



- (51) **International Patent Classification:**
B60L 11/18 (2006.01) **H01M 10/48** (2006.01)
B60S 5/06 (2006.01)
- (21) **International Application Number:**
PCT/JP2012/004599
- (22) **International Filing Date:**
19 July 2012 (19.07.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
2011-159769 21 July 2011 (21.07.2011) JP
- (71) **Applicant (for all designated States except US):** **KA-BUSHIKI KAISHA TOYOTA JIDOSHOKKI** [JP/JP];
2-1, Toyoda-cho, Kariya-shi, Aichi, 4488671 (JP).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **KURAISHI, Mamoru** [JP/JP]; c/o KABUSHIKI KAISHA TOYOTA JIDOSHOKKI, 2-1, Toyoda-cho, Kariya-shi, Aichi, 4488671 (JP).
- (74) **Agent:** **OSUGA, Yoshiyuki**; 3rd Fl., Nibancho Bldg., 8-20, Nibancho, Chiyoda-ku, Tokyo, 1020084 (JP).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM,

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

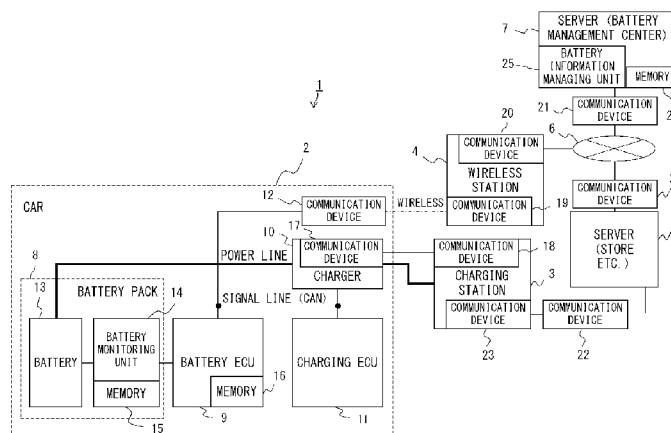
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: BATTERY INFORMATION UPDATE SYSTEM

[Fig. 1]



- (57) **Abstract:** A car obtains a degree of degradation of a battery based on a detection result of a battery monitoring unit, updates battery information stored in a memory based on the obtained degree of degradation of the battery, transmits to a server battery data where an association is made between a battery ID and battery information of a battery pack before being replaced when the battery pack has been replaced, and also transmits to the server request data indicating the battery ID of the battery pack after being replaced. The server updates battery information of battery data within a memory, which corresponds to the battery ID indicated in the received battery data, to battery information indicated in the battery data transmitted from the car, extracts from the memory battery data corresponding to the battery ID indicated in the received request data, and transmits the extracted battery data to the car.

Description

Title of Invention: BATTERY INFORMATION UPDATE SYSTEM

Field

[0001] The present invention relates to a battery information update system of updating battery information for estimating a charged condition of a battery according to a degree of degradation of the battery.

Background

[0002] A battery that is implemented by connecting a plurality of rechargeable batteries in series and outputs a high voltage has been put into practical use. In recent years, attention has focused on mounting of this battery type, for example, in a hybrid car, a plug-in hybrid car, an electric vehicle or the like.

[0003] There are also systems of analyzing information indicating a use history of a battery, a condition of a battery, and the like with a server or the like outside a car, and of obtaining the degree of degradation of the battery based on results of the analysis (for example, see Patent Citations 1 to 5).

[0004] Incidentally, battery information (such as a map where an association is made between an open circuit voltage and a state of charge of a battery, or a map where an association is made between an internal resistance and a state of charge of a battery) for estimating a charged condition of a battery is stored in a memory or the like within a battery ECU for estimating a charged condition of a battery. This information is not changed in normal cases.

[0005] However, a voltage, an internal resistance and the like of a battery vary according to the degree of degradation of the battery. Therefore, it is desirable to update also the battery information according to the degree of degradation of the battery. It is also desirable to pass the battery information after being updated to a switched car and use the battery information when the battery is moved to another car, such as when the same battery is used at switching of a car. Namely, it is desirable to update the battery information according to the degree of degradation of the battery after being replaced when the battery mounted in a car is replaced.

Citation List

Patent Literature

- [0006] PTL 1: Japanese Laid-open Patent Publication No. 2010-022155
PTL 2: Japanese Laid-open Patent Publication No. 2007-024687
PTL 3: Japanese Laid-open Patent Publication No. 2010-111276
PTL 4: Japanese Laid-open Patent Publication No. 2008-083022
PTL 5: Japanese Laid-open Patent Publication No. 2010-172142

Summary of Invention

Technical Problem

[0007] An object of the present invention is to provide a battery information update system that can update battery information for estimating a charged condition of a battery according to a degree of degradation of a battery after being replaced when the battery mounted in a car is replaced.

Solution to Problem

[0008] The battery information update system according to the present invention is a battery information update system where data is transmitted/received between a car and a server.

[0009] The car includes: a battery; first storing unit for storing identification information for identifying the battery; second storing unit for storing battery information for estimating a charged condition of the battery; battery monitoring unit for detecting a condition of the battery; first communication unit; and first control unit for obtaining a degree of degradation of the battery based on a detection result of the battery monitoring unit, for updating battery information stored in the second storing unit based on the obtained degree of degradation of the battery, for transmitting, to the server with the first communication unit when a battery has been replaced, battery data where an association is made between identification information and battery information of the battery before being replaced, for also transmitting, to the server with the first communication unit, request data indicating an identification information of the battery after being replaced, and for updating the battery information stored in the second storing unit to battery information indicated in received battery data upon receiving the battery data corresponding to the request data.

[0010] The server includes: third storing unit for storing a plurality of pieces of battery data; second communication unit; and second control unit for updating battery information of battery data within the third storing unit, which corresponds to identification information indicated in battery data, to battery information indicated in the battery data transmitted from the car upon receiving the battery data transmitted from the car, for extracting from the third storing unit battery data corresponding to identification information indicated in request data upon receiving the request data transmitted from the car, and for transmitting the extracted battery data to the car with the second communication unit.

[0011] As described above, battery information stored in the second storing unit of a car is updated according to the degree of degradation of a battery in the car. Moreover, if a battery is replaced, battery data corresponding to the battery before being replaced is transmitted from the car to the server, and battery information within the third storing

unit of the server, which corresponds to identification information indicated in the battery data, is updated to battery information of battery data transmitted from the car. Additionally, when the battery is replaced, request data indicating identification information of a battery after being replaced is transmitted from the car to the server, and battery data corresponding to the identification information is transmitted from the server to the car. When the battery data corresponding to the request data is transmitted from the server to the car, battery information of battery data stored in the second storing unit of the car is updated to the battery information of the battery data transmitted from the server. In this way, when a battery is replaced, battery information can be updated according to the degree of degradation of the battery after being replaced.

Advantageous Effects of Invention

- [0012] According to the present invention, even if a battery mounted in a car is replaced, battery information for estimating a charged condition of a battery can be updated according to the degree of degradation of the battery after being replaced.

Brief Description of Drawings

- [0013] [fig.1]FIG. 1 illustrates a battery information update system according to an embodiment of the present invention;
[fig.2A]FIG. 2A illustrates one example of battery information;
[fig.2B]FIG. 2B illustrates another example of the battery information;
[fig.3]FIG. 3 illustrates one example of battery data;
[fig.4]FIG. 4 is a flowchart illustrating operations of a battery ECU;
[fig.5]FIG. 5 is a sequence diagram when data is transmitted from the battery ECU to a server via a charging station;
[fig.6]FIG. 6 is a sequence diagram when data is transmitted from the battery ECU to the server via a wireless station;
[fig.7]FIG. 7 is a sequence diagram when data is transmitted from the server to the battery ECU via the charging station;
[fig.8]FIG. 8 is a sequence diagram when data is transmitted from the server to the battery ECU via the wireless station;
[fig.9]FIG. 9 is a flowchart illustrating operations of a battery information managing unit; and
[fig.10]FIG. 10 illustrates one example of a database.

Best Mode for Carrying out the Invention

- [0014] FIG. 1 illustrates a battery information update system according to an embodiment of the present invention.
- [0015] The battery information update system 1 illustrated in FIG. 1 includes a car 2, a

charging station 3, a wireless station 4, and servers 5, 7. In this system, data is transmitted/received between the car 2 and the server 7. The data transmission/reception between the car 2 and the server 7 are made via the charging station 3, the server 5 and the network 6 (Internet, a dedicated line network or the like), or via the wireless station 4 and the network 6. Assume that the battery information update system 1 according to this embodiment is mounted in a car such as a hybrid car, a plug-in hybrid car, an electric vehicle, a forklift or the like.

- [0016] The car 2 includes a battery pack 8, a battery ECU 9 (first control unit), a charger 10, a charging ECU 11, and a communication device 12. Assume that the battery ECU 9 and the charging ECU 11 are implemented, for example, with a configuration including a processor and a memory.
- [0017] The battery pack 8 includes a battery 13 that is configured to be attachable/detachable by a user and composed of a plurality of rechargeable batteries connected in series, a battery monitoring unit 14 (battery monitoring unit) for monitoring a condition of the battery 13, and a memory 15 (first storing unit) for storing a battery ID (identification information) for identifying the battery 13. The battery 13 may be configured with one rechargeable battery.
- [0018] The battery monitoring unit 14 detects a voltage of each of the rechargeable batteries of the battery 13, a current flowing into each of the rechargeable batteries of the battery 13, an ambient temperature and the like of the battery 13.
- [0019] The battery ECU 9 obtains an OCV (Open Circuit Voltage), an IR (Internal Resistance) and the like of each of the rechargeable batteries of the battery 13 based on the voltage, the current, the temperature and the like, which are detected by the battery monitoring unit 14, and also obtains an SOC (State Of Charge) of each of the rechargeable batteries, which corresponds to the OCV, the IR and the like, based on battery information (battery profile) stored in a memory 16 (second storing unit). The memory 16 may be provided outside the battery ECU 9.
- [0020] FIG. 2A illustrates one example of the battery information.
- [0021] The battery information illustrated in FIG. 2A is OCV-SOC maps each indicating an association between an OCV [V] and an SOC [%] of one of the rechargeable batteries within the battery 13. FIG. 2A illustrates the OCV-SOC maps represented as a graph. In FIG. 2A, a solid line represents an OCV-SOC map 1 (battery information 1) before the battery pack 8 is used, whereas a broken line represents an OCV-SOC map 2 (battery information 2) after the battery pack 8 is degraded by being used. According to the OCV-SOC maps 1 and 2 illustrated in FIG. 2A, the OCV increases with the degradation of the rechargeable battery.
- [0022] FIG. 2B illustrates another example of the battery information.
- [0023] The battery information illustrated in FIG. 2B is IR-SOC maps each indicating an as-

sociation between an IR [mohm] and an SOC [%] of one of the rechargeable batteries within the battery 13. FIG. 2B illustrates the IR-SOC maps represented as a graph. In FIG. 2B, a solid line represents an IR-SOC map 1 (battery information 1) before the battery pack 8 is used, whereas a broken line represents an IR-SOC map 2 (battery information 2) after the battery pack 8 is degraded by being used. According to the IR-SOC maps 1 and 2 illustrated in FIG. 2B, the IR increases with the degradation of the rechargeable battery.

[0024] Additionally, the battery ECU 9 illustrated in FIG. 1 updates the battery information stored in the memory 16 based on the voltage, the current, the temperature and the like, which are detected by the battery monitoring unit 14. For example, the battery ECU 9 makes the battery 13 open at an update of the battery information, newly creates an OCV-SOC map (such as the OCV-SOC map 2) indicating an association between an OCV and an SOC based on the voltage, the current, the temperature and the like, which are detected by the battery monitoring unit 14, and updates the OCV-SOC map (such as the OCV-SOC map 1) stored in the memory 16 to the newly created OCV-SOC map. The battery ECU 9 may obtain the degree of degradation of the battery 13 based on results of a comparison made between battery information newly created at the update of the battery information and the battery information stored in the memory 16, and may update another battery information stored in the memory 16 based on the obtained degree of degradation. For example, the battery ECU 9 may update the IR-SOC map 1 to the IR-SOC map 2 based on the degree of degradation of the battery 13, which is obtained based on the results of the comparison made between the OCV-SOC maps 1 and 2. Moreover, the battery information stored in the memory 16 may be updated when the battery pack 8 is replaced, updated periodically, or updated at timing when the battery ECU 9 receives from another ECU an update instruction issued by user operating an operation unit.

[0025] Additionally, the battery ECU 9 transmits/receives data to/from the charger 10 and the communication device 12 via a communication line such as CAN (Controller Area Network).

[0026] FIG. 3 illustrates an example of a configuration of the battery data.

[0027] The battery data illustrated in FIG. 3 is configured with an ID area 200 for storing a battery ID, a DATE area 201 for storing a date when the battery pack 8 has been replaced, and a DATA area 202 for storing battery information such as an OCV-SOC map, an IR-SOC map and the like.

[0028] Furthermore, the charger 10 illustrated in FIG. 1 charges the battery 13 by converting alternating current or direct current power fed from the charging station 3 into direct current power for charging. Moreover, a communication device 17 (first communication unit) included in the charger 10 transmits/receives data to/from a commu-

nication device 18 included in the charging station 3 with a power line communication via a charging cable connecting between the charger 10 and the charging station 3.

[0029] The charging ECU 11 controls operations of the charger 10 based on an SOC and the like obtained by the battery ECU 9. For example, if a user issues an instruction to fully charge the battery 13 and the current SOC is 80%, the charging ECU 11 controls the operations of the charger 10 so that the SOC further increases by 20%.

[0030] The communication device 12 (first communication unit) transmits/receives data to/from a communication device 19 of the wireless station 4 with a wireless communication (DCM (Data Communication Module) or the like).

[0031] A communication device 20 of the wireless station 4 transmits/receives data to/from a communication device 21 (second communication unit) connected to the server 7 via the network 6.

[0032] The server 5 is, for example, a computer installed at a store such as a convenience store, a department store or the like in which the charging station 3 is placed. A communication device 22 connected to the server 5 transmits/receives data to/from a communication device 23 provided at the charging station 3. Moreover, a communication device 24 connected to the server 5 transmits/receives data to/from the communication device 21 connected to the server 7 via the network 6.

[0033] The server 7 is, for example, a computer installed at a battery management center for managing information of the battery pack 8. A battery information managing unit 25 (such as a CPU or the like) (second control unit) within the server 7, based on battery data transmitted from the car 2 via the charging station 3 or the wireless station 4, newly registers battery information to a database stored in a memory 26 (third storing unit), or updates battery information already registered to the database. Moreover, the battery information managing unit 25, based on request data transmitted from the car 2 via the charging station 3 or the wireless station 4, extracts battery data from the database, and transmits the extracted battery data to the car 2 with the communication device 21.

[0034] FIG. 4 is a flowchart illustrating operations of the battery ECU 9.

[0035] Initially, if determining that the battery pack 8 has been replaced ("YES" in S1), the battery ECU 9 creates battery data by making an association among a battery ID, a date when the battery pack 8 has been replaced, and battery information (S2). For example, if a battery ID stored in the memory 15 has been changed, the battery ECU 9 determines that the battery pack 8 has been replaced, and creates battery data by making an association among the battery ID stored in the memory 15 before the battery pack 8 has been replaced, the current date, and the battery information stored in the memory 16.

[0036] Next, upon receiving from another ECU a communication permission signal based

on an operation performed by a user on the operation unit ("YES" in S3), the battery ECU 9 determines whether or not the charger 10 and the charging station 3 are mutually connected with a charging cable (S4). For example, if a charge control signal is transmitted/received between the charger 10 and the charging station 3, the battery ECU 9 determines that the charger 10 and the charging station 3 are mutually connected with the charging cable.

[0037] If determining that the charger 10 and the charging station 3 are mutually connected ("YES" in S4), the battery ECU 9 transmits the battery data from the charger 10 to the server 7 via the charging station 3 and the server 5 (S5). Namely, as illustrated in FIG. 5, battery data DATA (B) is transmitted from the battery ECU 9 to the communication device 17 of the charger 10 through the CAN, further transmitted from the communication device 17 to the charging station 3 with a power line communication, then transmitted from the charging station 3 to the server 5, and finally transmitted from the server 5 to the server 7 via the network 6.

[0038] Additionally, in the flowchart illustrated in FIG. 4, if determining that the charger 10 and the charging station 3 are not mutually connected ("NO" in S4), the battery ECU 9 transmits the battery data from the communication device 12 to the server 7 via the wireless station 4 (S6). Namely, as illustrated in FIG. 6, the battery data (B) is transmitted from the battery ECU 9 to the communication device 12 through the CAN, further transmitted from the communication device 12 to the wireless station 4 with a wireless communication, and finally transmitted from the wireless station 4 to the server 7 via the network 6.

[0039] Next, the battery ECU 9 creates request data by incorporating the battery ID stored in the memory 15 of the battery pack 8 after being replaced in the request data (S7), and transmits the request data to the server 7 (S8). At this time, the battery ECU 9 transmits the request data from the car 2 to the server 7 by using a communication channel established when the battery data is transmitted.

[0040] Then, the battery ECU 9 determines whether or not battery data corresponding to the request data has been received from the server 7 (S9). For example, if verifying that the battery ID of the request data transmitted to the server 7 and a battery ID of the battery data received from the server 7 match, the battery ECU 9 determines that the battery data corresponding to the request data has been received. Moreover, at this time, the server 7 transmits the battery data to the car 2 by using the communication channel established when the battery data is transmitted from the car 2 to the server 7. Namely, if the charger 10 and the charging station 3 are mutually connected, the battery data (B) is transmitted from the server 7 to the server 5 via the network 6, further transmitted from the server 5 to the charging station 3, then transmitted from the charging station 3 to the communication device 17 of the charger 10 with a

wireless communication, and finally transmitted from the communication device 17 to the battery ECU 9 through the CAN as illustrated in FIG. 7. In contrast, if the charger 10 and the charging station 3 are not mutually connected, the battery data DATA (B) is transmitted from the server 7 to the wireless station 4 via the network 6, further transmitted from the wireless station 4 to the communication device 12 with a wireless communication, and finally transmitted from the communication device 12 to the battery ECU 9 through the CAN as illustrated in FIG. 8.

- [0041] In the flowchart illustrated in FIG. 4, if determining that the battery data corresponding to the request data has been received ("YES" in S9), the battery ECU 9 updates the battery information stored in the memory 16 to battery information indicated in the received battery data (S10). Then, the flow goes back to S1.
- [0042] In the flowchart illustrated in Fig. 4, by omitting the process (S3) for determining whether or not to permit a communication, the flow may immediately go to S4 for determining whether or not the charger 10 and the charging station 3 are mutually connected after the battery data is created (S2).
- [0043] FIG. 9 is a flowchart illustrating operations of the battery information managing unit 25 of the server 7.
- [0044] Initially, upon receiving the battery data from the car 2 ("YES" in S11), the battery information managing unit 25 determines whether or not a battery ID indicated in the battery data is already present in the database (S12).
- [0045] If determining that the battery ID is not present yet in the database ("NO" in S12), the battery information managing unit 25 again determines whether or not battery data or request data has been received (S11 or S16) after newly registering the battery data to the database (S13). For example, in the database illustrated in FIG. 10, battery data where an association is made among a battery ID "001", a date "April 2010" that is a date when the battery pack 8 has been replaced, and battery information "OCV-SOC map 1, IR-SOC map 1", and battery data where an association is made among a battery ID "002", a date "April 2011" that is a date when the battery pack 8 has been replaced, and battery information "OCV-SOC map 2, IR-SOC map 2" are registered.
- [0046] Additionally, in the flowchart illustrated in FIG. 9, if determining that the battery ID is already present in the database ("YES" in S12), the battery information managing unit 25 determines whether or not the battery information of the battery data in the database, which corresponds to the battery ID, and the battery information of the received battery data match (S14).
- [0047] If determining that the battery information match ("YES" in S14), the battery information managing unit 25 again determines whether or not battery data or request data has been received (S11 or S16).
- [0048] Alternatively, if determining that the battery information do not match ("NO" in

S14), the battery information managing unit 25 rewrites the battery information of the battery data within the database, which corresponds to the battery ID, to the battery information of the received battery data (S15), and again determines whether or not battery data or request data has been received (S11 or S16). If determining that the battery information do not match, the battery information managing unit 25 may rewrite only battery information that does not match among a plurality of pieces of battery information of the corresponding battery data, or may rewrite the whole of the battery information. In this way, the battery information in the database, which corresponds to the battery pack 8 before being replaced, can be updated according to the degree of degradation of the battery 13 at the replacement of the battery pack 8.

[0049] Additionally, in the flowchart illustrated in FIG. 9, upon receiving the request data from the car 2 ("NO" in S11, "YES" in S16), the battery information managing unit 25 extracts from the database battery data corresponding to a battery ID indicated in the request data, transmits the extracted battery data to the car 2 that has transmitted the request data (S17), and again determines whether or not battery data or request data has been received (S11 or S16).

[0050] As described above, in the battery information update system 1 according to this embodiment, battery information stored in the memory 16 is updated in the car 2 according to the degree of degradation of the battery 13.

[0051] Additionally, in the battery information update system 1 according to this embodiment, when the battery pack 8 of the car 2 is replaced, battery data corresponding to the battery pack 8 before being replaced is transmitted from the car 2 to the server 7. Then, battery information of the battery data within the memory 26, which corresponds to a battery ID indicated in the battery data transmitted from the car 2, is updated to battery information indicated in the battery data transmitted from the car 2.

[0052] Furthermore, in the battery information update system 1 according to this embodiment, when the battery pack 8 of the car 2 is replaced, request data that indicates a battery ID of the battery pack 8 after being replaced is transmitted from the car 2 to the server 7, and battery data corresponding to the battery ID is transmitted from the server 7 to the car 2. When the battery data is transmitted from the server 7 to the car 2, battery information of the battery data, which is stored in the memory 16 of the car 2, is updated to the battery information of the battery data transmitted from the server 7.

[0053] In this way, battery information can be updated according to the degree of degradation of the battery 13 of the battery pack 8 after being replaced when the battery pack 8 of the car 2 is replaced. When the battery pack 8 is moved to another car 2, such as when the same battery pack 8 is used at switching of the car 2, battery information after being updated can be passed to the switched car 2 and used.

[0054] In the above described embodiment, data is transmitted/received via the charging

station 3 with priority if the car 2 and the charging station 3 are mutually connected when the data is transmitted/received between the car 2 and the server 7. However, the data may be transmitted/received via the wireless station 4 even if the car 2 and the charging station 3 are mutually connected.

- [0055] Additionally, a hardware configuration of the server 7 may include, for example, a recording unit, a recording medium reading device, an input/output interface and the like in addition to the communication device 21, the battery information managing unit 25, and the memory 26.
- [0056] In the recording unit, a program executed by the battery information managing unit 25 and data are recorded. Moreover, the recording unit is used as a working area. The recording unit is, for example, a ROM, a RAM, a hard disk drive or the like.
- [0057] The recording medium reading device controls a data read/write from/to a recording medium according to a control of the battery information managing unit 25. A data is recorded onto a recording medium or data recorded onto a recording medium is read according to a control of the recording medium reading device. Examples of an attachable/detachable recording medium include a computer-readable non-transitory recording medium such as a magnetic recording device, an optical disc, a magneto-optical recording medium, a semiconductor memory and the like. Examples of the magnetic recording device include a hard disk device (HDD) and the like. Examples of the optical disc include a DVD (Digital Versatile Disk), a DVD-RAM, a CD-ROM (Compact Disc-Read Only Memory), a CD-R (Recordable)/RW (ReWritable) and the like. Examples of the magneto-optical recording medium include an MO (Magneto-Optical) disk and the like. Also the recording unit is one type of the non-transitory recording medium.
- [0058] To the input/output interface, an input/output device is connected. Information input by a user is received and transmitted to the battery information managing unit 25 via a bus. Moreover, operation information and the like are displayed on a screen of a display according to an instruction from the battery information managing unit 25. Examples of the input/output device include a touch panel and the like.
- [0059] The present invention is not limited to the above described embodiment, and various improvements and modifications can be made within the scope that does not depart from the gist of the present invention.

Claims

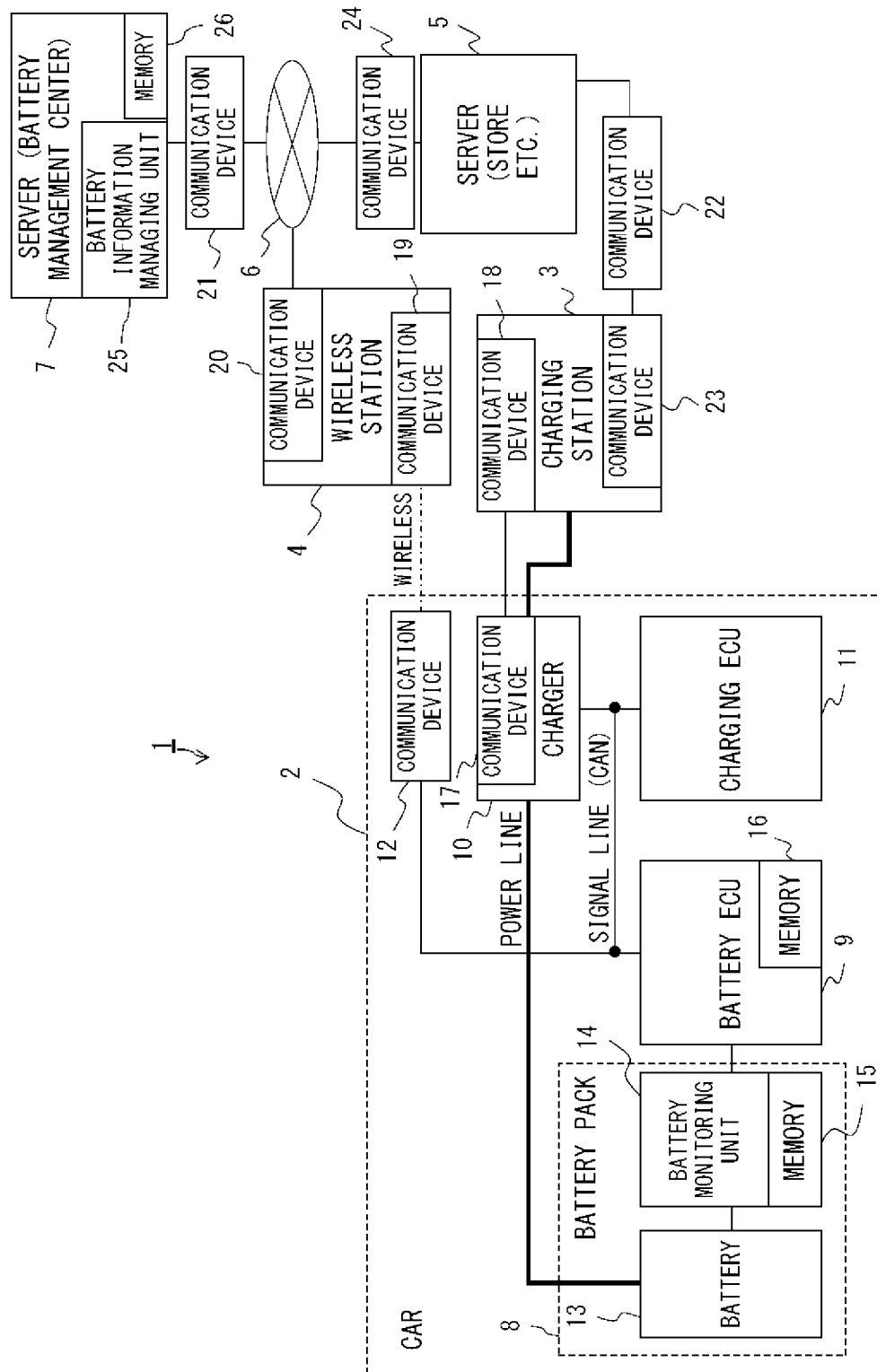
- [Claim 1] A battery information update system where data is transmitted/received between a car and a server, wherein:
the car comprises
a battery,
first storing unit for storing identification information for identifying the battery,
second storing unit for storing battery information for estimating a charged condition of the battery,
battery monitoring unit for detecting a condition of the battery,
first communication unit, and
first control unit for obtaining a degree of degradation of the battery based on a detection result of the battery monitoring unit, for updating battery information stored in the second storing unit based on the obtained degree of degradation of the battery, for transmitting, to the server with the first communication unit when the battery has been replaced, battery data where an association is made between identification information and battery information of the battery before being replaced, for also transmitting, to the server with the first communication unit, request data indicating an identification information of the battery after being replaced, and for updating the battery information stored in the second storing unit to battery information indicated in received battery data upon receiving the battery data corresponding to the request data; and
the server comprises
third storing unit for storing a plurality of pieces of battery data,
second communication unit, and
second control unit for updating battery information of battery data within the third storing unit, which corresponds to identification information indicated in battery data, to battery information indicated in the battery data transmitted from the car upon receiving the battery data transmitted from the car, for extracting from the third storing unit battery data corresponding to identification information indicated in request data upon receiving the request data transmitted from the car, and for transmitting the extracted battery data to the car with the second communication unit.
- [Claim 2] The battery information update system according to claim 1, wherein

the second control unit newly registers the battery data to the third storing unit if the battery data corresponding to the identification information indicated in the battery data transmitted from the car is not stored yet in the third storing unit.

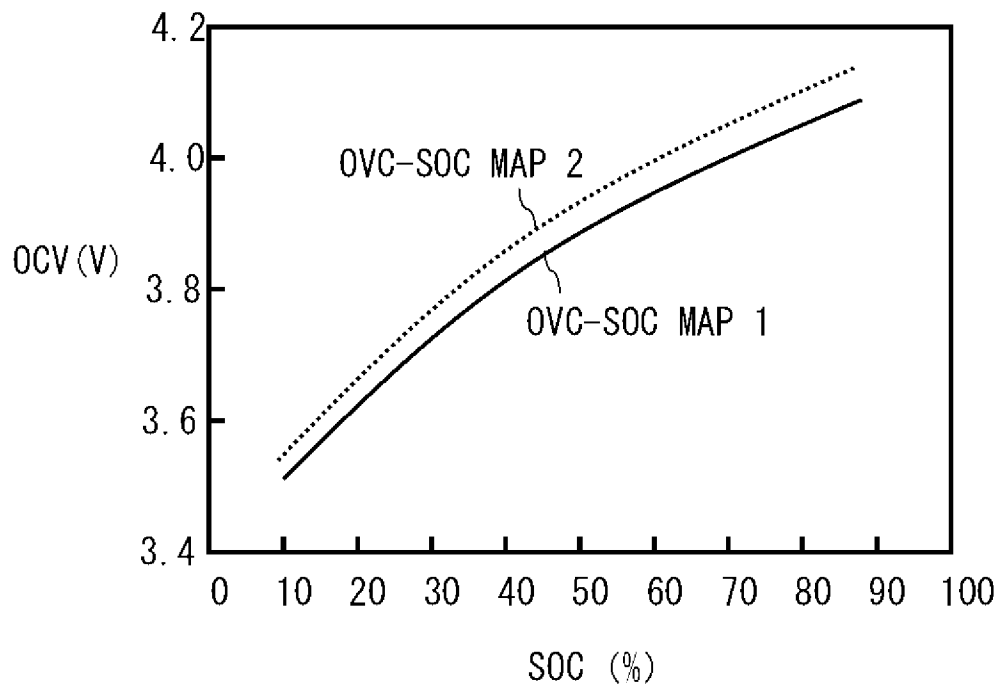
[Claim 3]

The battery information update system according to claim 1, wherein the second control unit updates only battery information that does not match the battery information indicated in the battery data transmitted from the car among the plurality of pieces of battery information indicated in the battery data within the third storing unit, which correspond to the identification information indicated in the battery data transmitted from the car.

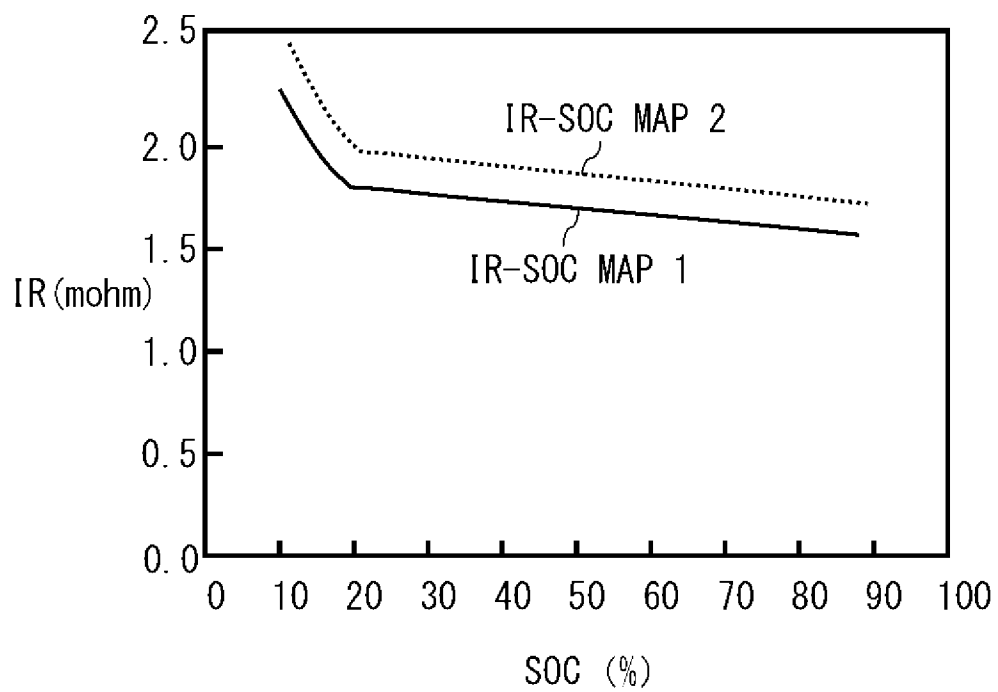
[Fig. 1]



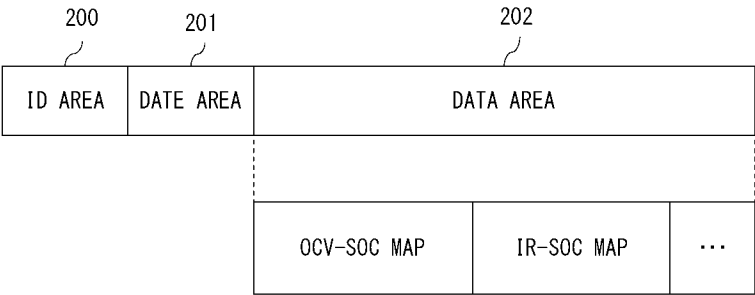
[Fig. 2A]



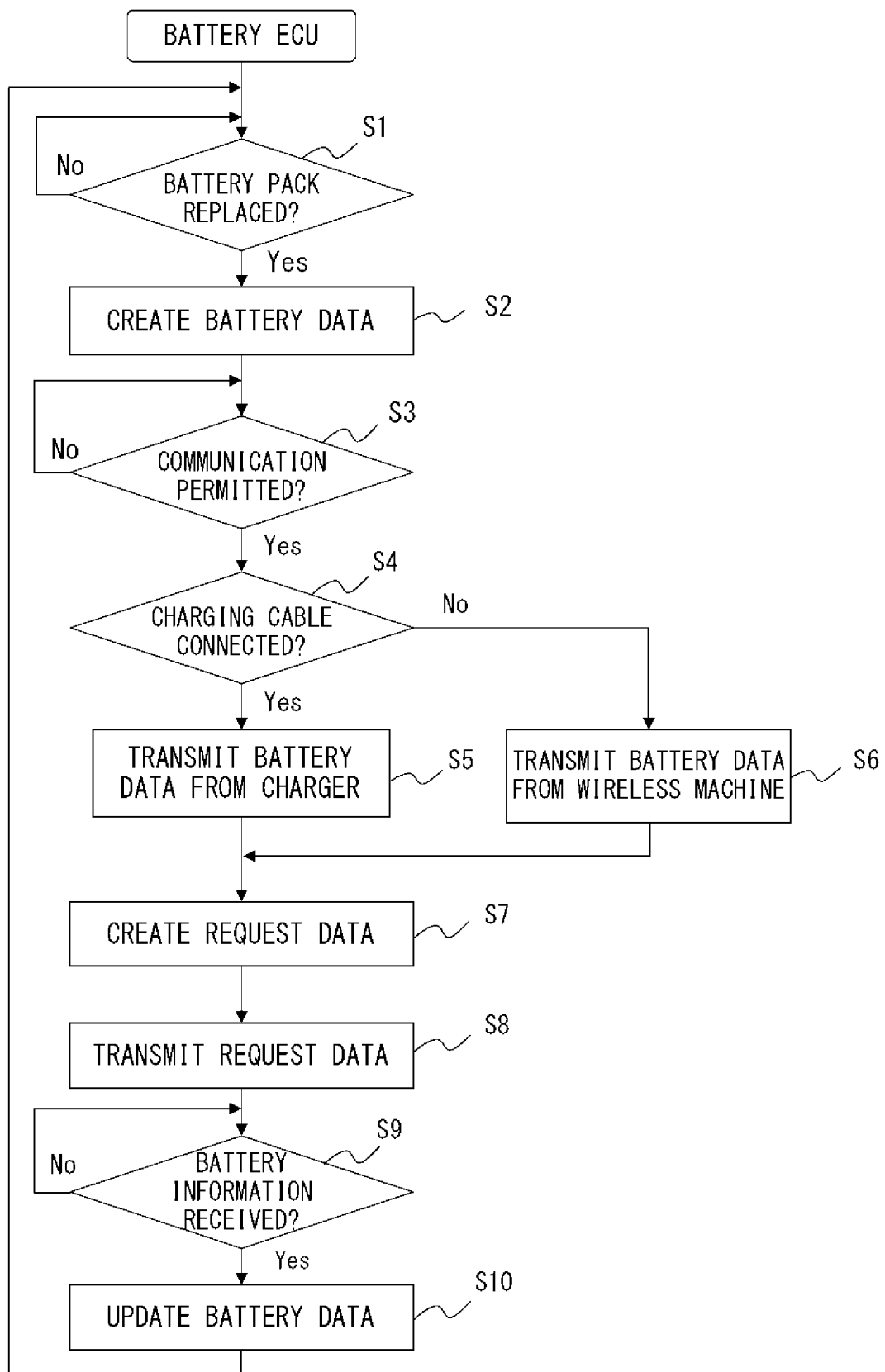
[Fig. 2B]



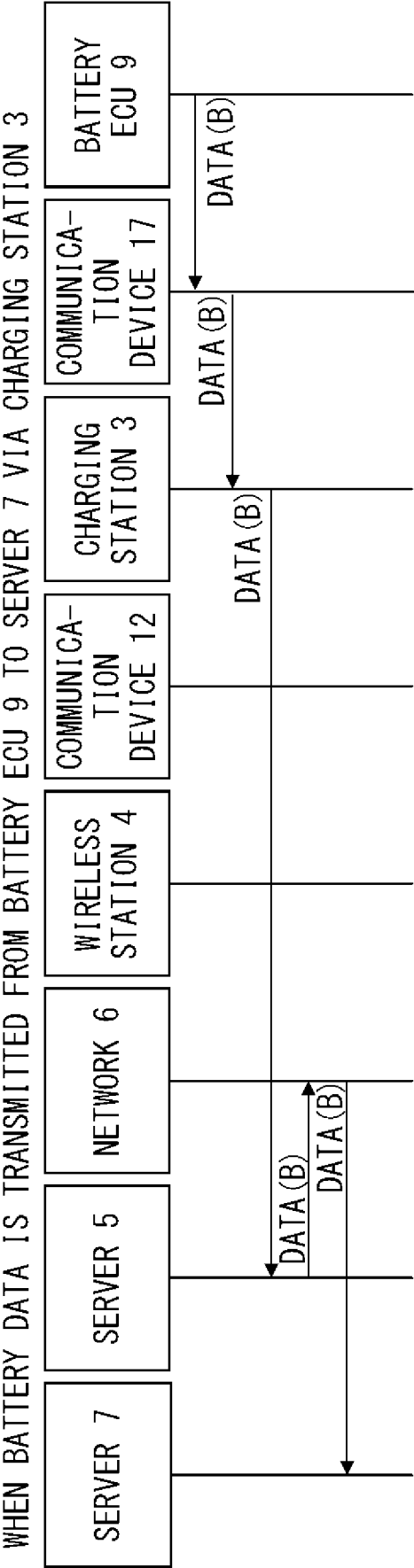
[Fig. 3]



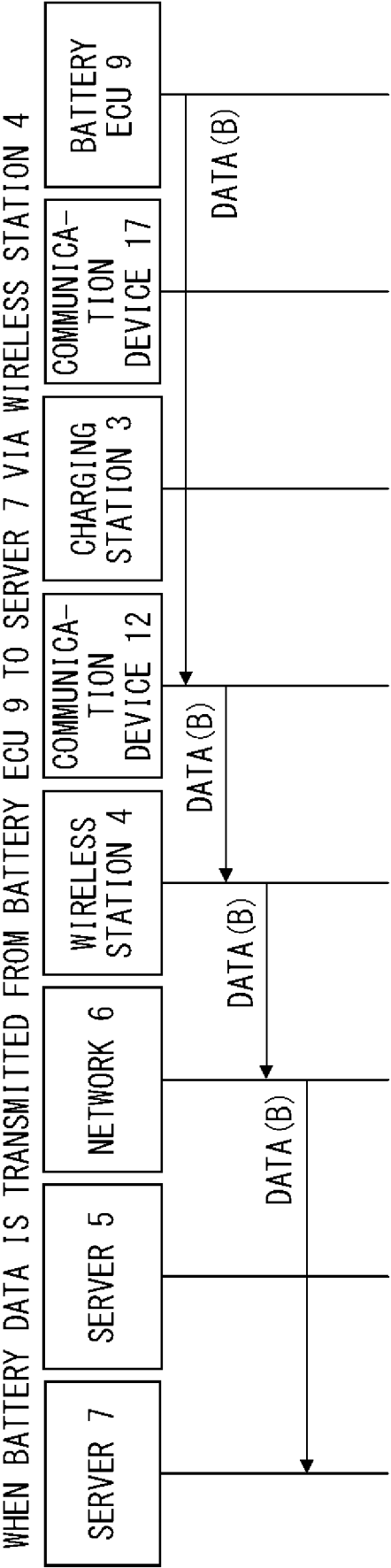
[Fig. 4]



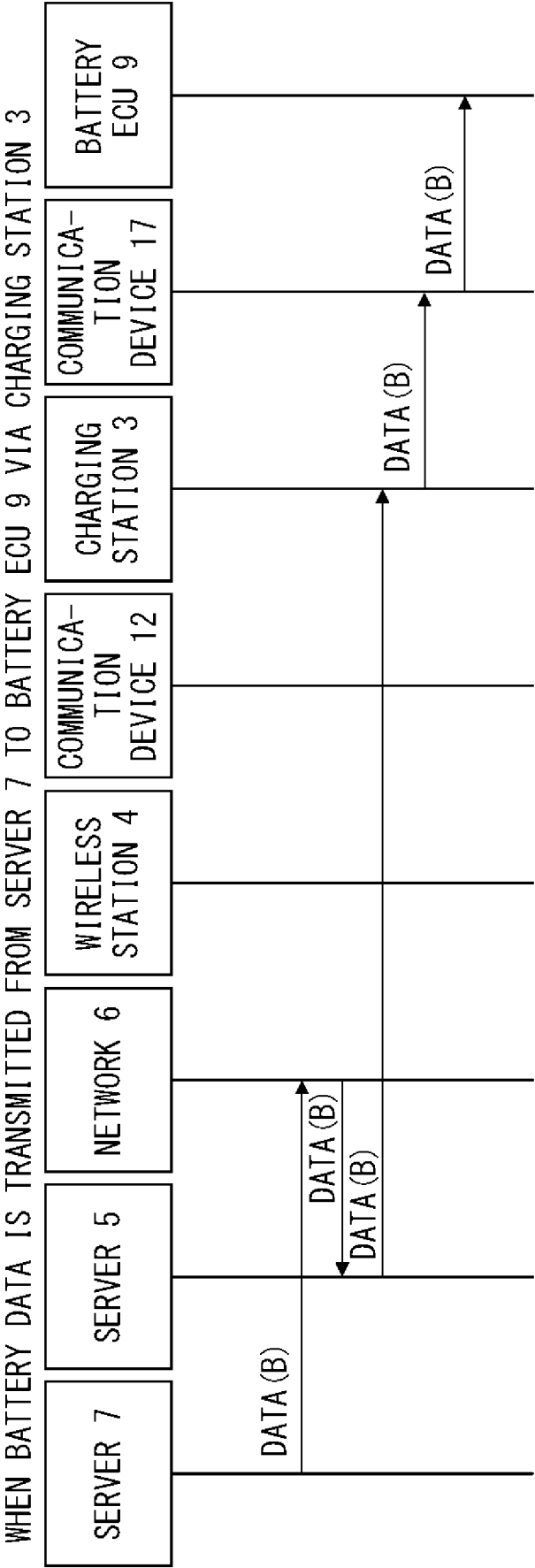
[Fig. 5]



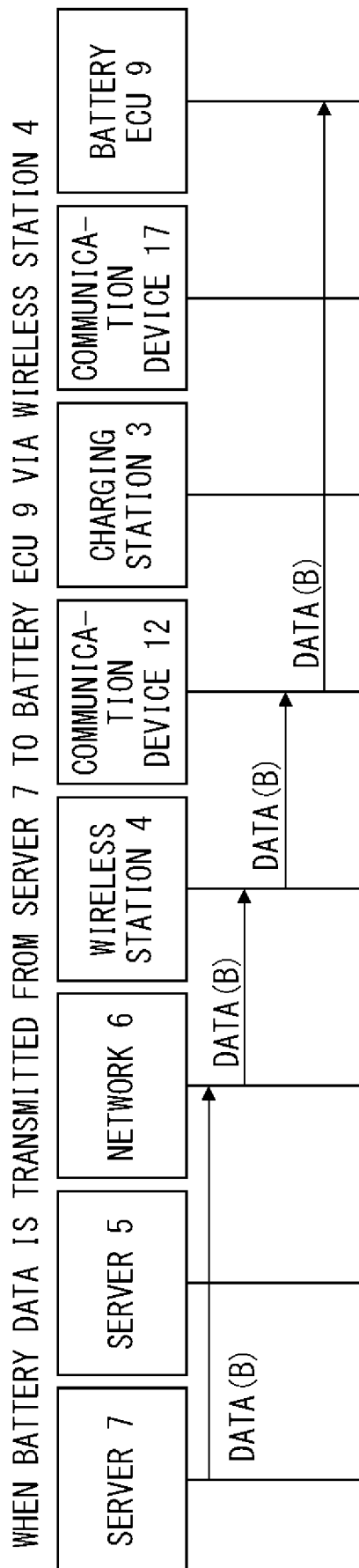
[Fig. 6]



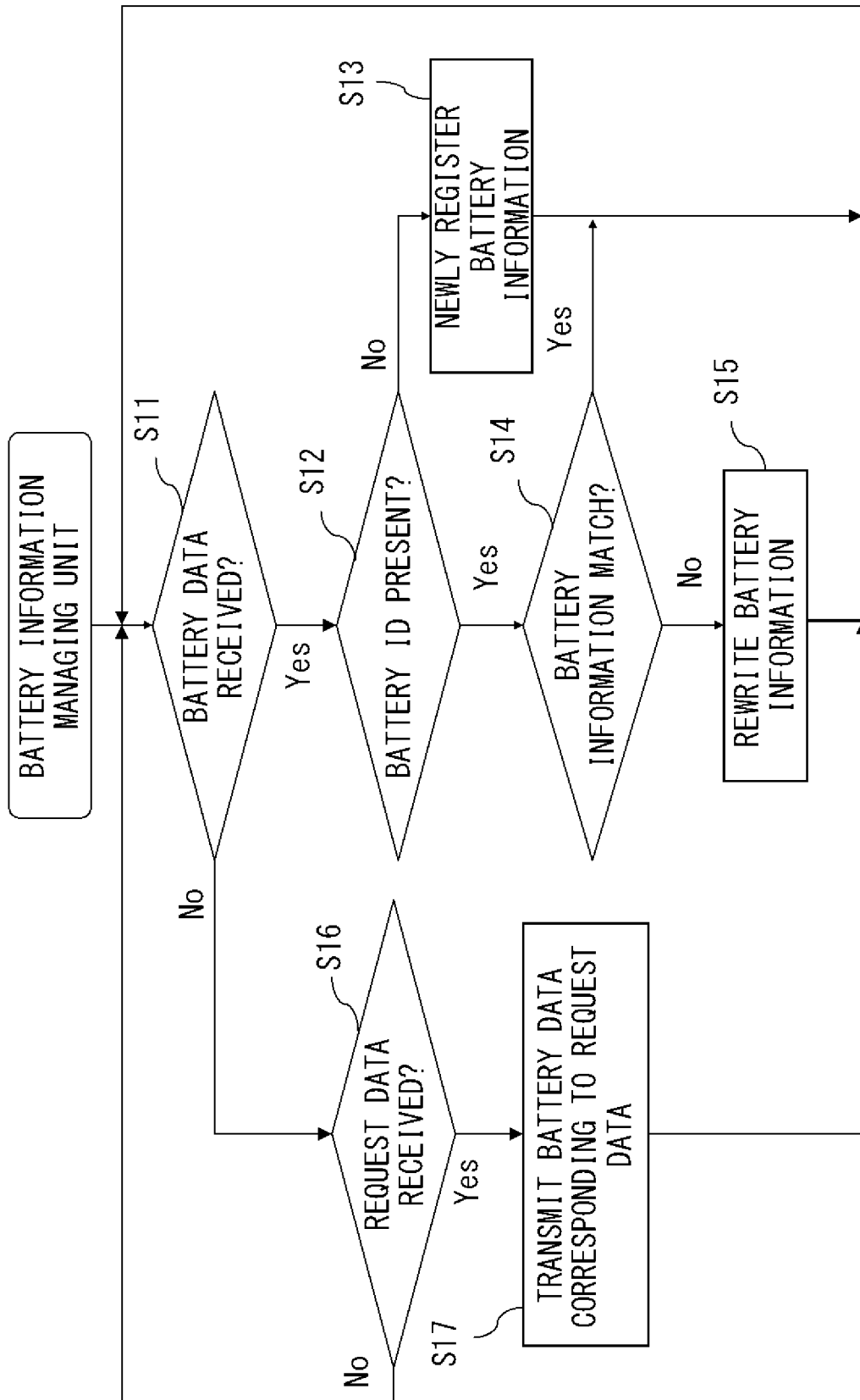
[Fig. 7]



[Fig. 8]



[Fig. 9]



[Fig. 10]

BATTERY ID	DATE	BATTERY INFORMATION
001	APRIL 2010	OCV-SOC MAP 1 IR-SOC MAP 1
002	APRIL 2011	OCV-SOC MAP 2 IR-SOC MAP 2
⋮	⋮	⋮

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2012/004599

A. CLASSIFICATION OF SUBJECT MATTER

INV. B60L11/18 B60S5/06 H01M10/48
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B60L B60S H01M

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 476 405 A1 (RIETER AG MASCHF [CH]) 25 March 1992 (1992-03-25) paragraphs [0014] - [0017], [0021]; claims 1,12-16; figures 1-5 -----	1-3
A	EP 0 583 906 A1 (SONY CORP [JP]) 23 February 1994 (1994-02-23) paragraphs [0022] - [0026], [0044]; figures 1,7 -----	1-3
A	WO 2010/061001 A2 (SIEMENS AG [DE]; KUNKEL SEBASTIAN [DE]) 3 June 2010 (2010-06-03) pages 3-6, - pages 11-14; claim 3; figure 1 -----	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

7 November 2012

Date of mailing of the international search report

21/11/2012

Name and mailing address of the ISA/

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

Authorized officer

Maître, Jérôme

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2012/004599

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0476405	A1	25-03-1992	CS 9102875 A3 15-04-1992
		EP 0476405 A1	25-03-1992

EP 0583906	A1	23-02-1994	DE 69320903 D1 15-10-1998
		DE 69320903 T2	11-03-1999
		EP 0583906 A1	23-02-1994
		JP 3371146 B2	27-01-2003
		JP 6068912 A	11-03-1994
		US 5525890 A	11-06-1996

WO 2010061001	A2	03-06-2010	DE 102008059491 A1 10-06-2010
		EP 2351183 A2	03-08-2011
		WO 2010061001 A2	03-06-2010
