



(51) International Patent Classification:

H02J 7/00 (2006.01)

(21) International Application Number:

PCT/CN2019/076447

(22) International Filing Date:

28 February 2019 (28.02.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

19120143.3

27 February 2019 (27.02.2019)

HK

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(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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,

(54) Title: A DEVICE FOR MANAGING RECHARGEABLE BATTERIES AND A BATTERY CHARGING SYSTEM COMPRISING SAID DEVICE

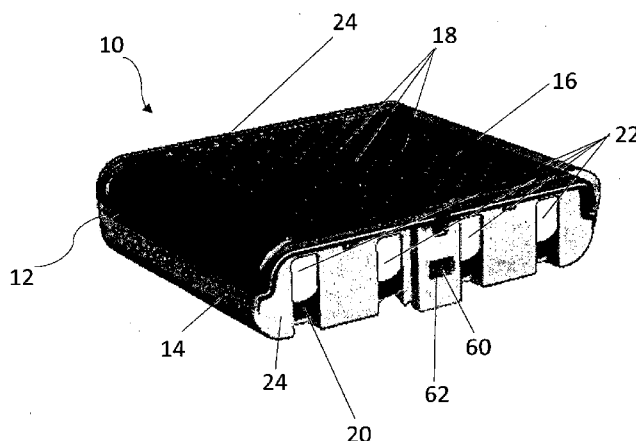


FIG. 1

(57) Abstract: The invention provides a device for managing rechargeable batteries, comprising: a housing having a base portion defining a chamber for receiving and accommodating one or more rechargeable batteries; wherein the base portion comprises one or more pairs of contact portions oppositely arranged at two facing side walls of the housing, thereby when the one or more rechargeable batteries are received and accommodated in the chamber, the contact portions allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging.



GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

A Device For Managing Rechargeable Batteries And A Battery Charging System Comprising Said Device

Technical Field

[0001] The invention relates to the field of battery, and more particularly, to the managing a plurality of rechargeable batteries.

Background Art

[0002] Rechargeable batteries in their various forms including different sizes, shapes, configurations and electrochemical types are commonly used to supply electric power for electrical appliances and devices. Among them, rechargeable battery cells such as nickel-cadmium (NiCd), nickel-metal hydride (NiMH), lithium-ion (Li-ion) and rechargeable alkaline batteries are popular among battery users, especially for their use with portable electronic devices in view of their relatively high energy density, affordability as well as the wide selection of battery sizes available. For example, rechargeable batteries such as NiMH batteries are known to be widely used by professional photographers in relatively large quantity for powering their photographic equipment such as digital cameras, camera flash lights and flash triggers, etc. One common problem encountered by the photographers with their use of rechargeable batteries is that, in order to provide sufficient electric power for their photographic equipment during a photo-shooting event, it may generally take up to about 20-30 rechargeable batteries, and the number of the rechargeable batteries required may even increase to about 50-60 for a photo-shooting over an extended period such as, for a wedding event, for example. It is therefore understood that it would be difficult and inconvenient for one to carry around and to manage such a large number of rechargeable batteries, let alone the need for the photographer to readily distinguish the used, flat batteries from those which are unused, i.e. new or recharged among the tens of the batteries. The separation among the used/flat and the recharged batteries is of particular importance as the use of a mixture of charged and used/flat batteries may not only reduce performance of the electric appliances, but may even cause damage to the electric appliances as well as the rechargeable batteries themselves. It also presents a challenge for the battery users to systematically organized, stored and managed a large number of individual rechargeable batteries, especially if the user, such as a photographer as abovementioned, is required to travel around and be moving from place to place.

Summary of Invention

Technical Problem

- [0003] An object of the invention is to provide a novel solution for one to manage, organize and/or recharge one or more rechargeable batteries.
- [0004] A further object of the invention is to mitigate or obviate to some degree one or more problems associated with known means for storing and/or recharging rechargeable batteries, or at least to provide a useful alternative.
- [0005] The above objects are met by the combination of features of the main claims; the sub-claims disclose further advantageous embodiments of the invention.
- [0006] One skilled in the art will derive from the following description other objects of the invention. Therefore, the foregoing statements of object are not exhaustive and serve merely to illustrate some of the many objects of the present invention.

Solution to Problem

Technical Solution

- [0007] In a first main aspect, the invention provides a device for managing rechargeable batteries. The device comprises a housing having a base portion defining a chamber for receiving and accommodating one or more rechargeable batteries; wherein the base portion comprises one or more pairs of contact portions oppositely arranged at two facing side walls of the housing, thereby when the one or more rechargeable batteries are received and accommodated in the chamber, the contact portions allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging.
- [0008] In a second main aspect, the invention provides a charging system for batteries. The charging system comprises an electric charging unit comprising a charging base having one or more sets of charging electrodes; and the device for managing rechargeable batteries according to the first main aspect; wherein the charging base is configured to snugly receive the device to thereby allow electric connection between the one or more sets of charging electrodes and the one or more received rechargeable batteries for electric charging.
- [0009] In a third main aspect, the invention provides a method of manufacturing a device for managing rechargeable batteries. The method comprises providing a housing having a base portion movably connected with at least one cover portion, the cover portion being movable between an open configuration and a close configuration to define a chamber for receiving and accommodating one or more rechargeable batteries; and providing one or more pairs of oppositely arranged contact portions at two facing side walls of the housing, such that when the one or more rechargeable batteries are received and accommodated in the chamber, the contact portions allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging.

Advantageous Effects of Invention

Brief Description of Drawings

Description of Drawings

- [0010] The foregoing and further features of the present invention will be apparent from the following description of preferred embodiments which are provided by way of example only in connection with the accompanying figures, of which:
- [0011] Figure 1 is a front perspective view of an embodiment of a device for managing rechargeable batteries according to the present invention;
- [0012] Figure 2 is a rear perspective view of the device of Figure 1;
- [0013] Figure 3 is a front perspective view of the device of Figure 1 with a cover portion at an open configuration;
- [0014] Figure 4 is a front perspective view of the device of Figure 3 with the cover portion at a close configuration;
- [0015] Figure 5 shows the receiving of the device of Figure 1 into an electric charging unit;
- [0016] Figure 6 shows another embodiment of the device and the electric charging unit;
- [0017] Figure 7 is a cross-sectional view showing an indicating means of the device of Figure 1 with the cover portion at a close configuration;
- [0018] Figure 8 is another cross-sectional view showing the indicating means of Figure 7 when the cover portion is at an open configuration;
- [0019] Figure 9 shows an embodiment of the electric charging unit having a triggering means;
- [0020] Figure 10 shows the electric charging unit of Figure 9 with the device being received therein;
- [0021] Figure 11 shows the indicating means of the device of Figure 10 after the device is received into the electric charging unit;
- [0022] Figure 12 shows another embodiment of the electric charging unit according to the present invention;
- [0023] Figure 13 shows a third embodiment of the device for managing rechargeable batteries according to the present invention;
- [0024] Figure 14 shows a fourth embodiment of the device for managing rechargeable batteries according to the present invention, with two of said devices being connected to form an device assembly;
- [0025] Figure 15 is a front view showing the device assembly of Figure 14;
- [0026] Figure 16 shows a further embodiment of the device assembly according to the present invention;
- [0027] Figure 17 shows an exemplified use of the device of Figure 1 with a cordless camera flash unit; and

[0028] Figure 18 shows the simultaneous charging of rechargeable batteries accommodated in a plurality of the devices of Figure 1 at an electric charging unit.

Mode for the Invention

Mode for Invention

[0029] The following description is of preferred embodiments by way of example only and without limitation to the combination of features necessary for carrying the invention into effect.

[0030] Reference in this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Moreover, various features are described which may be exhibited by some embodiments and not by others. Similarly, various requirements are described which may be requirements for some embodiments but not other embodiments.

[0031] Referring to Figs. 1 to 4, shown is a device 10 for storing, managing and/or organizing batteries, as well as to facilitate charging or recharging of one or more rechargeable batteries. The batteries can be of any known types such as, but are not limited to, nickel-cadmium (NiCd) batteries, nickel-metal hydride (NiMH) batteries, lithium-ion (Li-ion) batteries, rechargeable alkaline batteries or the like. Despite the references to "rechargeable batteries" in certain embodiments herein described, it is readily understood that the device 10 may also be applicable for storing, managing and/or organizing any other types of battery other than a rechargeable battery, such as non-rechargeable, primary batteries which are generally designed to be used once and be discarded after use. The present invention therefore shall not be limited to its use with rechargeable batteries only.

[0032] It will also be appreciated by a skilled person in the relevant art that the present invention shall not be restricted to batteries or rechargeable batteries of any specific shapes, sizes and/or electrochemical types. Particularly, although the use of the device 10 with cylindrical batteries in AA and AAA cell sizes are illustrated and described, any corresponding variations to the size, shape and configuration of the device 10 for receiving and accommodating other battery types such a prismatic battery and/or a C or D size cylindrical battery, etc. shall also be encompassed.

[0033] Preferably, the device 10 comprises a housing 12 having a base portion 14 which defines a chamber 20 for receiving and accommodating one or more batteries such as rechargeable batteries. The housing 12 may further comprise at least one cover portion

16 movably connected with the base portion 14. Particularly, the cover portion 16 is configured such that it is movable between an open configuration and a close configuration relative to the base portion 14 to thereby open and close the housing 12. In the embodiment as shown in the figures, the cover portion 16 is slidably connected with the base portion 14 to allow the housing 12 be opened and closed via a sliding motion of the cover portion 14 relative to the base portion 12. Yet it is readily understandable that any other movable connections between the base portion 14 and the cover portion 16, such as via one or more hinge joints, for example, shall also be encompassed by the present invention.

[0034] In one embodiment, the cover portion 16 may optionally comprise one or more apertures and/or air passageways 18 for heat dissipation when the received batteries are under charging and/or discharging, for example. The cover portion 16 may also be provided with a locking means (not shown) for locking the cover portion 16 with the base portion 14 when the cover portion is at its close configuration.

[0035] Preferably, the base portion 14 may comprise one or more pairs of contact portions 22 oppositely arranged at two facing side walls 24 of the housing 12, whereby when the one or more rechargeable batteries are received and accommodated in the chamber 20, the contact portions 22 is adapted to allow electric connection of the received rechargeable batteries with an external circuit for recharging and/or discharging such as, when the device 10 is received and positioned in an electric charging unit 50 for recharging the batteries, as shown in Fig. 5, for example. In one embodiment, the contact portions 22 may comprise one or more conductive parts or elements adapted to facilitate electric connection of the positive and negative electrodes of the received rechargeable batteries with the respective positive and negative charging terminals of the electric charging unit 50. More preferably, the contact portions 22 may comprise one or more through holes 22 appropriately sized to expose the anodes and cathodes of the received batteries from the housing 12, as shown in Figs. 1 to 5, to thereby allow electric contact of the battery electrodes with the corresponding charging terminals of the electric charging device 50.

[0036] Preferably, the contact portions 22 such as the through holes 22 of the base portion 14 are arranged to be in alignment, such as being aligned along each of the two facing side walls of the base portion 14 in forming, for example, four opposing pairs as shown in the figures, such that when four rechargeable batteries are received and are positioned in the chamber 20, the batteries are aligned in parallel with on another with the electrodes being arranged to face, engage and/or be exposed via the corresponding through holes 22.

[0037] In one embodiment, the electric charging unit 50 can be provided in the form of a portable electric charger, as shown in Fig. 5, which may comprise a charging base 52

having one or more sets of charging terminals 54 adapted to electrically connect with the corresponding, one or more sets of anodes and cathodes of the rechargeable batteries received in the device 10 when the device 10 is positioned at the charging base 52. The charging terminals 54 may optionally be configured to be extendable in a direction, such as towards the direction of the respective contact portions 22 of the device 10 when the device 10 is received at the charging base 52 to thereby facilitate and/or enhance electric contacts with the accommodated batteries. In one further embodiment, the electric charging unit 50 can be configured such that the one or more sets of charging terminals 54, such as the terminal sets 54a as shown in Fig. 6, be provided at an extendable platform 55 to allow adjustability of the distance between the two opposite terminal sets 54a and 54b so as to customize the charging base 52 for receiving a device 10 with smaller sized batteries, such as the AAA size batteries. Alternatively, one or more terminals 54 of the terminal sets 54a or 54b can be configured to be independently extendable to allow the conducting terminals 54 be extended towards or optionally, into the housing 12 of the device 10 to facilitate electric connection with the accommodated batteries.

[0038] The charging base 52 is preferred to be configured to conform substantially in shape with the exterior of the device 10, and specifically, with the exterior of the base portion 14 of the housing 12 whereby the device 10 can be snugly received and be positioned at the charging base 52. The conformity in shape and thus the close fitting between the charging base 52 and the base portion 14 of the device 10 facilitates matching in position between the contact portions 22 of the device 10 with the corresponding charging terminals 54 of the charging base 52 and thus, electric connections between the charging unit 50 and the rechargeable batteries accommodated in the device 10. The conformity in shape also allows a secure positioning of the device 10 at the charging unit 50, which is of particular importance during an electric charging. In one further embodiment, it is also preferred for the housing 12 of the device 10 be configured such that, when the device 10 is placed or received at the charging base 52, the upper part of the cover portion 16 is allowed to substantially flash with the uppermost side of the charging unit 50. This is beneficial in providing a more compact, streamlined structure of a charging system comprising the device 10 and the electric charging unit 50, especially when the charging system can be further modified or configured with a power outlet, such as by having a USB output at the housing of the charging unit 50 to allow the charging system be utilized as a portable power bank, for example.

[0039] Turning back to the structure of the device 10, in one embodiment, it is preferred for the device 10 to comprise at least one indicating means 60 arranged at the housing 12. The indicating means 60 can be actuated to display at least a first sign representing a

first condition of the housing 12, and/or a second sign representing a second condition of the housing 12. The first sign and the second sign may comprise different colors, patterns, marks and/or logos. For example, the first sign and the second sign may comprise different, contrasting colors which can be readily viewable and distinguishable by a user, such as a red color or a red-colored mark for the first sign, and a green color or a green-colored mark for the second sign. In one specific embodiment, the red-colored first sign can be used to indicate that one or more of the stored batteries have been exploited or used, while the green-colored second sign can be used to indicate that the stored batteries have been recharged or arranged for recharging, for example.

[0040] In the embodiment as shown in the figures, the indicating means 60 is actuatable to display either one of the first sign, such as a red color, and the second sign, such as a green color. More particularly, the indicating means 60 can be actuated automatically by movement of the cover portion 16 from the close configuration to the open configuration to display the first sign, for example. The red, first sign can be readily visible by the user to signify that the cover portion 16 of the housing 12 has been opened, which may imply that the stored batteries have been altered or used, for example.

[0041] In one embodiment, the first and/or the second signs can be displayed via a window 62 at the housing 12 such that the first and/or the second signs are visible from an exterior of the housing 12. The window 62 may comprise an opening and/or a transparent or translucent screen for the first and/or the second signs located at or behind it be visible by the user. Nevertheless, a person skilled in the art will appreciate that the window 62 shall not be limited to a mechanical type of window for displaying the first and/or second signs therethrough, but any other known display mechanisms such as electrically and/or thermally controlled displays, shall also be encompassed.

[0042] Preferably, for the indicating means 60 as being actuatable automatically by movement of the cover portion 16, the cover portion 16 can be configured to comprise a protruding member 17, such as one provided in the form of a tapered driving rib 17 as shown in Figs. 7 and 8. Particularly, the protruding, driving rib 17 is adapted to engage the indicating means 60, such as to slidably engage the indicating means 60 to thereby displace the indicating means 60 or a part of the indicating means 60 when the cover portion 16 is moved from the close configuration (Fig. 7) to the open configuration (Fig. 8). For example, in the embodiment as shown in the figures, movement of the cover portion 16 from the close configuration to the open configuration renders the tapered driving rib 17 in moving towards a movable member such as a flag 66 of the indicating means 60. The flag 66 may comprise or carry the first and the second signs at a side facing the window 62, and that the first and the

second signs are longitudinally arranged along the height of the flag 66, i.e. with one sign above another such as with the red-colored first sign positioned above the green-colored second sign, for example. Particularly, when the driving rib 17 is arranged to approach and to slidably engage the movable flag 66 when the cover portion 16 is moving towards the close configuration, the tapered side 64 of the driving rib 17 pushes the flag 66 in moving or sliding downward, as shown in Fig. 8, to thereby allow the upper-positioned red-colored first sign to be revealed or displayed via the window 62. The red sign may serve as an indicator to readily inform the user about a condition of the device 10, for example, that the housing 12 of the device 10 has been opened, which may imply that the contained battery or batteries have once been altered, or been removed from the housing 12 for use or discharge.

[0043] In one embodiment, the device 10 can be provided with a switch 63 such as a push button switch (as shown in Figs. 3 and 4), a click switch or the like which is actuatable manually by the user to mechanically reset the indicating means 60 and/or to display the second sign after the cover portion 16 is closed from the open configuration. This can be done by, for example, manually moving the flag 66 of the indicating means 60 via the switch to slide the flag 66 from the lower position to the upper position to thereby allow the lower-positioned, green-colored second sign be reviewed or displayed via the window 62.

[0044] In one further embodiment, after the cover portion 16 of the device 10 has been opened and that the indicating means 50 is actuated to display the first sign, the indicating means 60 can also be automatically triggered to display a sign, such as to restore to and/or to display the second sign when the device 10 is placed at the charging base 52 of the charging unit 50, such as to prepare for or during an electric recharging. For example, in an embodiment as shown in Figs. 9 to 11, the charging base 52 can be configured to comprise a triggering means 70 adapted to engage the indicating means 60 of the device 10 when the device 10 is received at the charging base 52. Preferably, the triggering means 70 may comprise a protrusion such as a protruding support rib 72 adapted to engage the indicating means 60 or a part of the indicating means 60 when the device 10 is received or positioned at the charging base 52 of the charging unit 50. More particularly, the support rib 72, which may optionally be assisted by a resilient member such as a spring (not shown), is adapted to engage and/or to mechanically move the indicating means 60 or the movable flag 66 of the indicating means 60 to move such as to slide upward, causing the flag 66 to reveal the second sign, such as the lower positioned, green sign from the window 62, as shown in Fig. 11.

[0045] Alternatively, the trigger means 70 of the charging unit 50 can also be configured to be electrically triggerable to engage the indicating means 60 of the device 10 when the

device 10 is received or positioned at the charging base 52. For example, in the embodiment as shown in Fig. 12, the triggering means 70 may comprise a solenoid 74 which is electrically operable in moving the support rib 72 to engage the indicating means 60. In one embodiment, the solenoid 74 can be powered by an electric circuit separated from the recharging circuit, and/or can be electrically actuated once the recharging circuit is completed when the batteries received device 10 is positioned at the charging base 52. In yet a further embodiment, the triggering means 70 may alternatively be triggered by other types of electrical switches such as, but are not limited to, electric relays, and/or any other triggering mechanisms controllable by the charging unit 50 for actuating the indicating means 60 in a more controlled, accurate manner.

[0046] Whilst the above description makes reference to a mechanically movable indicating means 60, such as one which comprises the signs-bearing flag 66 slidably movable by the movable driving rib 17 of the cover portion 16 when the housing 12 is opened and the movable support rib 72 of the triggering means 70 when the housing 12 is closed, it will be understood that operation of the indicating means 60 is not limited to mechanical means for mechanical actuation to display the first and/or the sign signs, but that the concepts of the invention could equally be implemented using other type of indicating means actuatable by alternative mechanisms, such as being controlled electrically to display the first and/or the second signs via an electrical actuation. The display of the indicating means may also be provided and implemented electrically, such as by means of one or more light-emitting diode (LED) and/or one or more liquid-crystal display (LCD) or the like, as long as the variations do not go beyond the invention concept of the present invention.

[0047] In one embodiment, the device 10 can be configured in having one or more of the upper and lower sides of the cover portion 16 with one or more corrugated outer surfaces, as shown in Fig. 13, to thereby enhance hand grip as well as to assist the slide-opening movement of the cover portion 16 by the user.

[0048] In a further embodiment, the housing 12 of the device 10 may comprise a plurality of cover portions 16 movable to actuate a respective, plurality of indicating means 60. For example, in the embodiment as shown in Fig. 14, the chamber 20 of the device 10 may be divided into two or more partitions, for example, each of which being coverable by a separate cover portion 16 for opening and closing the respective chambers 20. In this embodiment, the device 10 may comprise two indicating means 60 each of which being independently actuatable by the respective cover portions 16 to thereby display one or more signs to indicate working conditions of the respective compartments, such as, whether one or more compartments have been opened which may imply the usage condition of the batteries accommodated therein.

[0049] In yet a further embodiment, the housing 12 of the device 10 may comprise one or

more sets of recess 80a and protrusion 80b at the respective, lateral sides of the housing 12 for releasable connections of multiple of said device 10 to form a device assembly, as shown in Figs. 15 and 16, for example. The device assembly allows multiple of devices 10 be releasably connected for an easy handling and/or storage of said devices.

[0050] The present invention is advantageous in that it provides a novel solution for storing, handling, managing and/or organizing a plurality of batteries such as rechargeable batteries. The device of the present invention is designed and configured to receive and accommodate one or more batteries and particularly, rechargeable batteries, with the device being adapted to be directly insertable into and/or be placed at the charging base of an electric charging unit, such as a portable electric charging device for recharging. This is particularly useful for one to store, manage and charge a large number of rechargeable batteries, without the need of handling the individual batteries one at a time. The device with the rechargeable batteries accommodated therein may also serve as a battery pack for charging and discharging, for example, as shown in Figs. 17 and 18. Multiple battery packs may also be charged simultaneously by an electric charger, as shown in Fig. 18, and that the recharged battery pack can further be loaded directly into specific electric appliances, such as the flash unit as shown in Fig. 17, for providing electric power. More particularly, the device may comprise an indicating means at its housing, which can be automatically actuatable by an opening movement of the cover of the device to display a first sign to the user. The first sign can thus serve as an indicator to inform the user that the housing of the device has been opened, i.e. the batteries accommodated therein could once been altered, removed or used, for example. This is particularly useful in assisting the user to separate and/or to distinguish the used batteries from the un-used, e.g. new or recharged batteries. Furthermore, the indicating means can further be triggered automatically, such as by placing the device at the charging base of the electric charging unit, to display a second sign at the housing of the device. The second sign can serve as a further indicator to inform the user that the device has been placed at the electric charger, i.e. the batteries accommodated therein could possibly be charged or recharged and thus are ready for use. The present invention therefore negates the need for one to manually label a battery or a battery container, such as via sticker labels or the like, for the purpose of indicating the usage condition of the battery or the batteries being contained at the container. The present invention also provides a simple and user friendly means for managing and organizing a plurality of batteries, which also allows the batteries be readily charged or discharge as a battery pack, without the need to manipulate the individual one of the batteries.

[0051] In another aspect of the present invention, it is provided a charging system for

batteries. The charging system comprises the electric charging unit 50 as above described, comprising the charging base 52 having one or more sets of charging terminals 54. The charging system also comprises the device 10 for managing rechargeable batteries as above described, wherein the charging base 52 is configured to snugly receive the device 10 to thereby allow electric connection between the one or more sets of charging terminals 54 and the one or more received rechargeable batteries for electric charging.

[0052] In one further aspect of the present invention, it is provided a method of manufacturing the device 10 for managing rechargeable batteries as above described. The method comprises the steps of providing the housing 12 having a base portion 14 movably connected with at least one cover portion 16, the cover portion 16 being movable between an open configuration and a close configuration to define a chamber 20 for receiving and accommodating one or more rechargeable batteries; providing one or more pairs of oppositely arranged contact portions 22 at two facing side walls of the housing 12, such that when the one or more rechargeable batteries are received and accommodated in the chamber 20, the contact portions 22 allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging. The method steps may further comprise the step of providing at least one indicating means 60 arranged at the housing 12, wherein, when the cover portion 16 is moved from the close configuration to the open configuration, the at least one indicating means 60 is automatically actuated to display a first sign indicating that the housing 12 has been opened.

[0053] While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only exemplary embodiments have been shown and described and do not limit the scope of the invention in any manner. It can be appreciated that any of the features described herein may be used with any embodiment. The illustrative embodiments are not exclusive of each other or of other embodiments not recited herein. Accordingly, the invention also provides embodiments that comprise combinations of one or more of the illustrative embodiments described above. Modifications and variations of the invention as herein set forth can be made without departing from the spirit and scope thereof, and, therefore, only such limitations should be imposed as are indicated by the appended claims.

[0054] In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

[0055] It is to be understood that, if any prior art reference is referred to herein, such reference does not constitute an admission that the reference forms a part of the common general knowledge in the art.

Claims

- [Claim 1] A device for managing rechargeable batteries, comprising:
a housing having a base portion defining a chamber for receiving and accommodating one or more rechargeable batteries;
wherein the base portion comprises one or more pairs of contact portions oppositely arranged at two facing side walls of the housing, thereby when the one or more rechargeable batteries are received and accommodated in the chamber, the contact portions allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging.
- [Claim 2] The device according to claim 1, wherein the housing comprises at least one cover portion movably connected with the base portion, the cover portion being movable between an open configuration and a close configuration relative to the base portion of the housing.
- [Claim 3] The device according to claim 2, further comprising at least one indicating means arranged at the housing, wherein the at least one indicating means is actuatable to display at least a first sign representing a first condition of the housing, and/or a second sign representing a second condition of the housing.
- [Claim 4] The device according to claim 3, wherein the at least one indicating means is actuatable to display either one of the first sign and the second sign.
- [Claim 5] The device according to claim 3, wherein the at least one indicating means is actuatable by moving the cover portion from the close configuration to the open configuration.
- [Claim 6] The device according to claim 5, wherein the at least one indicating means is actuatable to display the first sign by moving the cover portion from the close configuration to the open configuration.
- [Claim 7] The device according to claim 6, wherein the cover portion comprises a protruding member adapted to engage the at least one indicating means when the cover portion is moved from the close configuration to the open configuration to thereby actuate the indicating means to display the first sign.
- [Claim 8] The device according to claim 7, wherein the at least one indicating means comprises a slidable member carrying the first sign and the second sign, the slidable member being movable by the protruding member of the cover portion when the cover portion is moved from the

- close configuration to the open configuration to thereby display the first sign at the housing.
- [Claim 9] The device according to claim 3, wherein the first sign and/or the second sign are displayed via a window at the housing such that the first sign and/or the second sign are visible from an exterior of the housing.
- [Claim 10] The device according to claim 7, wherein the protruding member is tapered.
- [Claim 11] The device according to claim 2, wherein the at least one cover portion is slidably connected with the base portion.
- [Claim 12] The device according to claim 1, wherein the contact portions comprise through holes.
- [Claim 13] The device according to claim 1, wherein the contact portions are aligned such that when a plurality of rechargeable batteries are received in the chamber, they are arranged in alignment.
- [Claim 14] The device according to claim 2, wherein the cover portion comprises one or more apertures for heat dissipation.
- [Claim 15] The device according to claim 3, wherein the first sign and the second sign comprise different colors, patterns, marks and/or logos.
- [Claim 16] The device according to claim 5, wherein the housing comprises a plurality of cover portions movable to actuate a respective, plurality of indicating means.
- [Claim 17] The device according to claim 1, wherein the housing comprises a set of recess and protrusion at respective lateral sides of the housing to thereby allow releasable connection of multiple of said device to form a device assembly for simultaneously recharging and discharging of the accommodated batteries.
- [Claim 18] A charging system for batteries, comprising:
an electric charging unit comprising a charging base having one or more sets of charging terminals; and the device for managing rechargeable batteries of claim 1;
wherein the charging base is configured to snugly receive the device to thereby allow electric connection between the one or more sets of charging terminals and the one or more received rechargeable batteries for electric charging.
- [Claim 19] The charging system according to claim 18, wherein the charging base comprises a triggering means adapted to engage at least one indicating means provided at the housing of the device when the device is

- received at the charging base thereby triggering the indicating means to display either one of a first sign and a second sign.
- [Claim 20] The charging system according to claim 19, wherein, when the device is received at the charging base, the triggering means is adapted to engage the at least one indicating means of the device to thereby trigger display of the indicating means to change from the first sign to the second sign.
- [Claim 21] The charging system according to claim 20, wherein the at least one indicating means comprises a movable member carrying the first sign and the second sign, the movable member being engageable by the triggering means when the device is received at the charging base to thereby move the indicating means to display the second sign.
- [Claim 22] The charging system according to claim 21, wherein the movable member is slidably movable by the triggering means when the device is received at the charging base for the indicating means to display the second sign.
- [Claim 23] The charging system according to claim 18, wherein the triggering means is electrically triggered to engage the at least one indicating means of the device when the device is received at the charging base.
- [Claim 24] The charging system according to claim 23, wherein the triggering means comprises a solenoid.
- [Claim 25] The charging system according to claim 19, wherein the triggering means comprises a resilient means.
- [Claim 26] A method of manufacturing a device for managing rechargeable batteries, comprising:
providing a housing having a base portion movably connected with at least one cover portion, the cover portion being movable between an open configuration and a close configuration to define a chamber for receiving and accommodating one or more rechargeable batteries;
providing one or more pairs of oppositely arranged contact portions at two facing side walls of the housing, such that when the one or more rechargeable batteries are received and accommodated in the chamber, the contact portions allow electric connection of the one or more received rechargeable batteries with an external circuit for recharging and discharging.
- [Claim 27] The method according to claim 26, further comprising the step of providing at least one indicating means arranged at the housing, wherein, when the cover portion is moved from the close configuration

to the open configuration, the at least one indicating means is actuated to display a first sign indicating that the housing has been opened.

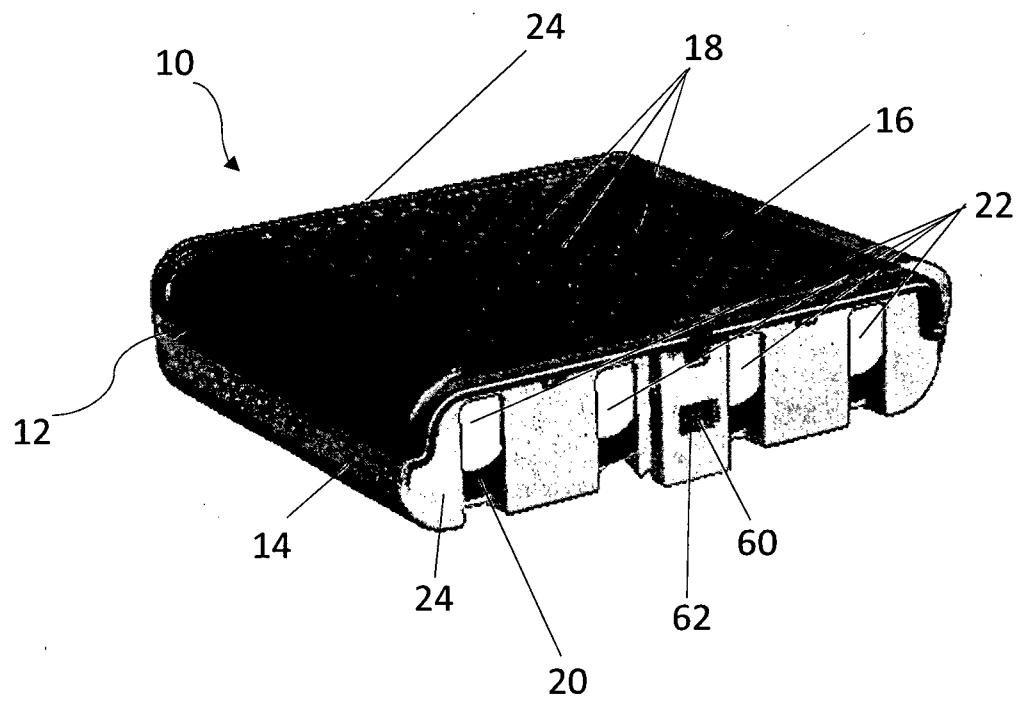


FIG. 1

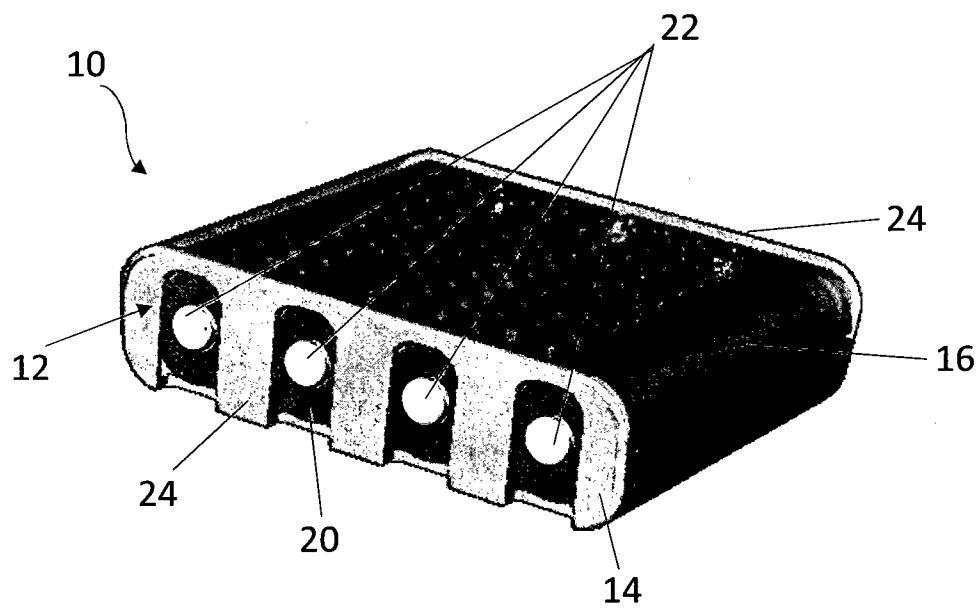


FIG. 2

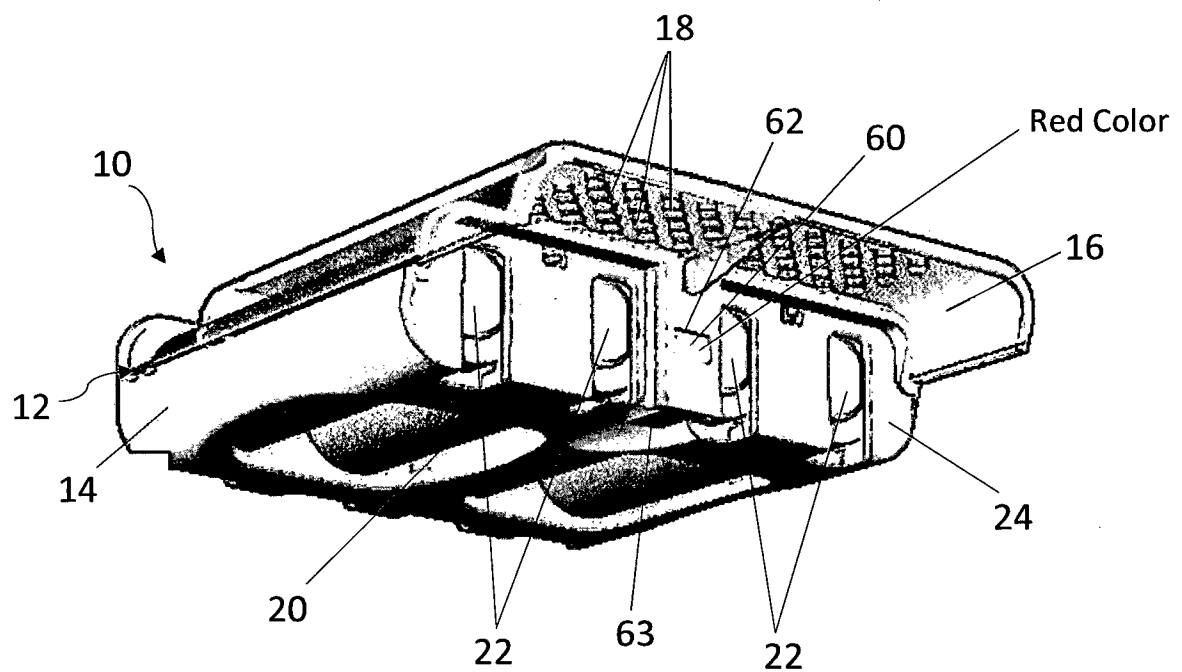


FIG. 3

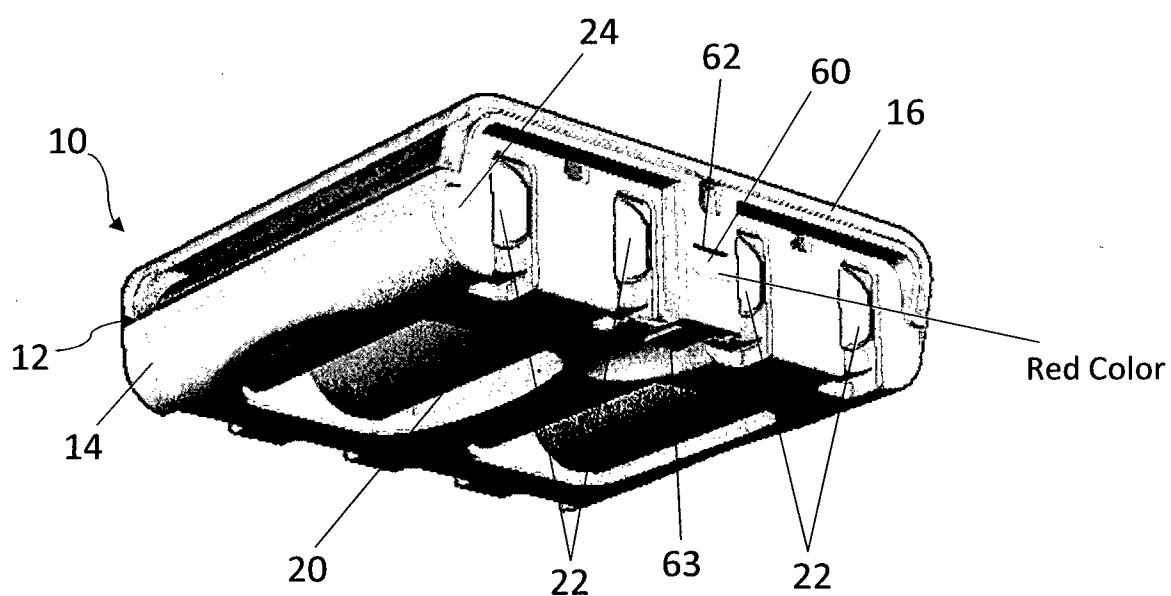
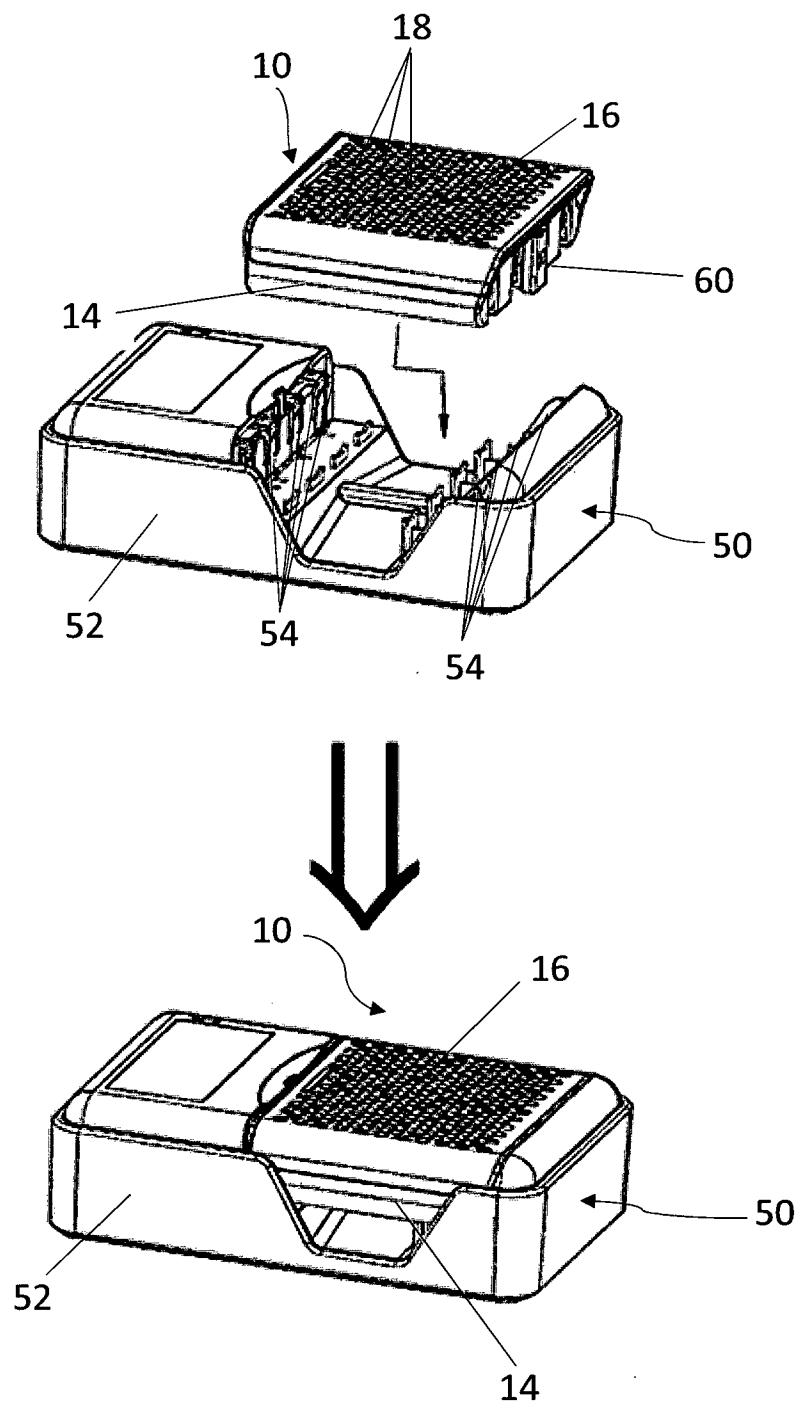
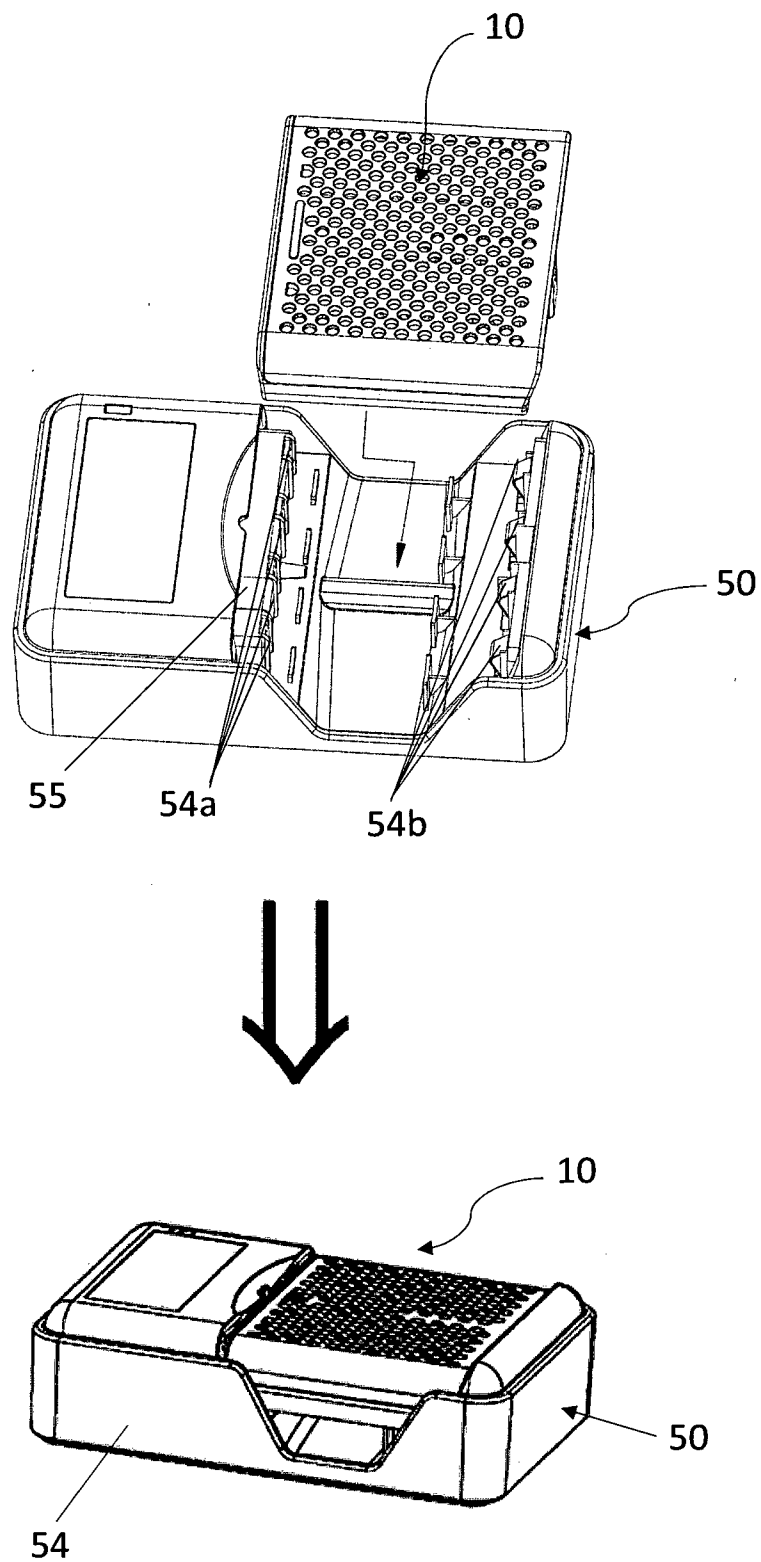


FIG. 4

**FIG. 5**

**FIG. 6**

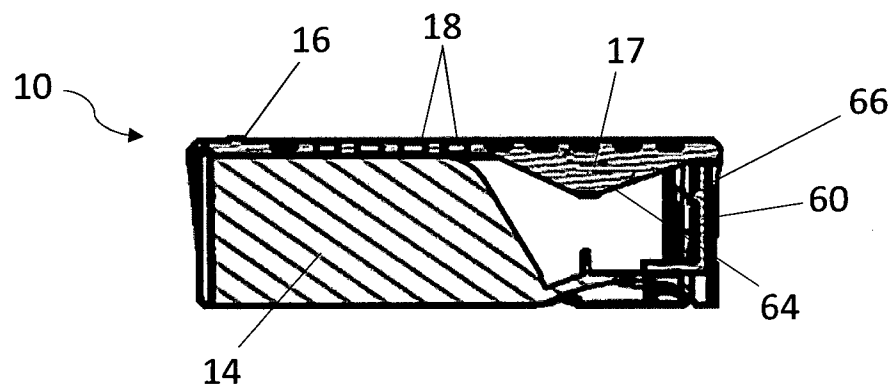


FIG. 7

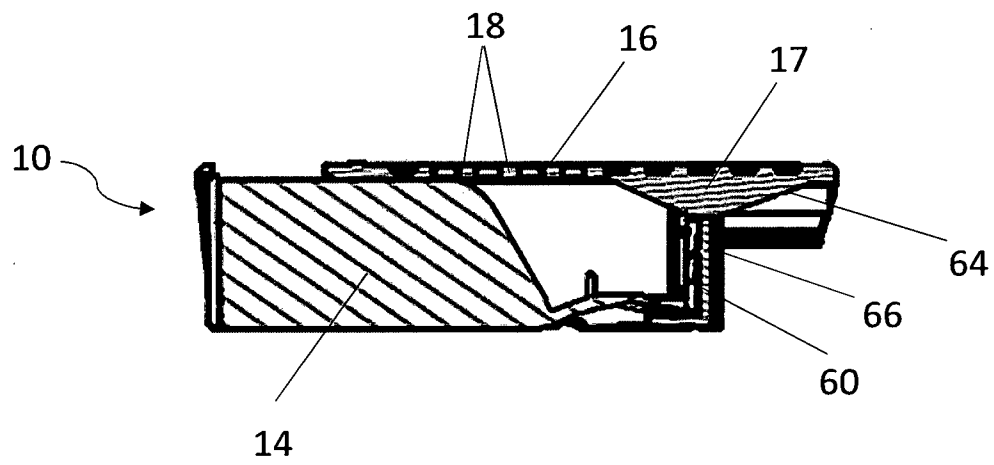


FIG. 8

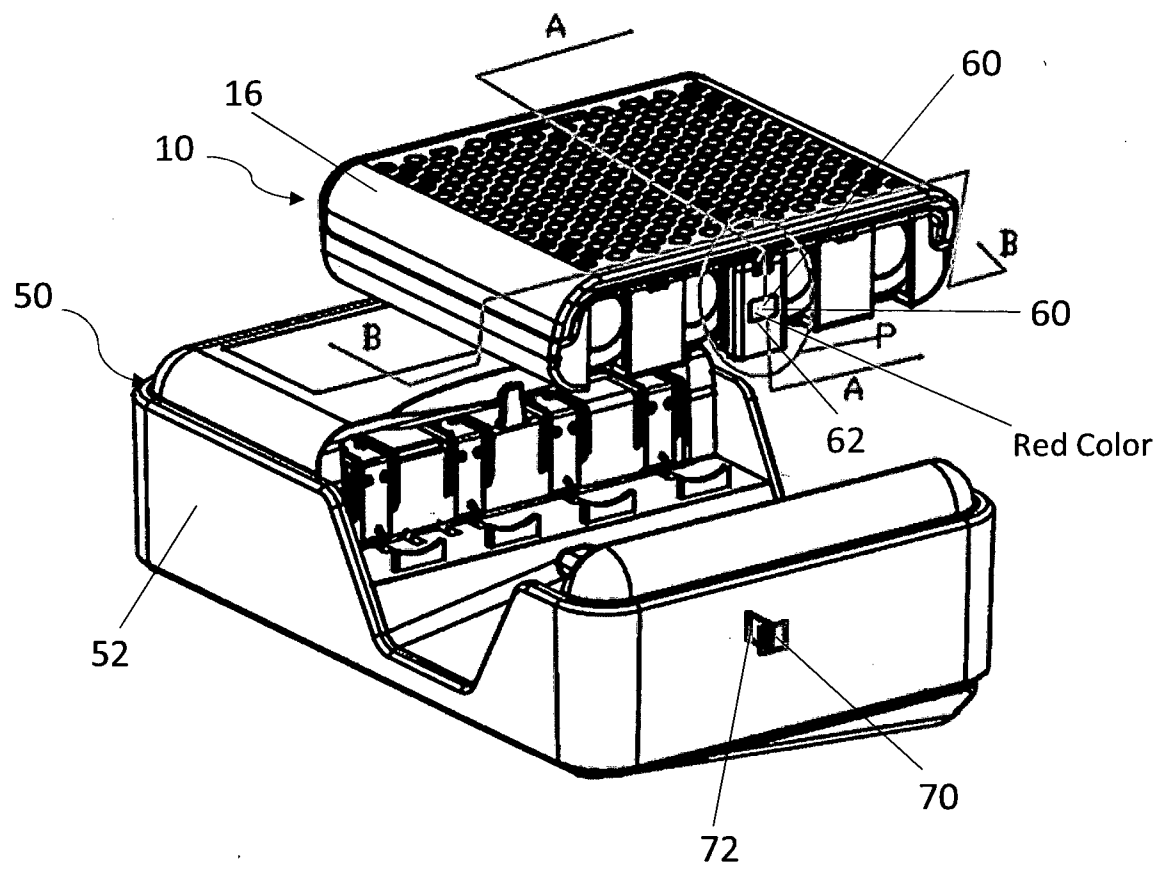


FIG. 9

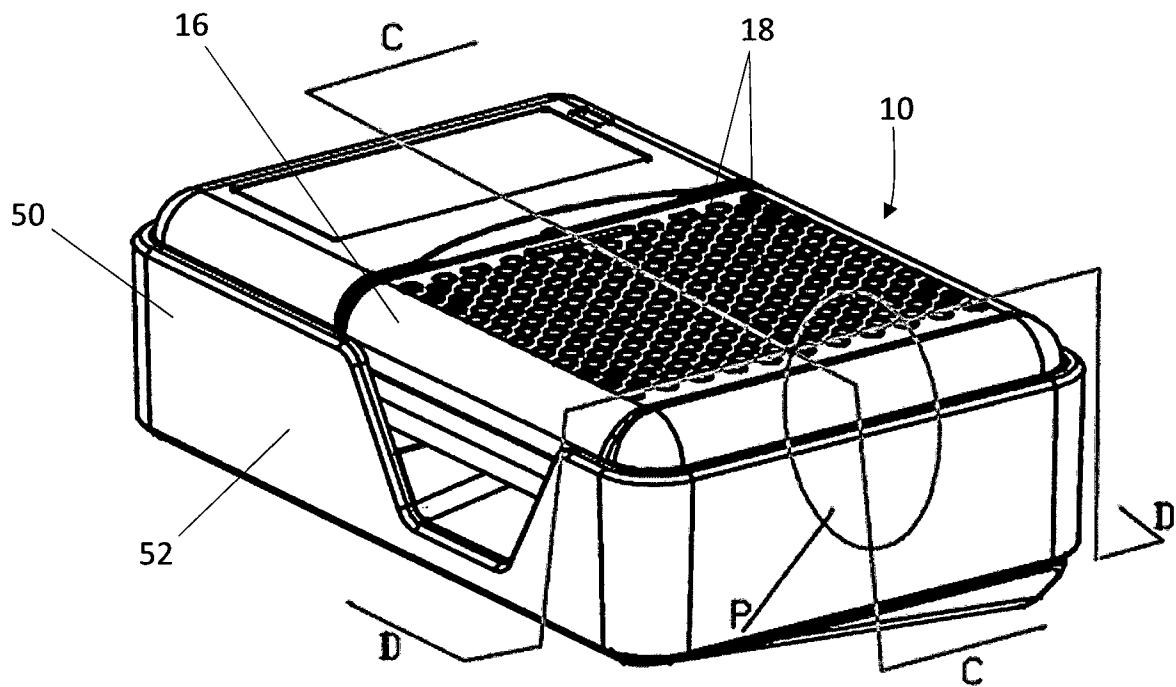


FIG. 10

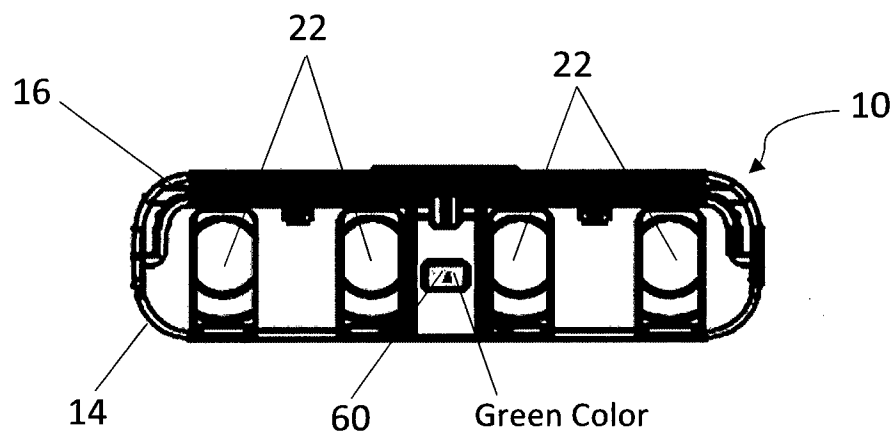


FIG. 11

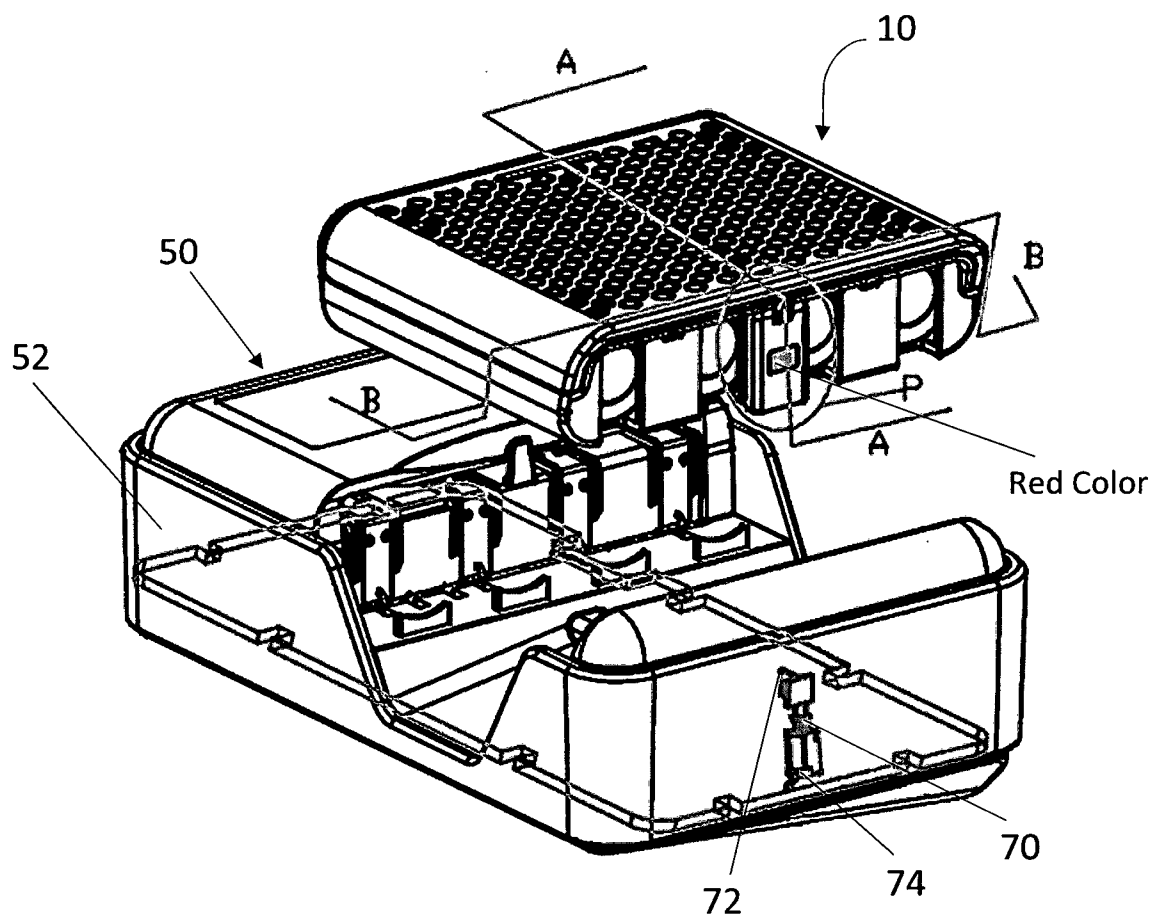


FIG. 12

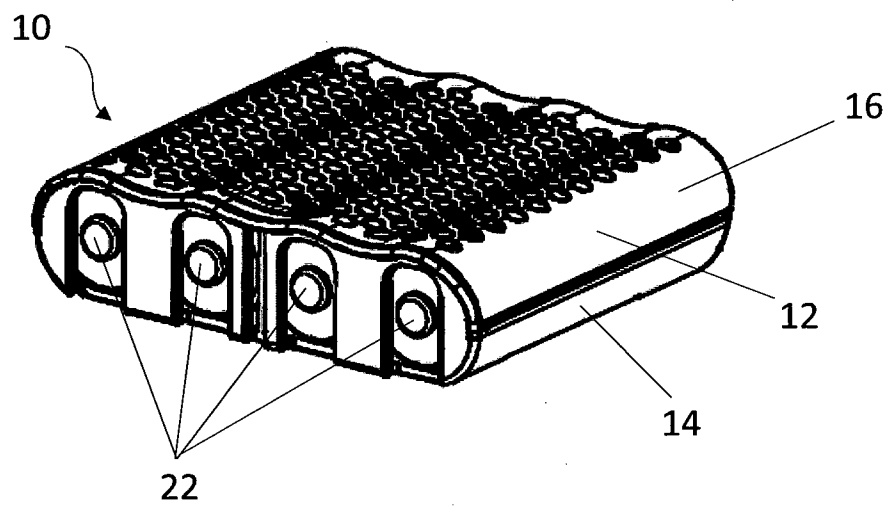


FIG. 13

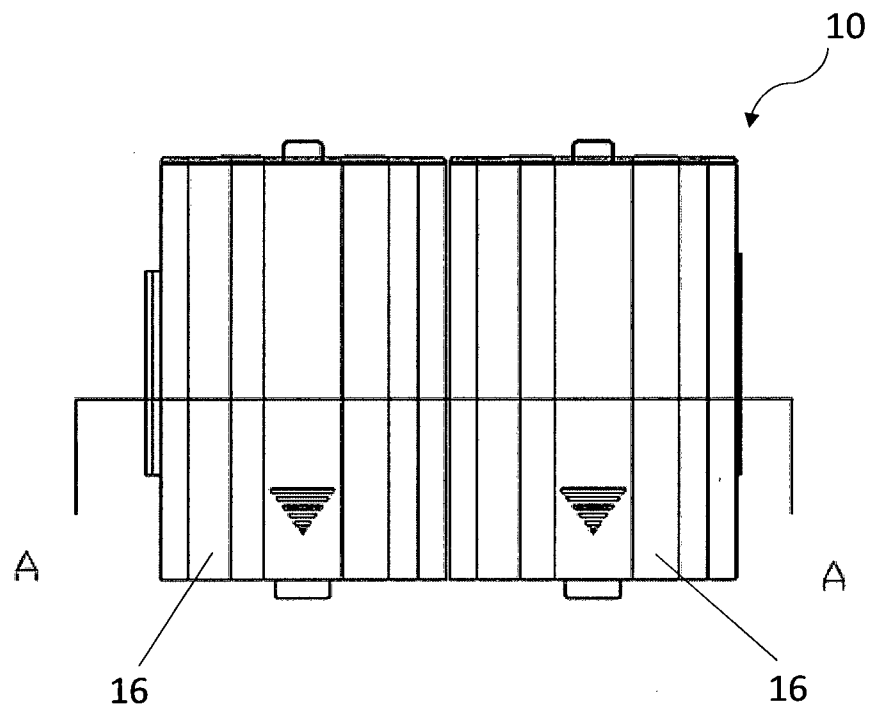


FIG. 14

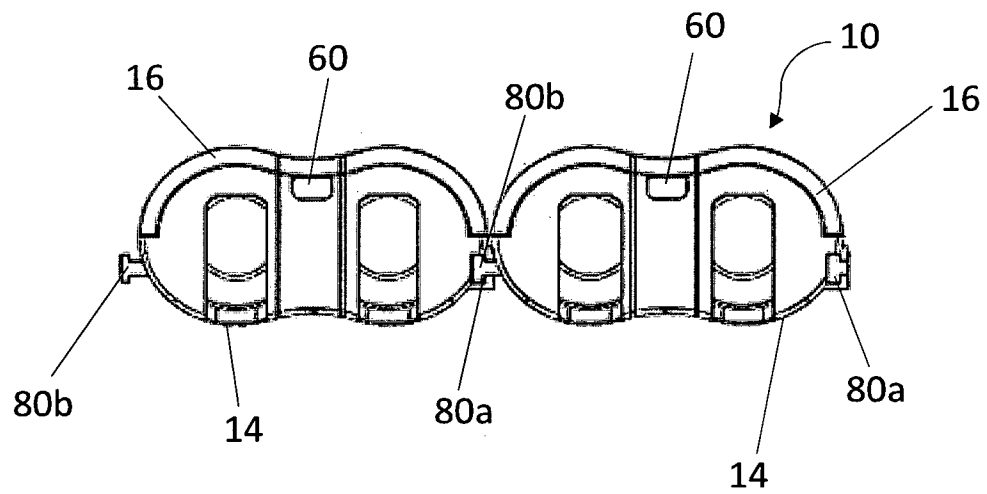


FIG. 15

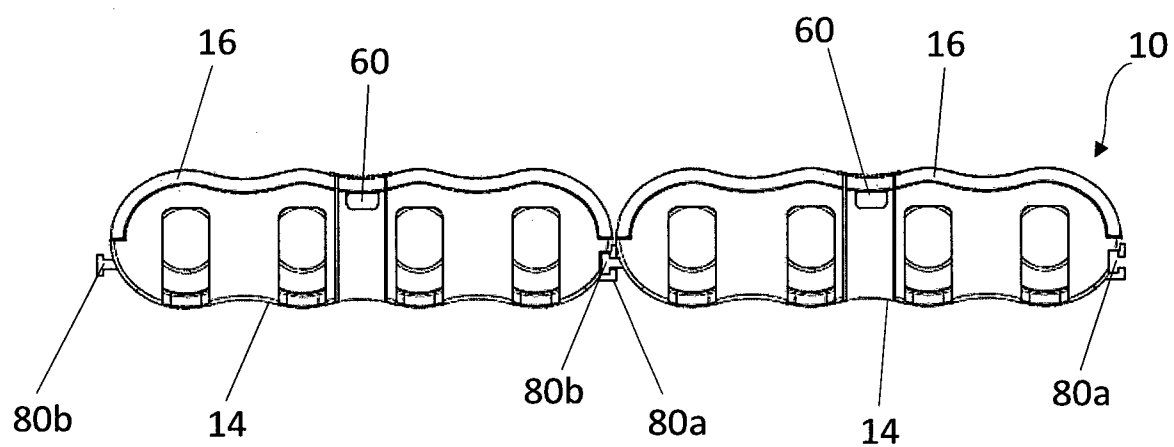


FIG. 16

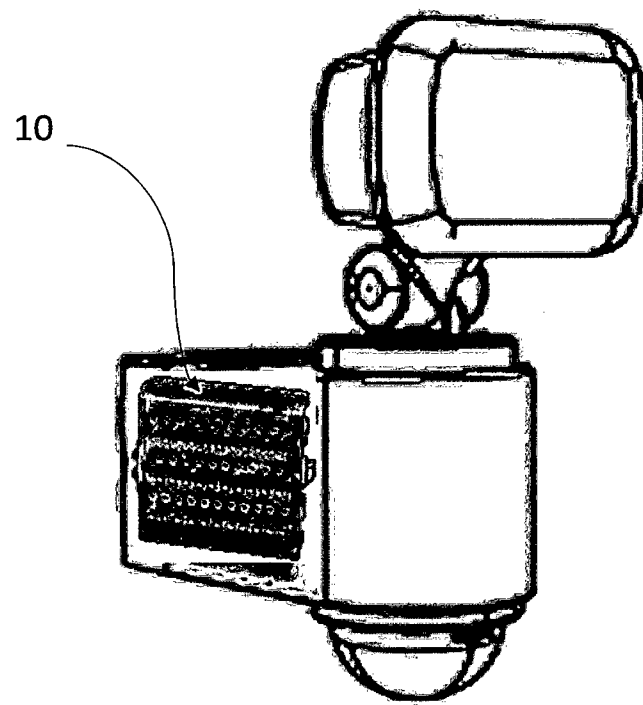


FIG. 17

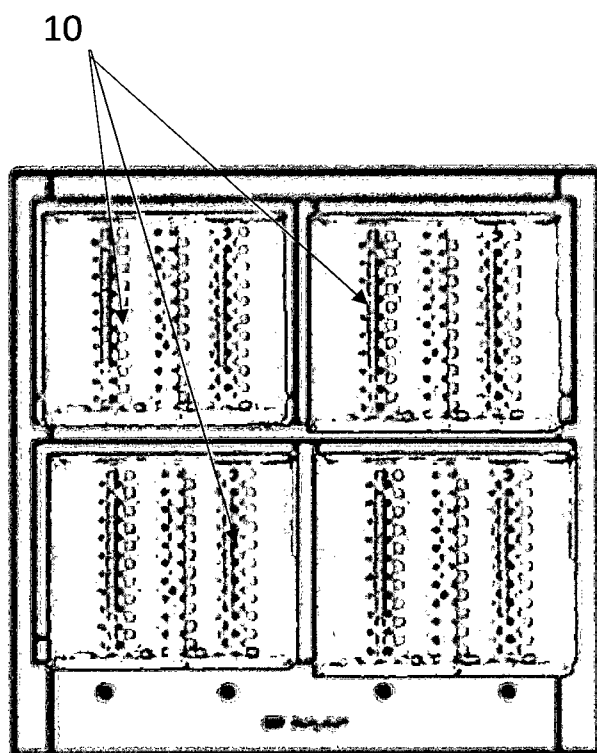


FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/076447

A. CLASSIFICATION OF SUBJECT MATTER

H02J 7/00(2006.01)i

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)

H02J

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 practicable, search terms used)

CNABS, CNKI, DWPI, SIPOABS; battery, recharge, charge, cavity, chamber, cover, multiple

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201839024 U (CHONGQING GUOHONG TECHNOLOGY DEV CO LTD) 18 May 2011 (2011-05-18) description paragraphs 3-19, figures 1-3	1-27
A	CN 205791685 U (GUANGZHOU SUOKE ELECTRIC APPLIANCE CO) 07 December 2016 (2016-12-07) the whole document	1-27
A	US 2015357684 A1 (HUSQVARNA AB) 10 December 2015 (2015-12-10) the whole document	1-27



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

“D” document cited by the applicant in the international application

“E” earlier application or patent 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

20 November 2019

Date of mailing of the international search report

04 December 2019

Name and mailing address of the ISA/CN

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MENG, Tiange

Facsimile No. (86-10)62019451

Telephone No. 86-10-62411653

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2019/076447

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	201839024	U	18 May 2011	None			
CN	205791685	U	07 December 2016	None			
US	2015357684	A1	10 December 2015	CN	105103365	A	25 November 2015
				CN	105103365	B	31 October 2017
				US	10211488	B2	19 February 2019
				EP	2951879	A1	09 December 2015
				WO	2014120912	A1	07 August 2014