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(54) **VEHICLE CABIN PORTABLE BATTERY**

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H01M 50/284	(2006.01)

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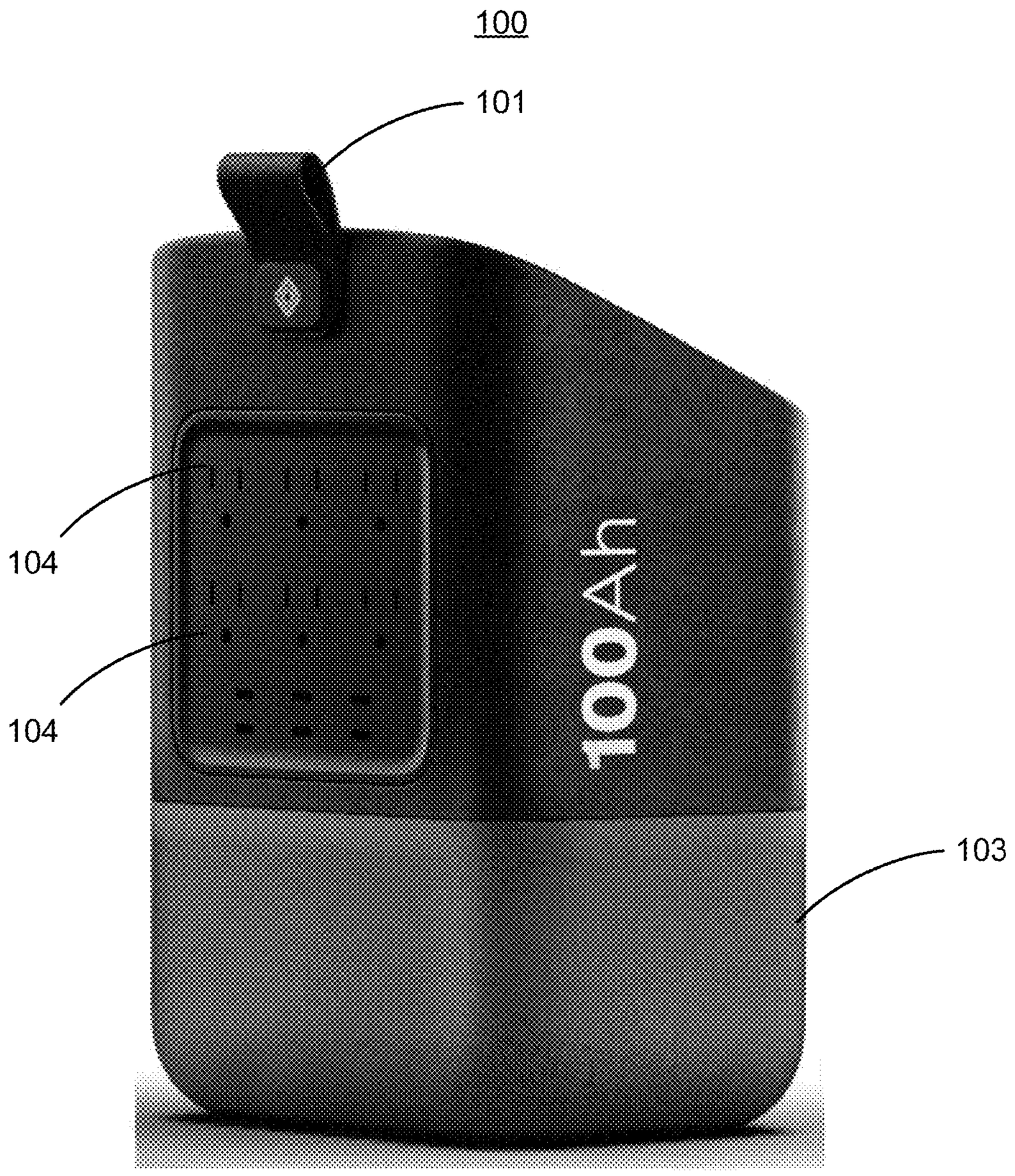
(57) **ABSTRACT**

A portable battery configured to be secured to a vehicle is disclosed. The portable battery includes a latch to secure it in the vehicle and electrical ports configured to provide power. The portable battery may also include a light source to provide ambient light which may be synchronized with the vehicle. The portable battery may charge a user device or the vehicle itself. The portable battery may also be charged from the vehicle.



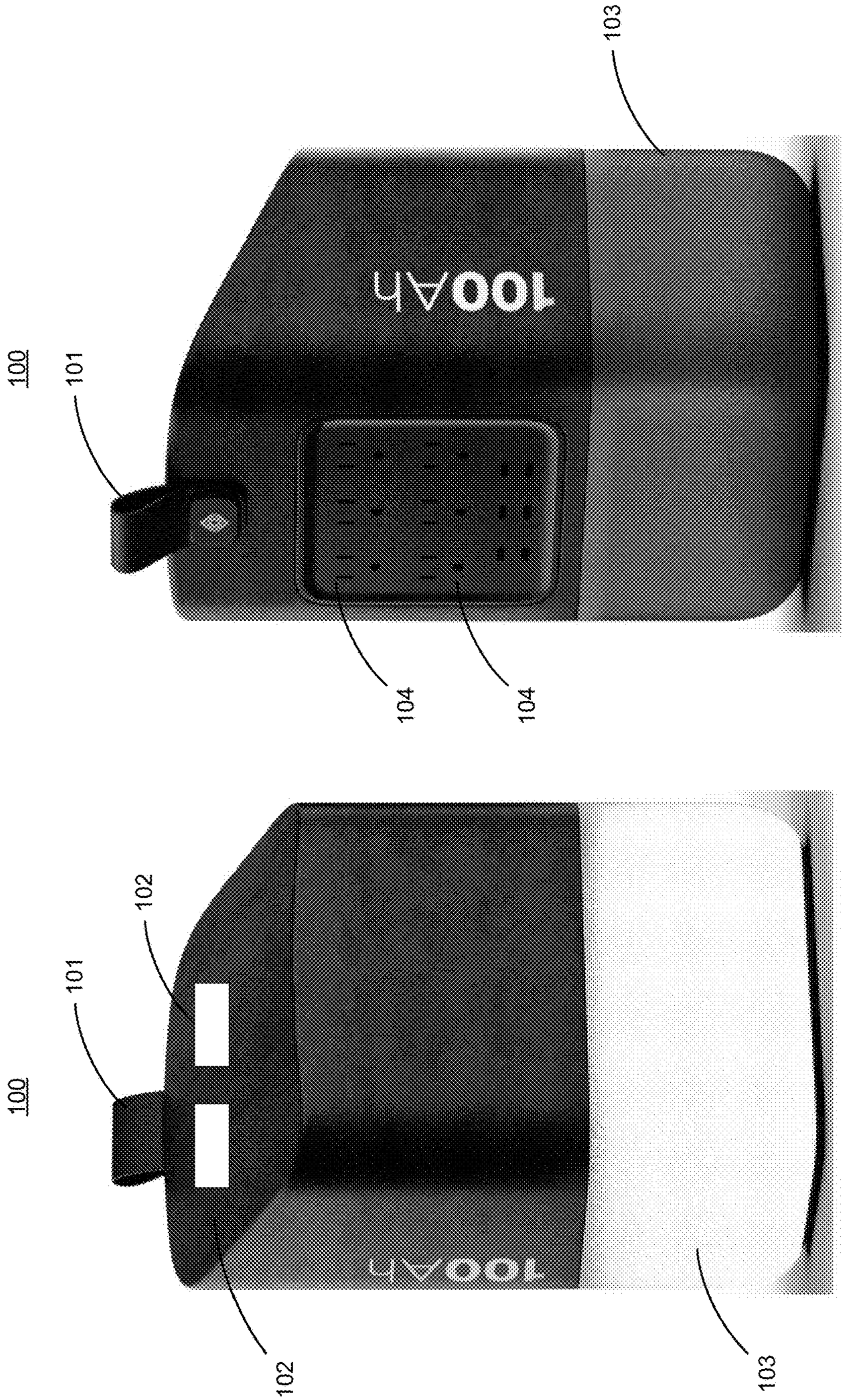


FIG. 1B

FIG. 1A

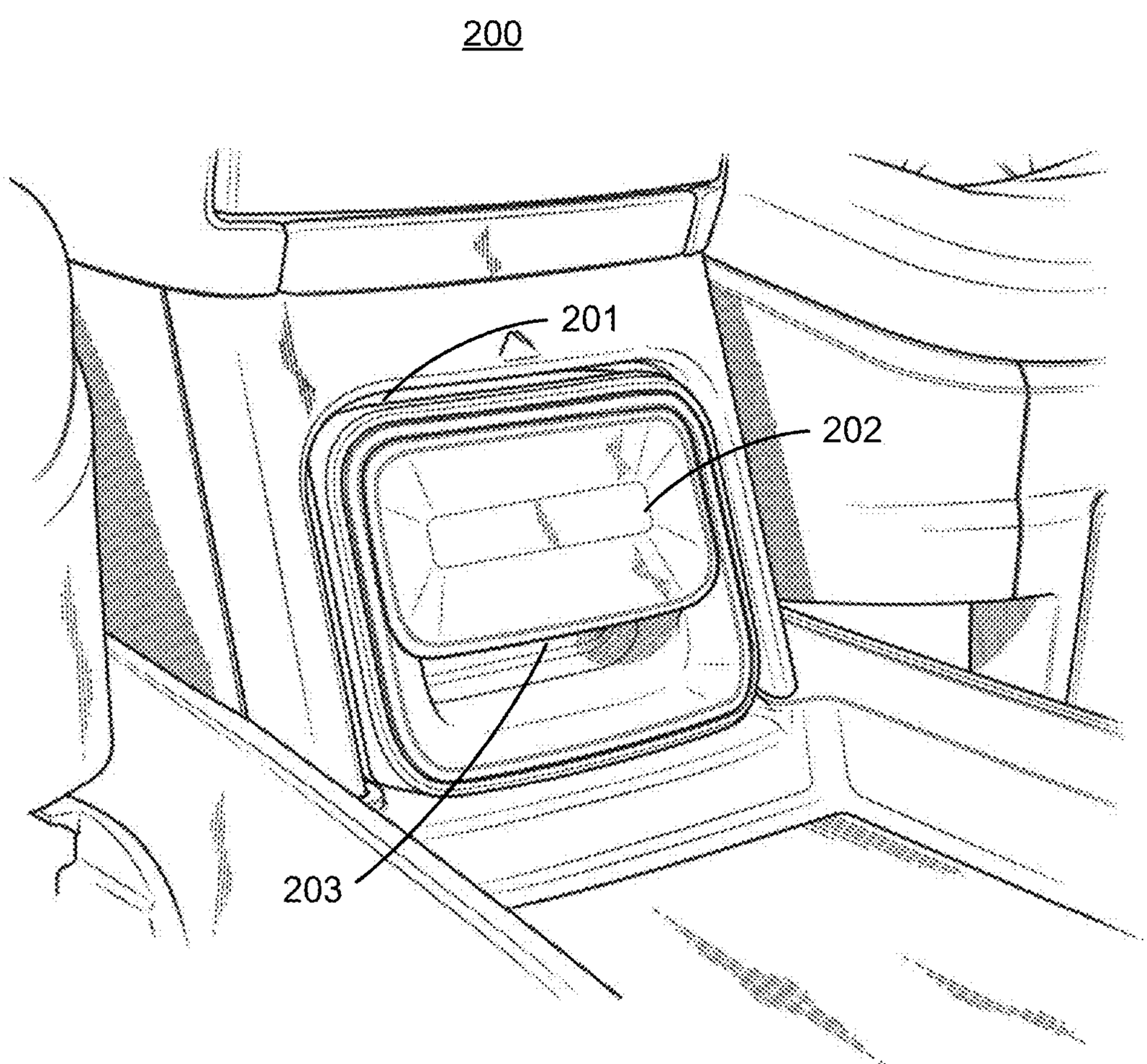


FIG. 2

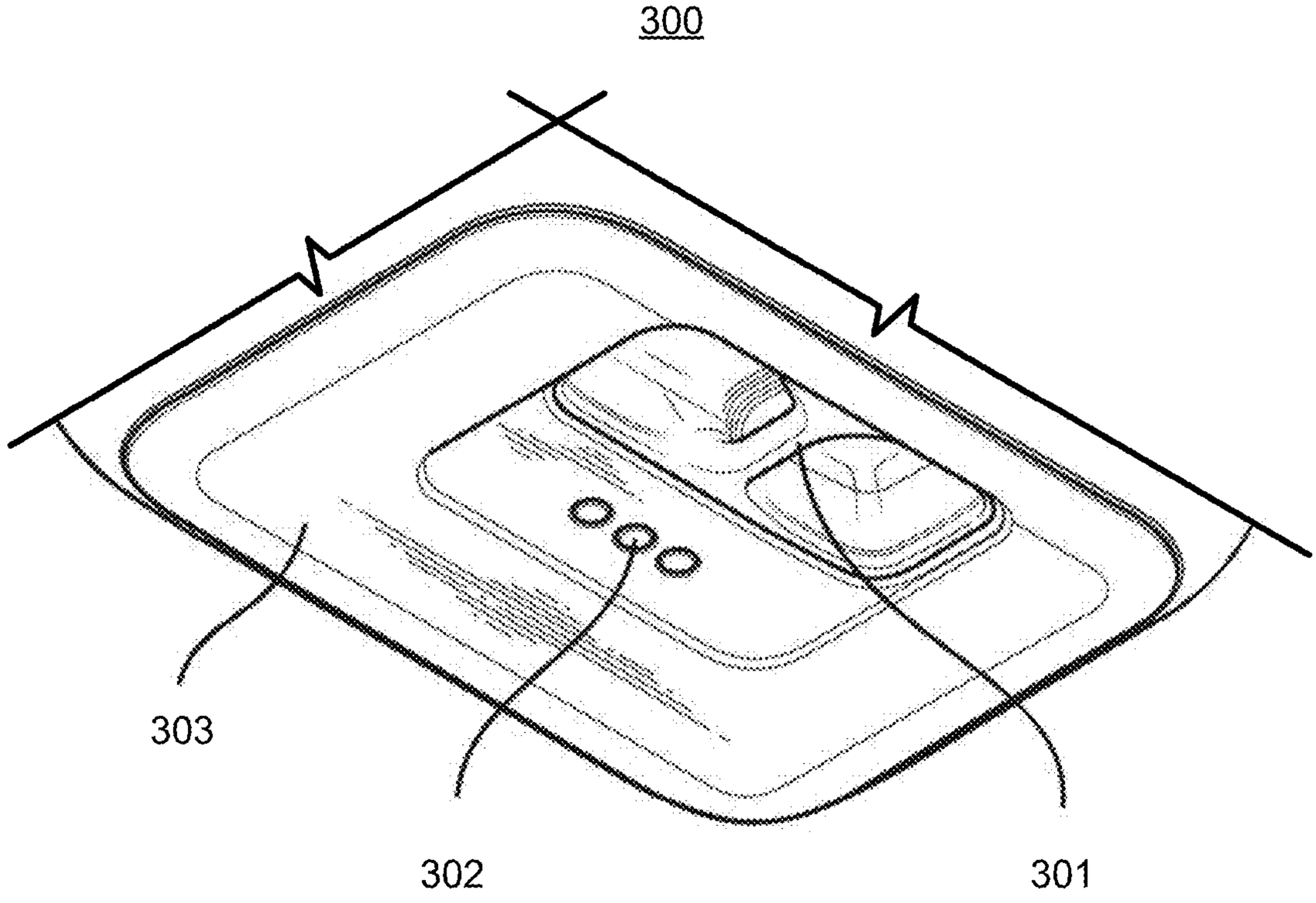


FIG. 3

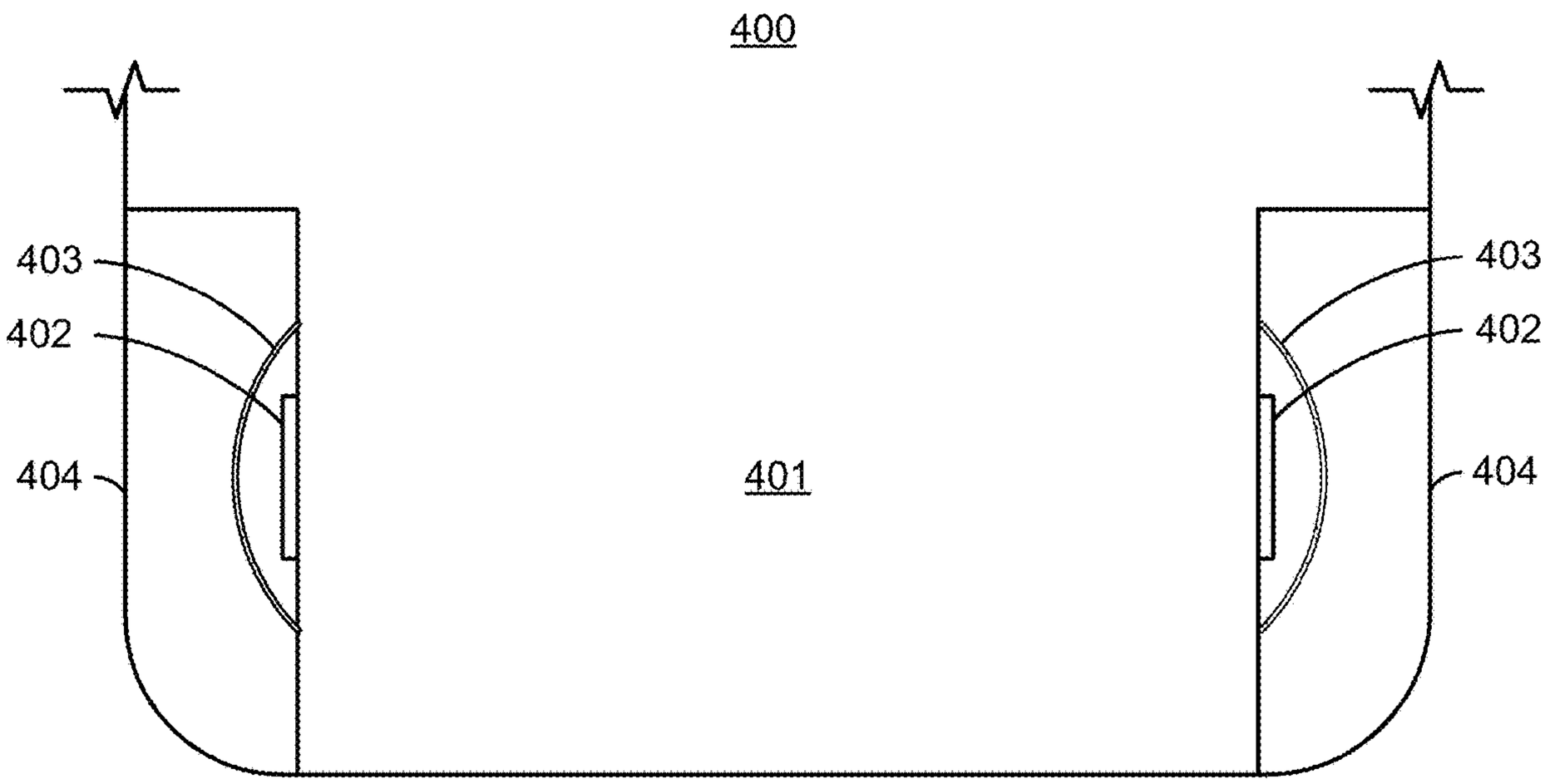

400
403
402
404
401
403
402
404

FIG. 4A

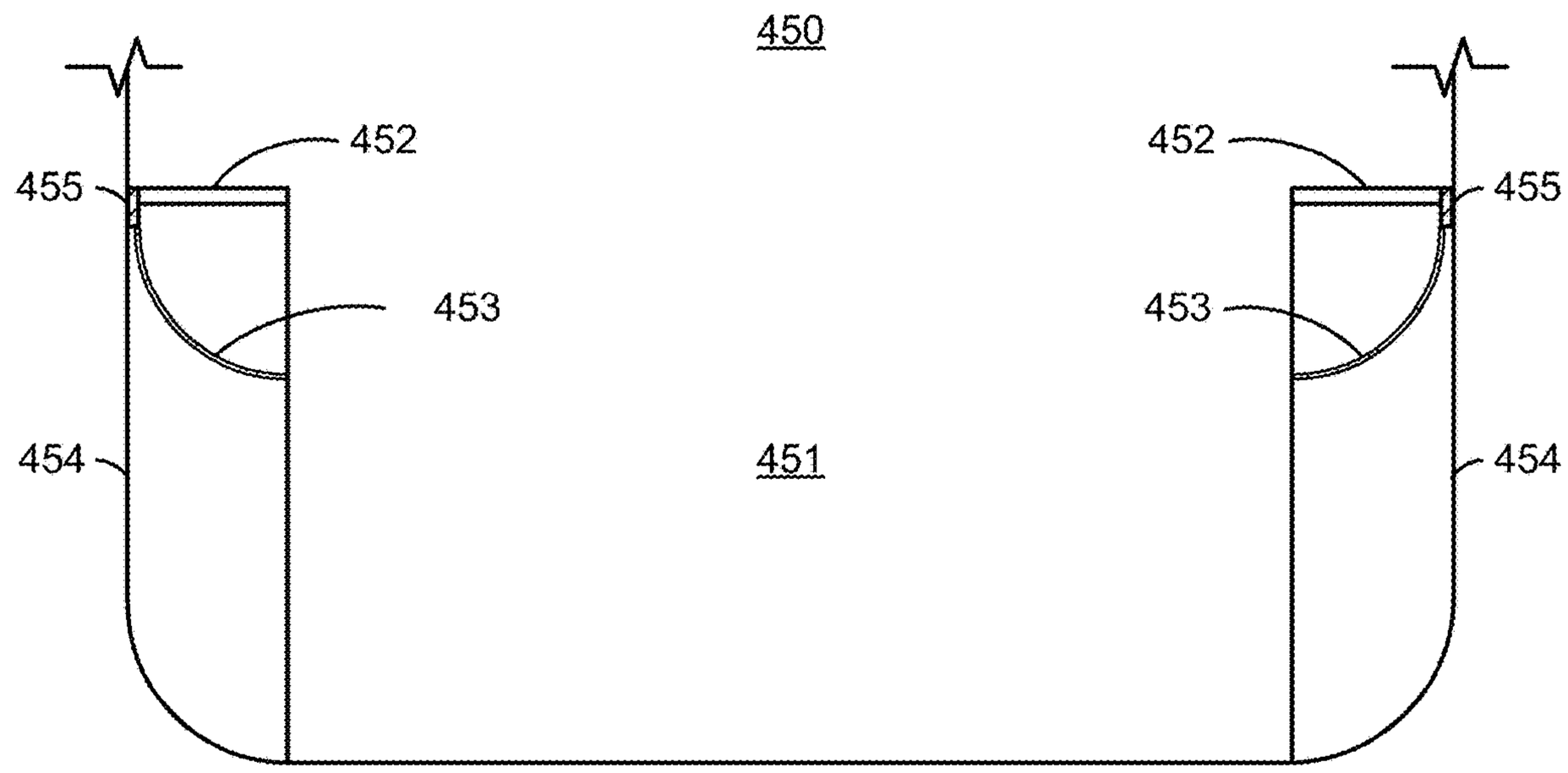

450
452
455
453
454
451
452
455
453
454

FIG. 4B

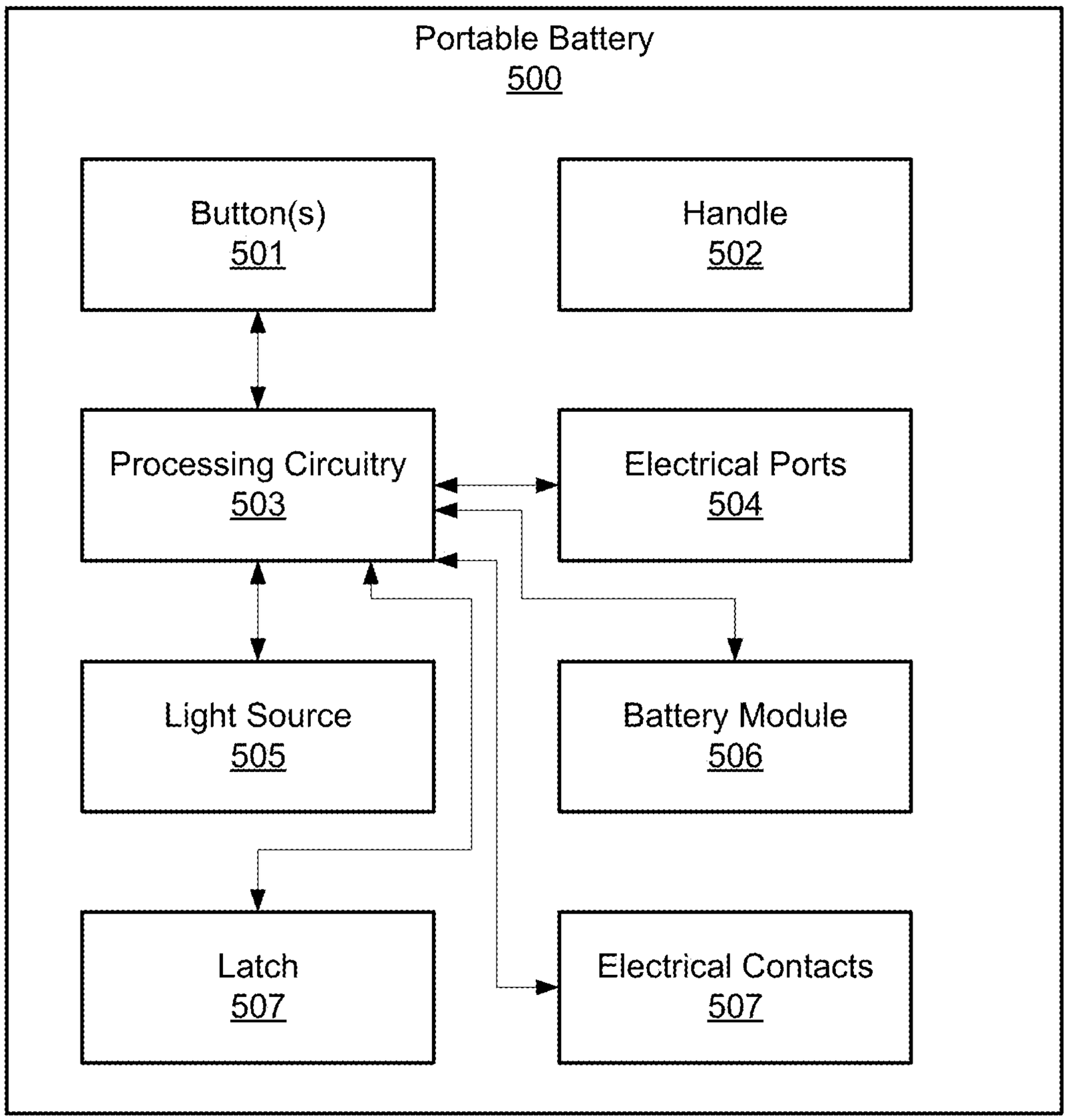

Portable Battery
500
Button(s)
501
Handle
502
Processing Circuitry
503
Electrical Ports
504
Light Source
505
Battery Module
506
Latch
507
Electrical Contacts
507

FIG. 5

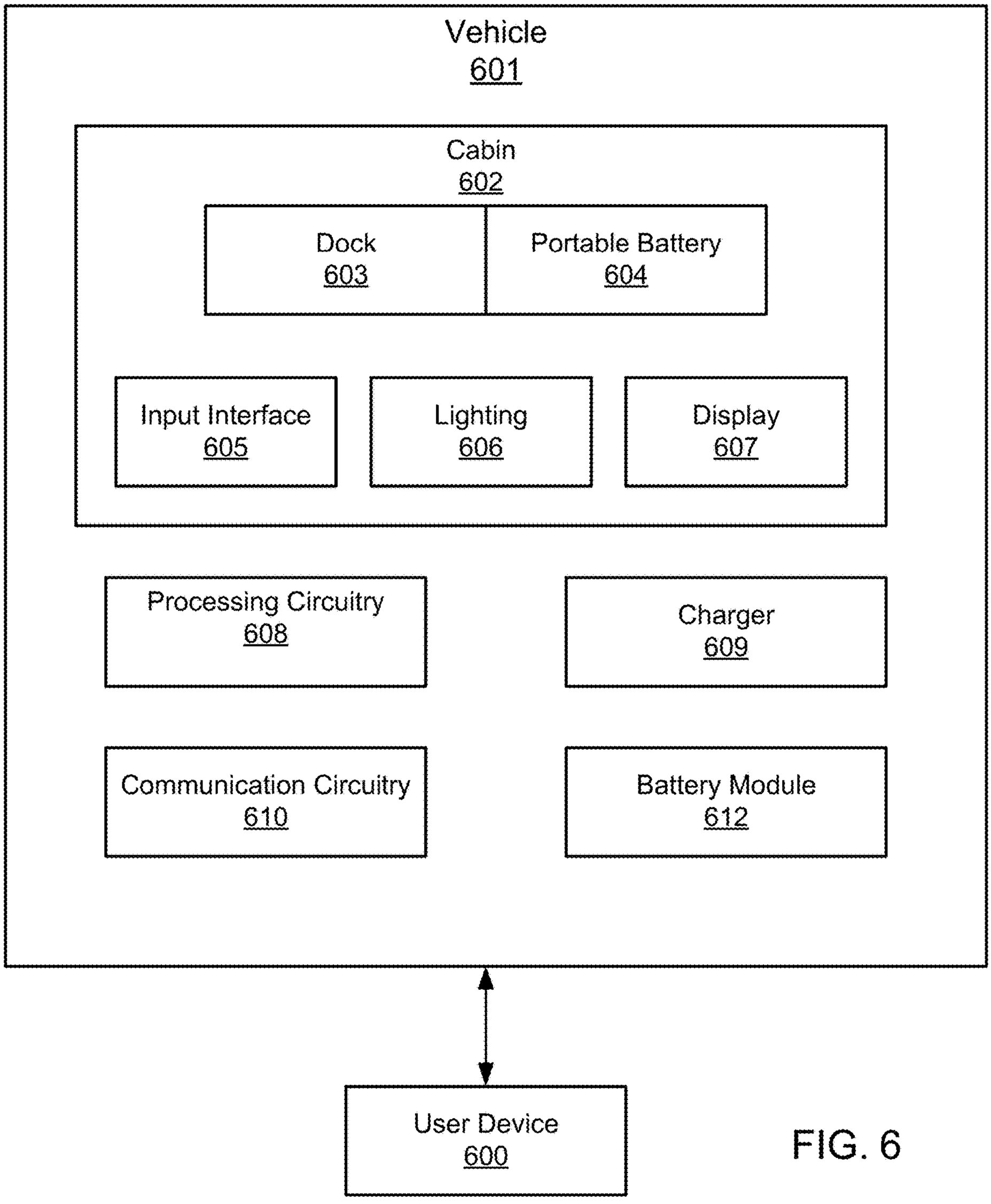

Vehicle
601
Cabin
602
Dock
603
Portable Battery
604
Input Interface
605
Lighting
606
Display
607
Processing Circuitry
608
Charger
609
Communication Circuitry
610
Battery Module
612
User Device
600

FIG. 6

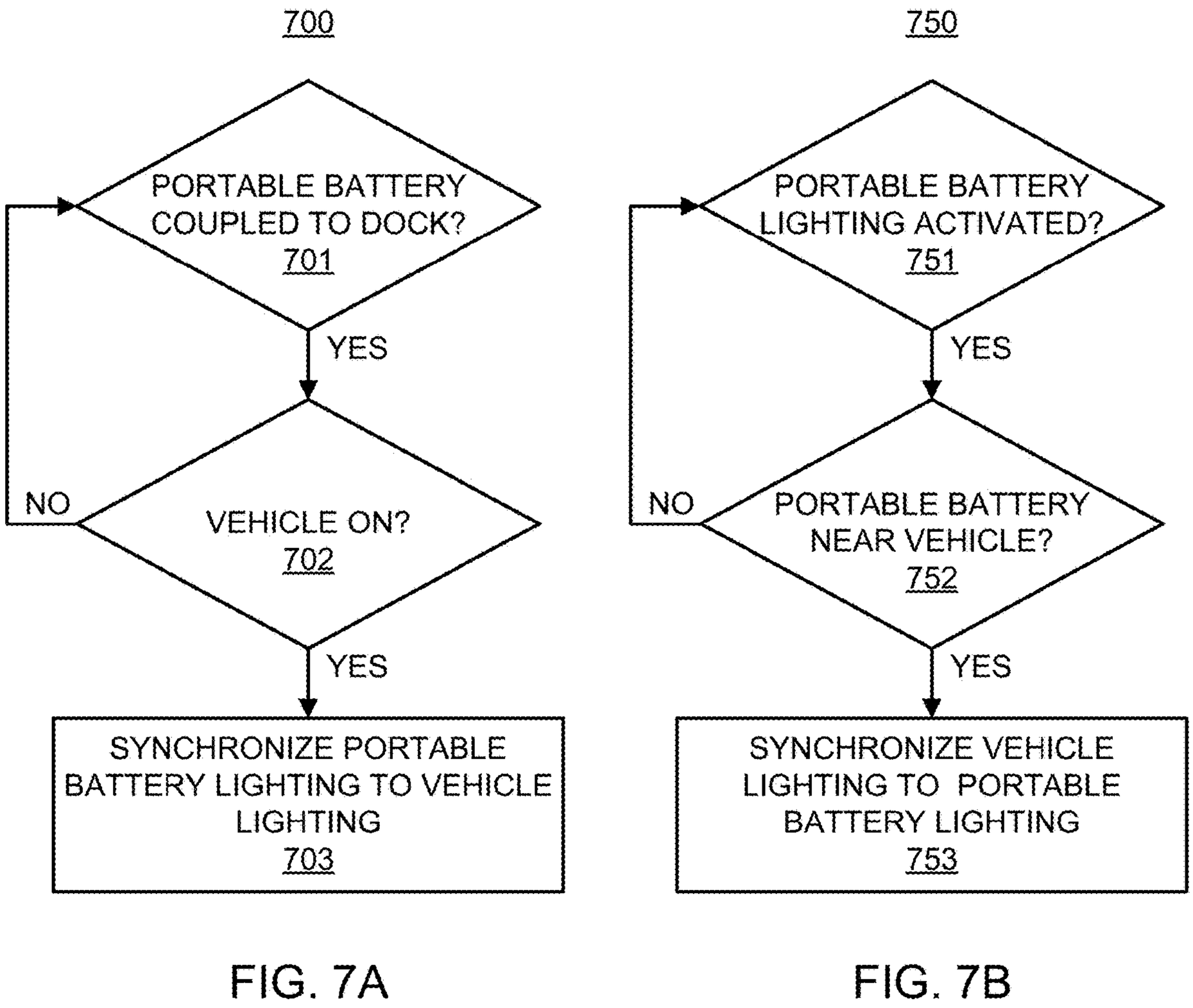

700
PORTABLE BATTERY COUPLED TO DOCK?
701
YES
NO
VEHICLE ON?
702
YES
SYNCHRONIZE PORTABLE BATTERY LIGHTING TO VEHICLE LIGHTING
703
750
PORTABLE BATTERY LIGHTING ACTIVATED?
751
YES
NO
PORTABLE BATTERY NEAR VEHICLE?
752
YES
SYNCHRONIZE VEHICLE LIGHTING TO PORTABLE BATTERY LIGHTING
753

FIG. 7A

FIG. 7B

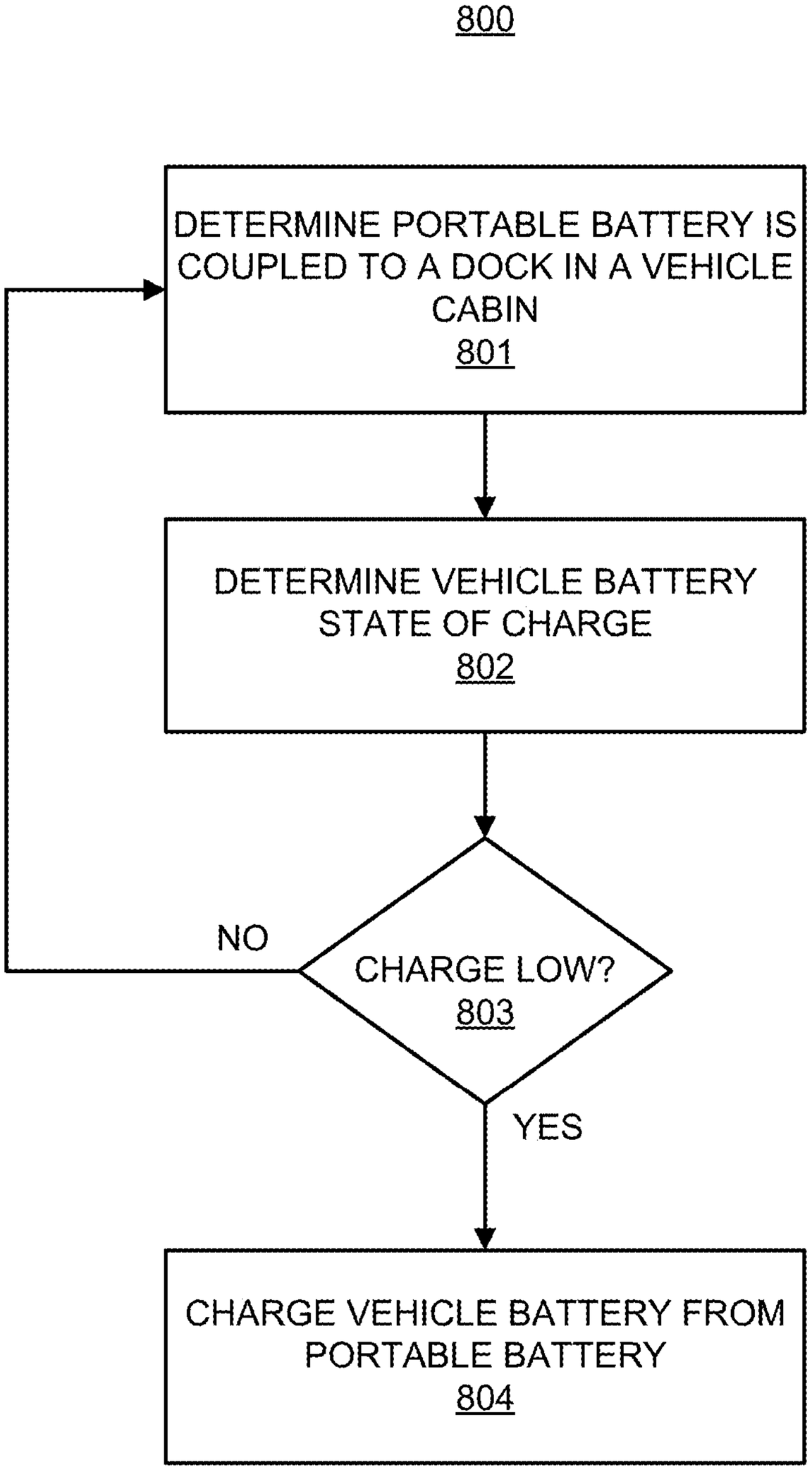

800
DETERMINE PORTABLE BATTERY IS COUPLED TO A DOCK IN A VEHICLE CABIN
801
DETERMINE VEHICLE BATTERY STATE OF CHARGE
802
CHARGE LOW?
803
NO
YES
CHARGE VEHICLE BATTERY FROM PORTABLE BATTERY
804

FIG. 8

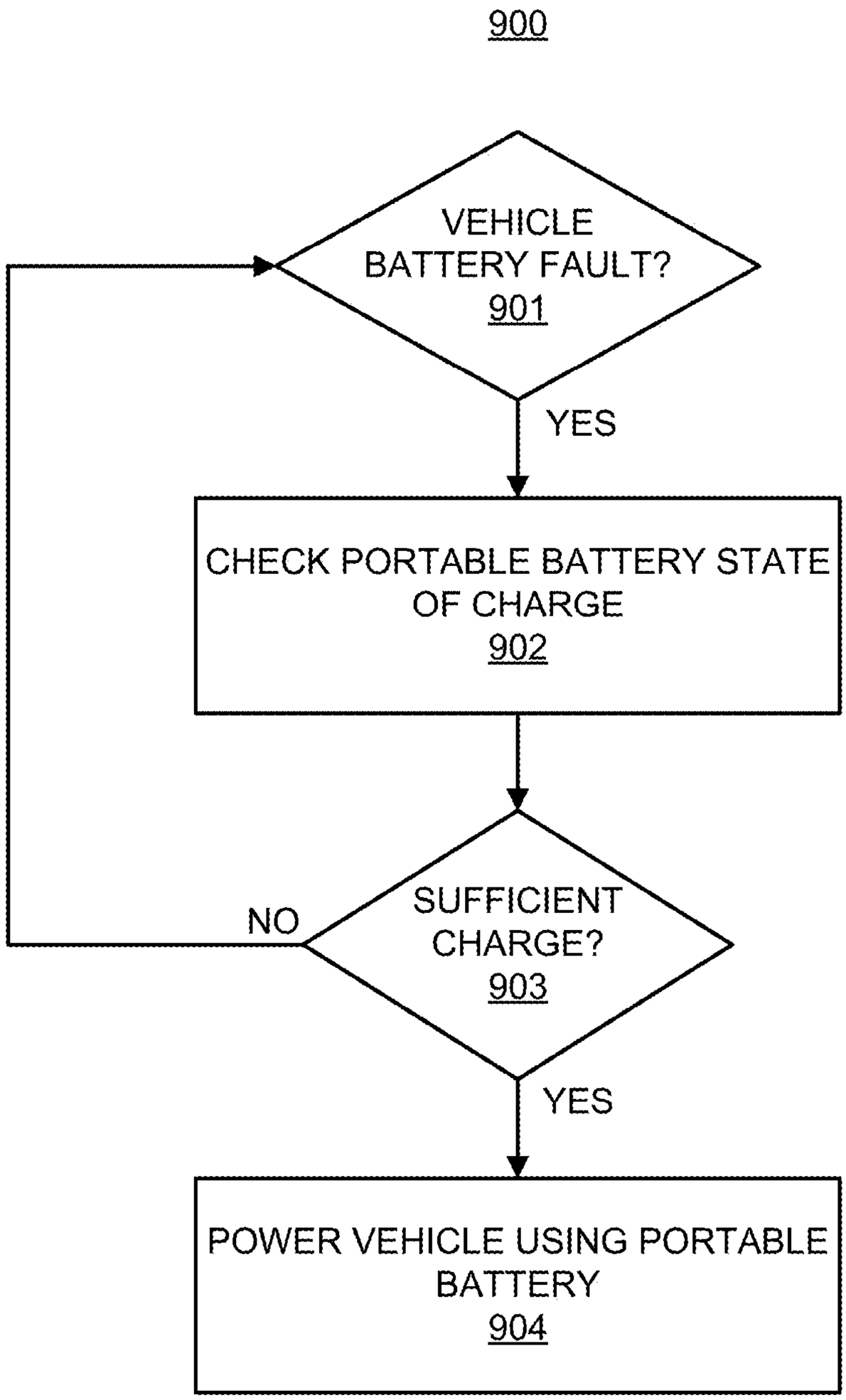

900
VEHICLE BATTERY FAULT?
901
YES
CHECK PORTABLE BATTERY STATE OF CHARGE
902
SUFFICIENT CHARGE?
903
NO
YES
POWER VEHICLE USING PORTABLE BATTERY
904

FIG. 9

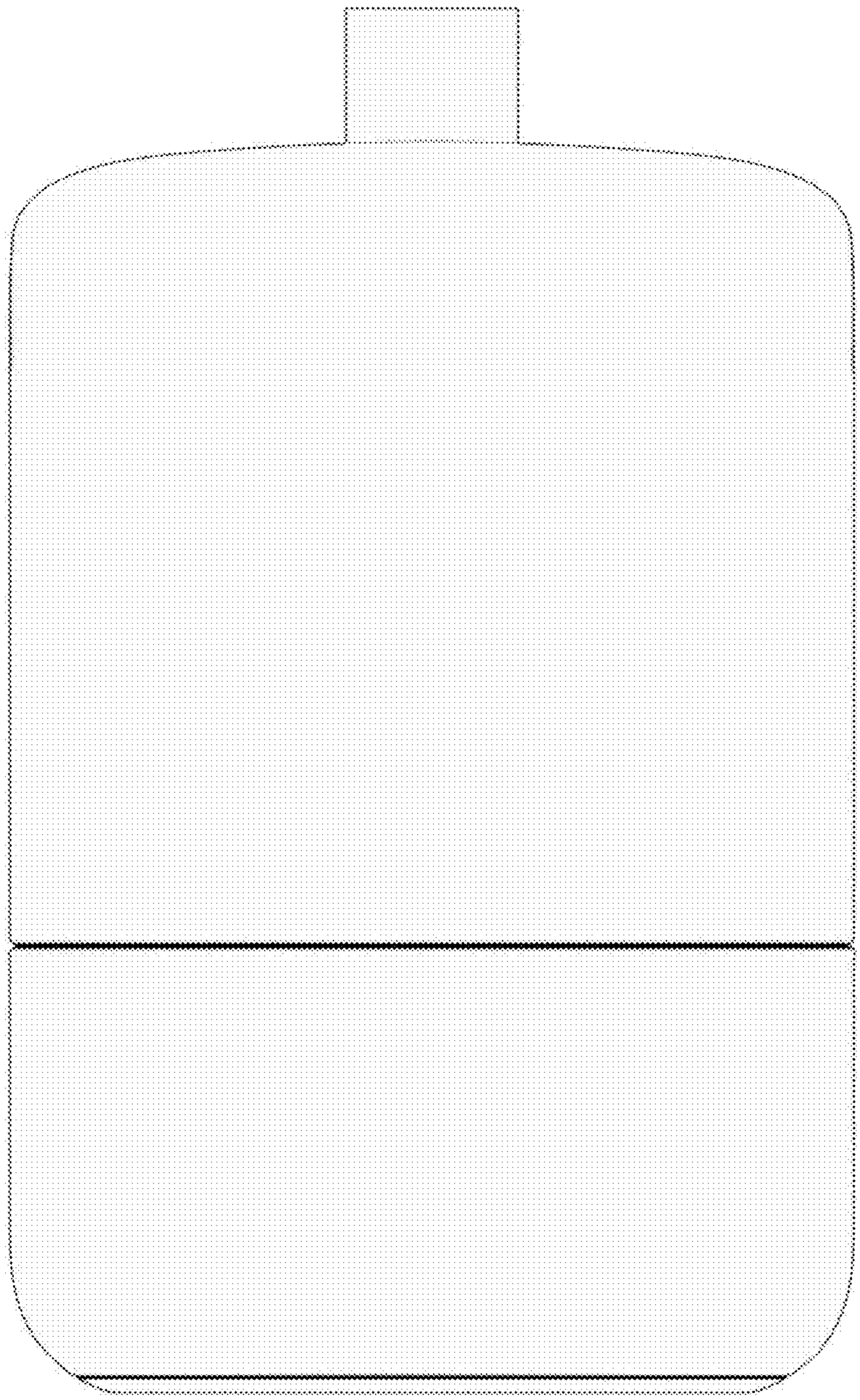


FIG. 10

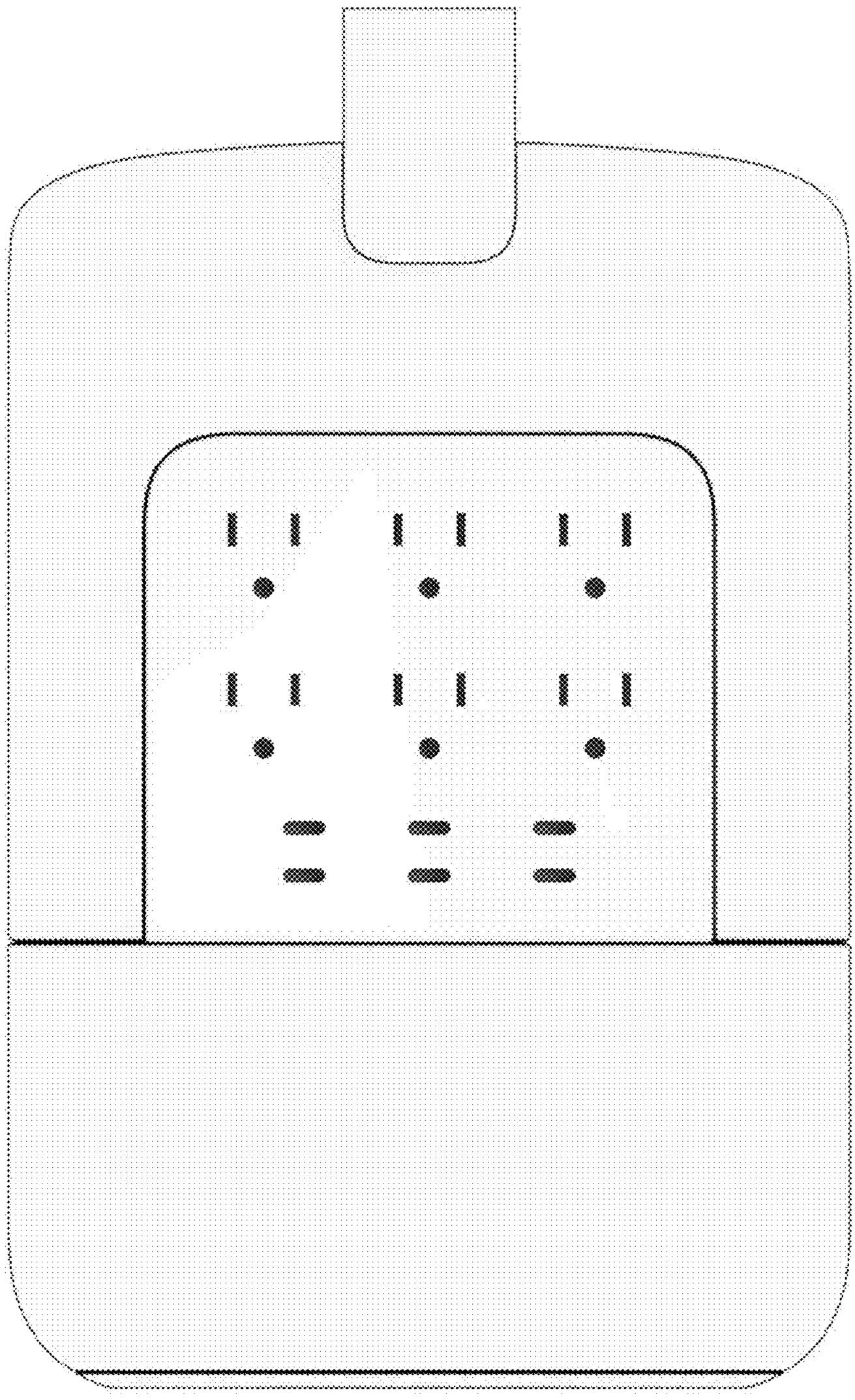


FIG. 11

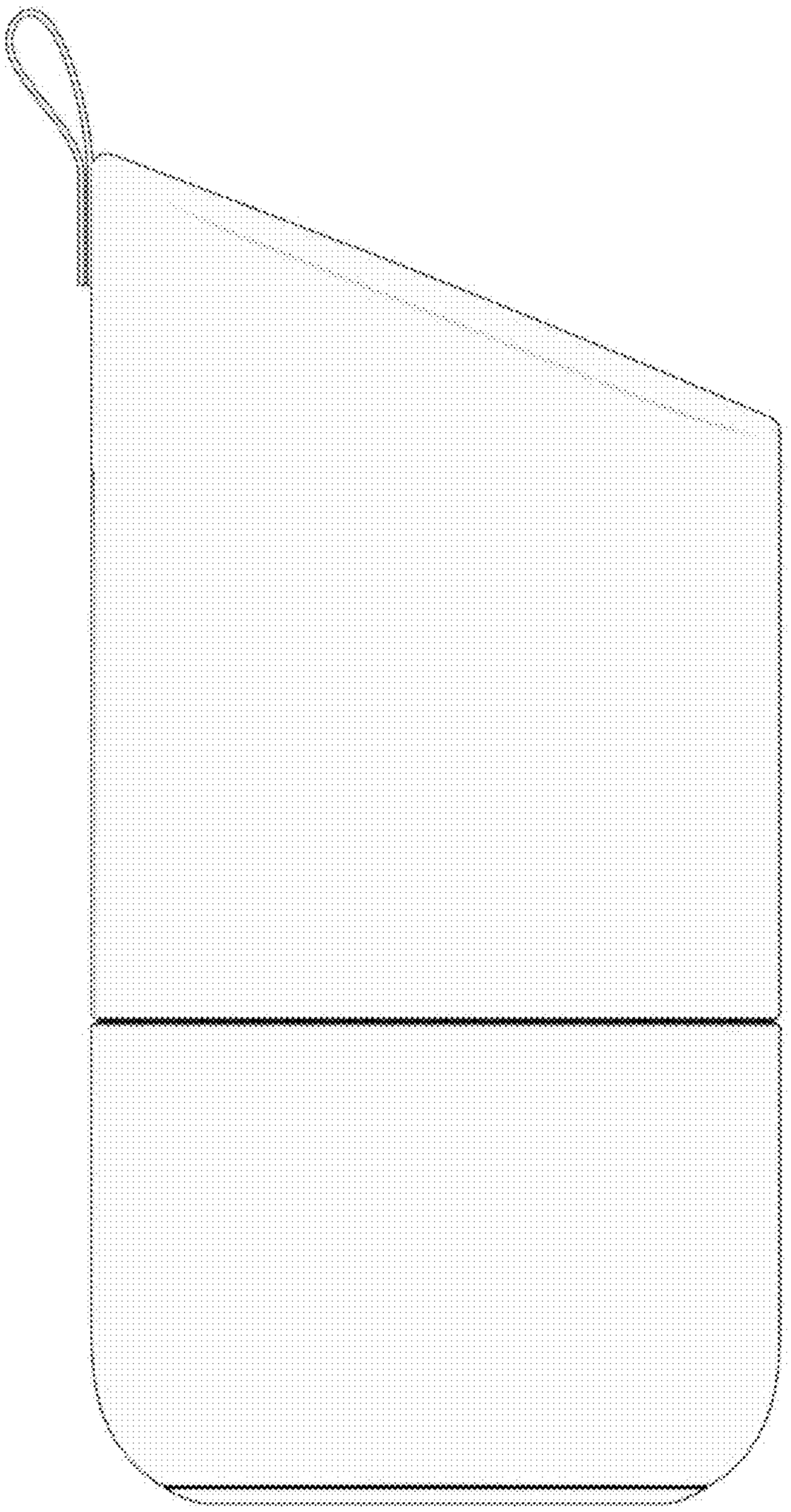


FIG. 12

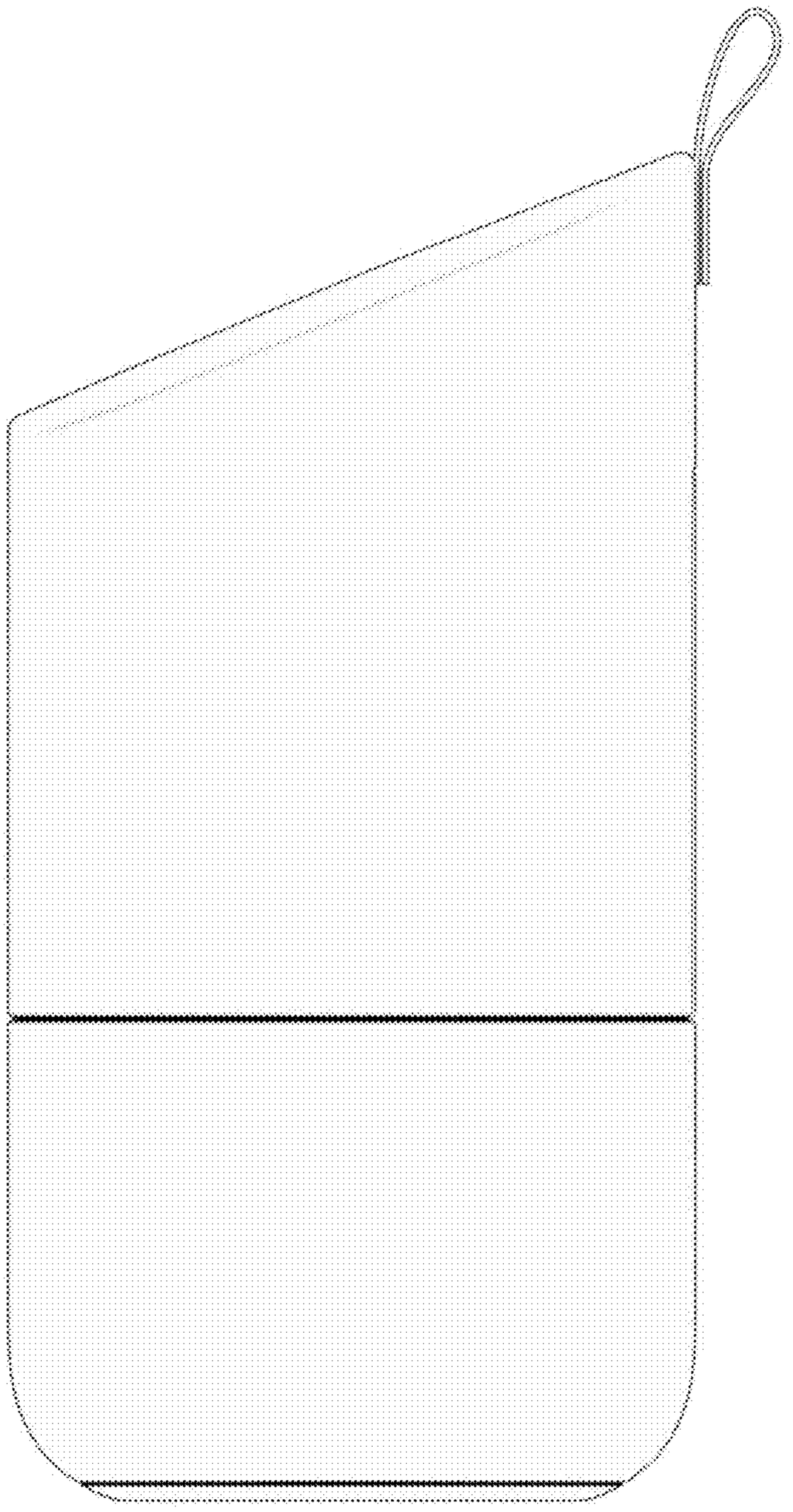


FIG. 13

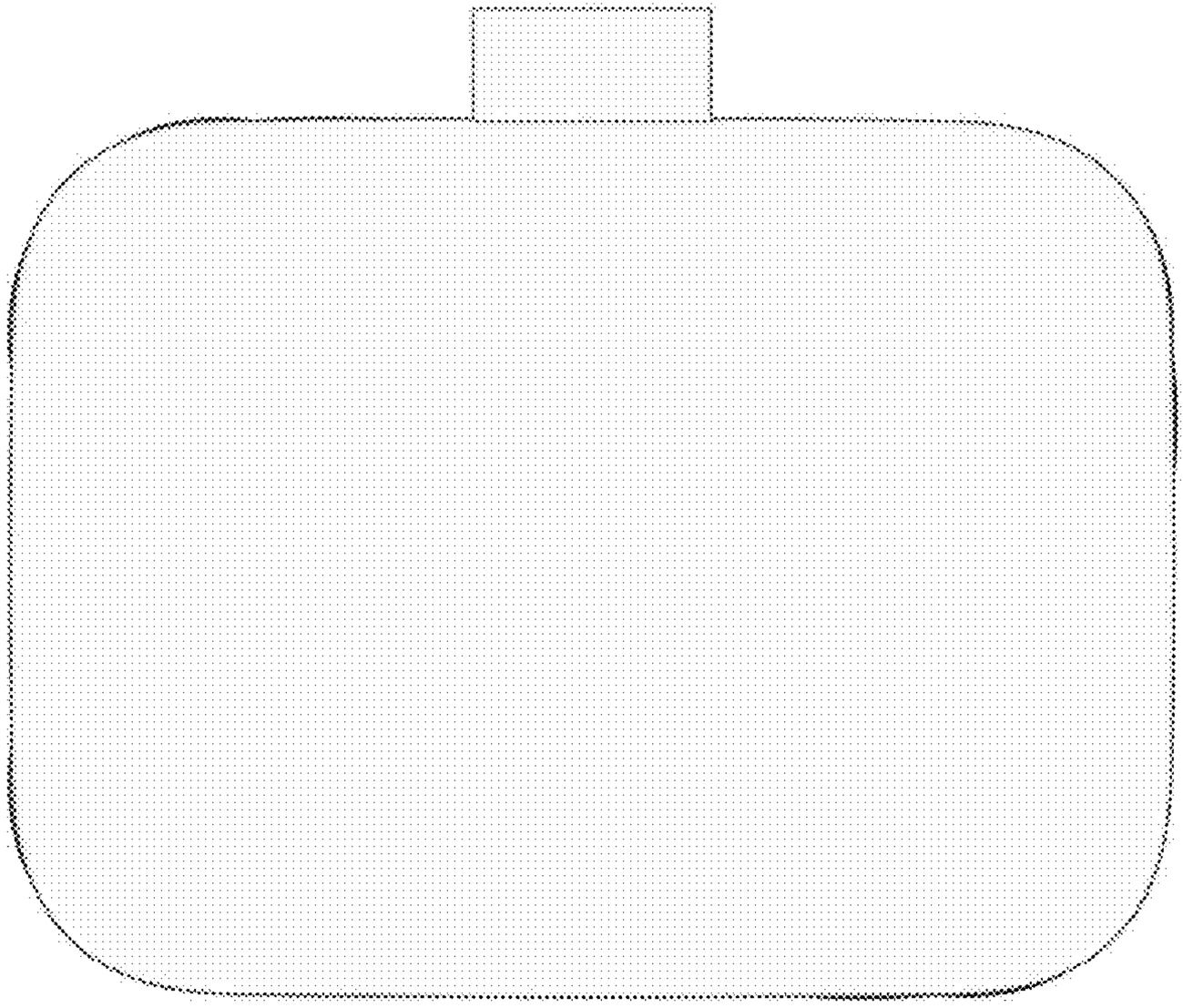


FIG. 14

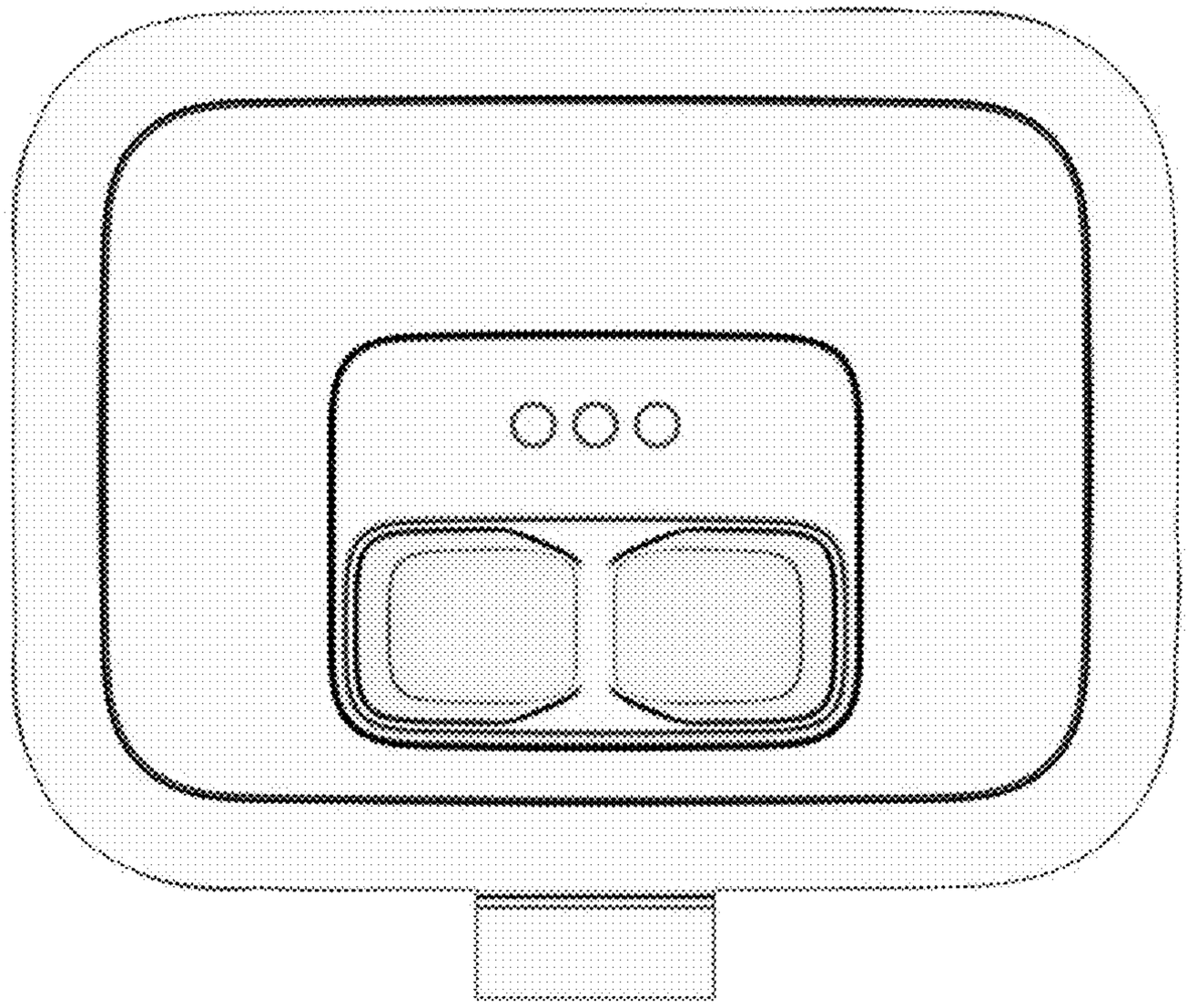


FIG. 15

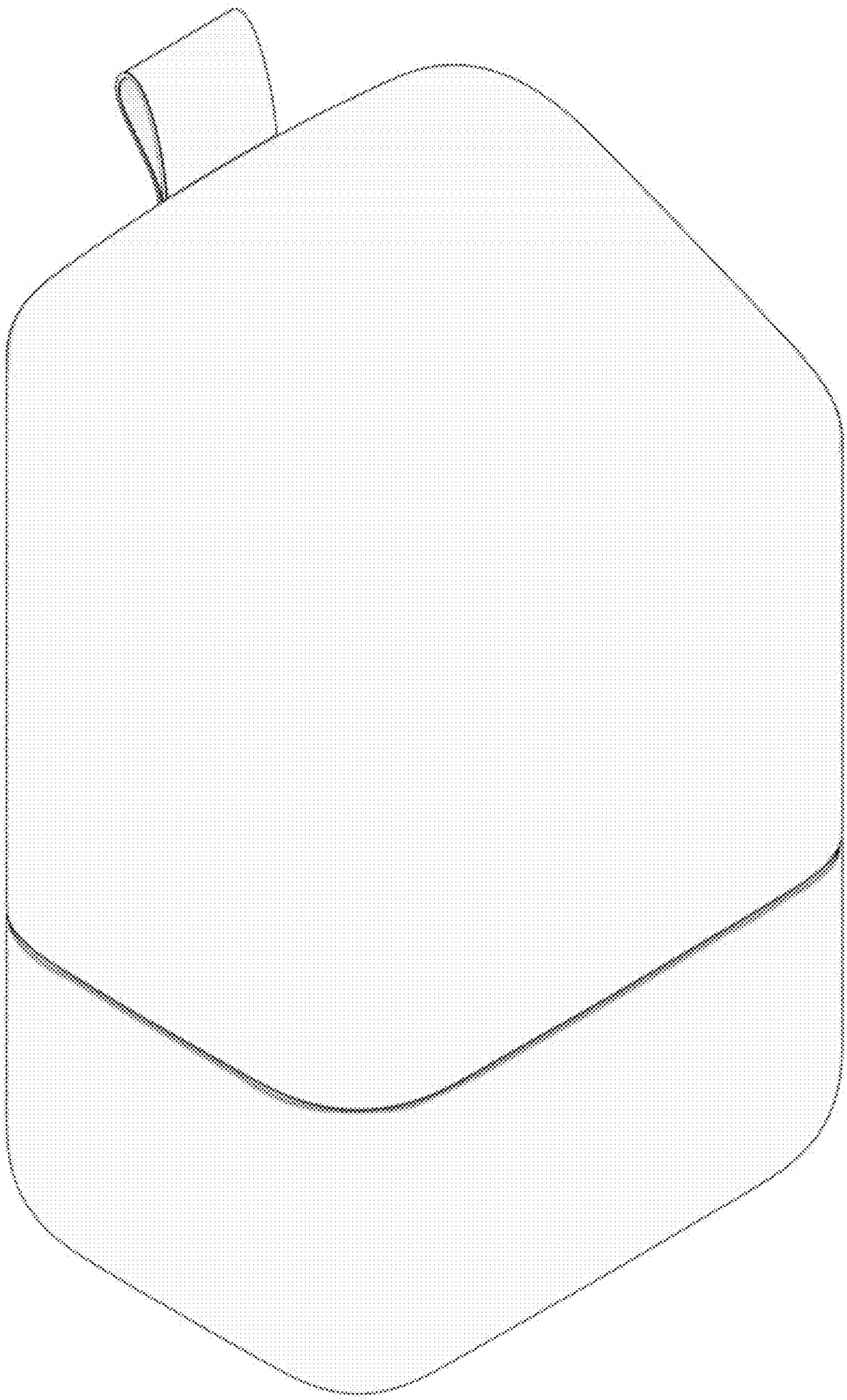


FIG. 16

VEHICLE CABIN PORTABLE BATTERY

INTRODUCTION

[0001] When arriving at a destination, people may need a portable battery for charging devices such as a cell phone, smart device, or even their electric vehicle and an ambient light source to provide soft lighting while setting up a campsite or while performing other actions. These actions may occur while alternative light and charging sources are packed away or in an environment where there is no access to a power source for charging.

[0002] This description is of an illustrative environmental context only. It will be readily apparent to those of ordinary skill in the art that the principles of the present disclosure may equally apply in other environmental contexts.

SUMMARY OF THE DISCLOSURE

[0003] Electric vehicles are becoming more common and the ability to charge portable electronic devices or the vehicle itself is important. Accordingly, described herein is a portable battery configured to latch into a vehicle (e.g., a vehicle cabin) for ease of access and charging. The portable battery comprises a latch configured to secure the device to the vehicle and electrical ports to provide power. The portable battery may include a battery module (e.g., comprising multiple battery cells). The battery module may, for example, have a capacity of at least 50 amp hours.

[0004] The portable battery may also include a light source. The light source may include a lens housing around the lower part of the portable battery and one or more emitters that provide diffuse light around the portable battery. Diffuse light is light that one which is spread over a wide area originating from an unconcentrated source as opposed to a point source. This light source may provide ambient light, as opposed to focused light, to create gentle light presence. The portable battery may communicate with a vehicle light controller so that the light source may be synchronized with other lights on the vehicle. Synchronizing may include adjusting the brightness, color, or power of the light source to match the other lights on the vehicle. The light source of the portable battery may also be synchronized with other portable batteries.

[0005] The portable battery may include electrical contacts to transfer (e.g., receive) electricity with the vehicle for charging purposes. When the portable battery is properly secured into the vehicle cabin with the latch, the electrical contacts are able to transfer electricity with the vehicle.

[0006] One or more buttons may be included on the portable battery. In some embodiments, the buttons may control the light source including powering the light on/off, adjusting the brightness, color, and/or any other settings adjustments of the light. In some embodiments, buttons may control the electrical ports including disabling or enabling power to each port. The buttons may comprise physical switches or capacitive switches.

[0007] A handle may be affixed to the surface of the portable battery, which when pulled, causes the latch to disengage the portable battery (e.g., from securement within a vehicle). The latch may be configured to prevent the portable battery from being disengaged based on whether a condition has been satisfied.

[0008] The vehicle may include a dock arranged in the cabin which include a latch that is used to secure the portable battery to the vehicle. The dock may be arranged on the center console.

BRIEF DESCRIPTION OF THE FIGURES

[0009] The above and other features of the present disclosure, its nature and various advantages will be more apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings in which:

[0010] FIG. **1**A is a front perspective view of a portable battery having a light that is powered on, in accordance with some embodiments of the present disclosure;

[0011] FIG. **1**B is a rear perspective view of the portable battery of FIG. **1**A with the light powered off, in accordance with some embodiments of the present disclosure;

[0012] FIG. **2** shows a vehicle console including a dock configured to receive the portable battery therein and to secure the portable battery;

[0013] FIG. **3** is a partial bottom perspective view of a portable battery, in accordance with some embodiments of the present disclosure;

[0014] FIG. **4**A is a partial cross-sectional view of a portable battery, in accordance with some embodiments of the present disclosure;

[0015] FIG. **4**B is a partial cross-sectional view of a lighting housing, in accordance with some embodiments of the present disclosure;

[0016] FIG. **5** is a block diagram of components of a portable battery and lighting device, in accordance with some embodiments of the present disclosure;

[0017] FIG. **6** is a block diagram of components of a vehicle having a portable battery coupled within a cabin, in accordance with some embodiments of the present disclosure;

[0018] FIG. **7**A shows a flowchart of an illustrative process to synchronize lighting on a portable battery with vehicle lighting by checking the connections, in accordance with some embodiments of the present disclosure;

[0019] FIG. **7**B shows a flowchart of an illustrative process to synchronize lighting on a portable battery with vehicle lighting by checking distance between the devices, in accordance with some embodiments of the present disclosure;

[0020] FIG. **8** shows a flowchart of an illustrative process to charge a vehicle battery from a portable battery, in accordance with some embodiments of the present disclosure;

[0021] FIG. **9** shows a flowchart of an illustrative process to power a vehicle from a portable battery, in accordance with some embodiments of the present disclosure;

[0022] FIG. **10** is a front view of a portable battery;

[0023] FIG. **11** is a back view of the portable battery of FIG. **10**;

[0024] FIG. **12** is a left-side view of the portable battery of FIG. **10**;

[0025] FIG. **13** is a right-side view of the portable battery of FIG. **10**;

[0026] FIG. **14** is a top view of the portable battery of FIG. **10**;

[0027] FIG. **15** is a bottom view of the portable battery of FIG. **10**; and

[0028] FIG. **16** is a front-left side perspective view of the portable battery of FIG. **10**.

DETAILED DESCRIPTION

[0029] This disclosure is directed towards a portable battery device that can be coupled inside a vehicle cabin. When the portable battery is secured inside the vehicle cabin, the vehicle may charge it. The portable battery may be used to charge other electronic devices or the vehicle itself. The portable battery may include a lighting module that proves ambient light that may be synchronized with the vehicle's lighting system.

[0030] FIG. **1**A is a front perspective view of a portable battery **100** having a light **103** that is powered on, in accordance with some embodiments of the present disclosure. Portable battery **100** is a removable device that can be configured to be secured to a vehicle for charging. For example, the portable battery may be secured to the center console, vehicle cabin, in a door, under a seat, in or adjacent to a storage compartment, a trunk, exterior the cabin and on an exterior portion of the body of the vehicle, and the like.

[0031] Handle **101** may be used to release and lift up the portable battery **100**. When handle **101** is pulled, portable battery **100** is configured to unlatch from the vehicle cabin. In some embodiments, handle **101** may include a sensor which determines whether the handle is being pulled by a user. In some embodiments, the sensor may be an electrical sensor which detects the user pulling on handle **101** to allow the latch securing portable battery **100** to the vehicle to be released. In some embodiments, the handle **101** may mechanically cause the portable battery **100** to be released. In some embodiments, handle **101**, or is configured to determine whether a user is intentionally triggering release of the portable battery to avoid accidental release during an accident and avoid portable battery **100** from becoming loose within the cabin. The latch may prevent the portable battery from being disengaged based on whether a condition is satisfied. Further details of the latching mechanism are described in FIG. **2** and FIG. **3**.

[0032] Buttons **102**, in some embodiments, control operation of the light **103**, including powering the light on/off, adjusting the brightness, color, and/or any other settings adjustments of the light. In some embodiments, buttons **102** control operation of the electrical ports, including disabling or enabling power to each of the ports (e.g., to disable or enable charging capability). In some embodiments, the buttons **102** may implement any of the above embodiments through capacitive switches, physical switches, or wireless communication.

[0033] Light **103** is configured to provide ambient light and is arranged on the lower exterior surface of portable battery **100**. In some embodiments, light **103** may be softened through use of a diffuser. In some embodiments, light **103** is adapted to emit light in a direction away from the top of and towards the bottom of portable battery **100**. In some embodiments, light **103** extends around the entire circumference of portable battery **100** (i.e., the front, back, and lateral sides). In some embodiments, light **103** includes an aperture adapted to disperse the light. Light **103** may include one or more light sources (e.g., light-emitting diodes (LEDs)) adapted to emit light in the direction outwards or towards the bottom of portable battery **100**. Arrangements of light **103** are described in further detail in connection with FIG. **4**A and FIG. **4**B. As illustrated in FIG. **1**A, handle **101** and buttons **102** are located on top of portable battery **100**, but it is to be understood that they may be located elsewhere on the portable battery, such as on the sides of the unit.

[0034] FIG. **1**B is a rear perspective view of the portable battery **100** of FIG. **1**A with the light **103** powered off, in accordance with some embodiments of the present disclosure. As shown, the rear of portable battery **100** includes electrical outlets **104** that provide a location for a plug to be inserted to charge a portable device such as a cell phone or any other device requiring charge. In some embodiments, electrical outlets **104** may be 2 prong outlets, 3 prong outlets, USB outlets, or any other suitable outlets for charging user devices. In some embodiments, electrical outlets **104** may be configured to be turned on or off by way of buttons **102**. While electrical outlets **104** are located on the back of portable battery **100** in FIG. **2**, it is to be understood that they may be located elsewhere on the portable battery, such as on the sides, front, or top of the unit.

[0035] FIG. **2** shows a vehicle console **200** including a dock **201** configured to receive the portable battery **202** therein and to secure the portable battery **202**. In some embodiments, portable battery **202** corresponds to portable battery **100** of FIG. **1**A and FIG. **1**B. Handle **203** may be configured to remove portable battery **100** from dock **201**. While handle **101** of FIGS. **1**A and **1**B is shaped as a tab, handle **203** of FIG. **2** overhangs a recess such that it can be grabbed from behind to pull portable battery **202** out of dock **201**.

[0036] While the dock **201** is positioned in the vehicle console **200** (e.g., a front center console), it will be appreciated that, in some embodiments, the dock **201** may be positioned in other locations of a vehicle, such as in a door, under a seat, in or adjacent to a storage compartment, a trunk, exterior the cabin, on an exterior portion of the body of the vehicle, and the like. Similarly, dock **201** may be configured, in some embodiments, to secure the portable battery **100** in different orientations such that light **103** is oriented to face various locations to provide additional lighting to, for example, the foot well of the front row, the foot well of the second row, the trunk, outside the vehicle, or any other suitable locations.

[0037] FIG. **3** is partial bottom perspective view of a portable battery **300**, in accordance with some embodiments of the present disclosure. In some embodiments, portable battery **300** corresponds to portable battery **100** of FIGS. **1**A and **1**B or portable battery **202** of FIG. **2**. Bottom **303** of portable battery **300** includes latch **301** and electrical contacts **302**. In some embodiments, bottom **303** corresponds to the bottom of portable battery **100** of FIGS. **1**A and. **1**B or the bottom of portable battery **202** of FIG. **2**. In some embodiments bottom **303** is adapted to support the portable battery **300** in a predetermined orientation while resting on a surface, such as an upright orientation.

[0038] In some embodiments, the bottom **303** includes latch **301**. The latch **301** may be part of a fastening mechanism adapted to secure the portable battery **300** to a vehicle, such as within dock **201** of FIG. **2**. In some embodiments, latch **301** is also adapted to connect to latching devices, such as carabiners, clips, and other mechanism used for connecting components, including camping equipment, together for hanging the portable battery **100**. In some embodiments, if desired another latch **301** may be included on the top of portable battery **300** and may be adapted for hanging the portable battery **300**. In various embodiments, the latch **301**

is configured to secure the portable battery **300** within a vehicle, such as within vehicle console **200** of FIG. **2**. As such, the latch **301** is configured to secure the portable battery **300** and ensure the portable battery **300** remains secured regardless of vehicle movements (e.g., acceleration, deceleration, sudden stops, sudden movements from collisions, sudden turns, vertical and/or horizontal movements, etc.) and vehicle orientations (e.g., rotated positions, tilted positions, other positions resulting from rock crawling, positions resulting from a rollover, and the like). In some embodiments, the latch **301** may interface with a power actuator in the dock **201**. Latch **301** may be released by a user interacting with handle **101** or handle **203** which may either mechanically, electrically, or wirelessly release latch **301**.

[0039] In some embodiments, bottom **303** includes electrical contacts **302** that are adapted to receive electricity from a vehicle for charging a battery of the portable battery **300**. In some embodiments, the electrical contacts **302** are further configured to facilitate communication between the portable battery **300** and a controller of the vehicle, such as a power or light system controller or the like. The combination of the position and orientation of the portable battery **300** along with the connection to the latch **301** can help contribute to ensuring a proper connection between the electrical contacts **302** and the dock **201** for proper charging of the portable battery **300** or communication with the vehicle.

[0040] FIG. **4**A is a partial cross-sectional view of a lighting housing on a portable battery **400**, in accordance with some embodiments of the present disclosure. In some embodiments, portable battery **400** corresponds to portable battery **100** of FIGS. **1**A and **1**, portable battery **202** of FIG. **2**, or portable battery **300** of FIG. **3**. In some embodiments, lens housing **404** corresponds to lighting housing **103** of FIGS. **1**A and **1**B. Storage enclosure **401** may hold one or more battery cells of a battery module of portable battery **400**.

[0041] Portable battery **400** comprises a lens housing **404** which wraps around the circumference of portable battery **400**. Lens housing **404** contains light emitter **402** which may be, for example, an LED. In some embodiments, light emitter **402** is located internal to portable battery **400** and is positioned around the outer sides of the storage enclosure **401**. In some embodiments, light emitter **402** may be a single light strip wrapped around the entire circumference of storage enclosure **401** or multiple light emitters spaced apart. In some embodiments, lens housing **404** is configured to create a soft, ambient light. If lens housing **404** does not sufficiently soften or diffuse the light, diffuser **403** be included between light emitter **402** and lens housing **404**. Depending on the brightness, spacing, size, and other configurations of emitter **402**, different diffusers may be chosen for diffuser **403**.

[0042] FIG. **4**B is a partial cross-sectional view of a lighting housing on portable battery **450**, in accordance with some embodiments of the present disclosure. In some embodiments, portable battery **450** corresponds to portable battery **100** of FIG. **1**A and FIG. **1**B, portable battery **202** of FIG. **2**, and portable battery **300** of FIG. **3**. In some embodiments, lens housing **454** corresponds to lighting housing **103** of FIG. **1**A and FIG. **1**B. Storage enclosure **451** may hold battery cells for portable battery **450**.

[0043] Portable battery **450** comprises lens housing **454** which wraps around the circumference of portable battery **450**. Lens housing **454** contains light emitter **452** which may be, for example, an LED. In some embodiments, light emitter **452** is located internal to battery **450** and is positioned around the upper portion of storage enclosure **451**. In some embodiments light emitter **452** may be a single light strip wrapped around the entire circumference of storage enclosure **451** or multiple light emitters spaced apart. In some embodiments, lens housing **454** is configured to create a soft, ambient light. If lens housing **454** does not sufficiently soften or diffuse the light, diffuser **453** may be included between light emitter **452** and lens housing **404**. Shield **455** blocks light from emitter **452** from coming directly out to lighting housing **454**, and instead deflects it down so that the light may be diffused by light diffuser **453**. Depending on the brightness, spacing, size, and other configurations of emitter **452**, different diffusers may be chosen for diffuser **453**. Shield **455** may comprise a mirror which reflects the light from light emitter **452** and focus it towards diffuser **453** or an opaque material such as plastic which simply blocks the light.

[0044] FIG. **5** is a block diagram of components of a portable battery **500**, in accordance with some embodiments of the present disclosure. In some embodiments, portable battery **500** corresponds to portable battery **100** of FIGS. **1**A and. **1**B, portable battery **202** of FIG. **2**, portable battery **300** of FIG. **3**, portable battery **400** of FIG. **4**A, or portable battery **450** of FIG. **4**B. Portable battery **500** may comprise buttons **501**, handle **502**, processing circuitry **503**, electrical ports **504**, light source **505**, battery module **506**, latch **507**, and electrical contacts **508**. Latch **507** may be designed to secure the portable battery **500** to a dock such as dock **201** of FIG. **2** with electrical contacts **508** lined up to allow for charging of the battery module **506**. Handle **506** may be used to release portable battery **500** from dock **201**. In some embodiments, handle **506** interacts with an actuator of latch **507** to release portable battery **500** from dock **201** when handle **506** is touched, pulled, or otherwise activated. In some embodiments, portable battery **500** can only be released from dock **201** based on whether a condition is satisfied (e.g., the vehicle is moving slowly (e.g., below a speed threshold such as 35 mph), the vehicle is stopped, and/or the vehicle is in a parked position). For example, latch **201** or an associated actuator prevent portable battery **500** from being release when the condition is not satisfied. Light source **505** provides an ambient light as described above.

[0045] The portable battery **500** may comprise processing circuitry **503** which may comprise a processor and memory. Processing circuitry **503** may comprise a hardware processor, a software processor (e.g., a processor emulated using a virtual machine), or any combination thereof. Memory included in processing circuitry **503** may comprise hardware elements for non-transitory storage of commands or instructions, that, when executed by processing circuitry **503**, cause processing circuitry **503** to operate portable battery **500** in accordance with embodiments described above and below. The memory in processing circuitry **503** may further store information about user configurations of portable battery **500** and light source **505**. This stored information may be based on user inputs from button(s) **501**, an interactive screen in the vehicle communicating with processing circuitry **503** of the portable battery, synchronizing information

with vehicle lights or other information from the vehicle, synchronizing information from other portable batteries or portable speakers, and/or any other suitable methods for configuring the portable battery **500**. Processing circuitry **503** may be communicatively connected to components of a vehicle via one or more wires, electrical contacts **508**, or via wireless connection.

[0046] Processing circuitry **503** may receive information from latch **507** and electrical contacts **508** to determine if the portable battery **500** is correctly positioned within dock **201** to begin charging operations. Processing circuitry **503** may also receive information from battery module **506** to determine the power level of portable battery **500** and based on the information configure electrical contacts **508** to stop charging operations when battery module **506** is fully charged.

[0047] FIG. **6** is a block diagram of components of a vehicle **601** having a portable battery **604** coupled within a cabin **602**, in accordance with some embodiments of the present disclosure. In some embodiments, portable battery **604** corresponds to portable battery **100** of FIGS. **1**A and. **1**B, portable battery **202** of FIG. **2**, portable battery **300** of FIG. **3**, portable battery **400** of FIG. **4**A, portable battery **450** of FIG. **4**B, or portable battery **500** of FIG. **5**. In some implementations of the present disclosure, the vehicle **601** may be an electric vehicle such as a car (e.g., a coupe, a sedan, a truck, an SUV, a bus), a motorcycle, an aircraft (e.g., a drone), a watercraft (e.g., a boat), or any other type of vehicle.

[0048] Vehicle **601** may include a cabin **602** containing a dock **603** configured to receive the portable battery **604**. In some embodiments, dock **603** may correspond to dock **201** of FIG. **2**. In some embodiments, multiple portable batteries **604** are utilized and dock **603** is configured to receive any one of the portable batteries **604**. In some embodiments, dock **603** is configured to receive other types of portable devices such as a portable speaker (e.g., having a similar form factor capable of interfacing with dock **603**). Additionally, within the vehicle cabin **602** there may be an input interface **605**, vehicle lighting **606**, and display **607**. Input interface **605** may be one or more buttons, a touch screen, or any other user interface that allows a user to input configurations for portable battery **604**. For example, a user may be able to configure the electrical ports on portable battery **604** on/off, the light of portable battery **604** on/off, and synchronize the light of portable battery **604** with the lighting **606** of the vehicle **601**. Display **607** may be configured to show information about how portable battery **604** is configured, including current charge level, a charging schedule, light brightness, which ports on the battery module are on/off, and any other suitable configurations.

[0049] Processing circuitry **608** may be communicatively connected to battery module **612** which may be configured to provide power to one or more of the components of vehicle **601** during operation. Battery module **612** may comprise an electric battery which may include one or more battery cells. In some embodiments, the battery module **612** may be a 180 kWh battery pack or a 135 kWh battery pack. Battery module **612** may interface with on-board charger **609** to manage the flow of electricity to portable battery **604** (e.g., to perform DC-DC conversion for charging), and any other suitable components. Battery module **612** may be configured to manage charging of portable battery **604**, measuring one or more characteristics of portable battery **604**, providing power to components of vehicle **601**, communicating with charger **609**, any other suitable actions, or any combination thereof. Battery module **612** may include, for example, electrical components (e.g., switches, bus bars, resistors, capacitors), control circuitry (e.g., for controlling suitable electrical components), and measurement equipment (e.g., to measure voltage, current, impedance, frequency, temperature, or another parameter). Battery module **612** may provide charge status information to processing circuitry **608**. Charge status information includes, for example, charge level, whether the portable battery **604** is being charged, charging current, charging voltage, charging mode, and whether a charging fault exists. User device **600** may then be plugged into portable battery **604** to receive charge. User device **600** may be a user's smartphone or any other personal device which can communicate directly or indirectly with the vehicle via server or the internet.

[0050] Processing circuitry **608** may be communicatively connected to display **607** by way of communication circuitry **610**. Display **607** may be located at a dashboard of vehicle **601** and/or a heads-up display at a windshield of vehicle **601**. For example, display **607** may comprise an LCD display, an OLED display, an LED display, or any other type of display.

[0051] In some embodiments, processing circuitry **608** comprises a vehicle light controller or is implemented as part of a vehicle light controller. The vehicle light controller may transmit signals to portable battery **500** to turn on and off light source **505**. For example, in response to a vehicle door being opened, the vehicle light controller may transmit a signal to portable battery **505** to turn on light source **505**. As another example, the vehicle light controller may transmit a signal to portable battery **500** to turn on light source **505** in response to a user input (e.g., inputted using input interface **605**).

[0052] It should be appreciated that FIG. **6** only shows some of the components of vehicle **601**, and it will be understood that vehicle **601** also includes other elements commonly found in vehicles (e.g., electric vehicles), e.g., a motor, brakes, wheels, wheel controls, turn signals, windows, doors, etc.

[0053] FIG. **7**A shows a flowchart of an illustrative process **700** to synchronize lighting on a portable battery with vehicle lighting by checking the connections, in accordance with some embodiments of the present disclosure. In some embodiments, process **700** is executed by processing circuitry **503** of portable battery **500** of FIG. **5**. In some embodiments, the execution of process **700** is distributed across processing circuitry of multiple devices (e.g., portable battery **604** and vehicle **601**).

[0054] At **701**, processing circuitry **503** determines whether portable battery **604** is coupled to dock **603**. In some embodiments, processing circuitry **503** may determine this by checking the connection of electric contacts **302** of portable battery **604** to corresponding contacts on dock **603**, determining whether charger **609** is currently sending power to portable battery **604**, determining whether processing circuitry **608** or communication circuitry **610** of vehicle **601** is communicating with processing circuitry **503** of portable battery **604**, or any other suitable technique. When portable battery **604** is not coupled to dock **603**, then process **700** may terminate or wait until portable battery **604** is coupled to dock **603**.

[0055] At **702**, processing circuitry **503** determines whether vehicle **601** is currently on. In some embodiments, portable battery **604** may only be synced with vehicle **601** when it is on. If vehicle **601** is determined to not be on ("NO" at **702**), the connection between portable battery **608** and vehicle **601** is checked again. In some embodiments, if vehicle **601** is determined to not be on ("NO" at **702**), process **700** is terminated.

[0056] If vehicle **601** is determined to be on ("YES" at **702**), the portable battery lighting is synchronized with the vehicle lighting **606** at **703**. In some embodiments, synchronizing the lighting may mean that if the vehicle lights **606** are on, then the light source **505** on portable battery **604** is also turned on. In some embodiments, the light source **505** on the portable battery **604** are synchronized with the configurations of the vehicle lighting, such as color, brightness, speed of pulsing, or any other suitable lighting configurations.

[0057] FIG. **7**B shows a flowchart of an illustrative process **750** to synchronize lighting on a portable battery with vehicle lighting by checking distance between the devices, in accordance with some embodiments of the present disclosure. In some embodiments, process **750** is executed by processing circuitry **503** of portable battery **500** of FIG. **5**. In some embodiments, the execution of process **750** is distributed across processing circuitry of multiple devices (e.g., portable battery **604** and vehicle **601**).

[0058] At **751**, processing circuitry **503** determines whether the portable battery lighting has been activated. In some embodiments, processing circuitry **503** may determine this by communicating with button(s) **501** or light source **505**. In some embodiments, processing circuitry **503** may determine this by determining whether portable battery **604** is turned on. If the portable battery lighting is determined to not be activated ("NO" at **751**), process **750** may be terminated or wait until the portable lighting is activated.

[0059] If the portable battery lighting is determined to be activated ("YES" at **751**), processing circuitry **503** determines whether portable battery **604** is currently near vehicle **601** at **752**. Processing circuitry **503** may determine this by checking the connection between communication circuitry **610** of vehicle **601** and portable battery **604**, using GPS location, checking a wireless connection, or any other suitable method for checking locations of the devices. If portable battery **604** is determined to not be near vehicle **601** ("NO" at **752**), process **750** returns to step **751**. In some embodiments, process **750** may be terminated.

[0060] If portable battery **604** is determined to be near the vehicle ("YES" at **752**), the vehicle lighting **606** and lighting on portable battery **604** are synchronized at **753**. In some embodiments, the light source **505** on the portable battery **604** is synchronized with the configurations of the vehicle lighting, such as color, brightness, speed of pulsing, or any other suitable lighting configurations. In some embodiments, adjusting the configuration of light source **505** on the portable battery **604** will cause corresponding adjustments to the vehicle lighting. For example, processing circuitry **503** may transmit (e.g., wirelessly) a light source status signal to a vehicle light controller of vehicle **601** to enable synchronization of other lights associated with vehicle **601**. The light source status signal may indicate, for example, whether light source **505** is on or off, a color of light source **505**, a brightness of light source **505**, speed of pulsing, any other light source status information, or any combination thereof.

[0061] FIG. **8** shows a flowchart of an illustrative process **800** to charge a vehicle battery from a portable battery, in accordance with some embodiments of the present disclosure. In some embodiments, process **800** is executed by processing circuitry **608** of vehicle **601** of FIG. **6**. In some embodiments, the execution of process **800** is distributed across processing circuitry of multiple devices (e.g., vehicle **601** and portable battery **604** and).

[0062] At **801**, processing circuitry **608** determines that portable battery **604** is coupled to dock **603** in vehicle cabin **602**. In some embodiments, processing circuitry **608** may determine this by checking the connection of dock **603** with electrical contacts of portable battery **604**, determining whether processing circuitry **608** or communication circuitry **610** of vehicle **601** is able to communicate with processing circuitry **503** of portable battery **604**, or any other suitable technique.

[0063] At **802**, processing circuitry **608** determines the state of charge of vehicle battery **612**. In some embodiments, processing circuitry **608** may determine this by retrieving this value from memory or communicating with battery module **612** or charger **609**. At **803**, if the state of charge is determined to not be low ("NO" at **803**), processing circuitry **608** continues to monitor the coupling of portable battery **604** to dock **603** and the vehicle battery **612** state of charge.

[0064] If the state of charge is determined to be low ("YES" at **803**), portable battery **604** may begin charging vehicle battery **612** at **804**. Portable battery **604** may charge vehicle **601** by transferring electricity through electrical contacts **508**, electrical ports **504**, or any other suitable connection. In some embodiments, the charging is performed in response to processing circuitry **608** instructing charger **609** to begin charging the vehicle battery **612** from portable battery **604**. In some embodiments, charger **609** is a bidirectional DC-DC charger capable of delivering current from the vehicle battery **612** to portable battery **604** and current from portable battery **604** to vehicle battery **612**.

[0065] FIG. **9** shows a flowchart of an illustrative process **900** to power a vehicle from a portable battery, in accordance with some embodiments of the present disclosure. In some embodiments, process **900** is executed by processing circuitry **608** of vehicle **601** of FIG. **6**. In some embodiments, the execution of process **900** is distributed across processing circuitry of multiple devices (e.g., vehicle **601** and portable battery **604**).

[0066] At **901**, processing circuitry **608** determines whether there is a vehicle battery fault. In some embodiments, processing circuitry **608** may determine this by communicating with battery module **612** or checking a vehicle diagnostic trouble code. If vehicle battery **612** is determined to not have a fault, process **900** may terminate or wait until a fault is determined.

[0067] If vehicle battery **612** is determined to have a fault ("YES" at **901**), processing circuitry **608** may check the state of charge of portable battery **604**. In some embodiments, processing circuitry **608** may determine this by communicating with the portable battery **605**. If the state of charge of portable battery **604** is determined to not be sufficient to run the vehicle ("NO" at **903**), process **800** may terminate or return to step **901**.

[0068] If the state of charge of portable battery **604** is determined to be sufficient to run the vehicle ("YES" at **903**), processing circuitry **608** may cause vehicle **601** to be powered using battery **506** instead of battery **612**. This

bypasses the fault state of battery **612** and allows the vehicle to continue to operate (e.g., at a reduced power state until the vehicle can be driven home or to a service location). This change in battery source may be displayed on display **607** to alert the driver that an error occurred with battery **612** and an alternate battery source is being used. Portable battery **604** may power vehicle **601** while secured in dock **603** or by any other suitable means (e.g., by connecting a power cable associated with the vehicle to one of electrical ports **504**).

Design Aspects

[0069] The following describes an illustrative design of a portable battery, in accordance with the present disclosure. In some embodiments, FIGS. **10-16** illustrate the ornamental design of a portable battery as shown in FIGS. **1**A, **1**, and **3** and as described above.

[0070] In some embodiments, the present disclosure is directed to a new, original, and ornamental design for a portable battery, of which the following is a specification, reference being had to the accompanying drawings (i.e., FIGS. **10-16**), forming a part thereof. The portable battery may, for example, be intended for use within a vehicle such as within a vehicle cabin. Applicant reserves the right to claim any part, portion, element, and/or combination thereof of the disclosed design, including to replace any part, portion, element, and/or combination thereof with a broken line boundary to disclaim such part, portion, element, and/or combination thereof of the disclosed design.

[0071] FIG. **10** is a front view of a portable battery;

[0072] FIG. **11** is a back view of the portable battery;

[0073] FIG. **12** is a left-side view of the portable battery;

[0074] FIG. **13** is a right-side view of the portable battery;

[0075] FIG. **14** is a top view of the portable battery and handle;

[0076] FIG. **15** is a bottom view of the portable battery; and

[0077] FIG. **16** is a front-left side perspective view of the portable battery.

[0078] The foregoing is merely illustrative of the principles of this disclosure, and various modifications may be made by those skilled in the art without departing from the scope of this disclosure. The above-described embodiments are presented for purposes of illustration and not of limitation. The present disclosure also can take many forms other than those explicitly described herein. Accordingly, it is emphasized that this disclosure is not limited to the explicitly disclosed methods, systems, and apparatuses, but is intended to include variations to and modifications thereof, which are within the spirit of the following claims.

What is claimed is:

1. A portable battery comprising:

a latch configured to secure the portable battery within a vehicle; and

one or more electrical ports configured to provide power.

2. The portable battery of claim **1**, further comprising:

a light source configured to emit light;

a lens housing surrounding a lower exterior surface of the portable battery; and

one or more light emitters internal to the light source and configured to emit light towards an interior surface of the lens housing to provide diffuse light around the portable battery.

3. The portable battery of claim **1**, further comprising:

a plurality of electrical contacts configured to transfer electricity with a vehicle to charge the portable battery, wherein when the portable battery is secured within the vehicle via the latch, the plurality of the electrical contacts interface with corresponding contacts within the vehicle to transfer the electricity with the vehicle.

4. The portable battery of claim **3**, wherein the electrical contracts are further adapted to transfer electricity with the corresponding contacts to charge the vehicle.

5. The portable battery of claim **1**, further comprising:

one or more buttons for operating a light source or for disabling or enabling the one or more electrical ports.

6. The portable battery of claim **5**, wherein the one or more buttons comprise one or more capacitive switches.

7. The portable battery of claim **1**, further comprising:

a handle with an exterior surface of the portable battery and configured to, in response to being pulled, disengage the latch.

8. The portable battery of claim **7**, wherein the latch prevents the portable battery from being disengaged based on whether a condition is satisfied.

9. The portable battery of claim **1**, further comprising:

a light source configured to emit light; and

processing circuitry configured to:

receive a signal from a vehicle light controller; and

in response to receiving the signal, turn on the light source.

10. The portable battery of claim **1**, further comprising:

a light source configured to emit light; and

processing circuitry configured to synchronize operation of the light source with other lights associated with the vehicle.

11. The portable battery of claim **10**, wherein the processing circuitry is configured to synchronize the light emitted by the light source by one or more of changing the brightness, color, or power of the emitted light.

12. The portable battery of claim **1**, further comprising:

a light source configured to emit light; and

processing circuitry configured to transmit a light source status signal to a vehicle light controller to enable synchronization of other lights associated with the vehicle based on the light source status signal.

13. The portable battery of claim **1**, further comprising:

a light source; and

processing circuitry configured to synchronize operation of the light source with another portable battery or a portable speaker.

14. The portable battery of claim **1**, further comprising a battery module having a capacity of at least fifty amp hours.

15. A vehicle comprising:

a vehicle;

a dock arranged within the vehicle; and

a portable battery comprising:

a latch, wherein the dock is arranged to receive the portable battery and secure the portable battery thereto via the latch;

a light source configured to emit light; and

one or more electrical ports configured to configured to provide power.

16. The vehicle of claim **15**, wherein the vehicle comprises a center console and wherein the dock is arranged within the center console.

17. The vehicle of claim **15**, wherein the portable battery further comprises a plurality of electrical contacts and wherein the dock comprises corresponding contacts configured to interface with the electrical contracts to transfer electricity between the vehicle and the portable battery for charging the portable battery from the vehicle or the vehicle from the portable battery.

18. The vehicle of claim **15**, further comprising processing circuitry configured to synchronize operation of the light source with other lights associated with the vehicle.

19. A method, comprising:

determining, using processing circuitry, a portable battery is coupled to a dock arranged in a vehicle;

determining, using the processing circuitry, a state of charge of a vehicle battery; and

in response to determining the state of charge is low, charging the vehicle battery from the portable battery.

20. The method of claim **19**, wherein the portable battery comprises:

a latch configured to secure the portable battery to the dock;

a light source configured to emit light; and

one or more electrical ports configured to configured to provide power.

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