Patent Brokerage Prospectus

This patent family eliminates waiting in line at a charging station or waiting while your EV charges.

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Making EVs More Driver-Friendly

- **U.S. Patent No. 11,962,028**
- **U.S. Patent No. 12,394,851**
- **U.S. Patent No. 12,409,741**
- **U.S. Patent No. 12,552,269**

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Executive Summary

This patent family totally re-thinks the concept of a large, single, ION lithium battery to power an electric vehicle. Instead, it is powered by a series of easily manageable and accessible batteries that can be quickly and easily replaced with fresh, charged batteries.

Making EVs More Driver-Friendly: Four U.S. Patents

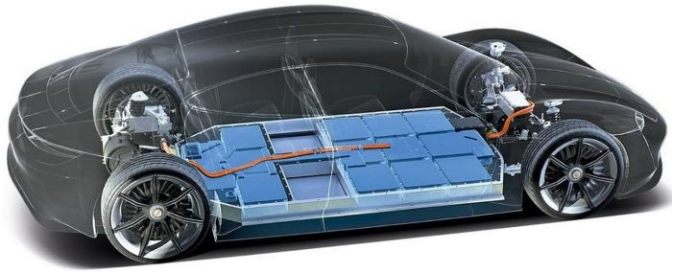
Electric vehicles (EVs) – despite all the hype and government incentives – comprise less than 2% of vehicles in use in America. There are two main problems holding the EV market back: (1.) It takes too long to charge their batteries and (2.) the fear of running out of power and being stranded where there is no available charging station nearby.

This patent family addresses both of those issues. ***It totally re-thinks the concept of a large, single, ION lithium battery to power the vehicle. Instead, EVs are powered by a series of easily manageable and accessible batteries that can be quickly and easily replaced with fresh, charged batteries***. Rather than wait for a lengthy re-charge, the EV owner swaps out one, several, or all of his discharged smaller batteries for freshly charged ones. The patent family also includes a system to draw energy from each battery in sequence. Total available battery power is consumed exactly has gasoline is consumed. This total system minimizes disruption to drivers and to service providers in industry.

Patent Portfolio

- U.S. Patent No. 11,962,028: Device for securing a replaceable vehicle battery
- U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery
- U.S. Patent No. 12,409,741: Vehicle battery power monitoring and management systems
- U.S. Patent No. 12,552,269: Vehicle battery power monitoring and management systems

These patents give an electric vehicle manufacturer the opportunity to re-think and dramatically improve its products for greater convenience and safety for drivers. Additionally, removing the urgency to fast charge batteries will increase battery life. Slower recharges extend battery life and will further protect the environment. Last, smaller batteries can mean smaller spills of toxic material in case of collisions.



IPofferings

First U.S. Patent

Abstract and Independent Claim

This patent has one Independent Claim and four Dependent Claims.

This patent is valid and enforceable through 2041.

The patent number is a link to this patent's listing at Google Patents.

U.S. Patent No. 11,962,028: Device for securing a replaceable vehicle battery

Priority Date: June 18, 2021
Application Date: June 18, 2021
Patent Grant: April 16, 2024

Patent Application: 17/351,686
Patent Expiration: June 19, 2041
Claims: 5

A device for securing a replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, including a substrate defining a first side and a second side, a first receiving port extending through the substrate, a second receiving port extending through the substrate, and first and second spring-biased clamps mounted on the second side of the substrate, wherein the first receiving port and second receiving port are positioned and dimensioned to receive the positive and negative terminals through the first side of the substrate, whereby the first and second spring-biased clamps respectively engage the positive and negative terminals on the second side of the substrate.

The invention claimed is:

1. A device for securing a replaceable vehicle battery in a battery space defined by one or more walls, the replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, the protruding positive terminal having a first length and the protruding negative terminal having a second length, the device comprising:

a) a substrate defining a body including a first side and a second side, the substrate including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, wherein the first receiving port and second receiving port are positioned on the substrate and dimensioned to enable the first receiving port and the second receiving port included in the substrate to receive both the protruding positive terminal and the protruding negative terminals therein, respectively, and the substrate has a thickness from the first side to the second side that is less than both the first length of the protruding positive terminal and the second length of the protruding negative terminal, the substrate being configured to enable both a first portion of the first length of the protruding positive terminal to protrude from the second side and a second portion of the second length of the protruding negative terminal to protrude from the second side;

(Continued next page...)

U.S. Patent No. 11,962,028: Device for securing a replaceable vehicle battery

b) a first spring-biased clamp mounted on the second side of the substrate, the first spring-biased clamp including a first electrically conductive portion, wherein the first spring-biased clamp is positioned adjacent to the first receiving port on the second side and configured to engage the first portion of the first length of the protruding positive terminal whereby the electrically first conductive portion is placed in electrical communication with the protruding positive terminal;

c) a second spring-biased clamp mounted on the second side of the substrate, the second spring-biased clamp including a second electrically conductive portion, wherein the second spring-biased clamp is positioned adjacent to the second receiving port on the second side and configured to engage the second portion of the second length of the protruding negative terminal whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal; and

d) a hinge connected to the substrate and a wall of the one or more walls of the battery space, wherein the substrate is enabled for pivotal motion to the battery space whereby the first side of the substrate faces the replaceable vehicle battery in the battery space, the first receiving port and second receiving port of the substrate receive the protruding positive terminal and the protruding negative terminal of the replaceable vehicle battery in the battery space, the first spring-biased clamp engages the first portion of the first length of the protruding positive terminal and the second spring-biased clamp engages the second portion of the second length of the protruding negative terminal.

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Second U.S. Patent

Abstract and Independent Claims

This patent has three Independent Claims and 16 Dependent Claims.

This patent is valid and enforceable through 2041.

The patent number is a link to this patent's listing at Google Patents.

U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery

Priority Date: June 18, 2021
Application Date: April 16, 2024
Patent Grant: August 19, 2025

Patent Application: 18/637,357
Patent Expiration: June 18, 2041
Claims: 19

A device for securing a replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, including a substrate defining a first side and a second side, a first receiving port extending through the substrate, a second receiving port extending through the substrate, and first and second clamps mounted on the second side of the substrate, wherein the first receiving port and second receiving port are positioned and dimensioned to receive the positive and negative terminals through the first side of the substrate, whereby the first and second clamps respectively engage the positive and negative terminals on the second side of the substrate.

The invention claimed is:

1. A device for securing a replaceable vehicle battery in a battery space defined by one or more walls, the replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, the protruding positive terminal having a first length and the protruding negative terminal having a second length, the device comprising:

a) a substrate defining a body including a first side and a second side, the substrate including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, wherein the first receiving port and second receiving port are positioned on the substrate and dimensioned to enable the first receiving port and the second receiving port included in the substrate to receive both the protruding positive terminal and the protruding negative terminals therein, respectively, and the substrate has a thickness from the first side to the second side that is less than both the first length of the protruding positive terminal and the second length of the protruding negative terminal, the substrate being configured to enable both a first portion of the first length of the protruding positive terminal to protrude from the second side and a second portion of the second length of the protruding negative terminal to protrude from the second side;

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U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery

b) a first clamp mounted on the second side of the substrate, the first clamp including a first electrically conductive portion, wherein the first clamp is positioned adjacent to the first receiving port on the second side and configured to engage the first portion of the first length of the protruding positive terminal whereby the electrically first conductive portion is placed in electrical communication with the protruding positive terminal; and

c) a second clamp mounted on the second side of the substrate, the second clamp including a second electrically conductive portion, wherein the second clamp is positioned adjacent to the second receiving port on the second side and configured to engage the second portion of the second length of the protruding negative terminal whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal,

wherein the first side of the substrate faces the replaceable vehicle battery in the battery space, the first receiving port and second receiving port of the substrate receive the protruding positive terminal and the protruding negative terminal of the replaceable vehicle battery in the battery space, and

wherein the first clamp and the second clamp are each respectively biased by a clamping force, whereby the first clamp engages the first portion of the first length of the protruding positive terminal and the second clamp engages the second portion of the second length of the protruding negative terminal.

8. A device for securing a replaceable vehicle battery in a battery space defined by one or more walls, the replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, the protruding positive terminal having a first length and the protruding negative terminal having a second length, the device comprising:

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Second U.S. Patent
(continued...)

Abstract and Independent Claims

U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery

a) a substrate defining a body including a first side and a second side, the substrate including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, wherein the first receiving port and second receiving port are positioned on the substrate and dimensioned to enable the first receiving port and the second receiving port included in the substrate to receive both the protruding positive terminal and the protruding negative terminals therein, respectively, and the substrate has a thickness from the first side to the second side that is less than both the first length of the protruding positive terminal and the second length of the protruding negative terminal, the substrate being configured to enable both a first portion of the first length of the protruding positive terminal to protrude from the second side and a second portion of the second length of the protruding negative terminal to protrude from the second side;

b) a first clamp mounted on the second side of the substrate, the first clamp including a first electrically conductive portion, wherein the first clamp is positioned adjacent to the first receiving port on the second side and configured to engage the first portion of the first length of the protruding positive terminal whereby the electrically first conductive portion is placed in electrical communication with the protruding positive terminal; and

c) a second clamp mounted on the second side of the substrate, the second clamp including a second electrically conductive portion, wherein the second clamp is positioned adjacent to the second receiving port on the second side and configured to engage the second portion of the second length of the protruding negative terminal whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal,

wherein the first side of the substrate faces the replaceable vehicle battery in the battery space, the first receiving port and second receiving port of the substrate receive the protruding positive terminal and the protruding negative terminal of the replaceable vehicle battery in the battery space, and

wherein the first clamp is configured to clamp onto the first length of the protruding positive terminal responsive to the protruding positive terminal being received by the first receiving port, and

wherein the second clamp is configured to clamp onto the second length of the protruding negative terminal responsive to the protruding negative terminal being received by the second receiving port.

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IPofferings

Second U.S. Patent

(continued...)

Abstract and Independent Claims

U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery

19. A device for securing a replaceable vehicle battery in a battery space defined by one or more walls, the replaceable vehicle battery having a protruding positive terminal and a protruding negative terminal, the protruding positive terminal having a first length and the protruding negative terminal having a second length, the device comprising:

a) a substrate defining a body including a first side and a second side, the substrate including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, wherein the first receiving port and second receiving port are positioned on the substrate and dimensioned to enable the first receiving port and the second receiving port included in the substrate to receive both the protruding positive terminal and the protruding negative terminals therein, respectively, and the substrate has a thickness from the first side to the second side that is less than both the first length of the protruding positive terminal and the second length of the protruding negative terminal, the substrate being configured to enable both a first portion of the first length of the protruding positive terminal to protrude from the second side and a second portion of the second length of the protruding negative terminal to protrude from the second side;

b) a first clamp mounted on the second side of the substrate, the first clamp including a first electrically conductive portion, wherein the first clamp is positioned adjacent to the first receiving port on the second side and configured to engage the first portion of the first length of the protruding positive terminal whereby the electrically first conductive portion is placed in electrical communication with the protruding positive terminal; and

c) a second clamp mounted on the second side of the substrate, the second clamp including a second electrically conductive portion, wherein the second clamp is positioned adjacent to the second receiving port on the second side and configured to engage the second portion of the second length of the protruding negative terminal whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal,

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U.S. Patent No. 12,394,851: Device for securing a replaceable vehicle battery

wherein the first side of the substrate faces the replaceable vehicle battery in the battery space, the first receiving port and second receiving port of the substrate receive the protruding positive terminal and the protruding negative terminal of the replaceable vehicle battery in the battery space, and

wherein the first clamp is configured to be forced open by the first length of the protruding positive terminal and clamp onto the first length of the protruding positive terminal responsive to the protruding positive terminal being received by the first receiving port, and

wherein the second clamp is configured to be forced open by the second length of the protruding negative terminal and clamp onto the second length of the protruding negative terminal responsive to the protruding negative terminal being received by the second receiving port.

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Third U.S. Patent

Abstract and Independent Claims

This patent has two Independent Claims and17 Dependent Claims.

This patent is valid and enforceable through 2041.

The patent number is a link to this patent's listing at Google Patents.

U.S. Patent No. 12,409,741: Vehicle battery power monitoring and management systems

Priority Date: August 18, 2021
Application Date: August 18, 2021
Patent Grant: September 9, 2025

Patent Application: 17/405,041
Patent Expiration: November 28, 2043
Claims: 19

Vehicle battery power supply monitoring and management systems and methods for use with replaceable and rechargeable batteries, which includes a battery case configured to mount each battery on a substrate that includes ports for receiving the electrical terminal of each battery and facilitating an electrical connection between each battery and an internal vehicle wiring harness, among other things, and is further configured to facilitate the sequential usage of each battery from a plurality of batteries secured within a vehicle based on a measurement of the condition of the battery, and facilitate the speed, ease and convenience in the removal and replacement of secured batteries.

The invention claimed is:

1. A vehicle battery management system, comprising:

a) a battery group mounted in a vehicle, the battery group comprising a plurality of vehicle batteries, wherein each vehicle battery of the plurality of vehicle batteries includes electrical terminals, a battery case including a lower battery surface and an upper battery surface, wherein the upper surface is adjacent to the electrical terminals, each said vehicle battery of being mounted on a substrate having a first side and a second side, wherein the second side opposes the first side, wherein the substrate includes a port for receiving each electrical terminal of the electrical terminals of each said vehicle batteries, the substrate and the port being dimensioned to enable each said electrical terminal of each said vehicle battery to protrude from the second side responsive to the upper battery surface contacting the first side;

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U.S. Patent No. 12,409,741: Vehicle battery power monitoring and management systems

b) a plurality of electrical conductors operatively associated with the battery group, the plurality of electrical conductors including a first one or more electrical conductors associated with a first vehicle battery of the plurality of vehicle batteries and a second one or more electrical conductors associated with a second vehicle battery of the plurality of vehicle batteries, the first one or more electrical conductors forming a non-permanent engagement with the electrical terminals of the first vehicle battery to electrically connect the first vehicle battery in the battery group with an internal vehicle wiring harness independently of the second vehicle battery, the second one or more electrical conductors forming a non-permanent engagement with the electrical terminals of the second vehicle battery to electrically connect the second vehicle battery of the plurality of vehicle batteries in the battery group with the internal vehicle wiring harness independently of the first vehicle battery;

c) a first electrically operated switch in electrical communication with the first one or more electrical conductors and a second electrically operated switch in electrical communication with the second one or more electrical conductors, each electrically operated switch of the first electrically operated switch and the second electrically operated switch being enabled to switch to (i) a closed position, wherein the closed position establishes an electrical circuit between one of the plurality of vehicle batteries and the internal vehicle wiring harness to supply current from said one of the plurality of vehicle batteries to the internal vehicle wiring harness, and (ii) an open position, wherein the open position interrupts electrical communication between the vehicle battery and the internal vehicle wiring harness;

d) a battery power control unit in electrical communication with a power source and each said electrically operated switch, the battery power control unit comprising a processor and a memory, the memory including an executable program whereby the processor executes the program to monitor the condition of the first vehicle battery and the second vehicle battery of the plurality of vehicle batteries, wherein responsive to a monitored condition of the first vehicle battery being less than a threshold value, the battery management control unit (i) transmitting a signal to switch the first electrically operated switch to the open position, and (ii) transmitting a signal to switch the second electrically operated switch to the closed position; and

e) a lever having a body, the body including a first end and a second end, the first end being mounted on the substrate for pivotal motion, the second end being dimensioned to protrude adjacent to the lower battery surface of the case, wherein the pivotal motion of the lever causes the disengagement of at least one non-permanent engagement.

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IPofferings

Third U.S. Patent

(continued...)

Abstract and Independent Claims

U.S. Patent No. 12,409,741: Vehicle battery power monitoring and management systems

10. A vehicle battery management system, comprising:

a) a battery group mounted in a vehicle, the battery group comprising a plurality of vehicle batteries;

b) a plurality of electrical conductors operatively associated with the battery group, the plurality of electrical conductors including one or more electrical conductors associated with each vehicle battery of the plurality of vehicle batteries, the one or more electrical conductors of the plurality of electrical conductors electrically connecting each vehicle battery of the plurality of vehicle batteries in the battery group with an internal vehicle wiring harness independently of any other vehicle battery of the plurality of vehicle batteries in the battery group, wherein the plurality of electrical conductors are operatively associated with the battery group by a substrate defining a first side and a second side, the substrate including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, a first spring-biased clamp including a first electrically conductive portion, wherein the first spring-biased clamp is configured to engage a protruding positive terminal of each vehicle battery, whereby the first electrically conductive portion is placed in electrical communication with the protruding positive terminal of each vehicle battery, and a second spring-biased clamp including a second electrically conductive portion, wherein the second spring-biased clamp is configured to engage a protruding negative terminal of each said vehicle battery, whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal;

c) a plurality of electrically operated switches, each electrically operated switch of the plurality of electrically operated switches being in electrical communication with the one or more electrical conductors associated with each vehicle battery, each said electrically operated switch being enabled to switch to (i) a closed position, wherein the closed position establishes an electrical circuit between one of the plurality of vehicle batteries and the internal vehicle wiring harness to enable a supply current from the one of the plurality of vehicle batteries to the internal vehicle wiring harness, and (ii) an open position, wherein the open position interrupts electrical communication between the one of the plurality of vehicle batteries and the internal vehicle wiring harness;

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IPofferings

Third U.S. Patent *(continued...)*

Abstract and Independent Claims

U.S. Patent No. 12,409,741: Vehicle battery power monitoring and management systems

d) a battery power control unit in electrical communication with a power source and each electrically operated switch of the plurality of electrically operated switches, the battery power control unit comprising a processor and a memory, the memory including an executable program whereby the processor executes the program to (i) monitor battery measurements of each said one of the plurality of vehicle batteries in the battery group, wherein responsive to said one of the plurality of vehicle batteries having a lesser measured battery life than a threshold value, the battery management control unit identifying a vehicle battery having a greater measured battery life than the threshold value, (ii) switch the electrically operated switch associated with the vehicle battery having the greater measured battery life than the threshold value to the closed position and (iii) switch the electrically operated switch associated with the vehicle battery having the lesser measured battery life than the threshold value to the open position; and

e) a lever mounted for pivotal motion to the substrate, the lever defining a first end and a second end, the first end protruding along an axis being transverse to the plane of the substrate, the second end being mounted at the substrate and connected with the first spring-biased clamp and the second spring-biased clamps by a first push rod and a second push rod, respectively, wherein the pivotal motion of the lever overcomes the spring-bias of the first spring-biased clamp and the second spring-biased clamps to cause the disengagement of the first electrically conductive portion and the second electrically conductive portions with the protruding positive terminal and the negative terminal, respectively.

IPofferings

Fourth U.S. Patent

Abstract and Independent Claims

This patent has one Independent Claims and three Dependent Claims.

This patent is valid and enforceable through 2041.

The patent number is a link to this patent's listing at Google Patents.

U.S. Patent No. 12,552,269: Vehicle battery power monitoring and management systems

Priority Date: July 30, 2022
Application Date: July 30, 2022
Patent Grant: February 17, 2026

Patent Application: 17/877,940
Patent Expiration: October 7, 2043
Claims: 4

Vehicle battery power supply monitoring and management systems and methods for use with replaceable and rechargeable batteries, which among other things is configured to facilitate the sequential usage of each battery from a plurality of batteries secured within a vehicle based on a measurement of the condition of the battery, and facilitate the speed, ease and convenience in the removal and replacement of secured batteries.

The invention claimed is:

1. A device for securing a battery group comprising a plurality of replaceable vehicle batteries, each battery of the battery group having a protruding positive terminal and a protruding negative terminal, the device comprising:

a) a non-electrically conductive substrate for each battery of the battery group, the substrate defining a first side and a second side, the substrate being positioned in a battery space defined by one or more walls and including a first receiving port extending through the substrate from the first side to the second side and a second receiving port extending through the substrate from the first side to the second side, wherein the first receiving port and second receiving port are positioned and dimensioned to receive the protruding positive terminal and the protruding negative terminals therein, respectively, and the substrate has a thickness from the first side to the second side that is less than the length of the protruding positive and negative terminals, wherein t least one wall of the one or more walls in the battery space includes a hinge, wherein the hinge is connected to the substrate to enable the the substrate for pivotal motion about the hinge;

b) a set of electrical conductors mounted on the second side of the substrate for each battery of the battery group, the set of electrical conductors being configured to engage the protruding positive terminal and negative terminal whereby the set of electrical conductors electrically connect the battery with an internal vehicle wiring harness independently of the electrical connection of each other battery in the battery group;

(Continued next page...)

U.S. Patent No. 12,552,269: Vehicle battery power monitoring and management systems

c) a relay in electrical communication with the set of electrical conductors for each battery of the battery group, the switch being enabled to switch to (i) a closed position, wherein the closed position establishes an electrical circuit between the battery and the internal vehicle wiring harness to supply current from the vehicle battery to the internal vehicle wiring harness, and (ii) an open position, wherein the open position interrupts electrical communication between the vehicle battery and the internal vehicle wiring harness; and

d) a battery power control unit in electrical communication with a power source and the relay for each battery of the battery group, the battery power control unit comprising a processor and a memory, the memory including an executable program whereby the processor executes the program to monitor the condition of each battery of the battery group, wherein responsive to a monitored condition of a battery of the battery group being less than a threshold value, the battery management control unit (i) transmitting a signal to cause the relay for the battery to switch to the open position, and (ii) transmitting a signal to cause the relay for another battery in the battery group to switch to the closed position; and

e) a first spring-biased clamp defined on the second side of the substrate, the first spring-based clamp including a first electrically conductive portion, wherein the first spring-biased clamp is configured to engage a protruding positive terminal of each vehicle battery, whereby the first electrically conductive portion is placed in electrical communication with the protruding positive terminal of each vehicle battery, and a second spring-biased clamp including a second electrically conductive portion, wherein the second spring-biased clamp is configured to engage a protruding negative terminal of each vehicle battery, whereby the second electrically conductive portion is placed in electrical communication with the protruding negative terminal.

IPofferings

U.S. Patents
(continued...)

Figures from the U.S. Patent

U.S. Patent Nos. 11,962,028; 12,394,851; 12,409,741; and 12,552,269

FIG. 1

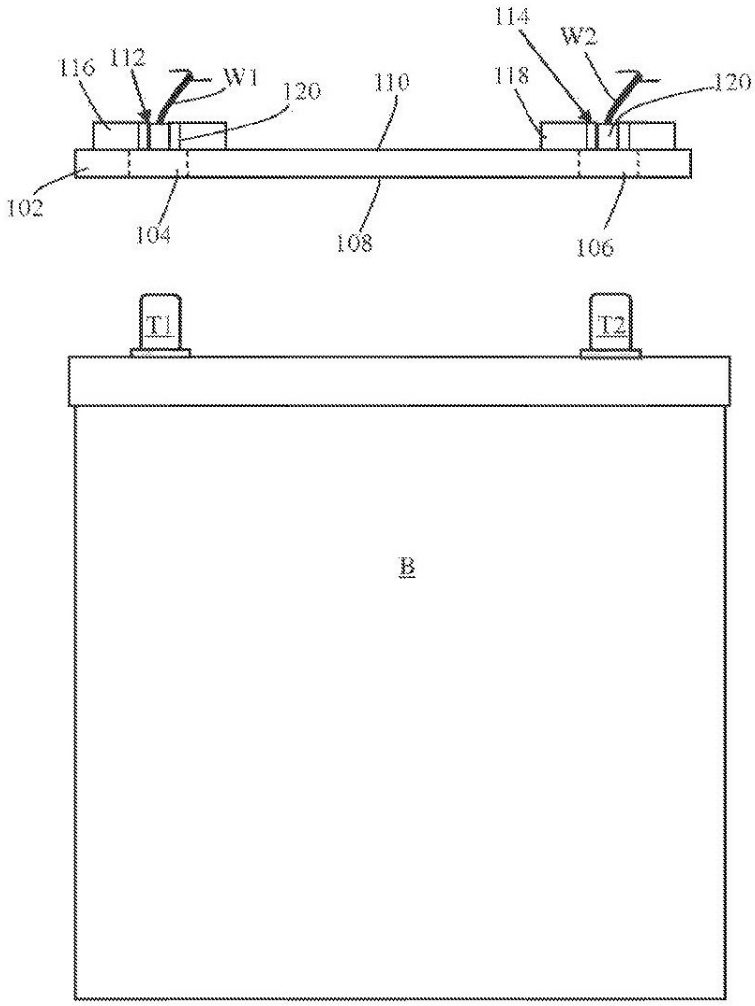


Figure 1 is a schematic view of a system constructed in accordance with the patented invention.
102: Connecting plate
104 and 106: Receiving ports
108: First side of plate
110: Second side of plate
112 and 114: Electrical connectors
116 and 118: Clamps
120: Clamping portion of the clamps
B: Battery
W1 and W2: Wires

IPofferings

U.S. Patents
(continued...)

Figures from the U.S. Patent

U.S. Patent Nos. 11,962,028; 12,394,851; 12,409,741; and 12,552,269

FIG. 2

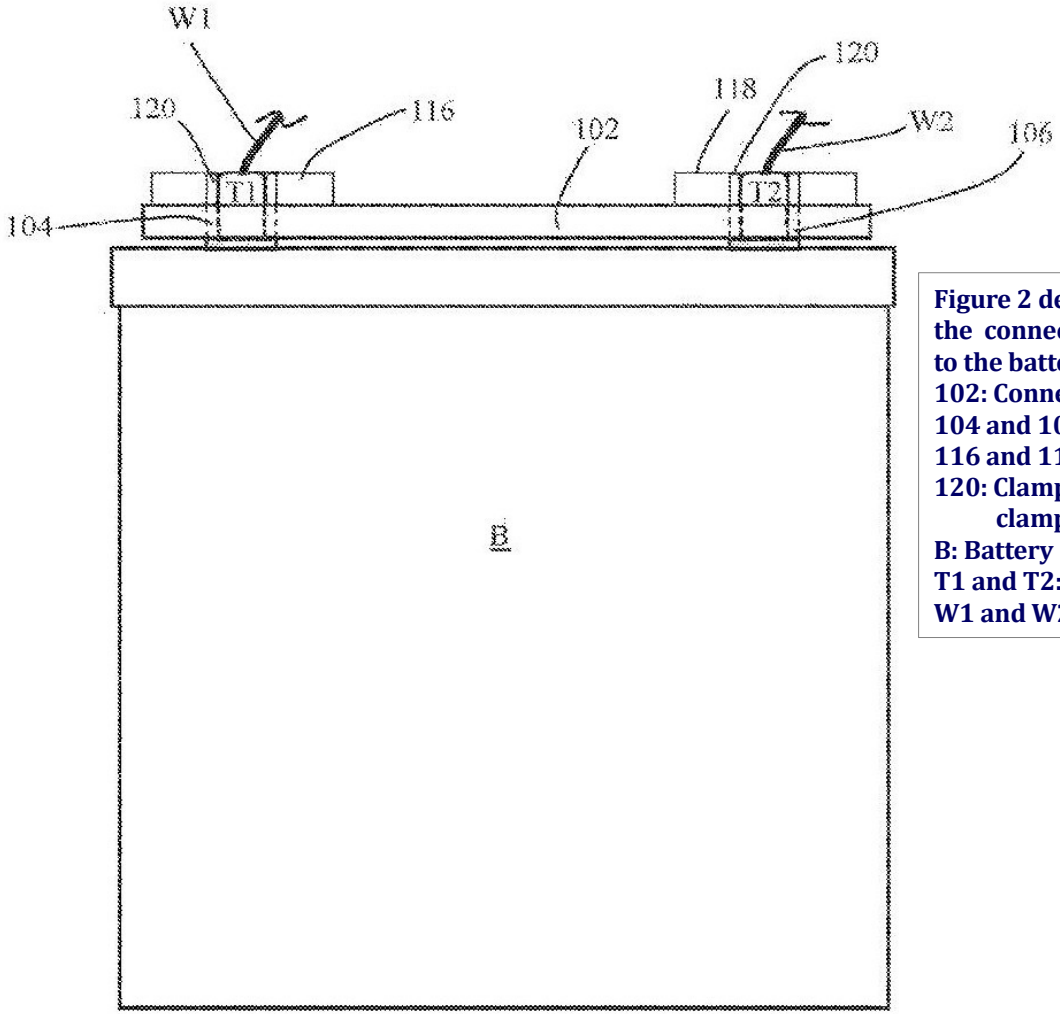


Figure 2 depicts Figure 1 with the connection of the substrate to the battery terminals.
102: Connecting plate
104 and 106: Receiving ports
116 and 118: Clamps
120: Clamping portion of the clamps
B: Battery
T1 and T2: Battery terminals
W1 and W2: Wires

FIG. 6

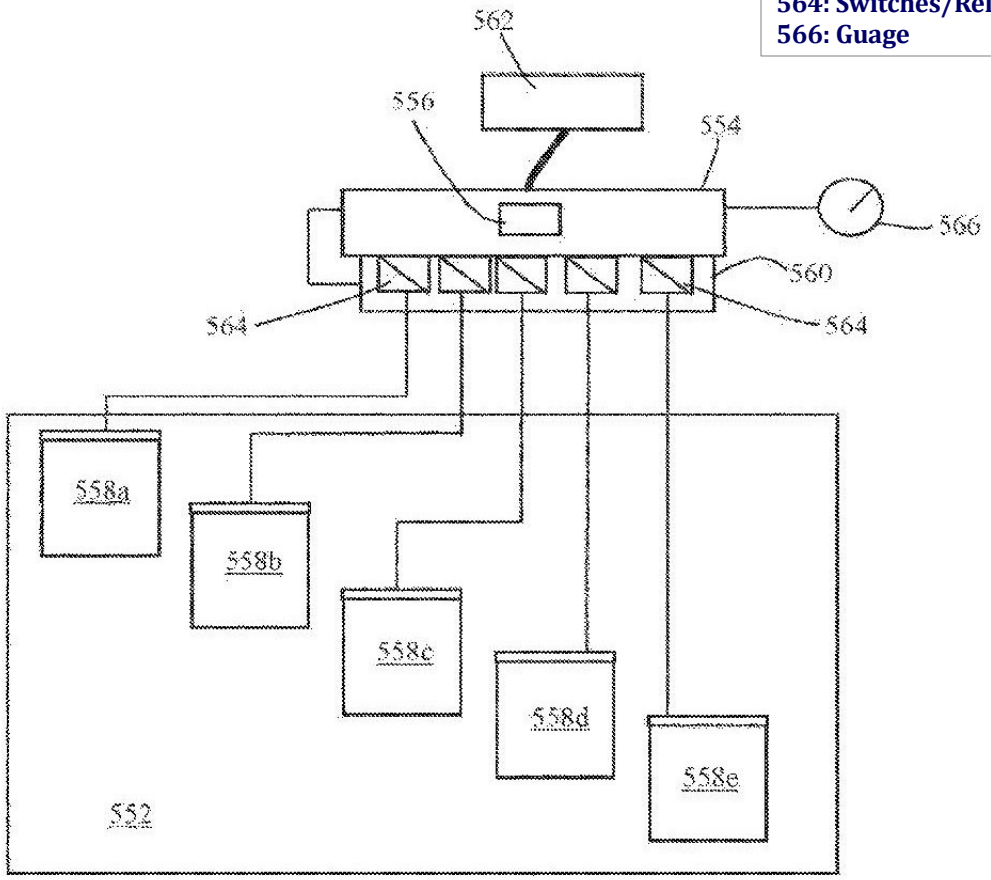


Figure 6 is a schematic of a battery group and management system for use with an EV.
552: Battery group
554: Battery control unit
556: Computer
558a through 588c: Batteries
560: Connections between harness
562: Vehicle wiring connection
564: Switches/Relays
566: Guage

FIG. 7

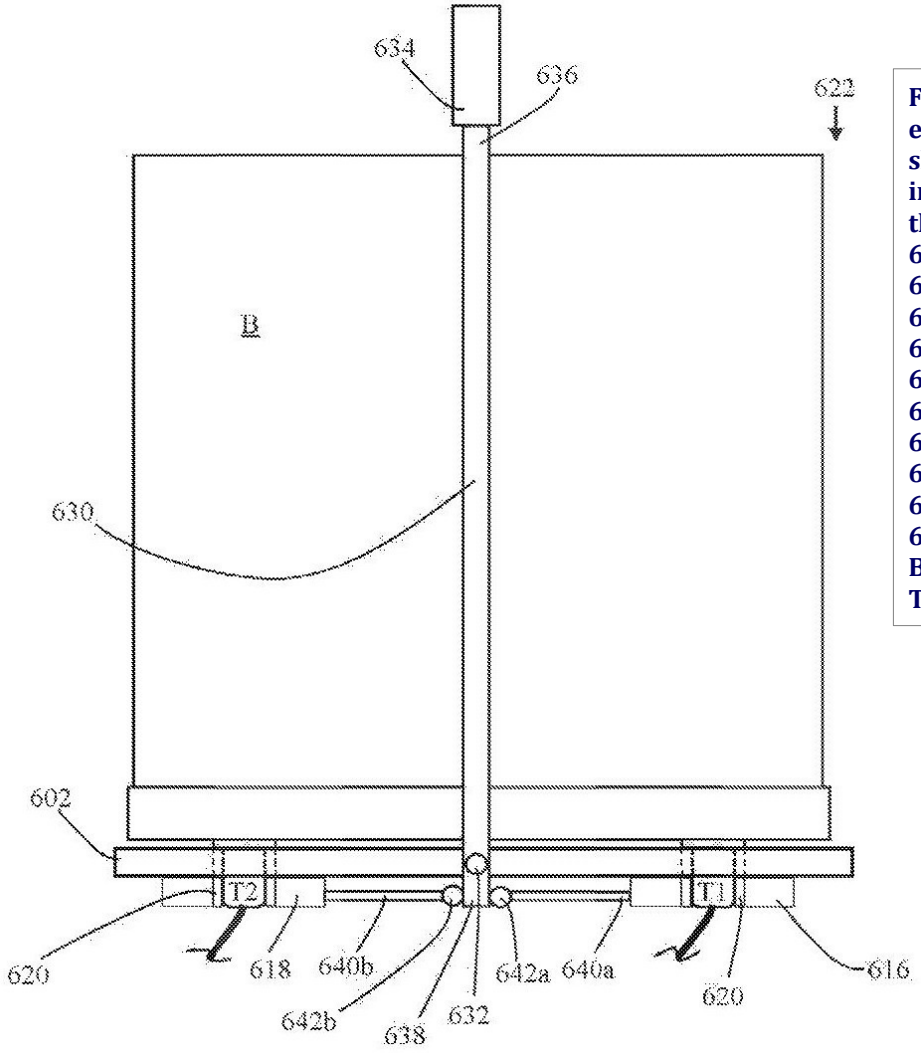


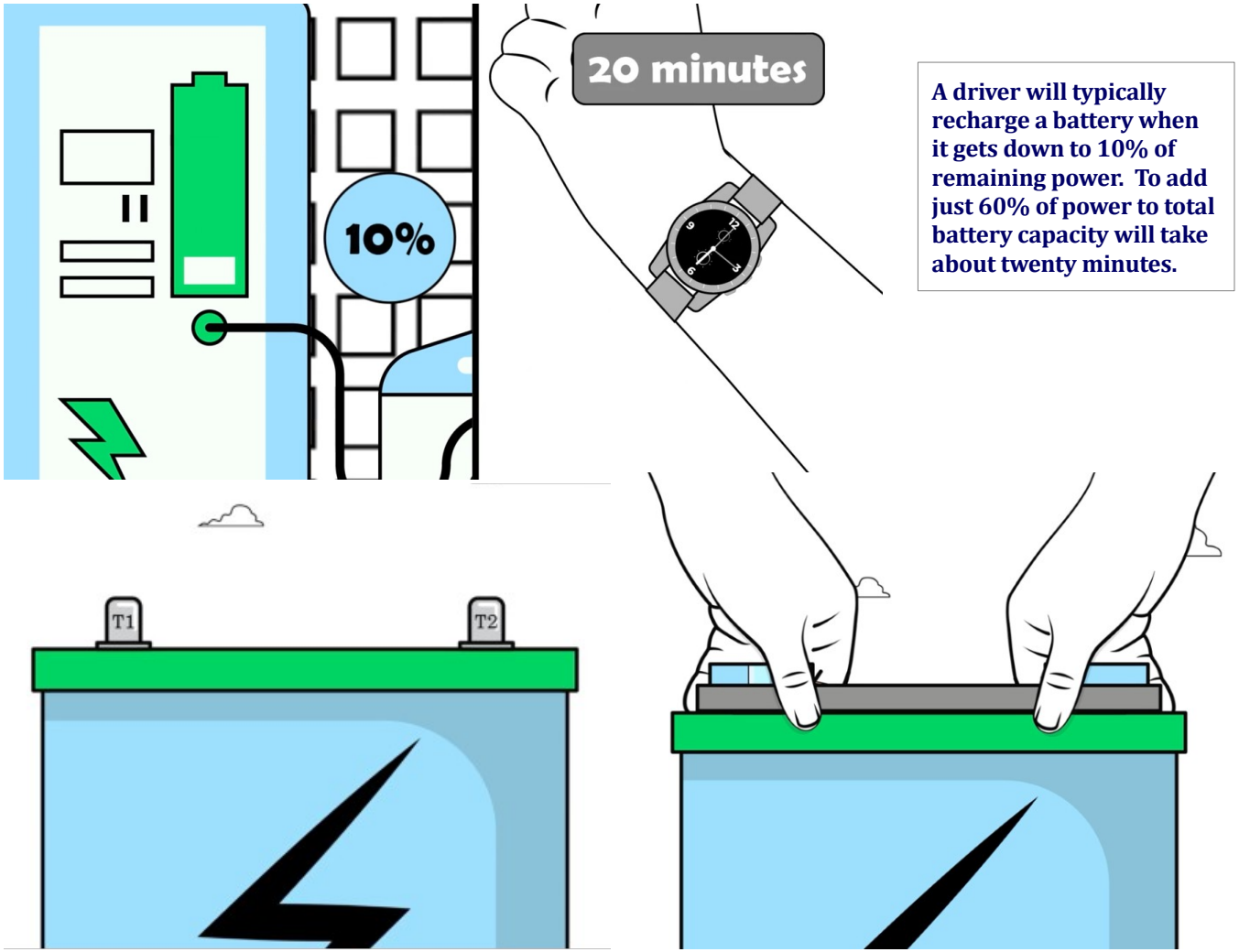
Figure 7 is a schematic of another embodiment of the invention showing an assembly for facilitating the removal of a battery from the battery compartment.
616 and 618: Clamps
620: Clamping portions
622: Battery holding space
630: Lever
632: Fulcrum
634: Handle
636: First end
638: Second opposing end
640a and 640b: Push rods
642a and 642b: Connectors
B: Battery
T1 and T2: Terminals

IPofferings

Commercial-ization of the Invention Covered by This Patent Family

The driver of an electric vehicle often has to wait on line at a charging station and then wait again as his or her battery is re-charged.

Making EVs More Driver-Friendly: Four U.S. Patents



A driver will typically recharge a battery when it gets down to 10% of remaining power. To add just 60% of power to total battery capacity will take about twenty minutes.

Under this patented technology, an EV battery is very similar to a traditional car battery, so it can be easily removed from the car when it runs low and be replaced with a fully charged battery.

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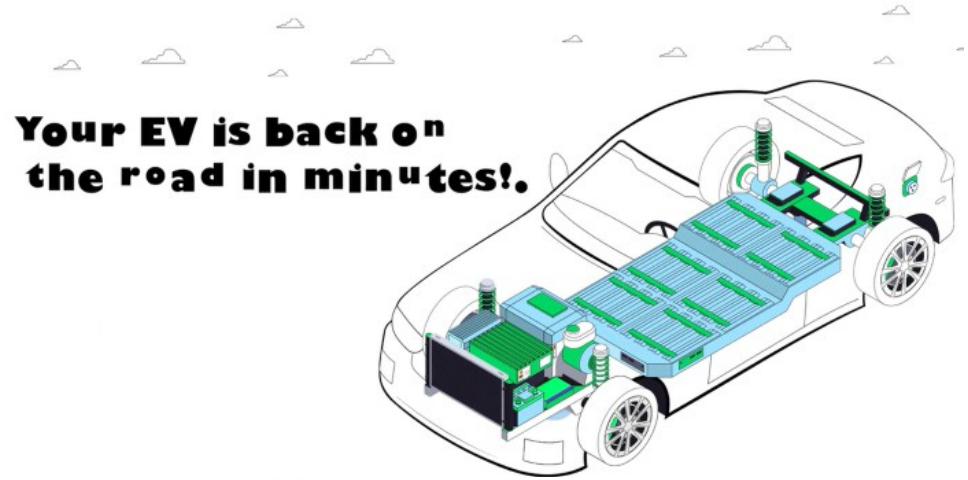
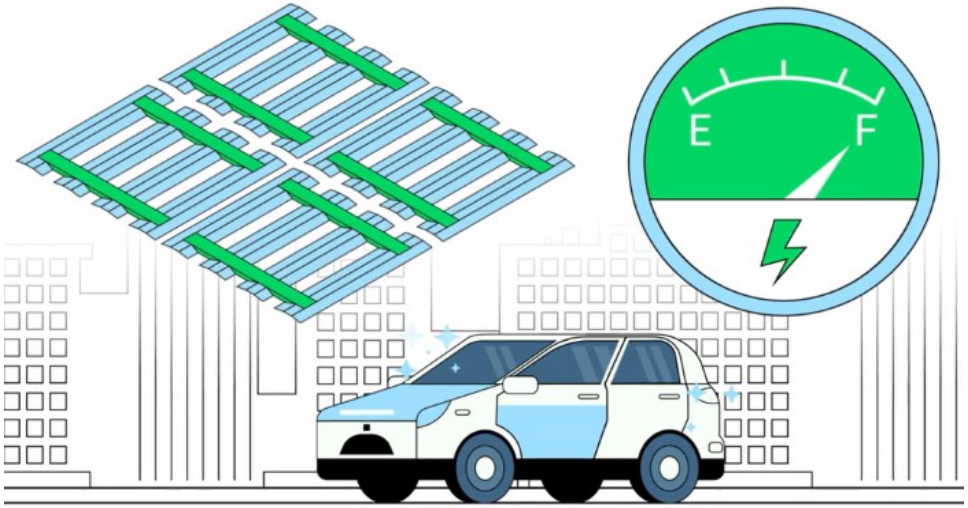
Commercial-ization of the Invention Covered by This Patent Family *(continued...)*

Under this patented technology, when one of the several EV batteries is low, it is removed from the car and replaced with a fully charged battery – in seconds!

Making EVs More Driver-Friendly: Four U.S. Patents



This patent family creates an electric vehicle with a series of small batteries – each of which can be easily replaced – rather than a single large battery that takes time to re-charge.



This patent family uses a system of multiple, smaller, swapable batteries to get an EV driver back on the road quickly!

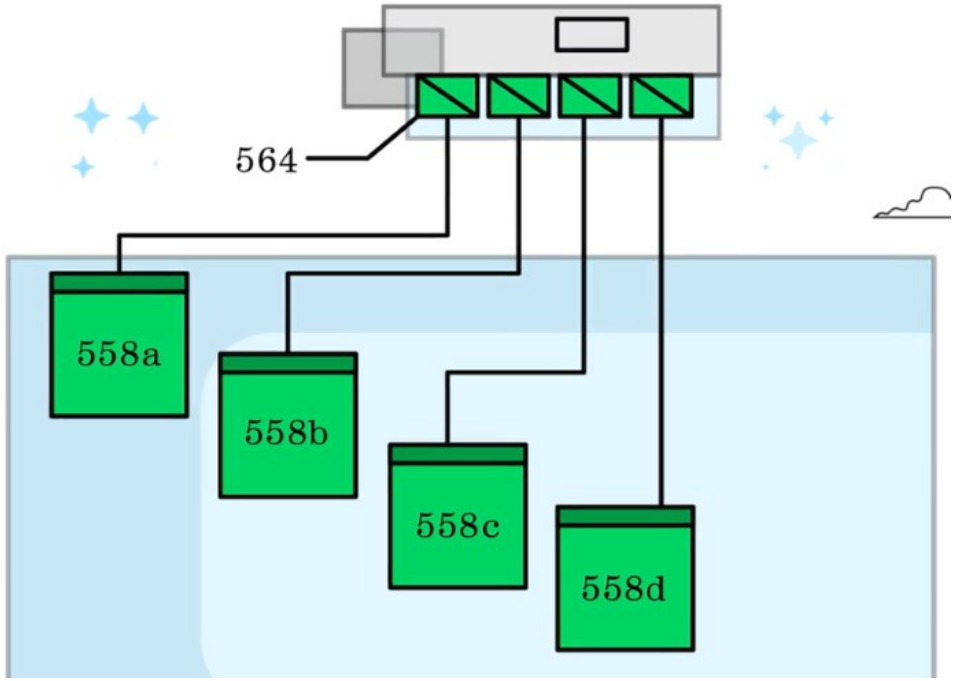
(Continued next page...)

IPofferings

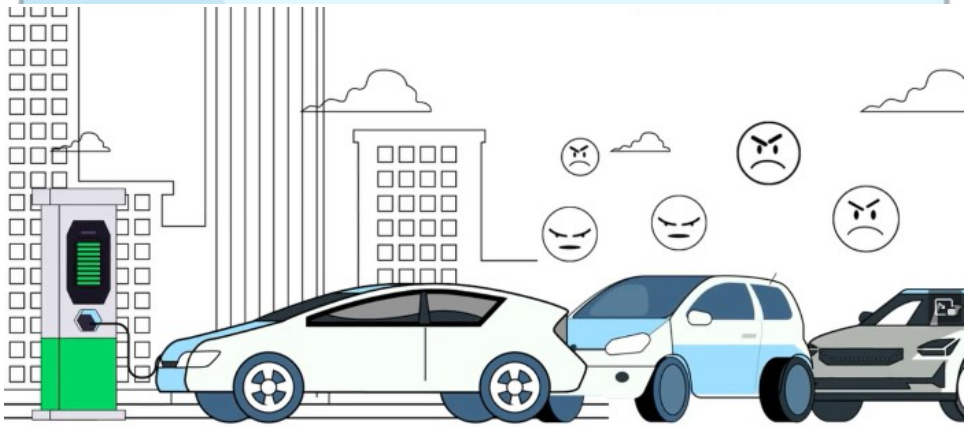
Commercial-ization of the Invention Covered by This Patent Family *(continued...)*

This technology draws power from each battery in sequence – rather than from all the batteries at the same time – so only the fully discharged batteries need be replaced.

Making EVs More Driver-Friendly: Four U.S. Patents



This patented technology draws power from each battery in sequence – rather than from all the batteries at the same time. In this way, only the fully discharged batteries need be replaced.



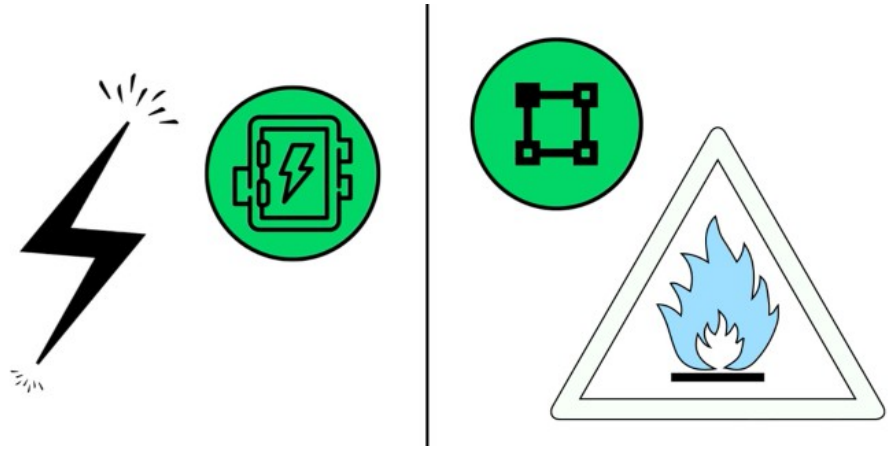
The driver with smaller, multiple, swapable batteries is on his way while other drivers are either waiting for their car to charge or waiting in line at a charging station.

IPofferings

Commercial-ization of the Invention Covered by This Patent Family *(continued...)*

This patent family can be used by electric vehicle manufacturers to offer customers a battery option, or by battery manufacturers as an aftermarket battery replacement.

Making EVs More Driver-Friendly: Four U.S. Patents



Lithium is one of the most dangerous, flammable substances on earth. When an EV with a single large lithium battery is in a collision, the entire hazardous contents of that battery will spill and cause a horrific fire. But, if there is a collision with an EV with smaller, modular batteries, it there will be a much smaller spill of hazardous waste.

❖ **Commercializing the Invention Covered by This Patent Family:** This patent family will enable electric car manufacturers and suppliers of batteries for EVs to introduce totally new thinking about batteries for electric vehicles – new thinking that will lead to a more driver-friendly experience for the EV owner and driver!

❖ **Commercializing Options:** There are multiple options for commercializing this technology.

① **EV Upgrade:** An electric vehicle manufacturer can offer this technology as an option on the vehicles it sells. For the driver who does NOT want to wait on line for a charging station and then wait while his or her vehicle charges, the EV manufacturer can offer multiple, swapable batteries instead of a large single battery.

② **Aftermarket Product:** When the times comes for an EV owner to replace the lithium battery in his or her electric vehicle, a package of multiple, swapable batteries can be offered by the battery suppliers as an aftermarket product.

③ **Charging Port:** A vehicle that uses this technology may or may not have a charging port. It can have a charging port, giving the driver two options for replenishing batteries. Or can have no charging port, and the driver can rely totally on swapping out batteries as needed.

IPofferings

Likely Acquirers – *or Licensees* – of This Patent Family

Any manufacturer of pickup truck accessories can use this patent family to expand its product offering to include weight-bearing bed covers.

Making EVs More Driver-Friendly: Four U.S. Patents

❖ **Overview:** The company that acquires this patent family will leapfrog the technology of all of its competitors!

Electric Vehicle Manufacturers

- BMW
- Ford
- General Motors
- Hyundai/Kia
- Lucid
- Mazda
- Mercedes-Benz
- Nissan
- Rivian
- Stellantis
- Tesla
- Toyota
- Volkswagen Group
- Volvo

EV Battery Manufacturers

- A123
- BYD
- CALB Group
- Contemporary Amperex Technology
- EnerSys
- EVE Energy
- Exide Technologies
- Gotion
- LG Energy Solution
- Manly
- Northvolt
- Panasonic
- Samsung SDI
- Sunwoda
- SVOLT Energy Technology
- Toshiba

Acquiring or Licensing This Patent Family

Here is some additional information about these patents as well as guidelines for their acquisition or licensing.

Making EVs More Driver-Friendly: Four U.S. Patents

The owner of this patent family has put it up for license or sale.

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