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(54) **CHARGING STATION FOR SIMULTANEOUSLY CHARGING A PLURALITY OF BATTERIES**

(71) Applicant: **Honda Motor Co., Ltd.**, Tokyo (JP)

(72) Inventor: **Kyusang Ro**, Chapel Hill, NC (US)

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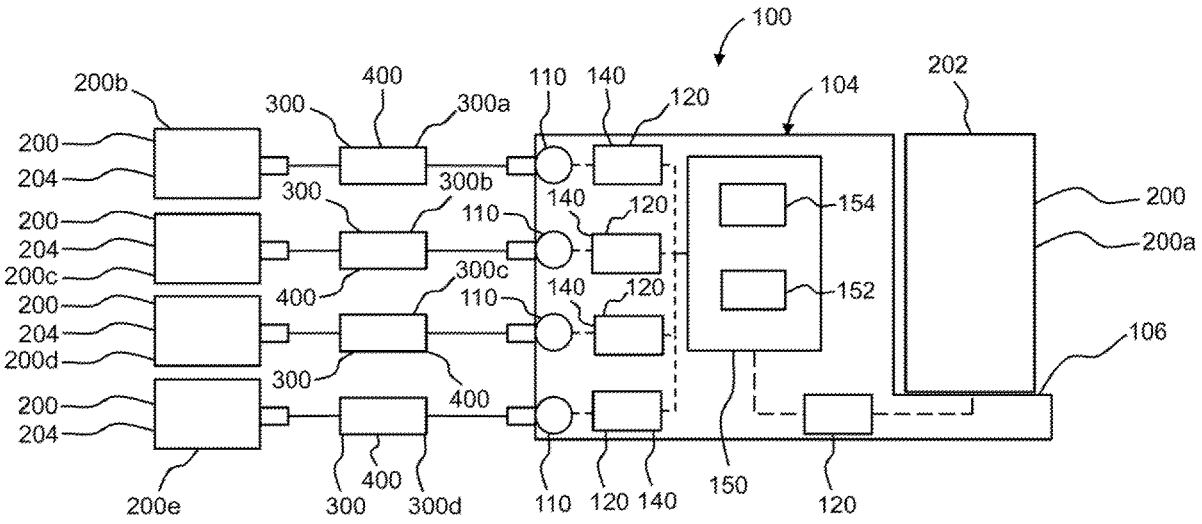
(57) **ABSTRACT**

A charging station for charging a plurality of batteries includes a charging terminal for charging a primary battery of the plurality of batteries in a first charging mode and a second charging mode, and at least one electrical outlet to enable connection of at least one external charger to enable a charging of at least one secondary battery of the plurality of batteries. The charging station also includes a controller configured to determine if the primary battery is connected to the charging terminal, and determine a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal. The controller is configured to control the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.



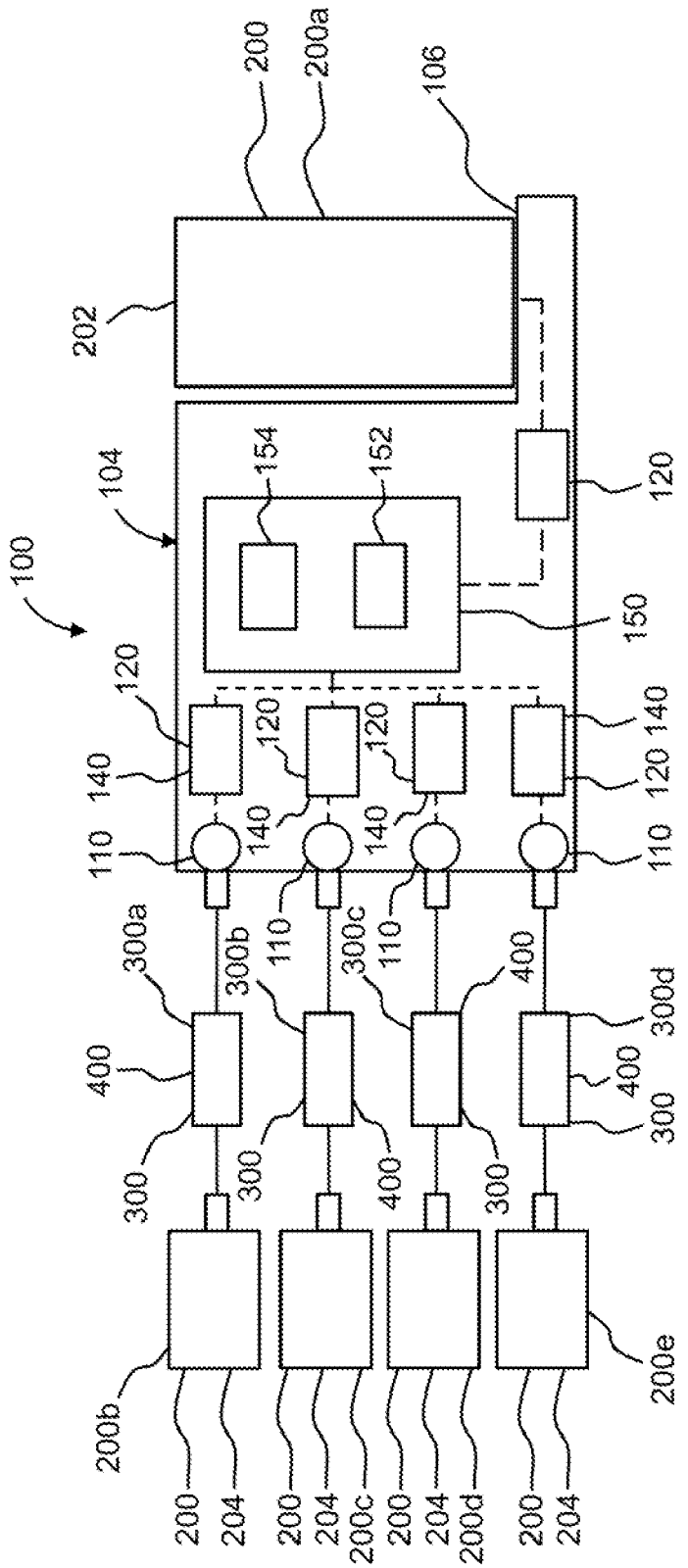

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FIG. 1

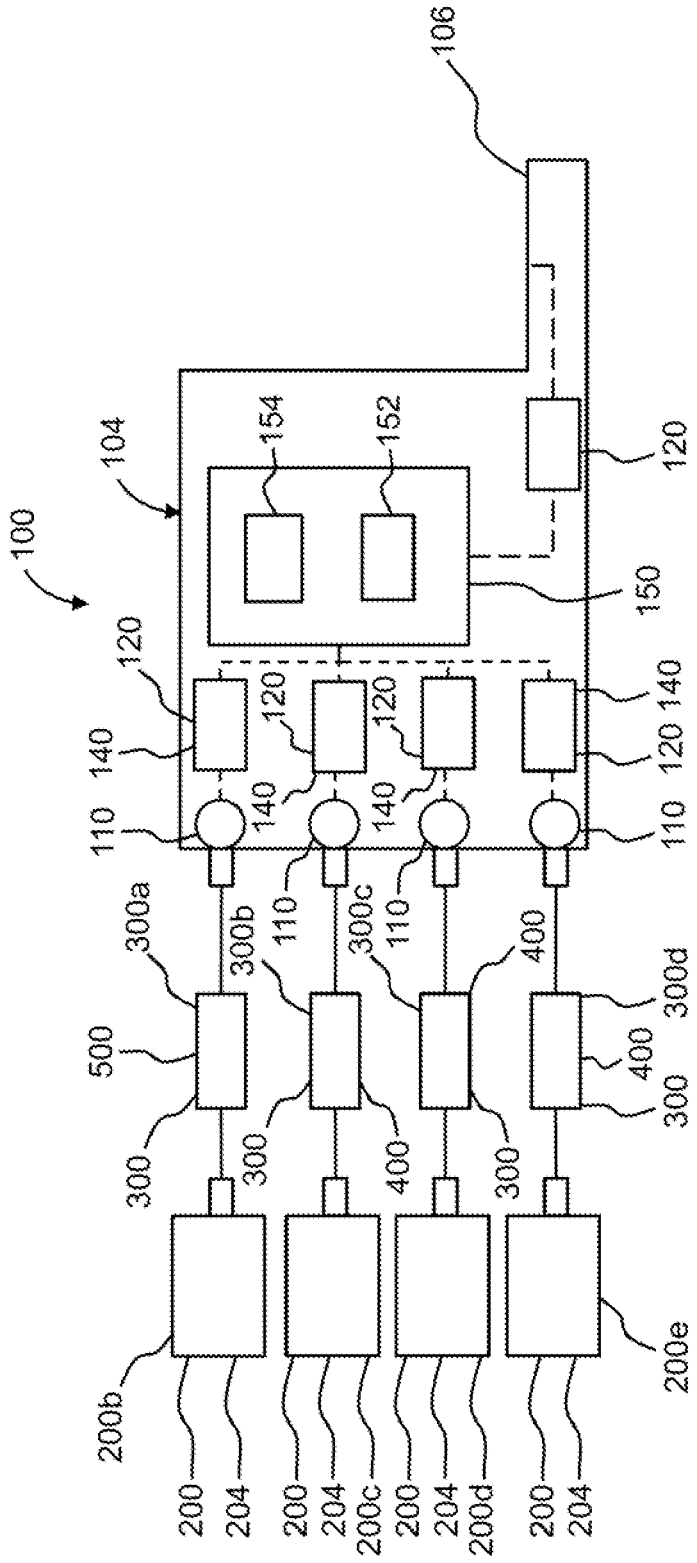
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FIG. 2

CHARGING STATION FOR SIMULTANEOUSLY CHARGING A PLURALITY OF BATTERIES

BACKGROUND

[0001] The disclosed subject matter relates, generally to, a charging station. More particularly, the disclosed subject matter relates to charging station having a charging terminal and at least one electrical outlet to enable a connection of at least one external charger to simultaneously charge a plurality of batteries.

[0002] Now a days, the garden equipment are generally electrically powered tools, and include similar type of batteries. For example, an electrical lawn mower and an electrical trimmer have same type of batteries. Users, generally, wish to quickly charge each of the multiple batteries. However, for so doing, a user either needs to have multiple chargers for quick charging of the multiple batteries simultaneously, or charge one battery at a time. Charging batteries sequentially with one battery being charged at a time increases overall charging time, and is undesirable to the users. Also, using multiple chargers for simultaneously charging the multiple batteries is expensive. Moreover, a quick charger supplies a relatively higher current to a battery for quick charging. Accordingly, multiple quick chargers, during simultaneously charging of the multiple batteries, draw a large amount of current from an electrical power supply, causing a blowing of a fuse of the electrical power supply, which is undesirable.

SUMMARY

[0003] In accordance with one embodiment of the present disclosure, a charging station for charging a plurality of batteries is provided. The charging station includes a charging terminal for charging a primary battery of the plurality of batteries in a first charging mode and a second charging mode, and at least one electrical outlet to enable connection of at least one external charger to enable a charging of at least one secondary battery of the plurality of batteries. The charging station also includes a controller configured to determine if the primary battery is connected to the charging terminal, and determine a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal. The controller is configured to control the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

[0004] In accordance with another embodiment of the present disclosure, a charging station for charging a plurality of batteries is provided. The charging station includes a charging terminal for charging a primary battery of the plurality of batteries in a first charging mode and a second charging mode, and at least one electrical outlet to enable connection of at least one external charger to enable a charging of at least one secondary battery of the plurality of batteries. The at least one external charger is a slow charge. The charging station also includes a controller configured to determine if the primary battery is connected to the charging terminal, and determine a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal. The controller is further configured to control the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

[0005] In accordance with yet a further embodiment of the present disclosure, a method for charging a plurality of batteries is provided. The method includes determining, by a controller, if a primary battery of the plurality of batteries is connected to a charging terminal of a charging station. The charging terminal is configured to charge the primary battery in a first charging mode and a second charging mode. The charging station further includes at least one electrical outlet and at least one secondary battery of the plurality of batteries is connected to the at least one electrical outlet via at least one external charger. The method also includes determining, by the controller, a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal, and controlling the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Certain embodiments of the present disclosure will be better understood from the following description taken in conjunction with the accompanying drawings in which:

[0007] FIG. **1** is a block diagram of a charging station having a plurality of electrical outlets and a plurality of external charger connecting a plurality of secondary batteries with the plurality of electrical outlets and a primary battery connected to a charging terminal, according to an embodiment of the disclosure; and

[0008] FIG. **2** is a block diagram of the charging station having the plurality of electrical outlets and a plurality of external charger connecting a plurality of secondary batteries with the plurality of electrical outlets, according to an embodiment of the disclosure.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0009] A few inventive aspects of the disclosed embodiments are explained in detail below with reference to the various figures. Exemplary embodiments are described to illustrate the disclosed subject matter, not to limit its scope, which is defined by the claims. Those of ordinary skill in the art will recognize a number of equivalent variations of the various features provided in the description that follows. Embodiments are hereinafter described in detail in connection with the views and examples of FIGS. **1-2**, wherein like numbers indicate the same or corresponding elements throughout the views.

[0010] FIGS. **1** and **2**, a block diagram of a charging station **100** suitable to charge a plurality of batteries **200** is shown. The charging station **100** may be suitable to charge the batteries of one or more garden equipment, for example, an electric lawn mower. However, it may be appreciated that the charging station **100** may be configured to charge batteries used in any equipment known in the art. The charging station **100** is a quick charger **104** having a charging terminal **106** to charge one of the plurality of batteries **102**, for example, a primary battery **202**, and at least one electrical outlet/socket **110** to facilitate remaining, for example, at least one secondary battery **204**, of the plurality of batteries **200** connected to the at least one electrical outlet **100** via an at least one external charger **300**.

Accordingly, the at least one secondary battery **204** is electrically connected to the at least one external charger **300** which in turn is connected to the at least one electrical outlet **110** of the charging station **100**. In the embodiment, the quick charger **104** enables a quick charging of the primary battery **202** which is connected to the charging terminal **106**, and enables the charging of the primary battery **202** in a constant current mode and a constant voltage mode. The quick charger **104** charges the primary battery **202** in the constant current mode when a charge of the primary battery **202** is below a predetermined value, and charges the primary battery **202** in the constant voltage mode thereafter to fully charge the primary battery **202**. In an embodiment, the at least one external charger **300** connected to the at least one electrical outlet **106** of the charging station **100** is a slow charger and configured to slowly charge the at least one secondary battery **204**.

[0011] Further, the charging station **100** includes a plurality of relays **120** associated with the at least one electrical outlet **110** and the charging terminal **106** to control charging currents to be supplied to each of the at least one external charger **300** (i.e., secondary batteries **204**) and the charging terminal **106**. Accordingly, one relay **120** is connected to one electrical outlet **110** to control the flow of the charging current to the associated electrical outlet **110**, and hence associated secondary battery **204**. In an embodiment, the relay **120** is a field effect transistor **130** (FET) to enable and disable the flow of the charging current to the associated electrical outlet **110** as well as to control an amount of the charging current being supplied to the associated electrical outlet **110**, i.e., the associated secondary battery **204**. Further, the FET **130** is configured to sense/determine a charging current rating of the associated external charger **300** at which the each of the external charger **300** is configured to charge the associated secondary battery **204**.

[0012] Additionally, the charging station **100** includes a controller **150** configured to control the relays **120** to control a total charging current of the charging station **100** as well as the charging current provided to each of the plurality of batteries **200**. Further, the controller **150** is configured to determine if a battery **200** is attached to the charging terminal **106** of the quick charger **104** and assigns/determines the battery **200** connected to the charging terminal **106** as the primary battery **202** of the plurality of batteries **200**, as shown in FIG. **1**. Further, the controller **150** is configured to determine if one or more batteries **200** of the plurality of batteries **200** is connected to the one or more electrical outlets **110** via the one or more external chargers **300**, and is configured to assign/determine the one or more batteries **200** connected to the one or more electrical outlets **104** as the secondary batteries **204**. For example, as shown in FIG. **1**, the controller **150** assigns a first battery **200***a* of the plurality of batteries **200** as the primary battery **202**, and assigns a second battery **200***b*, a third battery **200***c*, a fourth battery **200***d*, and a fifth battery **200***e* as the secondary batteries **204**.

[0013] In an embodiment, the controller **150** may include a processor **152** for executing specified instructions, which controls and monitors various functions associated with charging station **100**, and its components, for example, the relays **120**, the charging terminal **106**, and the electrical outlets **110**, etc. The processor **152** may be operatively connected to a memory **154** for storing instructions related to the control of the charging station **100**.

[0014] The memory **154** may be integrated into the controller **154**, but those skilled in the art will understand that the memory **154** may be separate from the controller **150** but onboard the charging station **100**, and/or remote from the controller **150** and the charging station **100**, while still being associated with and accessible by the controller **150** to store information in and retrieve information from the memory **154** as necessary during the operation of the charging station **100**. Although the processor **152** is contemplated, it is also possible and contemplated to use other electronic components such as a microcontroller, an application specific integrated circuit (ASIC) chip, or any other integrated circuit device.

[0015] Further, the controller **150** may be configured to determine a charge level (i.e., charge) of the primary battery **202**, and may control a charging current being supplied to the primary battery **202** based on the charge level of the primary battery **202**. In an embodiment, the controller **150** is configured to charge the primary battery **202** in a quick charging mode (i.e., constant current mode) when the charge level of the primary battery **202** is below a predetermined value. The controller **150** is also configured to charge the primary battery **202** in the slow charging mode (i.e., the constant voltage mode) when the charge level of the primary battery **202** is above the predetermined value. Accordingly, the controller **150** is configured to the charge the primary battery **200** in the constant current mode at a first charging current till the charge level of the primary battery **202** reaches the predetermined value, and is configured to shift the charging of the primary battery **202** from the constant current mode to the constant voltage mode in response to the charge level being equal to the predetermined value. Subsequently, the controller **150** is configured to the charge the primary battery **202** in the constant voltage mode till the primary battery **202** is fully charged. In an embodiment, the first charging current may be a lesser of a first current value and a maximum permissible current of the primary battery **204**. In some embodiments, the first current value is 10 ampere.

[0016] Moreover, the controller **150** is configured to monitor the charging current provided to the charging terminal **106** at any instant, and controls the charging of the secondary batteries **204** such that a total charging current of the charging station **100** remains equal to or below the threshold value. In some embodiments, the threshold value corresponds to a current value at which a fuse of an external power supply to the charging station **100** is blown. In an example embodiment, the threshold value is 15 ampere.

[0017] In an embodiment, each of the plurality of batteries **200**, as shown in FIG. **2**, is connected to the electrical outlets **110** of the charging station **110** via the external chargers **300**. In such a case, the controller **150** detects an absence of a connection of a battery (i.e., primary battery **202**) to the charging terminal **106**. Accordingly, the controller **150** detects the plurality of secondary batteries **204**, for example, the second battery **202***b*, the third battery **202***c*, the fourth battery **202***d*, and fifth battery **202***e*, as shown in FIG. **2**, connected to the charging station **110**, and the controller **150** enables or disables the charging of the plurality of secondary batteries **204** as well as amount of charging current being provided to each secondary battery **204** such that the total charging current remains below or equal to the threshold value. In some embodiments, each of the external chargers **300** is slow charger **400**. In such a case, a maximum

charging current provided to a battery **200** corresponds to a current rating of the associated external slow charger **400**. For example, a secondary battery **204** is connected to the charging station **100** via an external charger **300** having current rating of 3 ampere. In such a case, the controller **150** may control the associated relay **120** to provide a maximum of 3 ampere current to the associated secondary battery **204**. Further, the controller **150** may disable the charging of one or more secondary batteries **204** when controller **150** determines that the total charging to simultaneously charge each of the secondary batteries **204** is above the threshold value. In such a case, the controller **150** may enable charging of some of the secondary batteries **204** initially to keep the total charging current equal to or below the threshold value, and keep initiating the charging of the remaining secondary batteries **204** depending on the total charging current after completion of the charging of the one or more secondary batteries **204**.

[0018] In some embodiments, as shown in FIG. **2**, the controller **150** determines that one of the external chargers **300** is a quick charger **500**, while remaining of the external chargers **300** are slow chargers **400**. In such a case, the controller **150** may prioritize the charging of the secondary battery **204** connected to the quick external charger **500**, and enables or disables the charging of the remaining secondary batteries **204** that are connected to the slow chargers **400** to keep the total charging current equal to or below the threshold value. In an embodiment, the controller **150** may control the quick external charger **500** in a quick charging mode to the charge the associated secondary battery **204** till the charge of the associated secondary battery **204** reaches the predetermined value, and thereafter controls the charging of the associated secondary battery **204** in the slow charging mode to fully charge the associated secondary battery **204**. In an embodiment, in the quick charging mode, the controller **150** controls the charging current to be a lesser of the first charging current and the maximum permissible current of the associated secondary battery **204**.

[0019] An example method of charging the plurality of batteries **200** is explained according to an embodiment, as shown in FIG. **1**, of the disclosure. In the embodiment, as shown in FIG. **1**, one of the plurality of batteries **200**, for example, the first battery **200***a* is connected to the charging terminal **106**, and remaining of the plurality of batteries **200**, for example, for example, the second battery **200***b*, the third battery **200***c*, the fourth battery **200***d*, and the fifth battery **200***e* are connected to the four electrical outlets **110** via four external chargers **300**. In the illustrated example embodiment, each of the external chargers **300** is a slow charger **400** and configured to supply electrical current to the associated secondary battery **204** according to respective charging current rating. In an example embodiment, a first external charger **300***a* is configured to the charge the second battery **200***b* at a maximum of 3 ampere current, and the second external charger **300***b* is configured to charge the third battery **200***c* with a maximum of 2 ampere current. Similarly, the third external charger **300***c* is configured to charge the fourth battery **200***d* with a maximum of 1 ampere current, while the fourth external charger **300***d* is configured to charge the fifth battery **200***e* with a maximum of 4 ampere current.

[0020] Also, in the example embodiment, the first battery **200***a* that is connected to the charging terminal **106** has a charge less than the predetermined value. Accordingly, the controller **150** determines the first battery **200***a* as the primary battery **202** and remaining batteries **200***b*, **200***c*, **200***d*, **200***e* as the secondary batteries **204**. Therefore, the charging station **100** initially start charging the first battery **200***a* in the constant current mode with the first charging current. In the example embodiment, the first charging current for the first battery **200***a* in the constant current mode is 10 ampere. Further, the threshold value of the current, for the charging station is, for example, 15 ampere. The threshold current corresponds to a current at which a fuse of the external power supply to which the charging station **100** is electrically connected is blown. Accordingly, the controller **150** initiates the charging of the first battery at 10 ampere. Moreover, the controller **150** also initiates the charging of one or more secondary batteries **204**, for example, the second battery **200***b* and the third battery **200***c*, and disables the charging of the fourth battery **200***d* and the fifth battery **200***e* to keep the total charging current of the charging station equal to or below the threshold value (i.e., 15 ampere). During charging of the three batteries **200***a*, **200***b*, **200***c*, the controller **150** may keep monitoring the charge level of the batteries **200***a*, **200***b*, **200***c*, and controls the charging of the three batteries **200***a*, **200***b*, **200***c* based on the charge level of each of three batteries **200***a*, **200***b*, **200***c*. Further, the controller **150** may keep monitoring the charging current of the three batteries **200***a*, **200***b*, **200***c*, and total charging current of the charging station **100**. The controller **150** may initiate the charging of the fourth battery **200***d* and/or the fifth battery **200***e* as soon as the controller **150** determines that a difference between the total charging current being provided to the three batteries **200***a*, **200***b*, **200***c* and the threshold current value is greater than or equal to a charging current rating of the third external charger **300***c* and/or the fourth external charger **300***d*.

[0021] In an embodiment, the controller **150** shifts the charging of the first battery **200***a* from the constant current mode to the constant voltage mode in response to the charge level of the first battery **200***a* being equal to or greater the predetermined value. Thereafter, the controller **150** monitors the current provided to the first battery **200***a* and may initiate the charging of the fourth battery **200***d* and/or the fifth battery **200***e* depending on the total charging current of the charging station to keep the total charging current equal to or below the threshold value. In the example embodiment, the controller **150** initiates the charging of both the fourth battery **200***d* and the fifth battery **200***e* when the first battery **200***a* is being charged in the constant voltage mode as the total charging current provided to all the batteries **200***a*, **200***b*, **200***c*, **200***d*, **200***e* will be 13 ampere assuming that the maximum charging current provided to the first battery **200***a* is 3 ampere in the constant voltage mode. In this manner, the controller **150** controls the charging of the secondary batteries **204** (i.e., enable or disable the charging of the secondary batteries **204**) along with the primary battery **202** to keep the total charging current equal to or below the threshold value, while allowing the simultaneous charging of the plurality of batteries **200**—thereby prevents the blowing of the fuse of the external power supply.

[0022] A method of charging the plurality of batteries **200** in a scenario where each of the plurality of batteries **200** is connected to the charging station **100** via the external chargers **300**, as shown in FIG. **2**, is now described. The method is explained with reference to FIG. **2** that shows four batteries **200***b*, **200***c*, **200***d*, **200***e* connected to the charging

station **100** via four external chargers **300**, and the charging terminal **106** is free from the connection to a battery. In such a scenario, the controller **150** determines an absence of the primary battery **202** connected to the charging terminal **106**, while detects presence of a plurality of secondary batteries **204**, for example, the second battery **202***b*, the third battery **200***c*, the fourth battery **200***d*, and fifth battery **200***e*, connected to the four electrical outlets **110** via the first external charger **300***a*, the second external charger **300***b*, the third external charger **300***c*, and the fourth external charger **300***d*, respectively. In the example embodiment, the first external charger **300***a* is a quick external charger **500** and is configured to charge the second battery **200***b* in a constant current mode and a constant voltage mode, while the second external charger **300***b*, the third external charger **300***c*, and the fourth charger **300***d* are slow chargers **400**.

[0023] Accordingly, the first charger **300***a* may charge the first battery **200***a* in the constant current mode at the first charging current when the charge level of the second battery **200***a* is below the predetermined value. In an embodiment, the first charging current may be lesser of a maximum permissible current of the second battery **200***b* and the first current value. In an embodiment, the first current value may be 10 ampere, and the controller **150** charges the second battery **200***a* at 10 ampere current in the constant current mode. Also, the controller **150** prioritizes the charging of the second battery **200***b* with the first charging current, and controls the charging of the remaining secondary batteries **200***c*, **200***d*, **200***e* such that the total charging current of the charging station **100** remains equal to or below the threshold value, for example 15 ampere. In an example, the second external charger **300***b*, the third external charger **300***c*, and the fourth external charger **300***d* are slow chargers **400**, and have charging current ratings of 3 ampere, 2 ampere, and 1 ampere, respectively.

[0024] In such a case, the controller **150** may initiate the charging of the third battery **200***c* and the fourth battery **200***d* along with the second battery **200***b* and disable the charging of the fifth battery **200***e*, thereby keeping the total charging current of the charging station **100** equal to the threshold value, for example, 15 ampere. As soon as the controller **150** detects the shift of the charging of the second battery **200***b* from the constant current mode to the constant voltage mode, or completion of the charging of one of the third battery **200***c* and the fourth battery **200***d*, the controller **150** may enable the charging of the fifth battery **200***e*. In this manner, the controller **150** is configured to simultaneously charge the plurality of batteries **200**, while preventing a blowing of the fuse of the external power supply.

[0025] In some embodiments, the first external charger **300***a*, the second external charger **300***b*, the third external charger **300***c*, and the fourth external charger **300***d*, each is a slow charger **400**, and the controller **150** detects the absence of a battery connected at the charging terminal **106**. In such a case, the controller **150** may control the charging of one or more of the batteries **200** to keep the total charging current equal to or below the threshold value. The controller **150** may provide the charging currents to the batteries **200** depending on the charge current ratings of the external chargers **300**. Also, the controller **150** may disable the charging of the one or more secondary batteries **204** to keep the total charging current below or equal to the threshold value. In such a case, one more secondary battery **204**, whose charging was initially disabled, are charged only after completion of the charging of one or more batteries whose charging was initial enabled. Accordingly, the charging station **100** facilitates charging of the plurality of batteries simultaneously without blowing of the fuse of the external power supply.

[0026] The foregoing description of embodiments and examples has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the forms described. Numerous modifications are possible in light of the above teachings. Some of those modifications have been discussed and others will be understood by those skilled in the art. The embodiments were chosen and described in order to best illustrate certain principles and various embodiments as are suited to the particular use contemplated. The scope of the invention is, of course, not limited to the examples or embodiments set forth herein, but can be employed in any number of applications and equivalent devices by those of ordinary skill in the art. Rather it is hereby intended the scope of the invention be defined by the claims appended hereto.

What is claimed is:

1. A charging station for charging a plurality of batteries, the charging station comprising:

a charging terminal for charging a primary battery of the plurality of batteries in a first charging mode and a second charging mode;

at least one electrical outlet to enable connection of at least one external charger to enable a charging of at least one secondary battery of the plurality of batteries; and

a controller configured to

determine if the primary battery is connected to the charging terminal,

determine a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal, and

control the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

2. The charging station of claim **1**, wherein the first charging mode is a quick charging mode and a second charging mode is a slow charging mode, wherein the controller is configured to

charge the primary battery in the first charging mode when a charge level of the primary battery is below a predetermined value, and

shift the charging of the primary battery to the second charging mode when the charge level of the primary battery is equal to or above the predetermined value.

3. The charging station of claim **1**, wherein the at least one external charger includes at least one slow charger.

4. The charging station of claim **1**, wherein the charging station include a plurality of relays to control flow of electric current to the at least one electrical outlet and the charging terminal.

5. The charging station of claim **1**, wherein the controller determines an absence the connection of the primary battery to the charging terminal.

6. The charging station of claim **5**, wherein

the at least one external charger includes a plurality of external chargers, and at least one secondary battery includes a plurality of secondary batteries connected to

the charging station via the plurality of external chargers and one of the plurality of external chargers is a quick charger, and

the controller is configured to charge the secondary battery connected to the quick charger in a quick charging mode upon detection of the absence of the connection of the primary battery at the charging terminal.

7. The charging station of claim **6**, wherein the controller is configured to

determine a charging current of the secondary battery connected to the quick charger, and

control the charging of remaining secondary batteries to maintain the total charging current of the charging station equal to or below the threshold value.

8. A charging station for charging a plurality of batteries, the charging station comprising:

a charging terminal for charging a primary battery of the plurality of batteries in a first charging mode and a second charging mode;

at least one electrical outlet to enable connection of at least one external charger to enable a charging of at least one secondary battery of the plurality of batteries, wherein the at least one external charger is a slow charger; and

a controller configured to

determine if the primary battery is connected to the charging terminal,

determine a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal, and

control the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

9. The charging station of claim **8**, wherein the first charging mode is a quick charging mode and a second charging mode is a slow charging mode, wherein the controller is configured to

charge the primary battery in the first charging mode when a charge level of the primary battery is below a predetermined value, and

shift the charging of the primary battery to the second charging mode when the charge level of the primary battery is equal to or above the predetermined value.

10. The charging station of claim **8**, wherein the charging station include a plurality of relays to control flow of electric current to the at least one electrical outlet and the charging terminal.

11. The charging station of claim **8**, wherein the controller determines an absence the connection of the primary battery with the charging terminal.

12. The charging station of claim **11**, wherein the controller is configured to control the charging of each of the secondary batteries such that the total charging current remain equal to or below the threshold value.

13. The charging station of claim **11**, wherein

the at least one external charger includes a plurality of external chargers and one of the plurality of external chargers is a quick charger and remaining of the plurality of external chargers are slow chargers,

the at least one secondary battery includes a plurality of secondary batteries connected to the charging station via the plurality of external chargers and, and

the controller is configured to charge the secondary battery connected to the quick charger in a quick charging mode upon detection of the absence of the connection of the primary battery at the charging terminal.

14. The charging station of claim **13**, wherein the controller is configured to

determine a charging current of the secondary battery connected to the quick charger, and

control the charging of remaining secondary batteries to maintain the total charging current of the charging station equal to or below the threshold value.

15. A method for charging a plurality of batteries, the method comprising:

determining, by a controller, if a primary battery of the plurality of batteries is connected to a charging terminal of a charging station, wherein the charging terminal is configured to charge the primary battery in a first charging mode and a second charging mode, and the charging station further includes at least one electrical outlet and at least one secondary battery of the plurality of batteries is connected to the at least one electrical outlet via at least one external charger;

determining, by the controller, a charging current being supplied to the primary battery upon determination that the primary battery is connected to the charging terminal; and

controlling the charging of the at least one secondary battery to limit a total charging current of the charging station equal to or below a threshold value.

16. The method of claim **15**, wherein the first charging mode is a quick charging mode and a second charging mode is a slow charging mode, and the method further includes

charging the primary battery in the first charging mode when a charge level of the primary battery is below a predetermined value, and

shifting the charging of the primary battery to the second charging mode when the charge level of the primary battery is equal to or above the predetermined value.

17. The method of claim **15**, wherein the controller determines an absence the connection of the primary battery to the charging terminal.

18. The method of claim **17**, wherein the at least one external charger includes a plurality of external chargers, and the at least one secondary battery includes a plurality of secondary batteries connected to the charging station via the plurality of external chargers and one of the plurality of external chargers is a quick charger and remaining of the plurality of external chargers are slow chargers, and the method further includes

controlling the charging the secondary battery connected to the quick charger in a quick charging mode upon detection of the absence of the connection of the primary battery to the charging terminal.

19. The method of claim **18** further includes

determining a charging current of the secondary battery connected to the quick charger, and

controlling the charging of remaining secondary batteries to maintain the total charging current of the charging station equal to or below the threshold value.

20. The method of claim **15**, wherein the charging station includes a plurality of relays to control flow of electric current to the at least one electrical outlet and the charging terminal.

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