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(54) Title: MOBILE MULTI-CHARGER FOR MOBILE DEVICE EXTERNAL BATTERIES

dock station

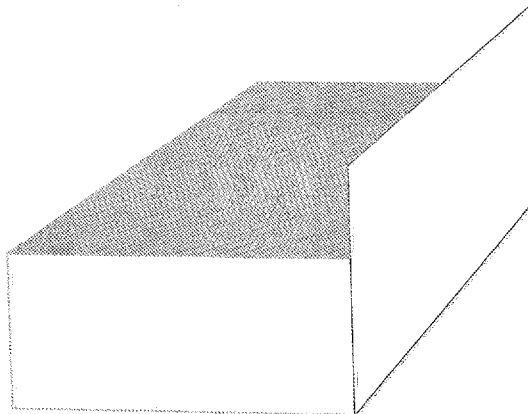


Fig 1

(57) Abstract: The present invention is directed to systems and methods for providing a plurality of external rechargeable batteries for mobile devices.



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MOBILE MULTI-CHARGER FOR MOBILE DEVICE EXTERNAL BATTERIES

[001] This application claims priority to U.S. Provisional Patent Application No. 61/936,794, entitled: "MOBILE MULTI-CHARGER FOR MOBILE DEVICE EXTERNAL BATTERIES" filed February 6, 2014, which is incorporated by reference in its entirety.

BACKGROUND

I. FIELD OF THE INVENTION

[002] The present invention relates generally to the fields of mobile device battery recharging docks, kiosks and methods of using the same.

II. DESCRIPTION OF RELATED ART

[003] With the advancements in mobile technology, the number of mobile devices is increasing at an astounding rate. Central to the use of mobile devices is a battery to keep the mobile devices running. However, while mobile technology and advancements have increased at a tremendous rate battery technology has lagged. Thus, as mobile devices become increasingly powerful, so do their requirements for power. The increased demand for power has manifested itself in reduced battery life for mobile devices.

SUMMARY

[004] Accordingly, embodiments of the present disclosure provide a charger for charging a plurality of rechargeable batteries for mobile devices. The charger or docking station comprises at least two docks for charging a first and second rechargeable battery for a mobile device, and a power supply electrically coupled to each of said docks.

[005] In one embodiment the disclosure provides a charger kiosk comprising a transaction network and a charger system, the charger system comprising at least a first and second dock, at least a first and second rechargeable battery, wherein the first and second rechargeable batteries are in the first and second docks, and at least one power supply electrically coupled to at least the

first and second docks. In addition, the kiosk comprises a vending controller located within the kiosk structured to determine whether the first or second battery is present in the first or second dock and whether communication with the transaction network provides for instructions to release the first or second battery.

[006] In addition, the disclosure provides a rechargeable battery for a mobile device comprising at least a first and second plug for insertion into said mobile device, wherein said first and second plug are compatible with different mobile devices.

[007] In one embodiment the disclosure provides a method of providing rechargeable batteries for mobile devices comprising providing a charger as outlined above, distributing at least a first charged battery to a consumer, collecting at least a first battery from the consumer, wherein the battery is at least partially discharged and recharging the at least partially discharged battery in the battery dock.

[008] In one embodiment the disclosure provides a method of providing rechargeable batteries for mobile devices comprising providing a charger kiosk as described above, receiving a request from a consumer for a battery compatible with an input for a mobile device; receiving input from the consumer of payment information; and upon confirmation of the adequacy of said payment information, providing a battery to the consumer compatible with said request.

[009] In one embodiment the disclosure provides a method of messaging a mobile device user comprising providing a charged, rechargeable battery for a mobile device, whereby upon attachment of the battery to the mobile device, software stored in the battery is executed and provides a message to the mobile device.

[010] It is contemplated that any embodiment of a method or composition described herein can be implemented with respect to any other method or composition described herein.

[011] The use of the word “a” or “an” when used in conjunction with the term “comprising” in the claims and/or the specification may mean “one,” but it is also consistent with the meaning of “one or more,” “at least one,” and “one or more than one.”

[012] The use of the term “or” in the claims is used to mean “and/or” unless explicitly indicated to refer to alternatives only or the alternative are mutually exclusive, although the disclosure supports a definition that refers to only alternatives and “and/or.”

[013] Throughout this application, the term "about" is used to indicate that a value includes

[014] As used in this specification and claim(s), the words "comprising" (and any form of comprising, such as "comprise" and "comprises"), "having" (and any form of having, such as "have" and "has"), "including" (and any form of including, such as "includes" and "include") or "containing" (and any form of containing, such as "contains" and "contain") are inclusive or open-ended and do not exclude additional, unrecited elements or method steps.

[015] Other objects, features and advantages of the present invention will become apparent from the following detailed description. It should be understood, however, that the detailed description and the specific examples, while indicating specific embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

DESCRIPTION OF THE DRAWINGS

[016] The following drawings form part of the present specification and are included to further demonstrate certain aspects of the present invention. The invention may be better understood by reference to one or more of these drawings in combination with the detailed description of the specification embodiments presented herein.

[017] FIG. 1 depicts a battery docking station as described herein.

[018] FIG. 2 depicts specific configurations of a battery docking station. A. Battery docking station with cord for wall outlet. B. Battery docking station with cord attached to solar battery. C. Battery docking station with rechargeable battery attached to docks.

[019] FIG. 3 depicts multiple, rechargeable batteries attached to the mobile charger. A. Batteries attached directly to the charger. B. Batteries attached to the charger via a cord. C. Batteries in contact with the charger so as to charge wirelessly. D. Batteries in contact with charger so as to charge wirelessly. E. Multiple batteries stacked and charging on the mobile charger. F. Configuration showing mobile device batteries attached directly to the charger via a connector appendage. G. Configuration showing mobile device batteries attached to the charger via a cord.

[020] FIG. 4 depicts a stand-alone kiosk for dispensing, receiving and charging rechargeable batteries.

[021] FIG. 5 depicts a rechargeable battery with two distinct appendages for inserting into mobile devices having different types of connectors.

[022] FIG. 6 depicts a rechargeable battery with cords for attaching to different mobile devices. A. Rechargeable battery with cord leading to mobile device. The cord is fitted with a multi-tip adaptor allowing for insertion into different types of mobile devices. B. Rechargeable battery with cord capable of retracting into the case of the battery. C. Rechargeable battery with cord capable of being stored in a molded storage slot on the exterior of the battery. D. Rechargeable battery with kickstand.

DESCRIPTION

[023] In view of the rapid expansion of mobile technologies and the plethora of mobile devices all using increasing amounts of power, there exists a need for a devices and methods that allow mobile device users to charge their devices throughout the day at a variety of locations. Frequently, mobile device users simply use their devices until the batteries are discharged. When the mobile device is a mobile phone, smart phone, tablet and the like, it is frequently the primary method these users have to communicate with third parties. Thus, upon discharge of the batteries, the users are left with no means to communicate with people, rendering them at least uncomfortable and potentially vulnerable. Currently, users overcome this challenge by carrying with them mobile device charge cords. While this allows the user to charge the device

throughout the day, it requires that the user find an available plug with which to charge their device. When in a public setting, such as a restaurant, bar and the like, this requires the user to either stay in close proximity to the outlet to which their device is attached, or leave the device unmonitored. Accordingly, there exists a need for improved methods and devices for charging mobile device batteries.

[024] Turning to FIG 1, an embodiment of the present disclosure provides a battery docking station **110** for charging a plurality of rechargeable batteries for mobile devices. By plurality is meant at least two. As such the docking station, charger, or charging station includes a plurality of docks for charging batteries for mobile devices. The batteries are external batteries for recharging mobile devices, e.g. recharging one or more mobile device internal battery.

[025] By mobile devices is meant a smart phone, including but not limited to iPhone, Windows phone, Android phone, and the like, a personal digital assistant (PDA), a tablet computer, a wearable computer, a laptop computer, iPod, “wearable technology”, including but not limited to smartwatch, Google glass, Nike+ FuelBand, or other activity trackers, and the like. In general a mobile device that uses a rechargeable battery finds use in the invention. The batteries for mobile devices as described herein include one or more appendages or connections for plugging into the mobile device, such as but not limited to USB connections, mini-USB connections, micro USB connections, and the like and can be updated or used with adapters to so as to make them compatible with updated or new connectors.

[026] By charging or recharging is meant to replenish the electrical charging capacity of a rechargeable battery.

[027] In an embodiment, as shown in FIG 2A, rechargeable batteries **220** are attached to the docking station **210** by any of a variety of methods, including contacting with a positive **230** and negative **240** pole. The rechargeable batteries may be placed in molded receivers for the battery. The positive and negative poles are in electrical communication with the batteries when inserted into or placed on the docking station for charging.

[028] In addition, in one embodiment the docking station has an electrical cord **250** extending therefrom which is plugged into or associated with a power supply and carries electricity to the docking station. In an embodiment, the free terminus of the electrical cord has a conventional plug **260**, which may be inserted into a wall outlet. As shown in FIG 2B, the electrical cord may be attached to other sources of electricity **270**, including but not limited to one or more solar panels or as shown in FIG 2C, or other sources of electricity, such as a generator **280**, and the like.

[029] Turning to FIG. 3, the present disclosure provides different configurations of contacting the rechargeable batteries **340** to the docking station **310**. As shown in FIG 3A and 3F, rechargeable batteries **340** may be placed in openings **350** in the docking station, wherein the openings are electrically coupled to a power source and allow for charging of the rechargeable batteries. In one embodiment the batteries are inserted into the charger. In another embodiment the docking station includes cords **360** emanating from the docking station, whereby the rechargeable batteries can be connected to the cords. As such, the rechargeable batteries include inputs or and/or appendages capable of being connected to the cords or to the docking station. Such inputs and complementary cords include USB connections, mini-USB connections, micro USB connections, and the like. For instance, in Fig 3F and 3G, the battery **340** contains an appendage **370** for connection into the complementary plug **380** in the docking station or the cord emanating from the docking station. In some embodiments the rechargeable battery is charged wirelessly.

[030] In one embodiment, the rechargeable batteries are placed on the docking station and charged via contact with magnetic strips on the docking station FIG 3C and FIG 3D. In an embodiment, a plurality of rechargeable batteries are stacked one on top of the other and in electrical connectivity so as to charge each of the stacked batteries FIG 3E. In one embodiment, a rechargeable battery may be adapted to couple with the docking station through latching mechanisms. According to another embodiment, a rechargeable battery may be adapted to couple a docking station through magnetic or electromagnetic-based systems. According to an embodiment, power may be transferred to and from a rechargeable battery through metal

contacts. According to another embodiment, power may be transferred to and from a rechargeable battery through inductive charging technology. Any of the configurations as outlined in Fig 3 can be used in conjunction with any of the docking station electrical sources outlined in Fig. 2. In some embodiments the external, rechargeable batteries have are charged through contact with the docking station via a first connector that is distinct from the connector used to connect to the mobile device.

[031] In an embodiment, the docking station itself may be powered by a rechargeable battery. In this embodiment, the docking station need not be connected to a power supply at all times. Rather, it can be a stand-alone docking/charging station that is recharged only as necessary. In some embodiments, the rechargeable batteries themselves may also be recharged by solar power. That is, the batteries are configured to receive a charge from one or more solar panels. In some embodiments the chargers are charged by inductive charging as known in the art.

[032] In one embodiment, the docking station includes a multi-hub connector, such as a multi-hub USB connector, which provides power to a plurality of docks in the docking station or provides power to a plurality of rechargeable batteries or mobile devices.

[033] In an embodiment, the docking station is enclosed within a water-tight container or otherwise made waterproof by methods known to those in the art.

[034] In yet another embodiment the rechargeable battery charging station is found within a kiosk. As shown in FIG 4, the kiosk may be a stand-alone station capable of receiving and vending batteries in response to customer input. In an embodiment, the kiosk also is capable of recharging discharged batteries. As described above for the docking station, the kiosk may be powered by external power or by an internal generator or rechargeable battery.

[035] On one embodiment, the kiosk contains a transaction network that mediates purchases by the customer. In this embodiment a customer provides information regarding the type of rechargeable battery is required, such as but not limited to a battery capable of recharging an iPhone, Windows phone, Android phone and the like. In addition, the transaction network is configured to receive payment information. In this regard, the transaction network may be

configured to receive cash, credit card, debit card, bitcoin, Paypal and/or other electronic methods of payment. As is appreciated by one of skill in the art, the kiosk may be configured with a router for internet access by direct connection or wireless connection.

[036] As described above the kiosk is configured with internal docking stations for charging and/or storing a plurality of rechargeable batteries. The kiosk may also comprise memory and software configured to store information about the rechargeable batteries, including the type of battery found in each dock as well as the level of charge associated with each of the rechargeable batteries.

[037] The kiosk also contains a vending controller configured to determine whether a particular dock is occupied and capable of releasing a battery upon instructions received from the transaction network.

[038] In one embodiment the present disclosure also provides a rechargeable battery having a plurality of connectors for different types of mobile devices. As shown in FIG 5A and FIG 5B, in one embodiment, first and second plugs may be embedded within the casing of the battery and moved in and out of the casing as needed. In this embodiment, the first and second plugs are different and are compatible with first and second different mobile devices.

[039] In one embodiment, the rechargeable battery may have a first cord or at least first and second cords extending therefrom, wherein the cords have termini capable of connecting to a plurality of different mobile devices or batteries from mobile devices FIG 6A. In this embodiment, the cords may be retractable and therefore capable of being stored within the battery casing FIG 6B. The battery casing also may comprise a molded depression capable of receiving and storing the cords or cables. In this embodiment, the location of the depression may vary and may be on a vertical or horizontal surface of the battery as shown in FIG 6C. In addition as shown in FIG 6D, the battery may also comprise an appendage capable of extending from the battery forming a “kick-stand” so that the battery can be positioned as desired on a surface.

[040] In other embodiments, the rechargeable battery may have attached thereto agents to facilitate or mediate attachment to the mobile device, which makes charging the mobile device convenient for the user. For instance, the rechargeable battery may have attached thereto, Velcro, at least one suction or a plurality of suction cups, suction cup tape and/or adhesive free grip, such as but not limited to CLINGO™ adhesive free grip, as is known in the art.

[041] In one embodiment, the rechargeable battery is surrounded by a waterproof casing or otherwise rendered waterproof using methods known in the art.

[042] Accordingly, the present disclosure provides a method of providing rechargeable batteries. In this embodiment, a docking station having a plurality of charged, rechargeable batteries is provided. Charged batteries are distributed to consumers as needed. Once the rechargeable battery has been used by the consumer, it is returned to the docking station where it is reinserted into or otherwise plugged into the dock for further charging. The advantage of such a system to the consumer is that they neither have to carry a spare battery with them nor have to stay next to a plug while their mobile device recharges.

[043] In an alternative embodiment, the present disclosure provides a method of providing a rechargeable battery using a kiosk. In this embodiment, the kiosk received a request for a battery from a user. If the appropriate type of battery is available and charged, the kiosk also receives input from the user about payment information. The kiosk contains hardware and software to allow for confirmation of payment information. Upon such confirmation, a signal is sent from the transaction network described above to the vending network to release the requested battery. Following usage of the battery or when user's battery is charged, the user may return to the battery to the kiosk where it may be sorted into the appropriate type of charger and docked so as to be recharged.

[044] Placing the rechargeable battery under the control of a kiosk or third party provider allows for the kiosk manager or third party provider to customize batteries. For instance, the batteries may be customized on the exterior by having custom colors, logos, messages and the like. In addition, the batteries may be customized by containing memory and software capable of

providing messages or information to the user of the mobile device being recharged. For instance, in this embodiment, upon plugging the rechargeable battery into the mobile device, or upon placing them in sufficiently close proximity when wireless charging is being performed, software stored in the memory in the battery is launched on the mobile device and provides advertising, messages, logos, instructions to connect to local Wi-Fi, and the like. Other messages, such as subscriptions (e-mail signup), social media connections (like, follow), and the like may also be launched. In this way, the batteries provide a method for third parties to provide advertising to users while also provide a service to users/customers in the form of rechargeable batteries.

[045] While the compositions and methods of this invention have been described in terms of preferred embodiments, it will be apparent to those of skill in the art that variations may be applied to the compositions and/or methods and in the steps or in the sequence of steps of the method described herein without departing from the concept, spirit and scope of the invention. More specifically, it will be apparent that certain agents which are both chemically and physiologically related may be substituted for the agents described herein while the same or similar results would be achieved. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the present invention.

CLAIMS

1. A charger for charging a plurality of external rechargeable batteries for mobile devices comprising:
 - a. at least two docks for charging a first and second external rechargeable battery for a mobile device;
 - b. a power supply electrically coupled to each of said docks.
2. The charger according to claim 1, wherein said power supply is a rechargeable power supply.
3. The charger according to claim 1, wherein said rechargeable power supply comprises a connector to electrically connect to an external power supply.
4. The charger according to claim 3, wherein said external power supply is selected from the group consisting of a wall outlet and a solar panel.
5. The charger according to claim 1, wherein said power supply is connected to an electrical source.
6. The charger according to claim 5, wherein said electrical source is a wall outlet or a solar panel.
7. The charger according to claim 5, further comprising a converter for converting AC voltage to DC voltage.
8. The charger according to claim 1, further comprising said first and second external rechargeable batteries.
9. The charger according to claim 1, wherein said docks comprise a positive and negative connection for receiving said batteries.

10. The charger according to claim 1 comprising magnetic strips or pins for charging said batteries.
11. The charger according to claim 1, wherein said docks comprise a connector to attach to said batteries.
12. The charger according to any of the preceding claims, further comprising an enclosure around said charger.
13. The charger according to claim 12, wherein said enclosure is waterproof.
14. The charger according to any of the preceding claims further comprising at least a first cord for connecting to a mobile device, wherein said cord is electrically coupled to said power supply.
15. The charger according to claim 14, wherein a plurality of different of different connectors attach to the end of the cord to which the mobile device attaches.
16. A charger kiosk comprising:
 - a. a transaction network;
 - b. a charger system, said charger system comprising:
 - i. at least a first and second dock;
 - ii. at least a first and second rechargeable battery, wherein said first and second rechargeable batteries are in said first and second docks; and
 - iii. at least one power supply electrically coupled to at least said first and second docks;
 - c. a vending controller located within the kiosk structured to determine:

- i. whether said first or second battery is present in said first or second dock;
and
 - ii. whether communication with the transaction network provides for instructions to release said first or second battery.
17. The charger kiosk according to claim 16, wherein said transaction network is capable of processing payment information.
18. The charger kiosk according to claim 17, wherein said payment information is selected from the group consisting of credit card information, debit card information, cash, online account information and bitcoin.
19. The charger kiosk according to claim 16, further comprising memory capable of storing user login information and payment account information.
20. An external rechargeable battery for a mobile device comprising at least a first and second plug for insertion into said mobile device, wherein said first and second plug are compatible with different mobile devices.
21. The battery of claim 20, wherein said first and second plugs are attached to said battery by first and second cords.
22. The battery of claim 21, wherein said first and second cords are stored in a casing of said battery.
23. The battery of claim 21, wherein at least one of said first and second cords are capable of retraction into the interior of said battery.
24. The battery of claim 21, wherein at least one of said first and second cords are capable of being stored in a molded storage slot on the exterior of said battery.
25. The battery of claim 21, wherein a plurality of different of different connectors attach to the end of the cord to which the mobile device attaches.

26. The battery of claim 20, further comprising a moveable appendage attached thereto, wherein said appendage, when extended forms a stand for said battery.
27. The battery of claim 20, wherein at least one of said first and second plugs retract into said charger.
28. The battery of claim 20, further comprising a material for holding said battery to said mobile device.
29. The battery of claim 28, wherein said material is selected from the group consisting of Velcro, at least one suction cup, suction tape and adhesive free grip.
30. The battery according to claim 21, further comprising a waterproof encasement.
31. The battery according to claim 21, 22, 23, 24, 25, 26, 27, 28, 29 or 30, wherein said battery is capable of being charged from one or more solar panels.
32. A method of providing rechargeable batteries for mobile devices comprising;
 - a. providing a charger according to claim 1;
 - b. distributing at least a first charged battery to a consumer;
 - c. collecting at least a first battery from said consumer, wherein said battery is at least partially discharged; and
 - d. recharging said at least partially discharged battery in said battery dock.
33. A method of providing rechargeable batteries for mobile devices comprising
 - a. providing a charger kiosk according to claim 15;
 - b. receiving a request from a consumer for a battery compatible with a input for a mobile device;

- c. receiving input from said consumer of payment information;
 - d. upon confirmation of the adequacy of said payment information, providing a battery to said consumer compatible with said request.
34. The method according to claim 33, further comprising receiving a partially discharged battery associated with the account of said consumer.
35. The method according to claim 33, whereby said kiosk replaces said partially discharged battery in one of said docks, whereby said partially discharged battery is capable of being charged.
36. The method according to claim 35, whereby said battery is charged.
37. A method of messaging a mobile device user comprising providing a charged, rechargeable battery for a mobile device, whereby upon attachment of said battery to said mobile device, software stored in said battery is executed and provides a message to said mobile device.
38. The method according to claim 37, wherein said message is selected from the group consisting of a request to login to Wi-Fi, advertisements and surveys.
39. The charger according to claim 1, wherein said rechargeable batteries are charged wirelessly from said charger.
40. The method according to claim 32, wherein said rechargeable battery is charged wirelessly from said charger.
41. The method according to claim 32, wherein said mobile device battery is charged wirelessly from said rechargeable battery.
42. The method according to claim 41, whereby a receiver is connected to said mobile device, whereby said receiver is capable of wirelessly receiving a charge from said rechargeable battery.

dock station

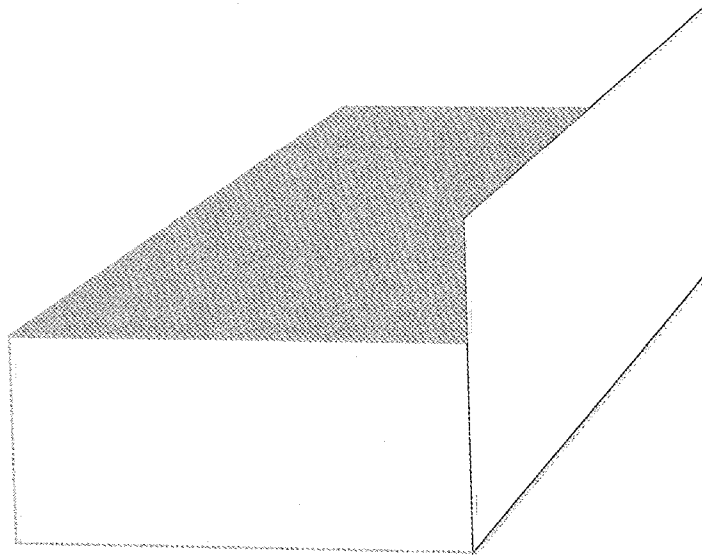


Fig 1

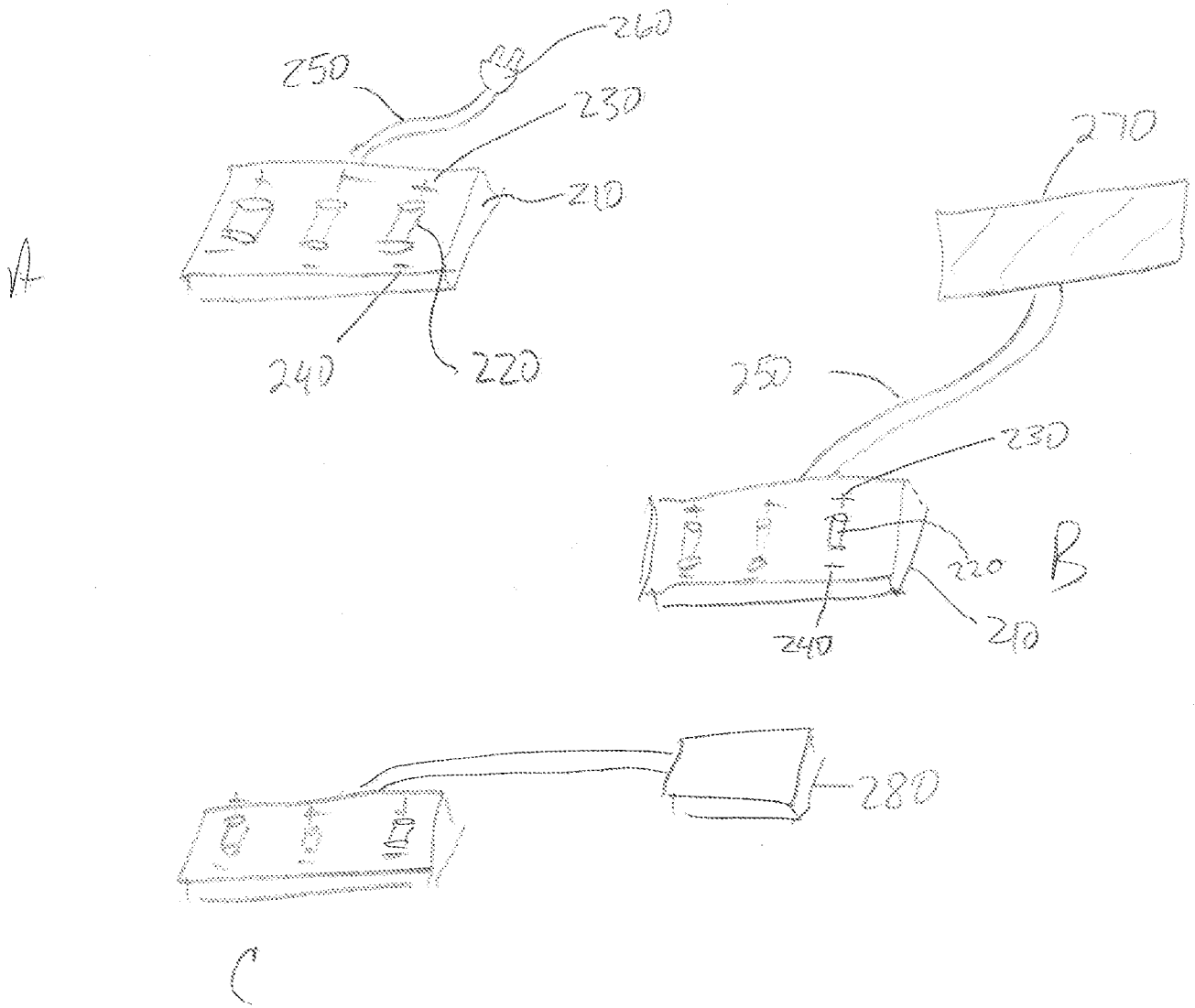


Fig 2

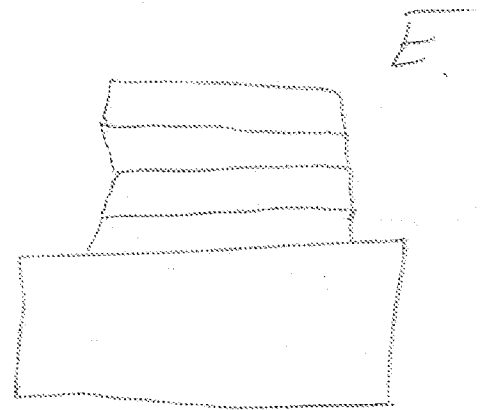
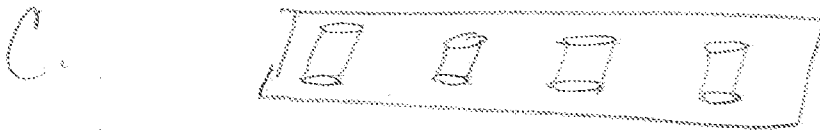
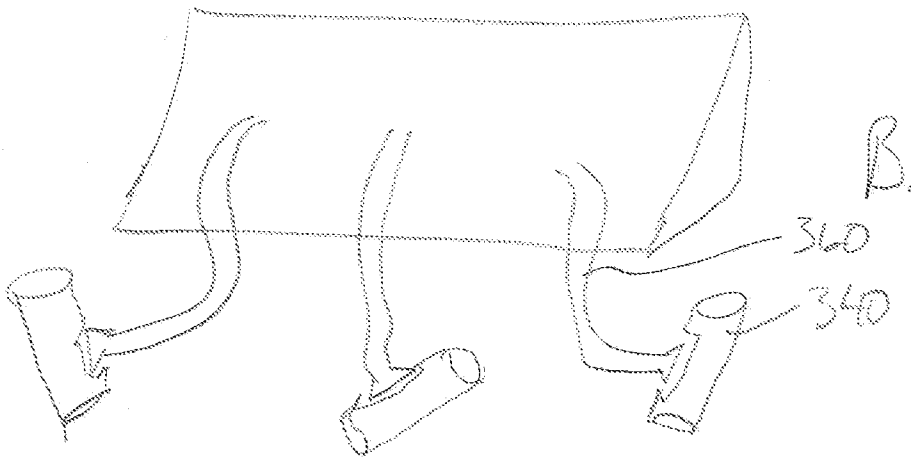
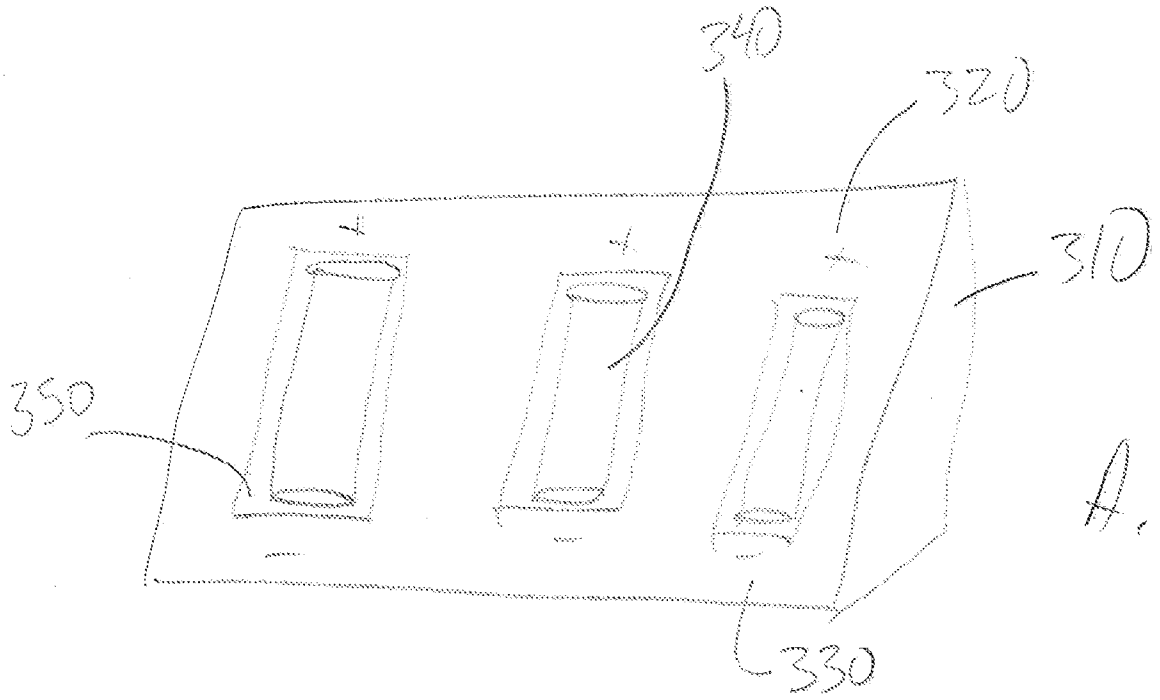


FIG 3

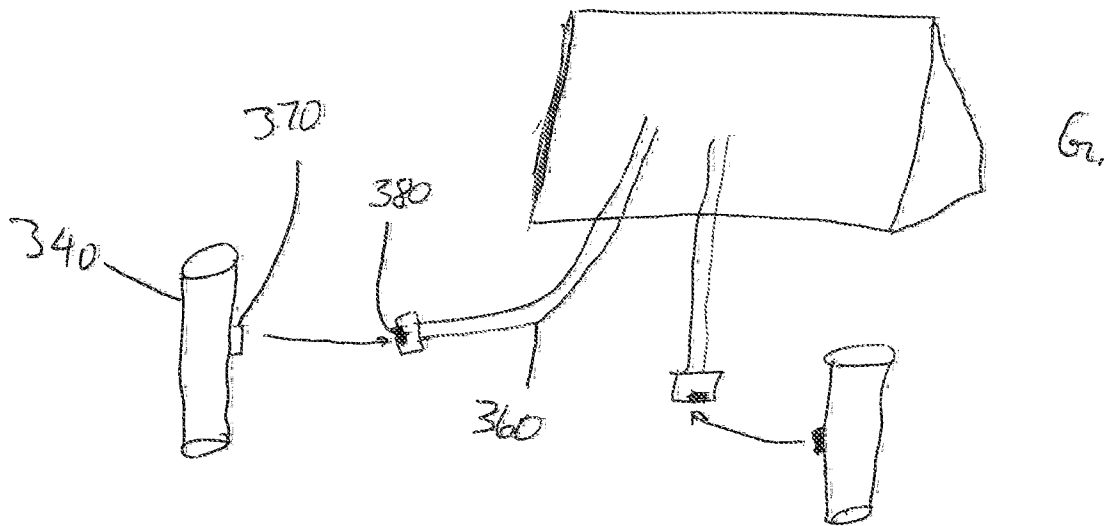
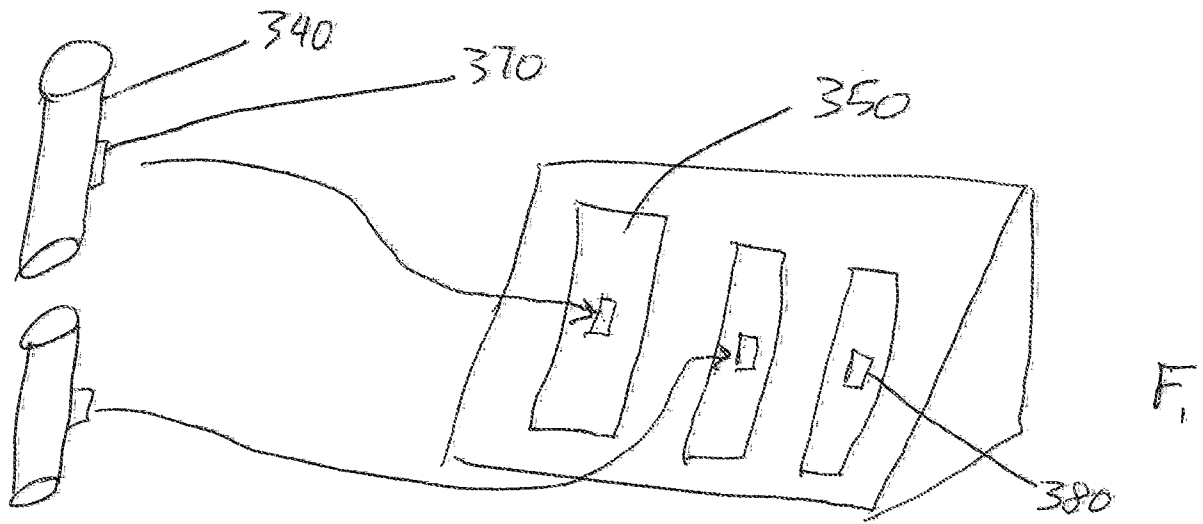


Fig 3

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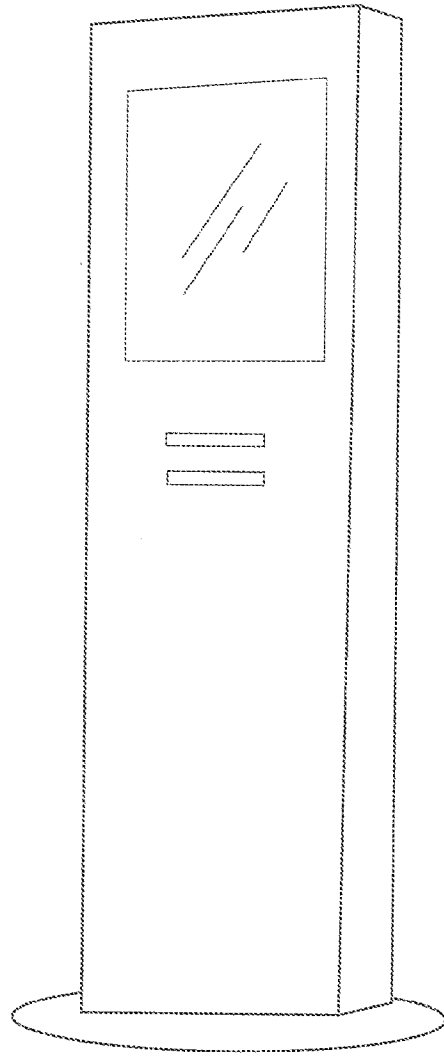
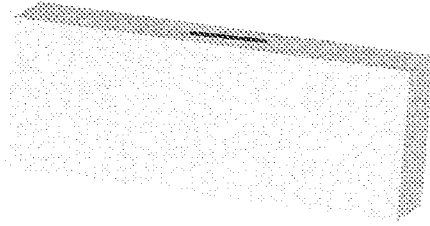


FIG. 4

5A



5B

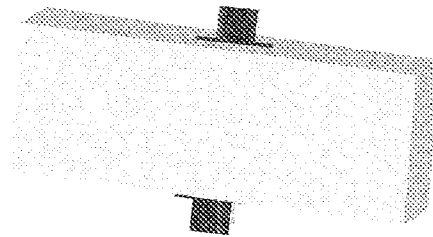
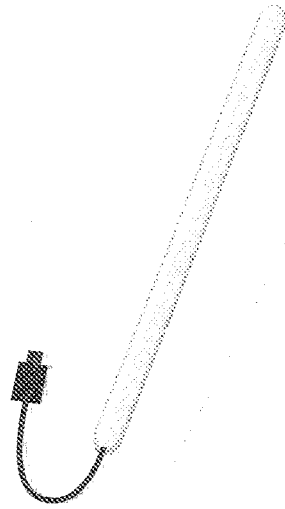


FIG 5

6A



6B

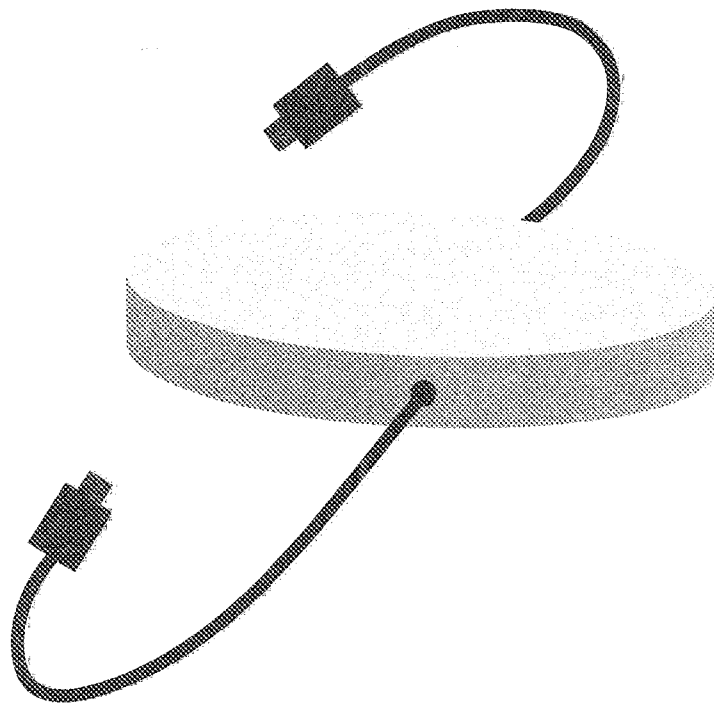


Fig. 6

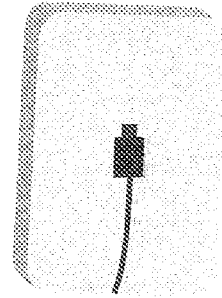
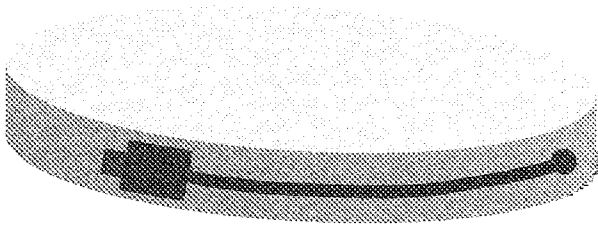


FIG 6C

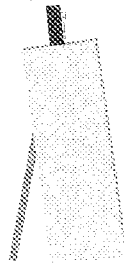
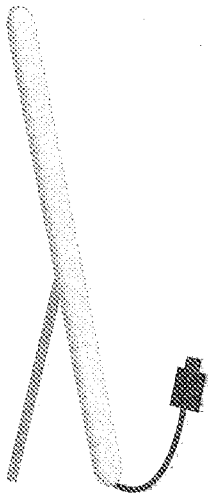


FIG 6D

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/014858

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H02J 7/00 (2015.01) CPC - H02J 7/00 (2015.01) 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) IPC(8) - G06F 1/26; H01M 10/42; H02J 5/00, 7/00 (2015.01) USPC - 320/107, 137; 455/572 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched CPC - G06F 1/26; H02J 5/00, 7/00 (2015.01) (keyword delimited) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatBase, Google Patents, Google Scholar. Search terms used: battery, rechargeable, charger, mobile device, wall outlet, solar panel, dock, AC, DC, external, velcro, power supply, kiosk, waterproof, messaging		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2012/0129577 A1 (VAKNIN et al) 24 May 2012 (24.05.2012) entire document	1-6, 8-9, 11-12, 16-21, 24, 31-32 ----- 7, 10, 13, 22, 23, 29, 30, 39-42
X	US 5,608,306 A (RYBECK et al) 04 March 1997 (05.03.1997) entire document	37, 38
Y	US 2013/0335027 A1 (XIN) 19 December 2013 (19.12.2013) entire document	7
Y	US 2013/0175983 A1 (PARTOVI et al) 11 July 2013 (11.07.2013) entire document	10, 28-29, 39-42
Y	WO 2013/169959 A1 (ANDERSON) 14 November 2013 (14.11.2013) entire document	13, 30
Y	US 2006/0264094 A1 (YOUNG) 23 November 2006 (23.11.2006) entire document	22-23, 27
Y	US 7,007,787 A1 (MILAN) 28 February 2006 (28.02.2006) entire document	25
Y	US 2013/0100597 A1 (BERG et al) 25 April 2013 (25.04.2013) entire document	26
A	US 2013/0063073 A1 (KAWASAKI et al) 13 March 2013 (13.03.2013) entire document	1-13, 16-32, 37-42
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 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 06 April 2015		Date of mailing of the international search report 14 MAY 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2015/014858

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.: 14, 15,33-36
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.