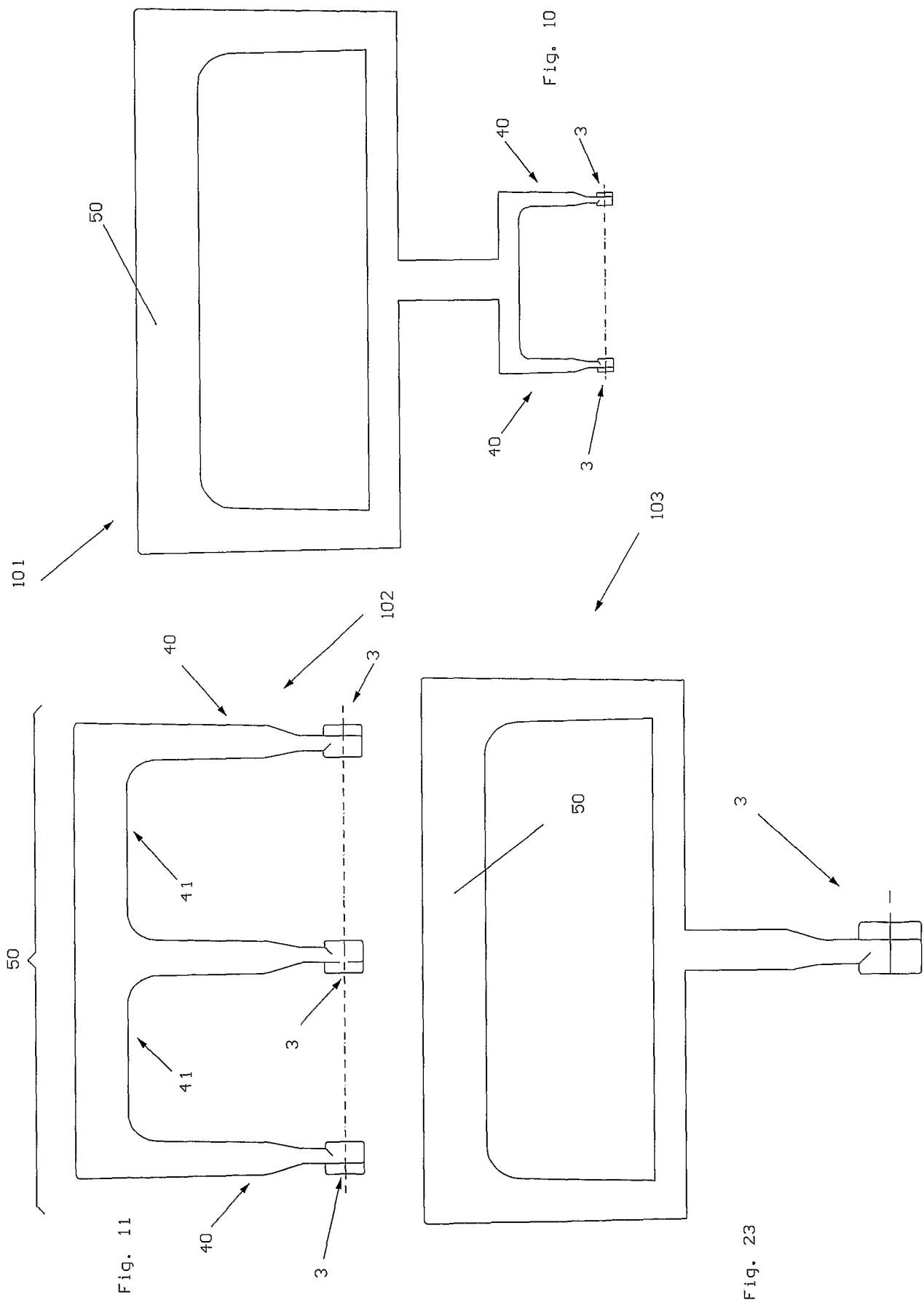
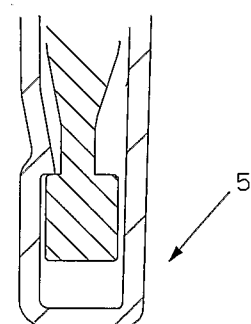
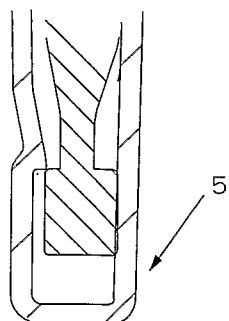
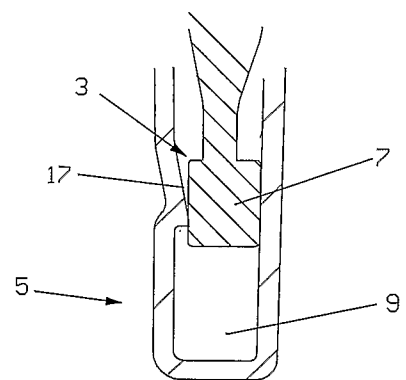
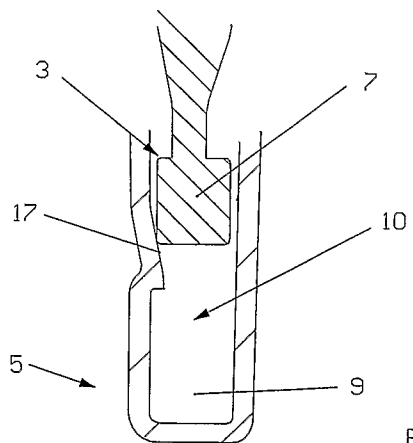
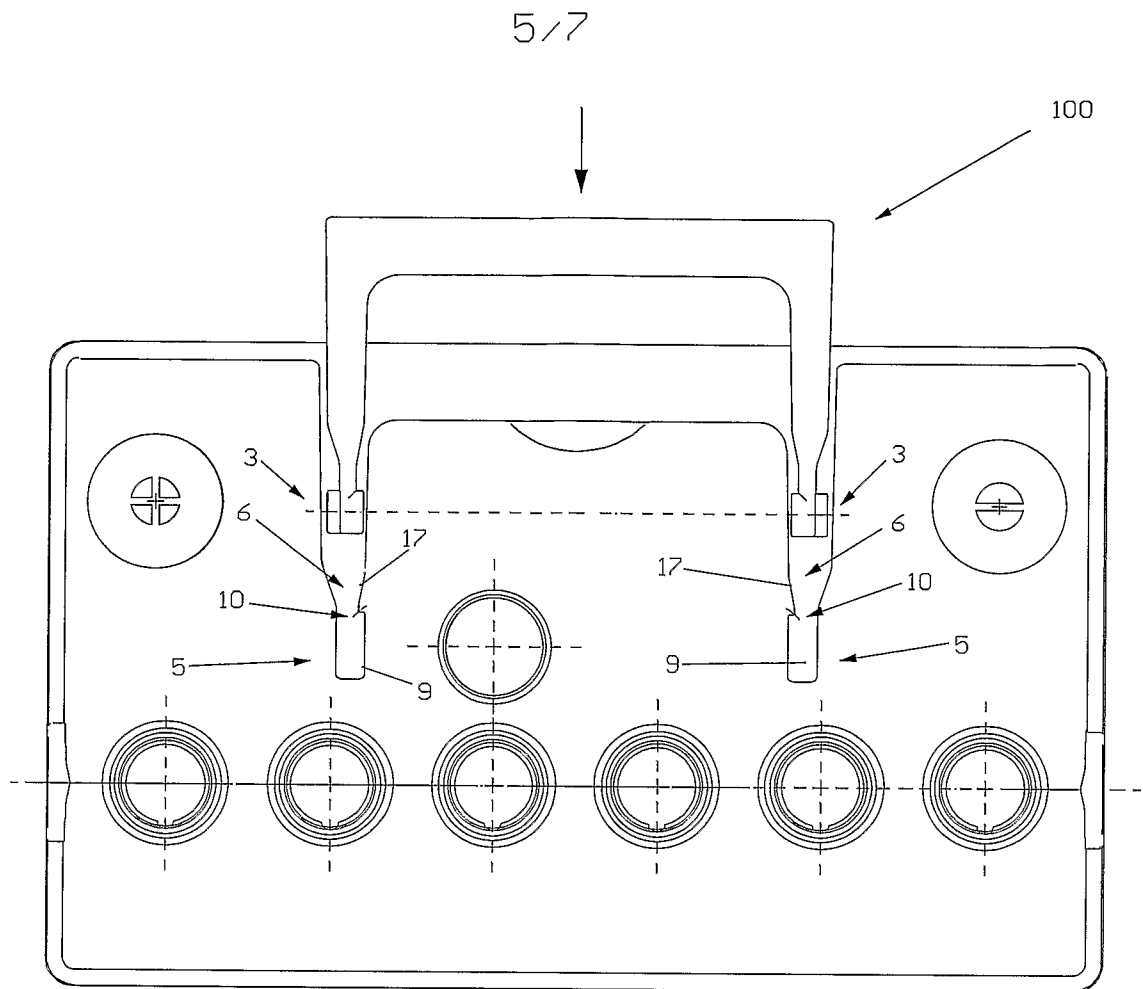


Fig. 6

Fig. 5







6/7

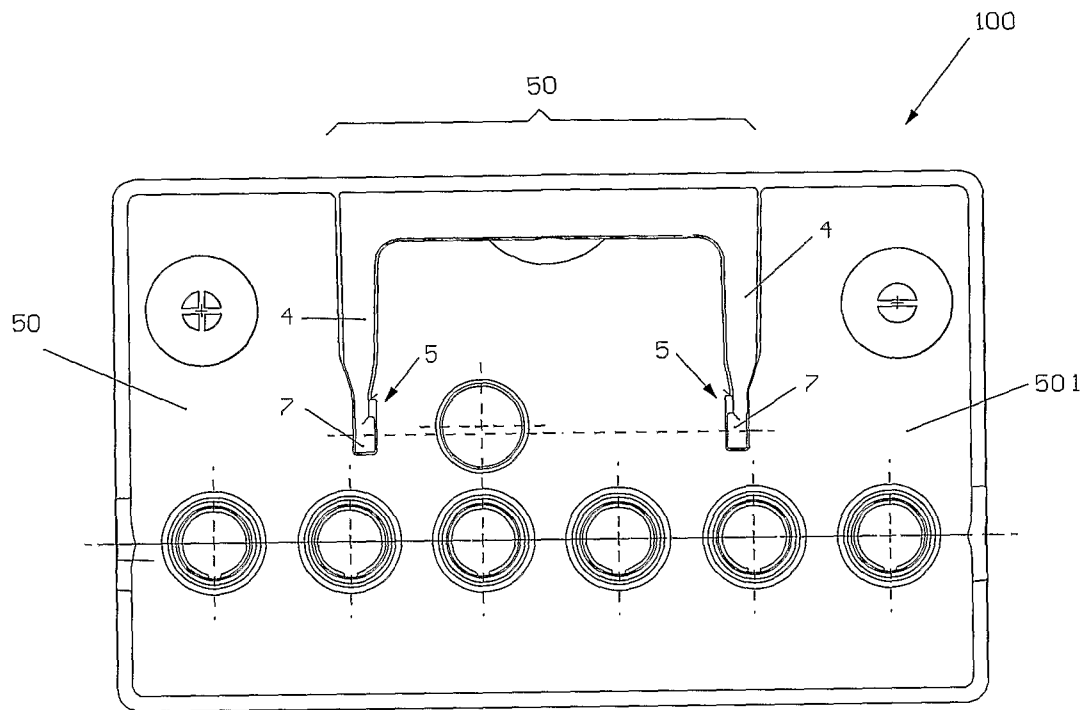


Fig. 17

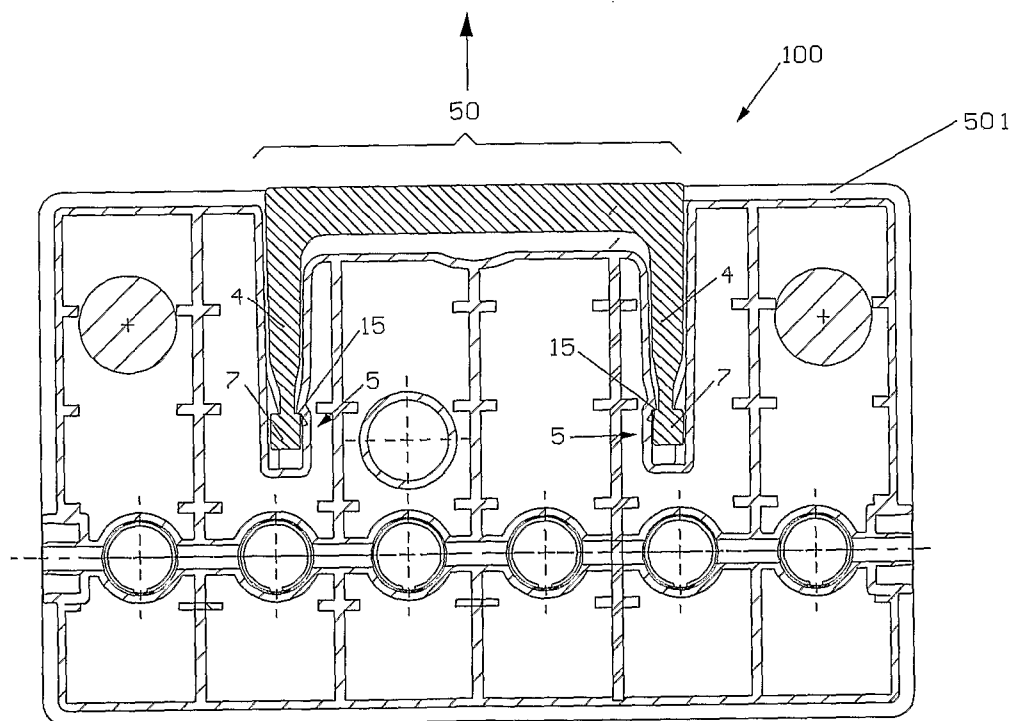


Fig. 18

7/7

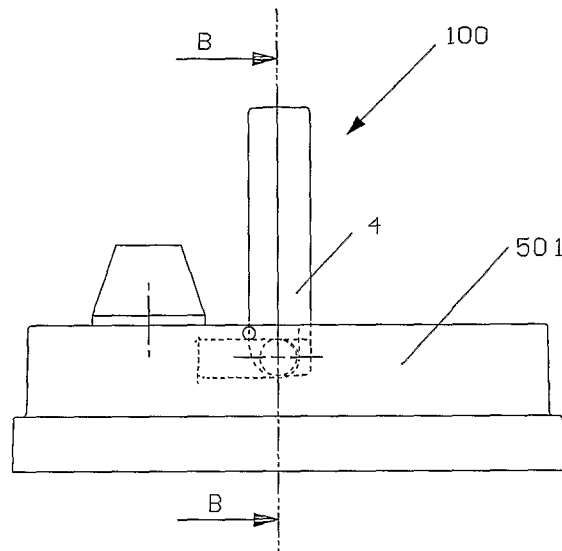


Fig. 19

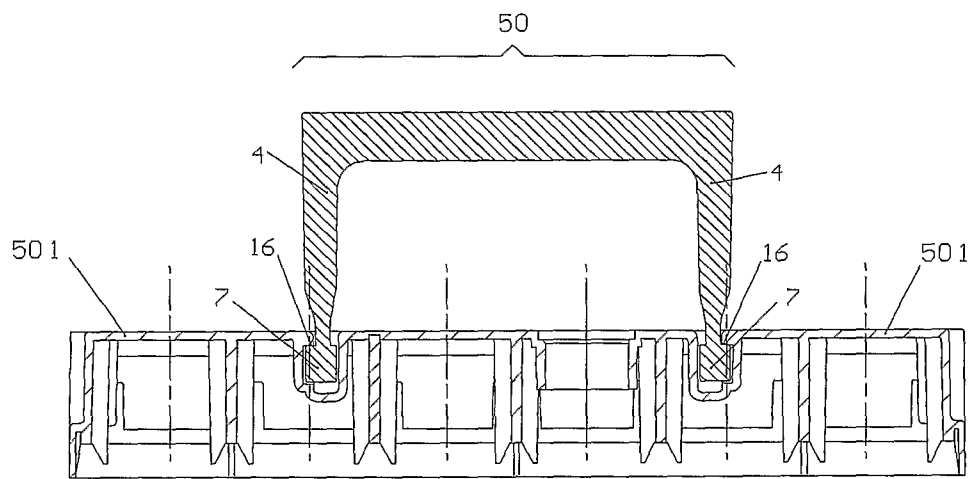


Fig. 20

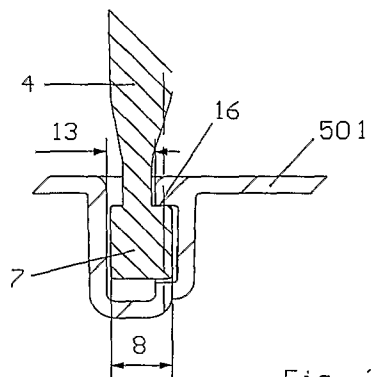


Fig. 21

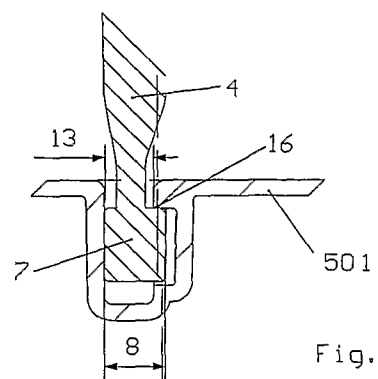


Fig. 22

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2006/002729

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01M2/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 022 638 A (HORTON ANTHONY R [US] ET AL) 8 February 2000 (2000-02-08) column 2, line 45 - line 67 figures 7-9	1,2,5-24
X	JP 61 250967 A (MATSUSHITA ELECTRIC IND CO LTD) 8 November 1986 (1986-11-08) abstract	3-25
X	US 1 574 790 A (CARROLL LEO F) 2 March 1926 (1926-03-02) the whole document	4-25
X	FR 2 681 981 A1 (BAROCLEM SA [FR]) 2 April 1993 (1993-04-02) figures 1-3	1-4,18
	-/--	

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 January 2007

Date of mailing of the international search report

24/01/2007

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Standaert, Frans

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2006/002729

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 752 543 A (ANDERSON CARL J [US] ET AL) 21 June 1988 (1988-06-21) claim 1 -----	1-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2006/002729

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6022638	A	08-02-2000	AU 6799598 A NZ 330394 A	26-11-1998 28-01-2000
JP 61250967	A	08-11-1986	NONE	
US 1574790	A	02-03-1926	NONE	
FR 2681981	A1	02-04-1993	NONE	
US 4752543	A	21-06-1988	NONE	